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P.O. Box 3472, Addis Ababa, Ethiopia

Tel. No. 251-15533742

www.emjema.org

emjeditor2018@gmail.com

Fax: 251-1-5533742

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EDITORIAL

EVALUATION OF SCHOLARLY PUBLICATIONS: PRACTICE AND PROSPECTS FOR ETHIOPIA

Sileshi Lulseged, MD[1*], MMd, Rawleigh Howe, PhD[2]

Scholarly journals constitute the main publication channel in many domains, and the international scientific community has developed through peer review a quality control system for the content of these journals (1). Although not always watertight, peer reviewing in general constitutes an external evaluation of the quality of a manuscript before it is published. Reviewers assess submitted manuscripts for originality, validity and significance to help editors determine whether a manuscript should be published in their journal. Although there is much effort being exerted in developing settings, it is an uphill struggle for journals to become known and respected in the international research landscape largely due to concerns associated with perceived quality and transparency of publication processes.

The international scientific community is paying much attention to quantitative data evaluation of scholarly journals. The most common method uses bibliometric citation analysis, which involves the "Impact Factor (IF)" calculated and published by the Institute for Scientific Information (ISI), now part of Thomson Reuters (2). Impact factor is determined by averaging the number of citations a journal receives and the average number of times that articles within the journal are referred to by other articles during the previous two years. Simply put, the more often a journal's articles are cited, the higher its impact factor, and most citations come from research institutes in the developed world (3). Scientists have justifiably complained for years about the inherent flaws and practical limitations of using impact factors for years as an assessment tool to gauge the quality of scholarly publications (4) and it has long been debated whether this citation-linked method is of much relevance for judging the merit of publications in the developing world.

In any case, evaluators should be aware of the necessity to try to obtain themselves some expert evaluation of the quality of the journal content. The Journal Quality List (JQL) (5), a widely used collation of journal rankings from a variety of sources may help to differentiate journals based on their quality standards. The basic assumption that only journals with high IF could feature high caliber research may be flawed as it is entirely plausible for good quality research to also appear in journals with low IF. Hence it does not appear to be justified to categorically conclude that all journals with low IF are of poor quality. Factors such as the editorial policy, frequency, timeliness and regularity of publication, language, proficiency, breadth of readership, extent of circulation, and quality of publication each contribute to the reputation of a journal. In recent years many new indices have been proposed to evaluate the research worthiness of authors, which have their own merits and demerits. The Journal Publishing Practices and Standards (JPPS) framework, established and managed by African Journals Online (AJOL), and the International Network for Advancing Science and Policy (INASP), provide detailed assessment criteria for the quality of publishing practices of journals in developing settings (6).

The full evaluation of the quality of a journal can, of course, only be performed by experts in the field. The most important dimensions to be considered during an independent evaluation of a journal's quality includes scientific quality, relevance, and availability, visibility of the journal. The scientific quality of a journal depends, of course, on the quality of the individual articles, which in turn depends on the intrinsic quality of the research that is reported, and the writing ability of the authors, the composition of the editorial committee, and the rigor of peer-reviewing,

The relevance of a journal is the extent to which it is appropriate for its intended use. The most important aspects include the Journal's relevance to development, relevance of content scope for the subject it treats, and journal appropriateness, including language and level of complexity for the intended audience. Availability and visibility of a journal are also critically important, including its availability in important libraries, on the Internet, bibliographic or indexing in databases, its geographical coverage, language of publication, regularity of publication, open access, and copyright provisions.

[1] Addis Ababa university
[2] Armauer Hansen Research Institute, Addis Ababa, Ethiopia
*Corresponding Author E-mail: sileshilulseged@gmail.com

In Ethiopia, the higher education landscape is transforming rapidly, research output has increased in volume and the number of journals published by institutions of higher education and research and professional associations has increased (7). These developments warrant establishment of quality standards and sustainability of the journals. The standardization of journal quality will promote improved teaching and learning in various institutions engaged in education and research in the country. Thus, the initiatives recently taken by the Ethiopian Academy of Sciences (EAS) and the Ministry of Science and Higher Education (MoSHE) to introduce a system of evaluating and accrediting scholarly journals are highly commendable. This, we believe, will pave the way to work towards achieving internationally comparable standards. It will draw attention to improvements, which are necessary so that Ethiopian scholarly journals, in addition to continuing to disseminate credible scientific information, mainly locally, can aspire to become a medium of choice for a much broader range of researchers to publish their research findings while working towards developing international stature.

A recent study report by the EAS (8) has indicated that one of the well-established means of assuring high quality research and outputs thereof is to conduct periodic and sustained evaluation of research dissemination platforms, notably scientific journals, using objective criteria. The report, integrating critical analysis of survey data and international benchmarking, has proposed a journal evaluation and accreditation system for Ethiopia. This has been well received by MoSHE, the Ministry leading the evaluation and accreditation initiative. The report suggests ranking of the journals into four grades based on aggregate total scores earned. It is believed that the relevant lead institutions in consultation with institutions of higher education and professional societies, could use the results of the accreditation and ranking of journals for standardizing the rating of the scholarly merit of academics for purposes of recruitment, mobility and promotion.

We believe that the accrediting agency should put in place mechanisms for strengthening emerging journals, motivating their editors and building research capacity, as well as a mechanism for rewarding best performing journals that serve as role models for other journals, eventually leading to excellence in scholarly research publication in the country. The Guidelines for Academic Publishing and Promotion issued recently by MoSHE (9), we believe, is a huge initial step in the effort to establish a uniform system across institutions of higher education, which currently is done in a very haphazard manner. It should be taken as a process that will benefit from cycles of assessment and continuous improvement with the active participation of its multiple stakeholders. Since the national evaluation and accreditation of journals as well as the systematic approach to academic publishing and promotion, is just starting in earnest, it is imperative that the lead institution and partners work towards creating awareness and ensuring efficient implementation of the system.

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ORIGINAL ARTICLE

HYPERTHYROIDISM IN A PRIVATE MEDICAL SERVICES CENTER, ADDIS ABABA: A 5-YEAR EXPERIENCE

Tessema Ersumo, MD[1], Mohammed Burka, MD[1], Girmaye Tamrat, MD[1*]

ABSTRACT

Introduction: *Hyperthyroidism is a common thyroid disorder especially in women. The disorder manifests predominantly as Graves' disease in iodine-sufficient areas and nodular toxic goiter in iodine-deficient countries. In Ethiopia, the magnitude of the disorder is unknown and its management remains suboptimal.*

Objective: *The aim of this study was to analyze the pattern and management of patients with hyperthyroidism at the United Vision Medical Services Center, between August 30, 2013 and February 1, 2018.*

Methods: *The study was a retrospective analysis of all patients with hyperthyroidism at the United Vision Medical Services Center. The data was statistically analyzed using the SPSS package. The results were tabulated and discussed with literature review.*

Results: *A total of 589 patients were studied. The median age was 40 years; the male to female ratio was 1:7.9; and 93% of patients presented with goiter. Majority presented more than two years after the onset of symptoms, in 91% with a toxic nodular goiter. A low thyroid stimulating hormone was noted in 83% of patients and 94% used propylthiouracil. Among 213 patients, 96% underwent a near-total thyroidectomy, in 92% without incident.*

Conclusion: *The incidence and prevalence of hyperthyroidism is apparently on the increase in Addis Ababa. Hyperthyroidism predominantly affects women, and, in surgery, toxic nodular goiter is more common than diffuse goiter and the treatment of choice in experienced hands is near-total thyroidectomy.*

Keywords: *Hyperthyroidism, pattern, management, United Vision Medical Services, Addis Ababa.*

INTRODUCTION

Hyperthyroidism is a common disorder characterized by increased thyroid hormone synthesis and secretion; and if undiagnosed or untreated, it can have profound adverse effects (1-3). Thyroid hormones are essential for growth, neuronal development, reproduction and regulation of energy metabolism.

The prevalence of overt hyperthyroidism ranges from 0.2% to 1.3% in iodine-sufficient parts of the world and its incidence corresponds to population iodine nutrition, with higher rates occurring in iodine -deficient countries, mostly due to longstanding nodular thyroid disease (1). Many cases of hyperthyroidism remain undiagnosed in the community unless routine testing is undertaken (4).

Globally, common causes of hyperthyroidism include Graves' disease, toxic multinodular goiter (TMNG), and toxic thyroid adenoma (2). Toxic adenoma and TMNG are the result of focal or diffuse hyperplasia of thyroid follicular cells whose functional capacity is independent of regulation by the thyroid-stimulating hormone (TSH) (5). In Graves' disease, activating thyrotropin-receptor antibodies induce thyroid hormone overproduction (6).

In iodine-sufficient areas, about 80.0% of patients with hyperthyroidism have Graves' disease, whereas TMNG and toxic adenoma account for 50.0% of all cases of hyperthyroidism in iodine-deficient areas, and more predominantly in elderly people (2,7-10). The total goiter rate of 39.9% reported in a recent national study on children is a clear indication that even Ethiopia's young population is severely affected by iodine deficiency, which necessitated national salt iodation (11).

However, a progressive increase in the prevalence of hyperthyroid and autoimmune thyroid disorders has been reported following iodine fortification showing connection between iodine fortification and iodine-induced hyperthyroidism and autoimmune thyroiditis (7,10,12). The increase in the rate of hyperthyroidism following iodine supplementation in several African countries may reflect the conversion of nonfunctioning nodules to hyperfunctioning state and could represent the transition from iodine-deficient to iodine-sufficient states or autonomous hyperfunctioning nodules to compensate for hypothyroidism (10,12). Anthonia OO, et al. (8) cited the prevalence rate of autoimmune thyroid disorders (AITD) of 1.2%, 3.7% and 9.9% from Ethiopia, Libya and Tunisia respectively.

[1]Department of Surgery, Addis Ababa University, School of Medicine, Addis Ababa

* Corresponding author email: girmayet@yahoo.com

In all forms of overt thyrotoxicosis, the serum value of TSH is decreased and the measurements of free thyroxine (fT4) or free tri-iodothyronine (fT3), or both, are raised (13,14). As a result of scarce resources, diagnosis and management of thyroid disorders in the African continent remain suboptimal (8,15).

The purpose of this study was to analyze the pattern and management of hyperthyroidism in a private surgical service to foster the bridging of private-public partnership in making appropriate policies in the control and monitoring of thyroid disorders, iodine intake and salt iodation programs. To our knowledge this is the first study on hyperthyroidism in a private facility within Ethiopia.

MATERIALS AND METHODS

This study was a retrospective analysis of medical records of patients with hyperthyroidism at the United Vision Medical Services Center (UVMSC), Addis Ababa in the period between August 30, 2013 to February 1, 2018. All patients with hyperthyroidism managed at the surgical unit of the medical services center during the study period, including patients referred from other clinics to the Center for surgical treatment were included. UVMSC, besides other medical services, provides outpatient care including preoperative evaluation of endocrine patients, pathology, imaging and laboratory services as well as follow up care for referred as well as visiting patients from all over the country. The collected data included demographic and clinical features, diagnostic reports, types of medical and surgical treatments and follow up courses of patients. During the study period, there was no radioisotope scanning or pharmacy service at the Center and the supply of thionamides was scarce on the market. Thyroid receptor antibody status was not assessed because of unavailability.

Five patients with thyrotoxicosis without goiter were excluded and 589 patients with hyperthyroidism make the basis of this study. Majority of the patients (428/589, 72.7%) had follow up at the medical services center. The extent of thyroidectomy is termed subtotal when the total estimated thyroid tissue left behind is about 8 grams, and near total when the remnant thyroid tissue is not more than 3 grams on one or both lobes of the thyroid gland.

Documents of 589 patients with hyperthyroidism were retrieved and 213 of these patients with controlled toxic goiters underwent thyroidectomy, 205 of these patients had a near total thyroidectomy (NTT) at the Bethzatha General Hospital, a private hospital in Addis Ababa.

Diagnosis of postoperative complications was based on documents of clinical evaluation and or laboratory confirmation.

A questionnaire was prepared, pretested, and the format was filled out by a senior surgical resident. The data were entered into computer and statistical analysis was done by using the SPSS package and the results were tabulated and discussed with literature review.

As the study was a retrospective analysis of medical records, a written ethical clearance was obtained from the management of the United Vision Medical Services Center.

RESULTS

As is shown in Table 1, most of the patients (400/589, 67.9%) were under 50 years of age, majority between 30 to 49 years (288/589, 48.9%) and 32.1% (189/589) above 49 years of age. The age range was 15 to 85 years. The overall mean age was 42, and median, 40 years. The median (range) age of patients with goiter type was TMNG, 42 (15-85), diffuse goiter, 35 (20-60), and toxic nodule, 33 (20-60) and thyroid cancer, 48 (19 -65) years. Nearly 89.0% (523/589) of patients were females. The male to female ratio was 1.0:7.9. Most of the patients (77.6%) came from Addis Ababa.

The main presenting symptom was goiter or neck swelling in 92.9% (547/589) of patients. Associated symptoms to the most common presenting feature included increased sweating (36.5%), weight loss (24.8%), increased appetite (8.0%), palpitation (7.5%), and irritability (7.1%). Shortness of breath and change in voice were uncommon.

The duration of illness was more than two years in 59.4% of patients. Only 28.2% of patients presented within one year of the onset of their disease. The mean duration at the time of presentation was 28 months.

Goiter was the most common physical finding (582/589, 98.8%), most frequently nodular goiter (534/589, 90.7%) and in majority, a multinodular goiter (504/589, 85.6%). Tachycardia was a common finding (42.4%). But, clinically diffuse goiter (8.3%), retrosternal extension (6.1%), toxic thyroid nodule (5.1%), and exophthalmos (2.9%) were rare clinical features. Hypertension (10.4%), diabetes mellitus (6.1%), and bronchial asthma (0.6%) were noted in 123 patients.

Table 1: Demographic and clinical features of 589 patients with hyperthyroidism at United Vision Medical Services Center, Addis Ababa, August 30, 2013 to February 1, 2018.

Variables	Number	Percent
Age groups (n=587)		
<30	112	19.0
30-39	160	27.2
40-49	128	21.7
50-59	116	19.7
>60	73	12.4
Mean/median +SD (range) age	42/40+13.6 (15-85) years	
Sex ratio, M:F	1.0:7.9 [66 (11.2%):523 (88.8%)]	
Address		
Addis Ababa	457	77.6
Outside of Addis Ababa	132	22.4
Main presenting symptoms		
Goiter or neck swelling	547	92.9
Palpitation	9	1.5
Neck pain	28	4.8
Other	5	0.8
Associated symptoms		
Increased appetite	47	8.0
Weight loss	146	24.8
Sweating	215	36.5
Hoarse voice	5	0.8
Fatigue	12	2.0
Palpitation	44	7.5
Shortness of breath	6	1.0
Irritability	42	7.1
Others	72	12.2
Duration of illness		
1-12 months	166	28.2
13-24 months	73	12.4
25-60 months	138	23.4
>61 months	212	36.0
Mean duration +SD (range)	28 +81.3 (1-600) months	
Comorbid disease (n=123)		
Hypertension	61	10.4
Diabetes mellitus	36	6.1
Bronchial asthma	4	0.7
Others	22	3.7
Physical findings		
Multi nodular goiter	504	85.6
Tachycardia	250	42.4
Diffuse goiter	48	8.1
Thyroid nodule	30	5.1
Exophthalmos	17	2.9
Retrosternal extension	36	6.1
Cervical lymphadenopathy	2	0.3
Other	5	0.8

Fine needle aspiration cytology report of 105 patients (Table 2) was consistent with nodular colloid goiter in 67.6% followed by follicular neoplasm (9.5%), thyroid cyst (6.7%), papillary thyroid carcinoma (8.6%), and thyroiditis (2.9%). Histological examination of the 10 follicular neoplasms showed follicular adenoma (50.0%), nodular colloid goiter (30.0%) and follicular carcinoma (20.0%).

Sonography examination on 76 patients revealed multinodular goiter in most of the patients (72.4%) followed by thyroid cyst (15.8%), solitary thyroid nodule (7.9%) and enlarged lymph nodes (1.3%). Chest x-ray evaluation in 102 patients showed tracheal displacement (41.2%), retrosternal extension (25.5%) and calcifications (4.9%).

Thyroid function tests (TFTs) were determined in all patients (Table 2) and the most frequent derangement was a low TSH level (82.7%). The rate of raised T3 or fT3 level plus a low TSH level or a raised T4 or fT4 plus a low TSH level was equivalent. All TFTs were in the toxic level in 16.0% of patients.

The most common final diagnosis was TMNG (79.1%) followed by toxic thyroid nodule (6.5%), diffuse toxic goiter (8.3%), toxic thyroid cancer (1.9%), toxic thyroid cyst (2.0%), and toxic thyroiditis (0.5%). Diffuse toxic goiter with exophthalmos was rare (2.9%).

Table 2: Reports of investigations and final diagnosis in 589 patients with hyperthyroidism at United Vision Medical Services Center, Addis Ababa, August 30, 2013 to February 1, 2018.

	Number	Percent
Fine needle aspiration cytology (n=105)		
Nodular colloid goiter (NCG)	71	67.6
Thyroid cyst	7	6.7
Follicular neoplasm	10	9.5
Papillary thyroid carcinoma	9	8.6
Thyroiditis	3	2.9
Histology report (n=10)		
Nodular colloid goiter	3	30.0
Follicular adenoma	5	50.0
Follicular cancer	2	20.0
Neck ultrasound report (n=76)		
Thyroid cyst	12	15.8
Solitary thyroid nodule	6	7.9
Multinodular goiter	55	72.4
Lymphadenopathy	1	1.3
TFT report (n=589)		
Raised T3 or fT3	155	26.3
Raised T4 or fT4	152	25.8
Low TSH	487	82.7
Raised T3 or fT3 + low TSH	51	8.7
Raised T4 or fT4 + low TSH	54	9.2
Raised T3 or fT3 + raised T4 or fT4 + low TSH	95	16.1
Chest X-ray report (n=102)		
Normal	27	26.5
Tracheal deviation	42	41.2
Retrosternal extension	26	25.5
Calcification of goiter	5	4.9
Other	2	2.0
Final diagnosis (n=589)		
Solitary toxic nodule	38	6.5
Toxic multinodular goiter (TMNG)	466	79.1
Diffuse toxic goiter	61	10.3
Toxic thyroid cancer	11	1.9
Toxic thyroid cyst	12	2.0
Toxic thyroiditis	3	0.5

As depicted in Table 3, most of the patients (93.9%) were treated with propylthiouracil (PTU), in 26.1% with beta-blockers. Due to lack of the drugs on the local market, only 10.2% of patients were treated with carbimazole or methimazole. Two hundred patients (34.0%) took antithyroid drug (ATD) therapy for more than 12 months, 16.1% for more than 2 years. Majority of the patients (47.8%) used ATD for six months or less. The mean duration of medical treatment at the time of data collection was 15 months.

Patients that became euthyroid with ATD therapy (213, 36.2%) underwent surgical treatment (Table 3), 205 patients in Bethzatha General Hospital. A 15 years old female underwent NTT because of progressive exophthalmos. The most common surgical procedure was an NTT (205/213; 96.2%).

Postoperatively 196 patients (92.0%) remained euthyroid. Twenty-two (10.3%) patients developed postoperative complications including hypothyroidism (6.6%), hypoparathyroidism, weakness of voice, and hematoma (0.9% each).

The follow up of (Table 3) 428 patients (72.7%) was up to three years with a mean duration of 7.9 months. The average duration from first visit to date of operation was 3.8 months, range 5 days to 56 months. The mean duration of postoperative follow up at the time of last visit was 5.8 months, range 7 days to 37.7 months. Postoperative follow up was low after 3 months probably due to personal preference of follow up venue.

Table 3: .Medical and surgical treatment and postoperative course of patients with hyperthyroidism at United Vision Medical Services Center, Addis Ababa, August 30, 2013 to February 1, 2018.

	Number	Percent
Medical therapy (n=589)		
Propylthiouracil (PTU)	553	93.9
Beta-blocker	154	26.1
Methimazole or carbimazole	60	10.2
Duration of medical therapy(n=589)		
1-6 months	268	45.5
7-12 months	120	20.4
13-24 months	105	17.8
>24 months	95	16.1
Mean duration + (range) of medical therapy	15.4 ±18.1 (1-120) months	
Extent of surgical treatment (n=213)		
Lobectomy	1	0.5
Subtotal thyroidectomy (STT)	6	2.8
Near total thyroidectomy (NTT)	205	96.2
Total thyroidectomy (TT)	1	0.5
Post-operative complication (n=22)		
Hypoparathyroidisism	2	0.9
Hypothyroidisim	14	6.6
Hematoma	2	0.9
Voice weakness	2	0.9
Other	2	0.9
Status at last follow up visit(n=213)		
Euthyroid	196	92.0
Hyperthyroid	1	0.5
Hypothyroid	16	7.5
Duration between 1st & last visits (n=428)		
<3 months	177	41.4
3-6 months	84	19.6
>6 months	167	39.0
Mean + (range)	236.7 (1-1809) days	
First visit to operation date (n=213)		
<3 months	118	55.4
3-6 months	35	16.4
>6 months	60	28.2
Average duration ± SD (range)	114 ±166.6 (5-1679) days	
Operation date to last visit (n=213)		
<3 months	147	69.0
3-6 months	26	12.2
>6 months	40	18.8
Mean ± (range)	173.8 ± 123.7 (7-1131) days	

DISCUSSION

Hyperthyroidism is a common disorder especially in women and characterized by excess synthesis and secretion of thyroid hormones leading to thyrotoxicosis, and it commonly includes diffuse toxic goiter, toxic multinodular goiter and toxic adenoma.

A majority of patients in our series were in the age group 30-49 and overall median age was 40 years. Others (16,17) reported median ages of 38 and 49 years. Several studies have reported that patients with Graves' disease are younger than those with nodular hyperthyroidism (18,19). The median age of 42 years in our 61 diffuse toxic goiter patients cannot be compared because of the small population of patients. The male to female ratio, 1:7.9 in this study, is comparable with the 1:5.8 to 1:10.0 in other studies reconfirming a clear female gender predisposition to hyperthyroidism (2,10,13,17,19,20]. Osei SK, et al (10) reported the median age and the male to female ratios of patients for the various thyroid disorders as follows: TMNG, 36 and 1:8.3, toxic adenoma, 35 and 1:6.1, and Graves' disease, 37 and 1:4.9. Nearly 78.0% of our patients were from Addis Ababa. C Abuye, et al. reported high prevalence of severe iodine deficiency disorders, even in Addis Ababa (11).

In another study (21), symptoms of thyrotoxicosis were, in decreasing order of frequency, palpitations, weakness, heat intolerance, and disturbed sleep. Signs and symptoms were more frequent in Graves' disease, in young patients, and were partially related to biochemical severity. As was also observed in our study, most patients with symptomatic chronic hyperthyroidism had one or several signs or symptoms of thyrotoxicosis. Similar to 59.1% reported from Nigeria (17), 59.4% of our patients presented more than two years after the onset of their symptoms but presented earlier than patients with euthyroid goiters because of the severity of symptoms of hyperthyroidism (22).

The importance of thyrotoxicosis as secondary cause of hypertension especially in Africa has been emphasized (23). A study on 878 patients with Graves' disease revealed that 6.5% of patients were diabetic and 17.1% were hypertensive (24). Hypertension (10.4%) and diabetes mellitus (6.1%) were uncommon comorbidities in the present study. Literature review of studies worldwide concludes that thyroid dysfunction and diabetes mellitus (DM) may coexist and recommends that patients with DM should be screened for thyroid dysfunction (25).

Correlating well with the physical finding, sonography neck scanning on 76 of our patients revealed multinodular goiter in most of the patients (72.4%). While sonographic thyroid examination is an excellent imaging tool, there are few indications for its use in the initial thyroid evaluation (26).

In iodine replete areas Graves' disease is reported to be more frequent than nodular goiter, whereas in iodine depleted areas secondary hyperthyroidism is predominant (1). In our study, the most common goiter was TMNG (79.1%) followed by diffuse toxic goiter (10.3%) and toxic thyroid nodule (6.5%). The prevalence of toxic nodular goiter increases with increasing age and presence of iodine deficiency and may therefore be more common than Graves' disease in chronic iodine deficient regions (27). Anecdotal studies on thyroid disorders in endocrine clinics at Black Lion Hospital showed preponderance of Graves' disease of 55.7% [19] and 48.2% [16,19]. The disparity from ours is probably due to selective referral of patients with diffuse goiters to internists and nodular goiters to surgeons. In a recent national survey in Ethiopia, severe iodine deficiency has been reported (11). The national salt iodation in Ethiopia, unless iodized salt intake is closely monitored, may lead to iodine-induced hyperthyroidism in patients in areas where goiter is endemic. Nonetheless it would appear that the occurrence of AITD in Africa is much less than that in iodine-replete Western populations. Anthonia OO, et al. (27) cited the prevalence rates of AITD of 1.2%, 3.7% and 9.9% from Ethiopia, Libya and Tunisia respectively.

Pathological examination in our series confirmed thyroid cancer in only 1.9% of 105 patients with suspicious features of neoplasms. In surgery, the reported prevalence of thyroid carcinoma in hyperthyroid patients varies widely, ranging from 1.0% to 21.1%. All histological types of thyroid cancers can be associated with lower incidences of all types of hyperthyroidism, and the most frequently reported type is papillary thyroid carcinoma followed by follicular carcinoma as was also noted in the present series (28). The rate of follicular carcinoma in follicular neoplasms in this series is comparable with that in the literature (29).

Thyroid function tests (TFTs) were determined in all patients and the most frequent derangement was a low TSH level (82.7%). Serum TSH measurement has the highest sensitivity and specificity of any single blood test used in the evaluation of suspected hyperthyroidism and should be used as an initial screening test.

However, when hyperthyroidism is strongly suspected, diagnostic accuracy improves when both a serum TSH and fT4 are assessed at the time of the initial evaluation. Serum TSH may remain suppressed for several months after starting therapy (13,14,30).

Most of our patients (93.9%) were treated with PTU due to scarcity of carbimazole or methimazole, which is the preferred ATD except in first trimester pregnancy where PTU is used (17). In addition, compliance with a once-daily methimazole therapy is superior to multiple daily doses of PTU (30).

The American thyroid association guideline suggests that patients with overtly TMNG or toxic adenoma be treated with either I^{131} therapy or thyroidectomy (30). For patients with TMNG, the risk of treatment failure or need for repeat treatment is less than 1.0% following NTT or TT, compared with a 20.0% risk of the need for retreatment following I^{131} therapy (30).

In our setup, thyroidectomy is still widely employed in the management of hyperthyroidism as patients often manifest with large goiters and secondary hyperthyroidism. The most common surgical procedure in this series was NTT (96.2%) and only one patient had TT. In high income countries, TT represents the treatment of choice for cancers, Graves' disease and increasingly for benign disease (17,30). In low- and middle-income countries, the risk of hypothyroidism, the risk of limited access to thyroxine and the risk of recurrence after partial resections need to be balanced. Moreover, a STT results in a high risk of recurrence, especially in hyperthyroidism, that often becomes unresectable due to scarring and fixation to the deep structures that complicate re-operations (22,29-31). If surgery is chosen as the initial therapy for Graves' disease and TMNG, the preferred procedure is NTT or TT by a high-volume surgeon [30]. However, TT should be avoided whenever possible, if thyroxine supplies are unreliable and, in a bid, to circumvent the inevitable need for lifelong thyroid hormone replacement (22,31-33).

Postoperatively 92.0% (196/213) of our patients remained euthyroid, which shows that surgery is a very effective treatment option. Twenty-two (10.3%) patients developed postoperative complications including hypothyroidism (6.6%), temporary hypoparathyroidism, weakness of voice, and hematoma (0.9% each), which is lower than a finding of hypocalcemia (4.3%) and voice related changes (3.9%) reported from Nigeria (17). In the hands of high-volume thyroid surgeons, following thyroidectomy for Graves's disease, the rates of permanent recurrent laryngeal nerve damage and hypocalcemia have been documented to be less than 1.0% and 2.0 % respectively (30).

In Nigeria, radioactive iodine is offered to only about 7% of patients with thyroid disorders and doses are mostly administered empirically (17). Similar to the report by Sarr A, et al (24) none of our patients received radioactive iodine therapy service because of unavailability in the country.

In conclusion, this study shows that hyperthyroidism predominantly affects young women and our observations indicate that the incidence and prevalence of hyperthyroidism are apparently on the rise and may be related partly to excess consumption of iodized salt. In our experience, nodular toxic goiter is more common than Graves' disease. Propylthiouracil is the main modality of medical treatment. NTT is the most commonly employed and effective surgical treatment and associated with a low and acceptable rate of mostly temporary complications.

RECOMMENDATION

To know the magnitude and make appropriate policy on the management, the introduction of national registry of thyroid disorders should be emphasized. To prevent goiter and its subsequent consequences, closely monitored salt iodation should be encouraged, but to prevent secondary (iodine-induced) hyperthyroidism, cautious consumption of iodized salt should be practiced especially in areas where chronic goiter is common.

All patients should be examined to exclude goiter and in all patients with goiter TFTs should be done. Thyroid receptor antibody tests should also be available in laboratories to appropriately diagnose Graves' disease, particularly when exophthalmos is absent in diffuse toxic goiter. Alternative and effective antithyroid drugs, especially carbimazole, should be available in the local pharmaceuticals. Besides, the importance and availability of radioactive iodine for the treatment of small and medium goiters should be underscored.

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Conflict of Interest
The authors have no conflict of interest to declare.

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ORIGINAL ARTICLE

NEEDLE-STICK INJURIES AND SPLASH WITH BLOOD AND BODY FLUIDS AMONG HEALTHCARE WORKERS IN HOSPITALS OF BALE ZONE, SOUTHEAST ETHIOPIA

Demisu Zenbaba, MPH[1], Daniel Bogale, MPH[1] , Biniyam Sahiledengle, MPH[1*], Demelash Woldeyohannes, MPH[1] , Yohannes Tekalegn, MPH[1]

ABSTRACT

Introduction*: Healthcare workers have increased the risk of contracting infection following accidental needle-stick injuries and splashes with blood and body fluids. In Ethiopia, occupational exposures are often under-reported in many healthcare facilities.*

Objective: *This study aims to estimate the prevalence and factors associated with needle-stick injuries and splashes with blood and body fluids among healthcare workers serving in hospitals of southeast Ethiopia.*

Methods*: A cross-sectional study was conducted from February 1 to March 10, 2018. A total of 404 healthcare workers were recruited into the study from five hospitals (one primary, three general and one referral hospital) using a simple random sampling technique. The outcome variables of the present study were the healthcare worker's needle stick injury (yes, no) and exposure to a splash of blood and body fluids (yes, no). Descriptive statistics were used to explore the data and a logistic regression model used to analyze the data. The strength of association was quantified using odds ratio and corresponding 95% confidence interval (CI).*

Results*: A total of 394 healthcare workers participated in the study. Lifetime needle-stick injury was 61.2 % (95% CI: 56.1-66.0%) and the occurrence of needle-stick injury in the previous year was 38.3 % (95%CI: 33.8-43.1%). There was a high prevalence of lifetime [60.2 % (95%CI: 55.6-64.7%)] and previous year [44.9% (95%CI: 39.8-50.0)] exposures to blood and body fluids. Needle recapping (AOR= 2.25; 95% CI: 1.26-4.03) and working in surgical and medical wards (AOR=1.85; 95% CI: 1.06-3.21) were significantly associated with increased odds of needle-stick injury and exposure to body fluid splashes, respectively.*

Conclusions*: The observed high level of occupational exposure to health risks among healthcare workers calls for the urgent need of formulating strategies to promote safe practice and occupational safety protocols along with strict adherence to infection prevention principles.*

Keywords*: Body fluids splash; Needlestick injuries; Hospitals; Infection Prevention; Bale Zone, Ethiopia*

INTRODUCTION

Healthcare workers (HCWs) have increased risk of contracting infection following accidental needle-stick injuries and splashes with blood and body fluids (1). In recent years the transmission of life-threatening infections, such as the Hepatitis Virus and Human Immunodeficiency Virus (HIV), is increasing the potential occupational exposure among HCWs (2-5). The World Health Organization (WHO) estimated that about 3 million HCWs face occupational exposure to bloodborne viruses each year (2 million to HBV, 900,000 to HCV, and 300,000 to HIV), and 40% of HBV and HCV cases among HCWs worldwide are the result of these exposures. Moreover, 90% of the infections that result from these exposures are in low-income countries (3,6,7).

Developing countries, which account for the highest prevalence of HIV-infected patients in the world, also record the highest rate of occupational infections including needle-stick injuries (5).

The current HIV epidemiology of Ethiopia is heterogeneous, with significant variations in the burden of HIV across geographic areas and population groups. Over the past two decades the country has observed remarkable progress in reducing the HIV prevalence rate, from 3.3 percent in 2000 to 0.9 percent in 2017, and AIDS-related deaths from 83,000 deaths in 2000 to 15,600 in 2017 (8). The annualized HIV/AIDS mortality rate reduction from 1990 to 2016 for both sexes was 0.4% (9). It is estimated that 4.4% of all HIV infections amongst healthcare workers are due to occupational injuries (10).

[1]Department of Public Health, School of Health Sciences, Madda Walabu University Goba Referral Hospital, Bale -Goba, Ethiopia

*Corresponding author email: biniyam.sahiledengle@gmail.com

Post exposure chemoprophylaxis can prevent HIV infection in at risk healthcare workers. In fact, Ethiopia has developed guidelines on infection prevention in healthcare facilities and also employed the use of post-exposure prophylaxis at all levels (2).

However, studies reported that a significant number of the workers (43.4%) had an unfavorable attitude towards post-exposure prophylaxis (PEP) and a low rate of PEP utilization upon exposure to HIV risk conditions (11,12,13).

Few studies present the prevalence of occupational exposure among HCWs in Ethiopia (14-17). Also, there is no standard occupational reporting system in the country; occupational exposures are often under-reported and/or not reported at all in many healthcare facilities. As a result of this, it is difficult to estimate the true burden of injury and exposure in Ethiopian health facilities. Studies also underline that there is a serious concern of needle-stick injuries, splashes with blood and body fluids and safe infection prevention practices among HCWs in different parts of healthcare facilities in Ethiopia (14-16, 18-20). Furthermore, the available research evidence in the country is based on similar study settings and conducted in the northern part of the country (21-25). The only study reported from the current study area did not cover the primary hospital and also did not assess HCWs blood and body fluid exposure (15).

Therefore, this study aims to estimate the burden of and factors associated with needle-stick injuries and splashes with blood and body fluids among HCWs in Bale zonal hospitals, southeast Ethiopia. The results may serve as a stepping stone towards identifying factors associated with occupational exposure among healthcare workers and could be useful for the development of the occupational reporting system.

METHODS

Study setting

This study was conducted in Bale zone hospitals. Bale zone is one of the Oromia Regional State zones that has twenty-one woreda (districts) (18 rural and 3 town administrations). Bale zone is found in the southeast part of Ethiopia. In Bale zone there are about 84 health centers and five hospitals, namely Goba referral hospital (276 HCWs), Ginner general hospital (158 HCWs), Robe general hospital (151 HCWs), Dello-Mena general hospital (112 HCWs) and Madda Walabu primary hospital (62 HCWs);the catchment population for each hospital was 940,672, 752,530, 650,619, 350,000 and 127,680 respectively.

Study design

A hospital-based cross-sectional study was conducted from February 1 to March 10, 2018, in five hospitals of the Bale zone. All HCWs (including physicians, health officers, midwives, nurses, dental technicians, laboratory technicians, cataract surgeons, anesthetists and waste handlers) working in those hospitals were involved in the study. However, those on annual or maternity leave during data collection time were not included.

Sample size determination

The sample size was estimated using a single population proportion formula using Epi Info version 7.1.1.14 software (CDC, 2013) with the assumptions of a 95% confidence level, 5% precision was used. Evidence from previous studies reporting 19.1% as a one-year prevalence of needle-stick injury (15) and 60.2% prevalence of one year blood and body fluid splash from north Ethiopia (21) were taken. The largest of these two sample size estimates was then taken as the sample size for the current study with a 10% non-response rate, resulting in 404. This final sample size was allocated to different hospitals proportion to the size of HCWs working in each hospital. Finally, the allocated numbers of health workers to each hospital were recruited into the study using the lottery method. Within each hospital list of health professionals was used as a sampling frame.

Data collection procedure

The data collection tool was developed by reviewing relevant literature (15,24,25). The tool was developed first in English and translated to local languages by using an expert of both ‘Amharic' and ‘Afaan Oromo' languages and then back to English to look for consistency of the questions. It consists of socio-demographic information, lifetime and last one-year needlestick injuries and lifetime and last one year blood and/or body fluid splash of health care workers items adapted from previous studies. Data were collected using a pre-tested structured questionnaire. Five trained (for one day) nurses were recruited for data collection and two environmental health officers were assigned to supervise the data collection process.

Operational definitions

Needlestick injury was defined as any cut or prick to HCWs by a needle previously used on a patient. It is work-related and sustained within the hospital premises. Blood or body fluid splash was defined as any blood or body fluids splash to the eye, mouth or mucous membranes of HCWs within the hospital premises.

Data analysis

Data were entered into Epi data 3.1 and exported to SPSS version 20.0 statistical software for analysis. Descriptive statistics were computed to present the prevalence of needlestick injury and blood and body fluid splash exposure. Bivariate and multivariable logistic regression analyses were used to identify associated factors associated with the odds of observing the outcome of interest. Multivariable logistic regression analysis was used and the model fitness was checked by the Hosmer and Lemeshow method and results of 0.534 and 0.985 was found for the final model of needlestick injury and blood and body fluid splash, respectively, confirming the validity of the model. Odds ratio with 95% confidence intervals were used to determine the strength of association and p-value < 0.05 was used as a cut-off point for all statistically significant tests.

Ethical considerations

Ethical clearance was obtained from the Ethical Review Committee of Madda Walabu University and written consent was obtained from each HCW.

RESULTS

A total of 394 HCWs were interviewed with a response rate of 97.5%. Of these, 241 (61.1%) were nurses and midwives, and 56 (14.2%) were physicians and health officers. In this study 202 (51.3%) and 192 (48.7%) of respondents were male and female healthcare workers respectively. The age of study participants ranged from 18 to 43 years with a mean age of 28.8 years (standard deviation ± 5.2).

116 (29.44%) of the participants had less than two years of service, 114 (28.93%) from two to five years, 125 (31.73%) from five to ten years, and 39 (9.89%) with greater than ten years of service.

The lifetime and previous year needle stick injuries of HCWs were 61.2% (95% CI: 56.1-66.0%) and 38.3% (95% CI: 33.8-43.1%), respectively. Health care worker's lifetime exposure of blood and body fluids was 60.2% (95% CI: 55.2-64.7%), while previous year prevalence of splash of blood or body fluids was 44.9% (95% CI: 39.8-50.0%) (Table1).

HCWs having less than five-year work experience were 44% less likely to have needle stick injury as compared to HCWs who had five and above years of work experience (AOR=0.56; 95% CI:0.33-0.96). HCWs who recapped used needles were 2.25 times more likely to had needle stick injury as compared to their counterparts (AOR= 2.25; 95% CI:1.26-4.03) (Table 2).

HCWs working in referral and general hospital were 87% and 61% less likely to have blood and body fluids splash exposure as compared to primary hospitals (AOR= 0.13; 95% CI:0.05-0.35) and (AOR= 0.39; 95% CI:0.17-0.90), respectively. HCWs working in surgical and medical wards were 1.85 more likely to have blood and body fluids splash exposure as compared to those working in OPD and laboratories (AOR=1.85; 95%CI: 1.06 -3.21) (Table 3).

Table 1: Healthcare workers lifetime and last one-year occupational exposure and other related variables in Bale zone hospitals, Southeast Ethiopia February to March 2018 (n=394).

Variable	Number (%) reported "Yes"	95% CI
Have you ever had a needle stick injury?	241 (61.2)	56.1-66.0
Have you had needle stick injury in the previous year?	151 (38.3)	33.8-43.1
Have you ever had splashing of blood or body fluids to your mouth or eyes?	237 (60.2)	55.6-64.7
Have you had splashing of blood or body fluids to your mouth or eyes in the last one year?	177 (44.9)	39.8-50.0
Do you recap used needles? (n=333)	92 (27.6)	22.8-32.7
Have you received HBV vaccination?	251 (63.7)	59.1-68.3
Do you always wear goggle when blood/body fluid splash is likely?	191 (48.5)	43.7-53.3
Have you had all the necessary personal protective equipment in your workplace?	262 (66.5)	61.7-71.6
Do you have awareness of Post Exposure Prophylaxis (PEP) service?	259 (65.7)	61.2-70.6
The PEP should be considered after potential blood/body fluid exposure?	251 (63.7)	58.6-68.5

Table 2: Association of HCW's risk of needlestick injury and characteristics of HCWs in hospitals of Bale Zone, Southeast Ethiopia.

Variables	Experienced needle stick injury		Crude OR (95% CI)	Adjusted OR (95% CI)
	Number saying Yes	Number saying No		
Sex				
Male	74	128	0.86 (0.58-1.29)	
Female	77	115	1	
Age				
< 25	43	68	1.14 (0.67-1.96)	
25-30	67	101	1.19 (0.73-1.95)	
>30	41	74	1	
Service years				
< 5 years	82	148	0.76 (0.51-1.15)	0.56 (0.33-0.96)**
≥ 5 years	69	95	1	1
Hospital				
Referral	39	105	0.33 (0.15-0.72)*	0.46(0.16-1.34)
General	95	123	0.68 (0.32-1.43)	1.22(0.43-3.42)
Primary	17	15	1	1
Current working department				
Surgical and Medical ward	57	63	1.62 (0.96-2.76)	1.59 (0.86-2.94)
Pediatrics ward	12	41	0.53 (0.25-1.12)	0.51 (0.21-1.24)
Gynecology and Obstetrics ward	43	69	1.12 (0.65-1.93)	1.19 (0.63-2.26)
OPD, Laboratory, and others	39	70	1	1
Profession				
Nurses and midwives	101	140	1.17 (0.64-2.13)	
Physicians and HO	18	38	0.77 (0.51-1.67)	
Laboratory technicians, technologist, and others	11	31	0.58 (0.24-1.38)	
Cleaners	21	34	1	
Educational status				
First degree and above	83	136	0.95 (0.53-1.72)	
Diploma	43	72	0.91 (0.48-1.74)	
Below diploma	23	35	1	
Awareness of PEP service				
Yes	94	165	0.78 (0.51-1.19)	
No	57	78	1	
Presence of the IP committee				
Yes	107	145	1.64 (1.04-2.54)*	1.86 (1.07-3.23)**
No	44	98	1	1
Presence of IP guideline				
Yes	94	131	1.41 (0.93-2.13)	
No	57	112	1	
Received IP training in the past 12 months				
Yes	19	33	0.92 (0.50-1.68)	
No	132	210	1	
Do you recap used needles (n=333)				
Yes	43	49	1.64 (1.01-2.67)*	2.25 (1.26-4.03)***
No	84	157	1	1

* p< 0.05 crude; ** p< 0.05 adjusted ; *** p<0.01 adjusted; OR=Odds Ratio; CI=Confidence Interval

Table 3: Association of HCWs exposure to blood and body fluids splash with different factors in hospitals of Bale Zone, Southeast Ethiopia.

Variables	Splash of blood and body fluids		COR (95% CI)	AOR (95% CI)
	Number saying Yes	Number saying No		
Sex				
Male	96	106	1.24 (0.84-1.85)	
Female	81	111	1	
Age				
< 25	49	62	1.43 (0.84-2.44)	0.58 (0.30-1.14)
25-30	87	81	1.94 (1.19-3.16)*	1.22 (0.71-2.11)
>30	41	74	1	1
Service years				
< 5 years	102	128	0.95 (0.63-1.41)	
≥ 5 years	75	89	1	
Hospital				
Referral	43	105	0.22 (0.09-0.50)*	0.13 (0.05-0.35) ***
General	113	101	0.56 (0.26-1.23)	0.39 (0.17-0.90) **
Primary	21	11	1	1
Current working department				
Surgical and medical ward	65	55	1.68 (0.99-2.84)	1.85 (1.06-3.21) **
Pediatrics ward	14	39	0.51(0.25-1.05)	0.56 (0.26-1.19)
Gynecology and Obstetrics ward	53	59	1.28 (0.75-2.18)	1.43 (0.82-2.49)
OPD, Laboratory, and others	45	64	1	1
Profession				
Nurses and midwives	123	118	1.68 (0.93-3.07)	
Physicians and health officers	21	35	0.97 (0.45-2.09)	
Laboratory technicians, technologist, and others	12	30	0.65 (0.27-1.53)	
Cleaners	21	34	1	
Educational status				
First degree and above	105	116	1.38 (0.77-2.48)	
Diploma	49	66	1.13 (0.59-2.15)	
Below diploma	23	35	1	
Awareness of PEP service				
Yes	105	154	0.59 (0.39-0.91)*	
No	72	63	1	
Presence of IP guideline				
Yes	104	121	1.13 (0.76-1.69)	
No	73	96	1	
Received IP training in the past 12 months				
Yes	23	29	0.97 (0.54-1.74)	
No	154	188	1	

* p< 0.05 crude;; *** p<0.05 adjusted; OR=Odds Ratio; CI=Confidence Interval

DISCUSSION

Occupational exposure to blood-borne and body fluid pathogens may occur following accidental needle-stick injury and splashes of blood or body fluids to mucous membranes (26). It is a recognized potential threat to HCWs. The finding of this study suggested that the lifetime and previous year needle stick injury was 61.2% and 38.3%, respectively. There was also a high prevalence of lifetime (60.2%) and previous year (44.9%) exposures to blood and body fluids. Needle recapping practice and working in surgical and medical wards were significantly associated with increased odds of needle-stick injury and exposure to body fluid splashes, respectively.

The present study detected a high prevalence of needle stick injury which is twofold higher compared to the previously conducted study (15). This difference may be due to a time gap, study setting differences, and HCWs' work experience. In the previous study seven out of ten HCWs had five or less years of work experience. The current finding is also higher compared to a study report from the east and north Ethiopia (14,21). High prevalence of needle stick injury was also reported in India, 79.5% of HCWs reported having had one or more needlestick injuries in their career (27).

In the current study, there was also a high prevalence of lifetime (60.2 %) and previous year (44.9 %) blood and body fluid exposure. Of this prevalence, 69.5% and 68.4% of blood and body fluid exposures occurred among nurses and midwives for the previous year and lifetime, respectively. For all blood and body fluid exposures, laboratory technologists had a significantly lower risk of previous year and lifetime exposure, 6.8% and 7.2%, respectively. Overall, the proportion of blood and body fluid exposure was higher among nurses and midwives followed by physicians and health officers and the least exposed group were laboratory technologists but there was no statistically significant difference in the prevalence by professional category. The highest share of blood and body fluid exposure among nurses and midwives may due to their job activities and frequent exposure to multiple procedures that can predispose them to many blood and body fluid exposures within the healthcare facility.

Moreover, the one year blood and body fluid exposure in the current study is lower than the previous report in north Ethiopia (60.2%) (21) and Tigray Region of Ethiopia (56.3%) (25). This can be explained by differences in study settings, the type of healthcare facility and a difference in HCWs' experience.

However, the current study finding was higher than a study report in eastern Ethiopia, which reported 20.2% (14). The possible explanation for this discrepancy may be due to a difference in study setting (the study includes 20 health centers) and standard precaution practice (where 80.8% of HCWs reported that they regularly follow standard precautions).

In the current study, exposure of blood splash or body fluids was 60.2%. This finding was almost twofold higher compared to a study report from eastern Ethiopia 28.8% (14), Addis Ababa (Ethiopia) 39.8% (16) and West Arsi (Southeast Ethiopia) 39.0% (17). This could be due to differences in study setting; the previous studies included health centers together with infection prevention training, whereas in the current study the majority of HCWs did not receive any such training. The safe injection practice recommendations of the Federal Ministry of Health (FMoH) include statements such as: "do not recap, bend or break needles prior disposable, single-use needles and syringes after giving injections" (2).

However, in the current study a significant number of HCWs reported recapping needles after use. Respondents who practiced needle recapping were 2.25 times more likely to experience needlestick injury than those who did not recap needles after use. This finding is consistent with the previously conducted study (15). Likewise, other similar studies from other countries (India, Cameron) reported recapping needles after use was associated with a higher risk of needle-stick injury (28,29). A study conducted by Berhanu on prevalence and determinant factors for sharp injuries among Addis Ababa hospitals reported similar findings: those health professionals who never recap used needles were protected from sharp injuries in 61.6% of the cases (30). In another recent study in the same area similarly found a high prevalence of lifetime and one-year prevalence of blood and body fluid exposures 42.6% (95% CI: 36.8-48.4) and 29.2% (95% CI: 23.8-34.7), respectively (31).

In the present study, HCWs that had less than five-years of work experience were 44% less likely to have needle stick injury as compared to HCWs who had five or more years of experience. HCW's total years of service increased the possibility of contracting needle-stick injury. However, this may not always be true since a study from Bihar Dar (north Ethiopia) report dissimilar findings.

In their assessment, the prevalence of needle-stick injury was higher among HCWs with work experience of less than 5 years, and among those working in dressing rooms and involved with injections, though such observations did not reach statistical significance (P> 0.05) (24).

Blood and body fluids splash exposure was significantly associated with type of hospital. HCWs working in referral and general hospitals were87% and 61% less likely to had blood and body fluids splash exposure as compared to primary hospitals. The possible reasons might be differences in awareness of body fluids splash risks, personal protective equipment supply, and variation in experience. Also, the current study observed that HCWs from surgical and medical wards were almost two times more likely to have blood and body fluids splash exposure as compared to those in OPD and laboratory facilities. This could be due to a difference in the job activities of healthcare workers and the type of healthcare activity.

Strength and limitations of this study

Strength

All hospitals in the Bale zone were included in the study and an adequate sample size was used.

Limitations of the study

This study has several limitations. Due to the cross-sectional nature of the study design, temporal relationships could not be established between the explanatory and dependent variables.

In this study, social desirability bias and recall bias are potential limitations of these self-reported needle-stick injuries and blood and body fluid exposure results. Also, there may be a chance of over-reporting and under-reporting occupational exposure prevalence. As participants were only chosen from hospital settings, the generalization of this study is limited to hospitals of Bale Zone, not to smaller healthcare facilities found in the Bale zone.

CONCLUSIONS

There was a high level of occupational exposures of both needle stick injury and body fluid exposure among HCWs. Health authorities as well as healthcare facilities need to formulate urgent strategies to promote safe practice and occupational safety protocols along with strict adherence to infection prevention principles. Moreover, the provision of job training and the establishment of a strong reporting system should be recommended.

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Conflict of Interest:

Authors have no conflict of interest to declare.

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ORIGINAL ARTICLE

CLINICAL CHARACTERISTICS AND IN HOSPITAL OUTCOME OF ACUTE HEART FAILURE: A FIVE-YEAR EXPERIENCE AT A TERTIARY CARE HOSPITAL IN ETHIOPIA

Esubalew Woldeyes, MD[1*], Henok Zewdu, MD[1], Hailu Abera, MD[1], Tola Bayissa, MD[1], Sisay Sirgu, MD[1]

ABSTRACT

Introduction: *Heart failure is a burgeoning problem worldwide, with more than 20 million people affected.* Information on the clinical characteristics, management and outcome of acute heart failure among Ethiopian patients is lacking.

Objective: *This study was done with the aims to determine, etiology, clinical characteristics, management and in hospital outcome of patients with heart failure.*

Methods: A *retrospective patient chart review was conducted at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia. A data of 496 patients admitted with acute heart failure over five years. September 2010 –September 2015, was collected using a pretested data abstraction form and entered onto and analyzed by SPSS Version 20.*

Results: *The mean (±SD) age of the patients was 47.1 (±19.4) years, and 57.8% were male. The mean (±SD) systolic blood pressure (BP) was 107.5 (±33) mmHg. Rheumatic heart disease (30%) was the most frequent cause of heart failure. In total 428 of analyzed patients had echocardiography ,136 (31.8%) Ejection fraction was 40% or less and electrocardiography result showed atrial fibrillation in 27.5%. On discharge, angiotensin converting enzyme inhibitors, beta-blockers, and spironolactone were prescribed for 38.9%, 27.9%, and 71% of the patients, respectively. In-hospital mortality was 24.4%. The median duration of hospitalization was 11 days. Chronic kidney disease as comorbidity, female sex, systolic blood pressure (BP) <90mmHg and high heart rate at admission were predicators of low in-hospital survival.*

Conclusions: *In our patients, acute heart failure affected young age and was associated with high mortality. Our patients were under-investigated and under-treated treated. We recommend a well-designed epidemiological study for better characterization of Ethiopian patients with acute heart failure.*

Key Words: *Acute heart failure, clinical characteristics outcome, in-hospital mortality, Ethiopia*

INTRODUCTION

There is a rising epidemic of non-communicable diseases (NCDs) in sub-Saharan Africa (SSA), including cardiovascular disease (CVD), cancer and metabolic diseases such as diabetes and obesity (1–4). Global Burden of Disease studies suggest that the age-standardized death rates from NCDs are higher in at least four SSA countries (Democratic Republic of the Congo, Nigeria, Ethiopia and South Africa) than in high income Countries (7).

Among NCDs, cardiac diseases and their risk factors are increasing in SSA (2). From cardiac disease heart failure, which is a complex clinical syndrome that results from structural or functional impairment of ventricular filling or ejection of blood, which in turn leads to the cardinal clinical symptoms of dyspnea and fatigue and sign of heart failure (HR), namely edema and rales. HF is a burgeoning problem worldwide, with more than 20 million people affected. The overall prevalence of HF among the adult population in developed countries is 2%.(6).

In spite of the scarcity of published literature on HF in SSA, the few available evidence suggest that the rate of hospital admission for heart failure is comparable with rates from the rest of the world. However the pathophysiology and etiologies are different (8,9).

Data regarding the burden of non-communicable disease in Ethiopia is scarce, None the less, a few studies done in different parts of the country indicate that there is progressive increase of NCDs. A systematic review of 32 studies done on NCDs in the country shows ,two hospital-based studies reviewed the prevalence of cardiovascular disease and found a prevalence of 7.2% and 24%; a hospital-based study reviewed cancer prevalence and found a prevalence of 0.3%; two hospital-based studies reviewed diabetes prevalence and found a prevalence of 0.5% and 1.2%; and two hospital-based studies reviewed prevalence of asthma and found a prevalence of 1% and 3.5%.

[1]St Paul's hospital millennium medical collage Department of internal medicine
*Corresponding Author E-mail: esubalew49@gmail.com

Few community-based studies were done on the prevalence of diabetes and chronic pulmonary obstructive disease among the population . (11).

The World Health Organization (WHO) estimated in 2011 that 34% of Ethiopian population died from NCDs, with a national CVD prevalence of 15% (12). Among CVDs, rheumatic heart diseases (RHDs) account for the majority of cases. Hospital-based studies in Gondar, north-western Ethiopia, have shown that about 42% of cardiovascular admission is attributable to RHD (13). Previous studies also showed a similar finding with prevalence of RHD being in the order of 35% (14). Patients in our setting are younger than patients seen elsewhere, receive suboptimal management, and carry a high case fatality rate (16,17).

A number of prospective registries done on clinical characteristics and the outcome of acute heart failure in different part of the world show that ischemic heart disease is the commonest cause, accounting for 53% in the Gulf care to 65% in the ADHER registry (18,21). Hospital mortality ranges from 3.8% in OPTIMIZE-HF registry in United States to 12% in the ALARAM-HF registry done in Europe (23,24).

One prospective registry done in SSA, where a few number of Ethiopian patients were included in the study, showed mean (±SD) age was 52.3 (±18.3) years, and 511 (50.8%) were women. Heart failure was most commonly due to hypertension, n=453 (45.4%), and rheumatic heart disease, n=143 (14.3%). The median hospital stay was seven days (Interquartile Range 5-10) and in-hospital mortality was 4.2 % (20).

Hospital based studies on acute heart failure involving adequate number of patients to look into clinical characteristics, management and outcome of the disease among Ethiopian patients is lacking. Therefore, this study has been conducted to contribute to filling this gap.

PATIENTS AND METHODS

The study was conducted in St. Paul's Hospital one of the large public hospitals located in Addis Ababa, Ethiopia. Retrospective data was collected from patient clinical records from September 2010-septemebr 2015. Patients admitted with the diagnoses of cardiovascular disorders were identified from different registries on the medical wards and medical intensive care unit (ICU). After reviewing available medical charts of all patients above 14 years of age and admitted to the medical ICU or medical ward with the diagnosis of CVD, all patients with the diagnosis of acute heart failure were selected and included in the study.

Acute heart failure was defined as a rapid onset or worsening of symptoms and/or signs of heart failure, which is a life-threatening medical condition requiring urgent evaluation and treatment, typically leading to urgent hospital admission (6).The medical chart of the patients were used to obtain demographic and clinical information.. Precipitating factors for heart failure were factors contributing to the causes for current admission of the patient and identified by the treating physician, even if the best option for the identification for the precipitating cause was not available.

The data collection format was prepared to capture information from medical the patient chart. The format included information on the background, heart disease, and laboratory and echocardiography information. The data was entered onto an Excel spreadsheet by the investigators and analyzed using SPSS version 20. Frequency distributions, cross tabulations tables and graphs were used to summarize the data.. Chi square test was used for categorical variables and one-way ANOVA for continues variables were done to see association between exposure and outcome variables. The logistic regression model was applied to identify predictors independently associated with the outcome (in-hospital mortality). Variables found to be statistically significant ($p<0.2$) in the univariable analysis were included in the multivariable model, except for variables with >10% missing values or variables that were closely related to other clinical variables and may have multicollinearity issues.

Ethical clearance for the study was obtained from the Research Ethics committee of St Paul's Hospital Millennium Medical Collage (SPMMC) Institutional Review Board (IRB.

RESULTS

Our analysis showed that the mean age was 47.1 (±19.42) years, and 57.9% were male (Table 1). Hypertension was recorded in 22.4% of the patients; known diabetes at admission was present in 9.6%, and CKD in 11.4% of the patients. Almost all patients were in NYHA class III or IV (5.2% and 90.3%, respectively), at admission. The mean (±SD) systolic and diastolic BP (SBP and DBP) were 107.5 (±32.96) mmHg and 67.9 (±21.14) mmHg, respectively, and the mean (±SD) heart rate was 98.0 (+19) beats per minute at admission. The percentages of patients with hypotension (SBP <90 mmHg) and hypertension (SBP ≥140 mmHg) were 25.8% and 12.5%, respectively.

Table 1: Baseline characteristics, outcome of hospitalized acute heart failure patients
St Paul's Hospital Millennium Medical College, Addis Ababa, September 2010-septemebr 2015

	All (n=496)	Survivor (n=375	In-hospital death (n=121)	P-value
Age in years (mean ±SD)	47.1+19.42	47.3+19.16	46.6+20.29	0.731
Female sex (%)	42.1	39.4	50.4	0.044
Cause of heart failure				
Rheumatic heart disease (%)	30.0	30.1	29.8	1.000
Non ischemic /idiopathic cardiomyopathy (%)	18.1	18.9	15.7	0.498
Ischemic heart disease (%)	14.9	14.9	14.9	1.00
Right side heart disease (pulmonary hypertension) (%)	20.4	20.3	20.7	0.898
Hypertensive heart disease (%)	8.3	7.7	9.9	0.450
Number of admission (>1times) (%)	22.0	20.8	25.6	0.312
Precipitating factor for heart failure				
Community acquired pneumonia (%)	28.0	26.9	31.4	0.353
Unidentified cause (%)	25.6	25.9	24.8	0.905
Atrial fibrillation (%)	8.7	9.1	7.4	0.711
Drug discontinuation (%)	7.9	8.3	6.6	0.698
Infective endocarditis (%)	10.9	11.5	9.1	0.509
Known/identified comorbidity				
chronic kidney disease (%)	11.4	9.1	18.5	0.008
Hypertension (%)	22.4	22.4	22.3	1.000
Diabetes (%)	9.6	9.4	10.2	0.857
Smoking (documented) (%)	3.5			
Clinical characteristics				
SBP at admission (mmHg) (mean±SD)	107.5+32.96	112.3+29.52	92.6+38.46	<0.0001
Diastolic blood pressure at admission	67.9+21.138	70.5+19.18	59.9+24.74	<0.0001
Heart rate at admission(mean±SD)	98.0±19	96.6±18.1	102.5±2	0.03
NYHAC III/IV (%)	96	95.2	98.3	0.183
Duration of stay (days) (mean±SD)	14.4+15.4	15.6+15.8	10.8+15.85	0.004
median	11	6	12	

The results indicate that rheumatic heart disease was the most frequent (30%) of the causes of HF, followed by right side heart failure (20.4%), idiopathic dilated cardiomyopathy (18.1%), and Ischemic heart disease (14.9%). Hypertension was found to be the cause in 8.3% of patients (Figure 1). The most frequent identified precipitating cause for heart failure was community acquired pneumonia (28%), followed by infective endocarditis (10.9%), atrial fibrillation (8.7%) and drug discontinuation (7.9%). Ischemia accounted only for 6.9%, whereas a definitive cause of precipitating factors was not found in 25.6% of the patients.

Anemia (hemoglobin <12 mg/dL) was documented in 32.3%, and leukocytosis (white blood cell count ≥10000/mm^3 in 31.7% of patients. Urinalysis and renal function test were done in 421 and 471 patients, respectively (Table 2). Proteinuria on urine dipstick was identified in 29.2% of the patients, and 23.4% and 10.5% of patient who had renal function test done had eGFR <60ml/min/1.73m^2 and eGFR <30 ml/min/1.73m^2, respectively.

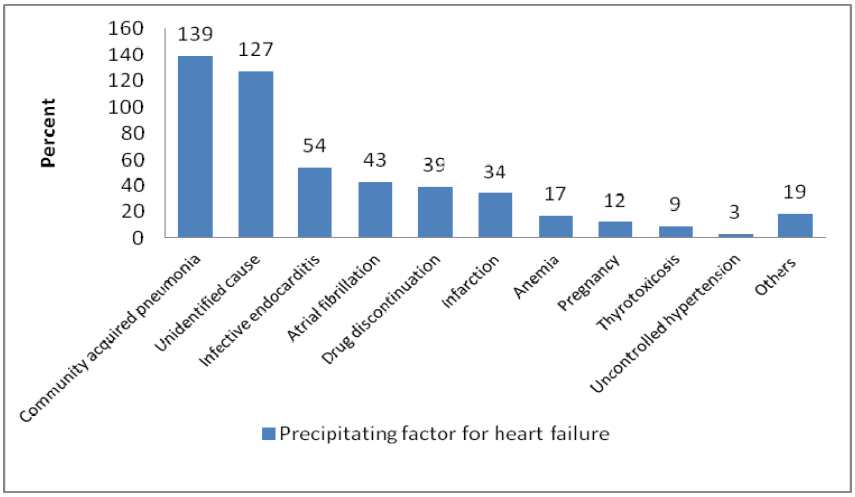

Figure 1: Precipitating factors for hear failure, St Paul's Hospital Millennium Medical College, Addis Ababa, September 2010-septemebr 2015

Table 2: Laboratory test, echocardiography, and electrocardiography findings, St Paul's Hospital Millennium Medical College, Addis Ababa, September 2010-septemebr 2015.

	All (n=496)	**Survivor (n=375)**	**In hospital death (n=121)**	**P-value**
Lab tests				
White blood cell count, per mls (mean ±SD)	10044.1±6855.3	9914.4±14543.3	104449.5±6855	0.698
Hemoglobin(g/dl)	13.12+3.28	13.3+3.2	12.8+3.53	0.188
Platelets (n=473)	246519.6+133357.27	254200+137159	222608.7+118141.21	0.027
BUN (mg/dl) (n-471)	37	34	46	<0.001
eGFR (ml/min/1.73m2)	92.1+45.4	96.8+44.94	78.0+44.33	<0.001
Urine protein dipstick (n-421)	29.2% (123)	26.9% (87)	37.1% (36)	0.057
Electrocardiography (n=388)				
Atrial fibrillation	27.5% (107)	27.5% (79)	27.7% (28)	0.533
QRS duration (ms)	97.8+22.45	97.7+22.9	98.0+21	0.883
Echocardiography(n=428)				
LVEF (<40%)	31.8% (136)	24.5% (105)	31.6% (31)	1.000
Moderate to severe pulmonary hypertension	59.7% (254)	59.0% (194)	62.3% (60)	0.556

A total of 428 patients had Echocardiography done for left ventricular ejection fraction (LVEF) measurement; In 136 (31.8%), LVEF was 40% or less, while 254 had moderate and above pulmonary hypertension (Table2). Of 388 (78.2%) patients, who had electrocardiography (ECG) done, The ECG result showed atrial fibrillation (AF) in 27.5% of the patients at admission and mean (±SD) QRS duration was 97.8(±22.45) millisecond .The most prescribed medications at discharge of patients with heart failure were diuretics (furosemide) (89.7%), mineralocorticoid antagonist MRA (spironolactone) (71%), and Digoxin (40.2%) (Table 3).

At discharge, angiotensin converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs), beta-blockers, aspirin and statin were prescribed for 38.9%, 27.9%, 30.3% and 16.9%, respectively. Evidence based heart failure medication recommended for patients with LVEF < 40% (ACEIs/ ARBs, beta-blockers and MRA) were prescribed for 60%, 39% and 84% of the patients, respectively (Table 4). Among those treated with beta -blockers, 60.8% received metoprolol, 30% atenolol, and 11.5% propranolol. Warfarin was used in 18.5% of the patients and atrial fibrillation documented in 37.1% of the patients.

Table 3: Underlying cause of heart failure, St Paul's Hospital Millennium Medical College, Addis Ababa, September 2010-septemebr 2015.

Type of cardiac disease	All (n=496)
Rheumatic valvular heart disease	30%
Right side heat failure	20.4%
Cardiomyopathy	17.1%
Ischemic heart disease	14.9%
Hypertension heart disease	8.3%
Non rheumatic valvular heart disease	1.4%
Congenital heart disease	1.2%
Pericardial heart disease	1.2%
Thyrocardiac disease	1%
Primary arrhythmia	0.4%
Others	4%

Table 4: Drug prescription pattern at discharge in patients with heart disease, St Paul's Hospital Millennium Medical College, Addis Ababa, September 2010-september 2015

	Overall discharged patient	LVEF <40%	LVEF >40%	P value
ACE inhibiters	38.9% (145)	60% (63)	31.83 % (71)	<0.001
B-Blockers	27.9% (104)	39% (41)	23.8% (53)	0.006
Mineralocorti-coid antagonist (spironolactone)	71% (267)	84% (89)	68.3% (153)	0.03
Diuretics (furosemide)	89.7% (338)	96.3% (103)	88.9% (199)	0.036
Digoxin	40.2% (153)	65.1% (71)	31.7% (72)	<0.001
Aspirin	30.3% (113)	42.8% (45)	25.1% (56)	0.002
Warfarin	18.5% (69)	21.9% (23)	16.5% (37)	0.284
Statins	16.9% (63)	26.7% (28)	13.9% (31)	0.008

In-hospital mortality in our series was 24.4%. The median duration of hospitalization was 6 days for non survivors. There were significant differences in demographic and clinical characteristics and hospital course between survivors and non-survivors **(Tables 1 and 2).** More female patients than males died, 50.4% vs 39.4% (P=0.044) and had CKD as a co-morbidity, 18.5% vs. 9.11% (P=0.008). They had lower BP, mean (±SD) SBP 92.6 (±38.46) mmHg vs. 112.3 (±29.5) mmHg (P<0.001), and higher heart rate (102.5 ±21) beats per minute vs 96.6(±18.1) beats per minute (P=0.03).

The deceased also had lower eGFR, 78±(44.33) ml/min/1.73m2 vs 96.8±44.94 ml/min/1.73m2 (P<0.001), higher blood urea nitrogen (BUN), 46mg/dl vs 34mg/dl (P<0.001) and stayed shorter in the hospital, median of six days vs 12 days (P=0.004).

A multivariate logistic regression analysis revealed that CKD at admission, heart rate >100 beats per minute, female sex, and BP <90mmHg were independently associated with lower in-hospital survival **(Table 5).**

Table 5: Multivariable logistic regression for in-hospital survival

	Survived	In hospital death /non-survivors	Hazard ratio and with 95% CI	P-valve
Female sex	39.4%	50.4%	0.476(0.279-0.813)	0.007
Age >60 years	26.4%	21.5%	1.123(0.602-2.094)	0.715
CKD at admission	9.1%	18.4%	0.342(0.141-0.833)	0.018
eGFR< 60ml/ min/1.73m2)	20.3%	33.1%	0.694(0.314-1.534)	0.367
SBP< 90mmHg	21%	40.6%	0.247(0.127-0.482)	0.000
HR > 100beats/min	32.2%	52.1%	0.403(0.232-0.701)	0.001
Hgb<12mg/dl	30.6%	37.1%	0.825(0.469-1.453)	0.505
WBC >10,000/ ml	70.6%	61.2%	0.735(0.419-1.29)	0.283

DISCUSSION

The characteristics and outcomes of Ethiopian patients with acutely decompensated heart failure are poorly defined despite cardiovascular disease are important cause morbidity and mortality from few available studies (11). Since we couldn't find comparable studies done using similar study designs, we are comparing the result with prospective registers.

The demographic and clinical characteristics of patients with acute heart failure identified by this study is hugely different when we compare it with results from studies/registry done in SSA and other part of the world **(**18-25). Our patients are much younger than patients in the developed countries (66-70 years vs 47 years), and also younger than patients from other SSA countries (52 years vs. 47 years) (18,20,24).

The etiology of acute heart failure in our patients different form that shown by other studies. The commonest etiology in our series is RHD (30%), followed by right side heart failure (20.3%), while registries done in Europe, the United States and the Middle East show ischemic heart disease is the commonest cause, accounting for 53% in Gulf Care to 65% in ADHER registry. This contrasts the lower proportion (14.9%) of ischemic heart disease documented among our patients (18,21)**.**

Hypertension was the most common cause of heart failure in THESUS study done in SSA accounting for 45.4% (20) . Poor socioeconomic status and lack of access to medical care might contribute to the high proportion of RHD and as an underlying cause of heart failure in our series. This finding could partly explain the difference in age between our patients and those reported from developed settings. RHD affects the young among Ethiopian patients. In a study done in Ethiopia, average survival of patients with RHD is 21 years (17). The commonest precipitating factors for heart failure in our study was infection in the form of community acquired pneumonia (28%) and infraction in (6.8%), which ranges from 14.7% to 36% in the Western registry (19,24).

In our study, known comorbidities at admission like diabetes, hypertension and CKD were identified in 9.6%, 22.37% and 11.3%, respectively. This figures are lower compared to other registries; diabetes was identified in 41% in the OPTIMIZE-HF to 50% in Gulf Care, and hypertension was commonest comorbidity in western registers identified in approximately 70% of patients (19,21).

The prevalence of diabetes identified in our study is comparable to results from a study done in other SSA country (9.6% vs. 11.4%) (20). The young age at the diagnosis of acute hear failure in our patients could partly explain why we had less proportion of patients with comorbidities, and poor documentation and workup of our patients might contribute.

Though our patients were younger, the proportion with documented atrial fibrillation in those who had electrocardiography is comparable to observations from the western world (27.9% vs 30%), but higher than what has been reported from other SSA countries (27.9% vs. 18.3%) (18,20). The high proportion of atrial fibrillation at the young age might be explained by high proportion of RHD in our patients, and unavailability of ECG for all patients might have affected the result. The proportion of patients with preserved ejection fraction or mild left ventricular dysfunction/mid-range was 68.2%, which is relatively higher than results from other studies, which ranges from 31% in Gulf Care to 51% in OPTIMZE-HF (19,21). This might be because of large proportion of patients with RHD and right side heart disease, which could have heart failure before or without left ventricular dysfunction.

In this study fewer numbers of patients received ACEIs or ARBs, 38.9% among all patients and 60% in patients with EF< 40%vs 83% in OPTIMIZE-HF trial and 81% in the THESUS study (19,20). The low use of ACEIs/ARBs can be explained by the lower proportion of patients with hypertension and higher proportion of patients with EF>40%, but their low use of ACEIs/ARBs in those with reduced EF might indicate poor guideline adherence. Beta-blockers were prescribed in 27.9% of all patients and 39% of patient with EF<40%, which is comparable THESUS (30%) but much lower than western registries, ranging from 55% to 60% (18-24). This partly indicates again less adherence to use of evidence-based medical treatment. There is disproportionately high use of spironolactone in our patients, 71% vs 48 % in Gulf Care and 55% in ESC HF Long-Term Registry, but comparable with THESUS (72%) (20-23). The high use of spironolactone (68.3%), even in patients without significant left ventricular dysfunction is not evidence based.
Our study showed high mortality compared to other studies. The proportion who died in our series was 24.4%, where as in-hospital mortality ranges from 3.8% in OPTIMIZE-HF registry to

The high mortality in our study might be attributable to high proportion of cardiogenic shock at presentation as 25.5% of patient in our study had SBP < 90mmHg, which is much higher than Gulf Care; and the ALARM-HF population 8% and 11.7%, respectively (21,24). Different underlying etiology compared to other registries may contribute for high death rate, even though there were no difference in mortality among the different etiology.

Unmeasured factors might also contribute to the high proportion of death, since some patients had multiple hospitalization in same hospital or in other centers. Anecdotal observations in clinical practice suggest that late presentation of patients, poor medical care and lack of access to advanced cardiac service, including cardiac surgery, can contribute to the high mortality.

There were several limitations to this study. The study was based on a retrospective chart review. Therefore, because poor documentation, missed data and unmeasured variables might have caused bias and influenced the results. That the data was collected form study from a single health facility, generalizability of the results is limited.

Our study did not specify strict criteria for heart failure, underlying cause and precipitating factors for heart failure since it is retrospective chart review. Laboratory tests and echocardiographic results were not centralized. Furthermore, echocardiographic in-

Finally, some of laboratory test, electrocardiographic and echocardiographic results were not available for all patients.

In conclusion AHF affects patients in Ethiopia at an extremely young age and is caused mostly by RHD and right side heart disease (pulmonary hypertension). Use of evidence-based drug treatment, lab investigation and cardiac diagnostic tests were suboptimal in our study. The proportion of death in our patients was high despite their young age at the diagnosis of heart failure compared to western and other registers in SSA. Dedicated programs and policy that strive to improve the cardiac diagnostic service, pharmacological management of acute heart failure need to be developed. Since our study was done at a single center and was a retrospective study, we recommend a well-designed epidemiological study.

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Conflict of interest:
The authors have no conflict of interest to declare.

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ORIGINAL ARTICLE

CLINICAL PROFILE AND OUTCOME OF PEDIATRIC PATIENTS: A FIVE -YEAR ENDOSCOPY TREND ANALYSIS

Abebe Habtamu Tamire, MD

ABSTRACT

Introduction: *Gastrointestinal diseases are important healthcare problems in pediatric age groups across the world. Patients can have diverse clinical manifestations of gastrointestinal problems. Since the inception of pediatric endoscopy in the 1970's, it has been used widely in clinical practice to identify the causes of different upper and lower gastrointestinal complaints and, hence has become standard of care in diagnosing and treating esophageal band ligation, sclerotherapy, balloon dilatation, polypectomy, biopsy taking and other pediatric gastrointestinal problems.*

Objective: *This study assessed the clinical profile and outcome of children with gastrointestinal problems.*

Methods: *A retrospective-cross-sectional descriptive study was conducted through chart review of all pediatric patients who underwent esophagogastroduodenoscopy and colonoscopy and performed at Tikur Anbessa Specialized Hospital from September 2013 to January 2017. Data was analyzed using Statistical Package for Social Sciences version 25.0.*

Results: *There were 615 patients, 340 (55.3%) male and 275 (44.7%) female, who had endoscopy done. The commonest indication for gastroscopy was bloody vomiting which was documented in 186 (44.3%) of the patients and the commonest gastroscopic finding being esophageal varices identified in 159 (37.9%). Colonoscopic indication was rectal bleeding in 96 (49.2%) of the patients, findings revealing rectal polyps in 130 (66.7%). Hyperplastic polyps (32%) were found the commonest biopsy finding followed by Juvenile polyps (27%).*

Conclusions: *Esophageal varices, polyps, nonspecific inflammations and IBD were the commonest gastroscopic and colonoscopic findings, indicating that endoscopy is a better procedure for the diagnosis and treatment of gastrointestinal problems in children.*

Keywords: *Pediatric age, gastrointestinal disease, endoscopy, gastro intestinal bleeding.*

INTRODUCTION

Gastrointestinal diseases are important healthcare problems in pediatric age group across the world (1). The patients have diverse clinical manifestations of gastrointestinal problems. Since the inception of pediatric endoscopy in the 1970's, it has been used widely in clinical practice to identify the causes of different upper and lower gastrointestinal complaints and hence has become the standard of care in the diagnosis e of pediatric gastrointestinal problems (2-4).

The various endoscopic procedures used as therapeutic and diagnostic tools include esophagogastroduodenoscopy (EGD), colonoscopy, polypectomy, hemostatic therapy (hemoclip), balloon dilation, and placement of percutaneous endoscopic tube (PET). As part of diagnostic procedures, EGD is useful to evaluate common pediatric conditions like allergic, infectious, or peptic esophagitis; infectious or inflammatory gastritis; and celiac disease (5).

Endoscopy also helps to obtain routine tissue sampling in pediatric patients from duodenum, stomach, and esophagus during gastroscopy and from the colon and terminal ileum during colonoscopy with pancolonoscopy (6,7). The absence of gross endoscopic abnormality doesn't rule out clinically significant diseases and hence most study recommends obtaining biopsy sample given the risk of sedation and performing repeat endoscopy outweighs obtaining biopsy samples in pediatric populations (8).

Colonoscopy is routinely performed in case of rectal bleeding to identify attributable causes like juvenile polyps and to confirm the diagnosis of inflammatory bowel diseases in infants and children (9,10) . On the other hand, the less common yet important indications of colonoscopy in pediatric patients include screening of neoplastic conditions in long standing inflammatory bowel disease, hereditary polyposis syndrome and allergic gastrointestinal conditions (11-13).

[1] Addis Abeba university college of health sciences
Corresponding Author E-mail: tamireabebe05@gmail.com

Locally there is few data regarding the prevalence of gastrointestinal problems associated with various gastrointestinal complaints from in Ethiopia. There is also a paucity of data on the indications, endoscopic findings and diagnostic yield of this procedure. This study was conducted in order to identify demographic and clinical characteristics and related endoscopic findings. Besides, the study also aimed to further investigate the safety and effectiveness of this procedure in pediatric care in our setting.

PATIENTS AND METHODS

A cross-sectional descriptive study was conducted through chart review of all pediatric patients who underwent esophagogastroduodenoscopy (EGD) and colonoscopy performed at Tikur Anbessa Specialized Hospital (TASH) from September 2013 to January 2017.

The data was analyzed using Statistical Package for Social Science (SPSS) version 25.0.

RESULTS

In this study, there were 615 patients, 340 (55.3%) male and 275 (44.7%) female who had endoscopy done**.** The commonest indication for gastroscopy was bloody vomiting, documents in 186 (44.3%) of the patients and gastroscopic findings were esophageal varices in 159 (37.9%) **(**Figures 1 and 2**).** Colonoscopic indication was rectal bleeding in 96 (49.2%) of the patients and findings revealed rectal polyps in 130(66.7%). Of the 615 patients who had endoscopy done, 420 (68.3%) underwent gastroscopy; 308 (73.3%) and 112 (26.7%) of the patients were from urban and rural areas, respectively. Among 195 (31.7%) of the patients who had colonoscopy done, 130 (66.7%) were from urban and 65 (33.3%) were from rural areas.

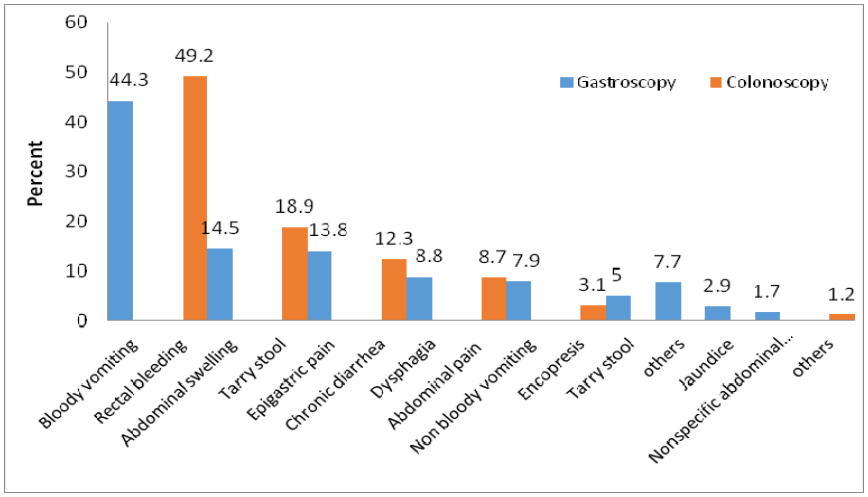


Figure 1: Indications for gastroscopy and colonoscopy in children (0-18years), Tikur Anbessa Specialized Hospital, Addis Ababa, September 2013 to January 2017.

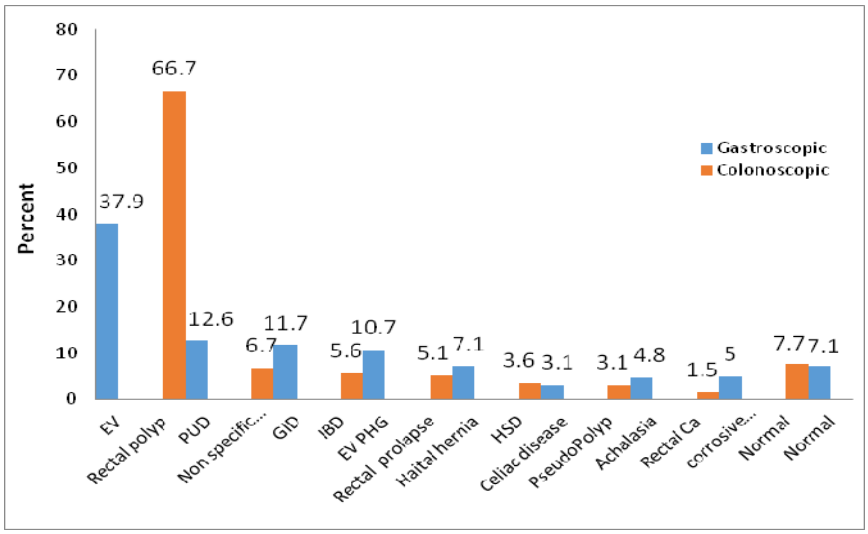


Figure 2: Gastroscopic and colonoscopic findings in children (0-18years), Tikur Anbessa Specialized Hospital, Addis Ababa, September 2013 to January 2017.

Regarding sex distribution, of 420 patients who underwent gastroscopy, males were 220 (52.4%) and females 200 (47.6%). Most age groups were between 5-12 years 150 (35.7%), and 13-18 years, 146 (34.8%).

Of those, the 195 patients who underwent colonoscopy, males were 132(67.7) and females 63(32.3), and distribution by age showed that most were in the age groups 5-12 years, 102 (52.3%) and 13-18 years,

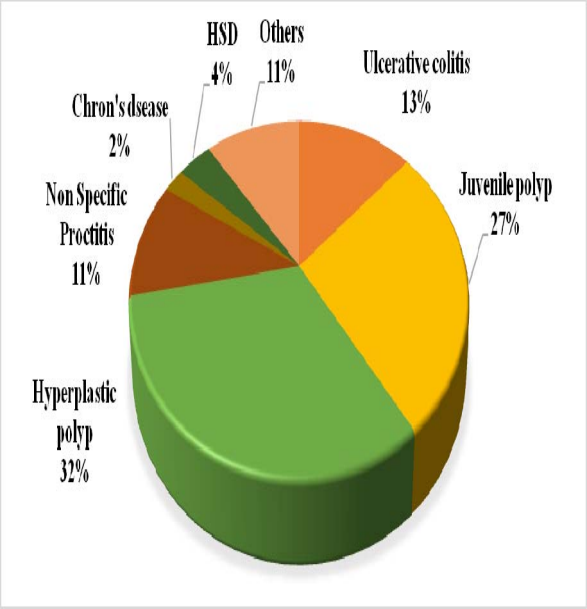
Pathological examination of the specimens (biopsy) was done for 130 patients and the result revealed Juvenile polyps (27%) and hyperplastic polyps (32%) were found the commonest biopsy finding in those who underwent colonoscopy.

Non-specific proctitis (11%), ulcerative colitis (inflammatory bowel disease) (13%) and Crohn's disease (2%) were other common biopsy results

Table 1: Age and sex distribution of children (0-18years) who had endoscopy Tikur Anbessa Specialized Hospital, Addis Ababa, September 2013 to January 2017.

Procedures done	Age (years) Age (Years)	Number (%)	Male Number (%)	Female Number (%)
Gastroscopy	0-1	27(6.4)	11(2.6)	16(3.8)
	2-4	97(23.1)	82(19.5)	15(3.6)
	5-12	150(35.7)	103(24.5)	47(11.2)
	13-18	146(34.8)	101(24.1)	45(10.7)
	Total	420(100)	297(70.7)	123(29.3)
Colonoscopy	0-1	13(6.7)	8(4.1)	5(2.6)
	2-4	47(24.1)	39(20)	8(4.1)
	5-12	102(52.3)	64(32.8)	38(19.5)
	13-18	33(16.9)	21(10.8)	12(6.1)
	Total	195(100)	132(67.7)	63(32.3)

Figure 3: Colonoscopic biopsy result in children (0- 18years). Tikur Anbessa Specialized Hospital, Addis Ababa, September 2013 to January 2017.



DISCUSSION

In this study, the commonest indications for endoscopic procedures were bloody vomiting which were documented in 186 (44.3%) of the patients followed by abdominal swelling in 61 (14.5%) and epigastric pain/discomfort in 58 (13.8%). This is similar to findings from studies done in Pakistant where the indications for endoscopy were failure to thrive followed by bloody vomiting (7), and a Korean study with indications for endoscopy being abdominal pain, non-bloody vomiting and bloody vomiting (1).

In a study done in Uganda, epigastric pain and dyspepsia were the commonest indications for gastroscopy with bloody vomiting being the 3rd most common indication accounting for 8.9% of the indications (8).

Unlike other studies, the commonest gastroscopic findings in our study were esophageal varices, which were findings in 159 (37.9%) of the patients followed by peptic ulcer diseases seen in 53 (12.6%) of them and inflammatory gastric diseases (reflux gastritis, gastropahty, chronic gastropathy, portal hypertensive gastropathy (PHG) in 49 (11.7%), This observation concur with that of the Pakistan study (7), where gastropathy is the commonest finding accounting for 14.5% of the observations.

Duodenal lesions were the most common (24.4%) - duodenal ulcer (14.8%), duodenal scaring (5.2%) and duodenitis (4.4%) followed by gastritis (12.6%) and bile reflux gastropathy (5.2%) - in a study done in Uganda (8). Commonest complaint for colonoscopy in our study was rectal bleeding which was 96 (49.2%) that is congruent with 48.8% and 56.6% in a study from Korea & China as commonest presenting symptoms respectively (1,6), and 41 (39.8%), the commonest complaint in study done in Nigeria (12).

Regarding the commonest colonoscopic findings, rectal polyps was diagnosed in 130 (66.7%) of our patients, nonspecific inflammations, in 13 (6.7%) and inflammatory bowel disease (IBD) in11 (5.6%). In a study done in China, polyps (42.9%) and IBD (16.5%) were the two most common positive findings (5).

Pathological examination of the specimens revealed polyps (Juvenile and hyperplastic) were found in 77 (59%) and were the commonest biopsy resulst in those who underwent colonoscopy. This is in line with the study results from Iran that showed that the most common pathological findings were juvenile polyp seen in 84 (23.1%) followed by lymphoid nodular hyperplasia in 55 (15.2%) and solitary rectal ulcers in 25 (6.9%) of the patients (10,14).

CONCLUSION

This study clearly demonstrated that the commonest indication for gastroscopic and colonoscopic procedures were bloody vomiting and rectal bleeding, respectively. Esophageal varices, polyps, nonspecific inflammations and IBD were the commonest gastroscopic and colonoscopic findings, indicating that endoscopy is a better procedure for the diagnosis and treatment of gastrointestinal problems in children. For children with upper and lower gastrointestinal bleedings, unexplained abdominal pain and constipation, endoscopic evaluation is important.

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Melese Shenkut Abebe, Girma Seyoum. *Ethiop Med J, 2020, Vol. 58, No. 1*

ORIGINAL ARTICLE

VARIANT CORONARY ARTERY AMONG CADAVERIC HEARTS IN ETHIOPIA

Melese Shenkut Abebe, MSc[1] , Girma Seyoum, PhD[2*]

ABSTRACT

Introduction*: Coronary artery variation/anomaly is defined as a coronary artery with abnormal origin, course, termination or anomalies of intrinsic coronary arterial anatomy. Thorough, sound and complete knowledge of the magnitude of a variant coronary artery is important for correct interpretation of angiography findings mainly during cardiac surgery.*

Objective: *The aim of the study was to identify a variant coronary artery among cadaver hearts in Ethiopia.*

Methods*: A descriptive, laboratory-based, observational study was conducted. A total of thirty cadaver hearts were obtained from the Department of Anatomy in different medical schools of Ethiopia.*

Result*: The median arteries were identified in 43.3% of the specimens. The myocardial bridge was found in three (10%) of the hearts of the median arteries. The presence of myocardial bridge was significantly associated with median artery (p-value <0.05). The conus artery or third coronary artery arose separately from right aortic sinus and nourished the proximal outflow part of the right ventricle in 6.7% of the hearts. In most hearts (66.7%), the sino-atrial nodal artery originated from the right coronary artery. The right coronary artery was dominant in 63.3%, while the left coronary artery was dominant in 23.3%, and in the remainder these arteries were codominant.*

Conclusion*: This study identified important coronary artery variation among Ethiopian cadaver hearts. Further investigation should be conducted on live individuals using imaging modalities.*

Keywords*: Anatomical variation, Cadaver, Coronary artery, Heart.*

INTRODUCTION

The heart receives an arterial supply for its myocardium and epicardium from the right and left coronary arteries. The endocardium and subendocardial tissues of the heart are nourished by diffusion or microvasculature directly from the chambers of the heart (1).

The right coronary artery (RCA) originates from the anterior right coronary sinus slightly inferior to the origin of the left coronary artery (LCA). The RCA passes posteriorly to the right of the pulmonary artery and traverses in the right atrioventricular groove to the posterior interventricular septum. The RCA gives off the conus branch in around 50% of the people; in the remaining the conus artery may arise directly from the right coronary sinus(2). Next, the RCA gives rise to the sinoatrial node artery, many right ventricular branches, the marginal branch and finally divides into the posterior interventricular artery (PIVA) and posterior left ventricular branches in a right dominant anatomy (2, 3).

The left coronary artery (LCA) originates from the left coronary sinus and passes to the left of and posterior to the pulmonary trunk. Usually, it bifurcates into the anterior interventricular artery (AIVA) and left circumflex (LCx) arteries. Sometimes, the LCA trifurcates into the AIVA and LCx arteries and the median artery.

The AIVA artery passes to the left of the pulmonary trunk and passes through the anterior interventricular groove toward the apex. It gives off the diagonal branches to the anterior free wall of the left ventricle and the septal branches to the anterior interventricular septum. The LCx artery passes over the left atrioventricular groove and gives rise to marginal branches and posterior left ventricular branches in a left dominant anatomy (2-4).

The dominance of the coronary arterial system is defined based on the origin of the posterior interventricular artery which typically supplies the inferior portion of the interventricular septum. In right dominance (about 85% of individuals), the right coronary artery crosses to the posterior interventricular groove and give rise to a posterior interventricular artery. In left dominance (7-8%) the left circumflex artery crosses the interventricular groove and give rise to the posterior interventricular artery. The remaining cases are named as codominance (7-8%) by which the inferior interventricular septum is perfused not by the posterior interventricular artery but by branches from distal RCA and LCx (1, 2).

The term “normal coronary anatomy” refers to the structures that are habitually observed. The term “anomaly” or infrequent variation is used for variations that occur in less than 1% of the general population (5).

[1]Lecturer of Anatomy, Department of Anatomy, College of Health Science, Addis Ababa University, Addis Ababa, Ethiopia. [2]Associate Professor of Anatomy, Department of Anatomy, College of Health Science, Addis Ababa University, Addis Ababa, Ethiopia.
*Corresponding Author E-mail: girma91@yahoo.com

However, authors used different criteria for classifying coronary artery into normal or variant. In this research, we used some minimal criteria adapted from Texas Heart Institute.

The coronary arteries should have the following criteria to be considered as normal coronary arteries: 1) dual aortic and separate origins from the right and left coronary ostia; 2) the course of the right coronary artery follows the right atrioventricular groove and that of the left coronary artery follows the left atrioventricular groove and anterior interventricular groove; 3) the posterior interventricular branch originates from either the right or left coronary arteries; 4) the left main coronary artery (left main trunk) bifurcates into the anterior interventricular and left circumflex branches; 5) the major coronary branches flow epicardially and their branches terminate at the myocardial capillary level (6) (Fig 1). Failure to distinguish between normal and anomalous structures may lead to misinterpretations and disastrous complications during heart surgery.

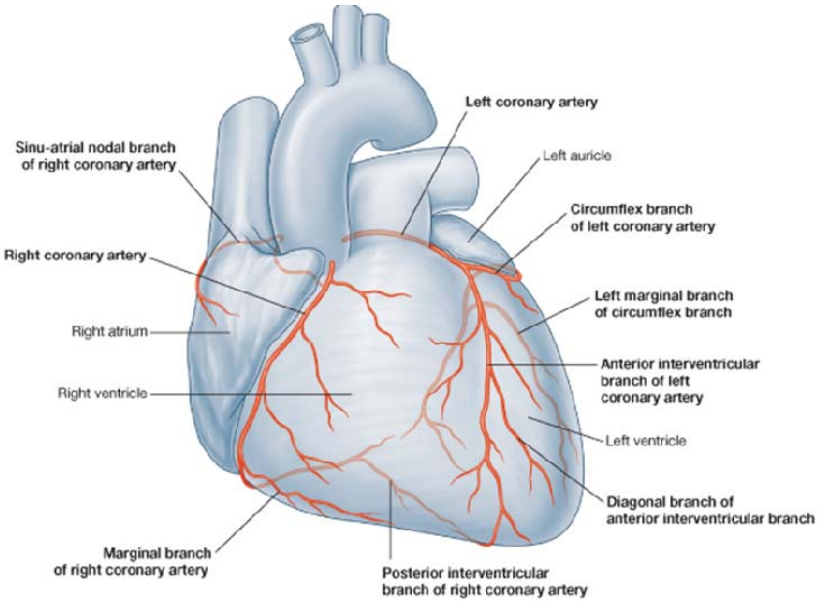

Figure 1: figurative representation of normal coronary artery and its branches. (adapted from Drake R et al, 2009(7).

A coronary artery anomaly is defined as a coronary artery with abnormal origin, course, termination or as an anomaly of intrinsic coronary arterial anatomy(8). Such anomalies are seen in 0.3% to 1.3% of patients undergoing diagnostic coronary angiography, in 1% of routine autopsies, and in 4% to 15% of young individuals who experience sudden death (9).

Many authors have stated that some of the coronary artery variations are considered as normal variant or minor anomalies. In spite of this, there are hemodynamically significant anomalies. These include: anomalous origin of the coronary artery from the opposite sinus with a course between the aorta and pulmonary artery, anomalous origin of the coronary artery from the pulmonary artery, myocardial bridging, and coronary artery fistula (10-12).

Complete knowledge of the magnitude of a variant or anomalous coronary artery is important for those who undergo diagnosis and intervention for cardiac diseases.

There are numerous studies from developed countries on the prevalence and the pattern of variant coronary arteries. However, epidemiological data on this issue originating from developing countries is limited, and in Ethiopia totally neglected. Therefore, this study is aimed to assess the magnitude of variant coronary arteries.

MATERIALS AND METHODS

A descriptive, laboratory-based, observational study design was conducted with the aim of identifying the prevalence of variant coronary arteries. A total of thirty (30) cadaver heart specimens used in this study were collected from the Department of Anatomy from different medical schools in Ethiopia. The study was approved by the ethical review committee of Wollo University prior to data collection. The specimens were collected irrespective of religion, age, and medical diagnosis. Any heart which was considered to be traumatized by injury or subject to a pathological process was excluded from the study.

Each heart was preserved by an embalming fluid (10% formalin, phenol solution, and glycerin). The epicardial and subepicardial adipose tissues were removed and the root of both right and left coronary arteries was investigated.

Each coronary artery was examined for their branches, pathway, and area of distribution. The origin of the conus branch was identified. For the purpose of determining coronary arterial dominance, the artery that supplied the posterior interventricular sulcus was investigated. The number of hearts with median artery and its origin was also investigated. Dye was injected through the left coronary orifice in order to visualize the median artery and myocardial bridge. A transverse section of the ascending aorta was made 2 cm above the sino-tubular junction in order to visualize the coronary sinuses and ostium.

Finally, all findings from the hearts were photographed, coded and entered to Epi-info 7. The data were analyzed by using SPSS version 20 statistical software. A p-value <0.05 was considered statistically significant. Descriptive statistics were applied and the results are presented in text, tables, and figures.

RESULTS

A total of 30 cadaveric hearts (23 males and seven females) were investigated in this study. All specimens had both right and left coronary arteries and the three aortic sinuses (anterior, right and left). The right and left coronary arteries arose from the right and left aortic sinuses respectively (Fig.2).

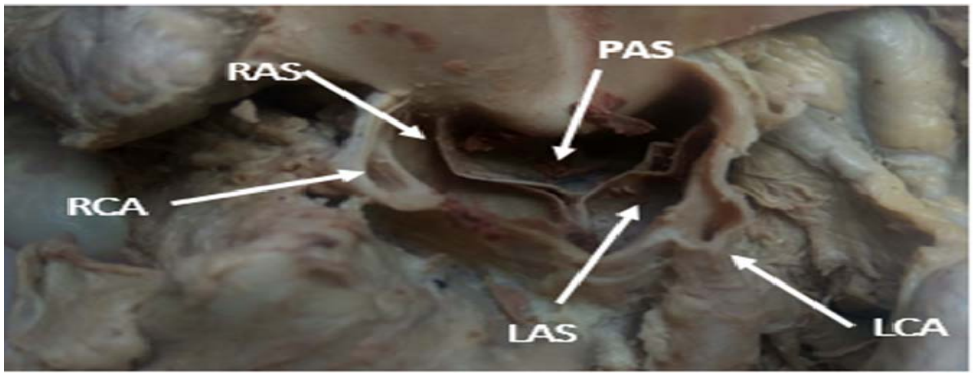

Figure 2: A photograph of transversely sectioned ascending aorta (male) showing the three aortic sinuses and the two coronary ostia. RAS: right aortic sinus; LAS: left aortic sinus; PAS: posterior aortic sinus; RCA: right coronary artery; LCA: left coronary artery.

Table 1: The common type of coronary artery variations seen in this study.

Type of variation	Sex		Frequency % N=30
	Female	Male	
Myocardial bridge	0	3	3(10%)
Median artery	3	10	13(43.3%)
Conus artery arose from right coronary artery	6	20	26(87.7)
Conus artery arose from right coronary sinus	1	3	4(13.3%)
SA nodal artery arose from RCA	4	16	20 (66.7%)
SA nodal artery arose from LCA	3	7	10 (33.3%)

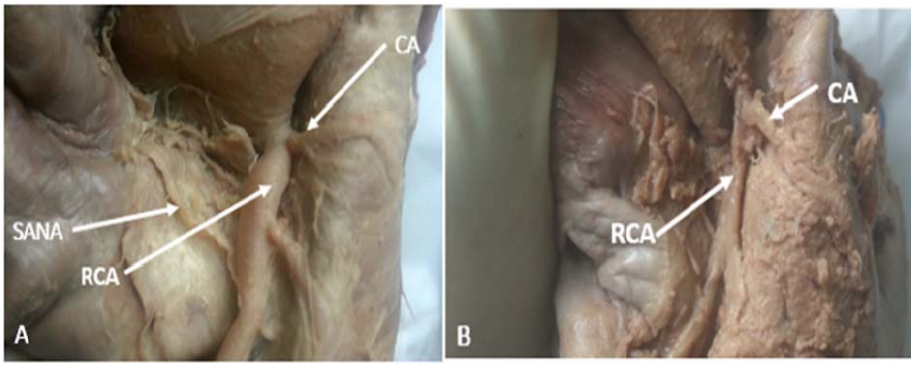

Figure 3: Photograph shows (A) the conus artery arises from right coronary sinus and SA nodal artery arising from right coronary artery, and (B) the conus artery originating from right coronary sinus. RCA: right coronary artery; SANA: SA nodal artery; CA: conus artery.

The SA nodal artery arose from RCA in 66.7% of the hearts. In the remaining hearts (33.3%) the SA nodal artery originated from the LCA. More distally, the RCA gave rise to marginal branch in all hearts and posterior interventricular artery (PIVA) in 63.3% (Fig 6). In 23.3% of the hearts the PIVA originated from the left circumflex branch of LCA.

The main trunk LCA bifurcated into the anterior interventricular artery (AIVA) and left circumflex in 56.7% of hearts, trifurcated into one median artery in addition to the AIVA and left circumflex artery in 26.3%, and quadrifurcated into AIVA, left circumflex and two median arteries in 16.7% of the specimens (Fig 4).

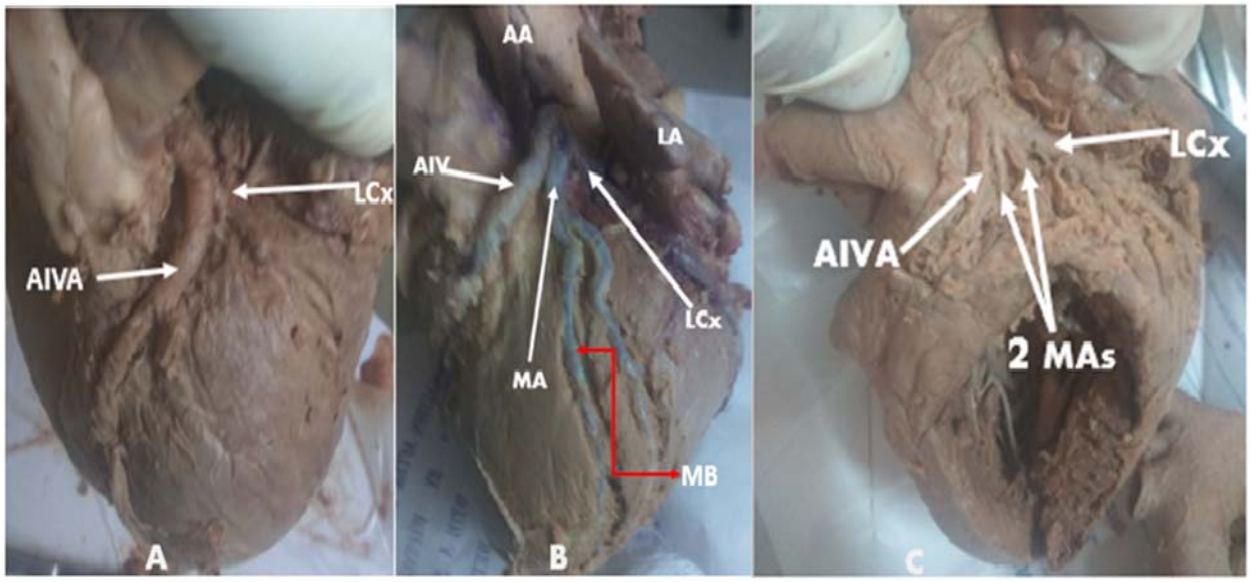

Figure 4: Photograph shows branches of left coronary artery. (A) Bifurcation, (B) Trifurcation and muscle fibers form myocardial bridge removed (red z line), (C) Quadrifurcation. AIVA: anterior interventricular artery; LCx: left circumflex; MA or MAs (plural): median artery or arteries; MB: myocardial bridge; AA: Ascending aorta; LA: Left auricle.

In all hearts, the AIVA arose from LCA under left auricle and passed in the anterior interventricular groove towards the apex of the heart. This is observed in Figure 4B where the AIVA originated from the LCA under the left auricle flap, and in Figure 4A where it passes through the anterior interventricular groove.

The median artery or raminus intermedius was found in 43.3% of the specimens. One median artery (26.3% of hearts) and two median arteries (16.7%) arose from the main trunk of the LCA. Most of the median arteries, eleven of thirteen were small as compared to the other two usual branches, whereas the remaining two median arteries were comparable in size with the AIVA and left circumflex branch (Fig 4C).

One of the median arteries arose singly from the LCA main trunk and then bifurcate, pass through the cardiac muscle fibers forming a bridge over it and reach to the apex of left ventricle unlike the other which mostly terminated to the proximal segment of the left ventricle (Fig 4B). All the median arteries were distributed to the anterior surface of the left ventricle (Fig 4).

Ten percent (10%) of the coronary artery branches passed through the myocardium forming myocardial bridge, meaning the main artery passed through a tunnel forming cardiac muscle fibers. All such arteries were median arteries (Fig 4B), and this association reached statistical significance (p value= 0.037).

Based on which coronary artery gave rise to the posterior interventricular branch, coronary arterial dominance was also investigated. Right dominance accounted for most of the specimen (63.3%), while left dominant and codominance contributed for 23.3% and 13.3% respectively (Fig 5).

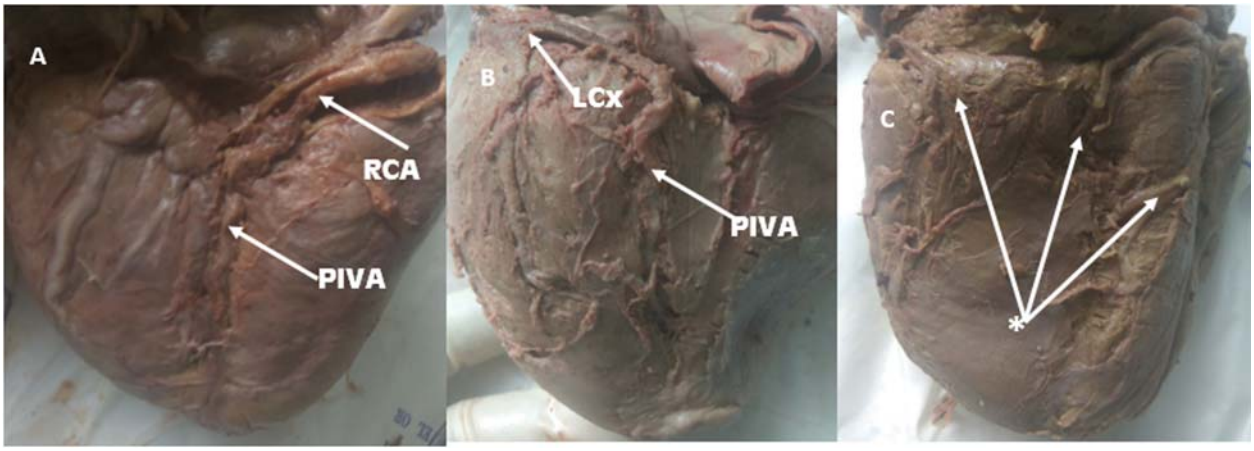

Figure 5: Photographs show coronary arterial dominance. (A): right dominant; (B): left dominant; (C): co-dominant. RCA: right coronary artery; LCx: left circumflex; PIVA: posterior interventricular artery; Asterisk (*): branches from both RCA & LCA.

DISCUSSION

Coronary arteries have long been investigated by anatomist and clinicians. However, the definition of "normal" and "abnormal" coronary artery is still equivocal. The consensus is that the majority of hearts have left and right coronary arteries, with some hearts having additional artery (13).

Coronary arteries can vary in their origin, distribution, number, and size. The nature of variation may be minor or major, a normal variant or a hemodynamically significant anomaly. These variations are studied by gross anatomic inspection, injecting corrosive chemicals or by radiography (5).

The knowledge of the existence of variant or anomalous coronary arteries is important to correctly interpret angiographic findings. During open-heart surgery, it is very difficult to cannulate vessels which arise from the anomalous ostia. While performing coronary arteriography and angiography, a preliminary aortic root injection of the dye must be given to locate the exact number of orifices and coronary arteries, so that fatal outcomes can be prevented. In addition, variants with particular hemodynamic significance have potential clinical implications (5). For example, an abnormal origin of a coronary artery from the pulmonary trunk or pulmonary artery has a chance to cause: myocardial infarction, mitral insufficiency, congestive heart failure and death in early infancy (14, 15). Reversed aortic sinus origin of coronary arteries is associated with cardiac ischemia and sudden death. Myocardial bridges are also reported to cause myocardial ischemia, infarction, stunning, left ventricular dysfunction, life threatening arrhythmias, exercise-induced tachycardia and sudden cardiac death (16, 17).

Understanding and diagnosing coronary artery variations is very critical in planning the treatment and interpretation of findings of cardiovascular diseases, especially for patients undergoing coronary arteriography, coronary interventions and cardiac surgery(18). Some investigators even suggest coronary artery variations like right coronary dominance are associated with the severity of coronary artery disease (19).

The first demonstrable variation identified was the origin of the conus artery, which for most hearts represents the first branch of the RCA. However, in some other heart samples it arose from the right aortic sinus and therefore, this artery is frequently referred as the third coronary artery (20). In our study, we found a conus artery variation in 13.3% of the heart samples. This finding is consistent with results reported by Erol and Seker, Gajbeet al and Kalpana who reported that in 17%, 16% and 24%, respectively, of the cases the conus artery directly originated from right aortic sinus (21-23). Other investigators also have reported higher frequencies of the third coronary artery (conus artery) (Table 2). According to Miyazaki and Kato, variation in prevalence were explained by differences in age or physiologic growth (24).

The presence of the third coronary artery has been reported to supply blood to the interventricular septum upon occlusion of the anterior interventricular artery. This may compromise diagnostic tests to evaluate AIVA occlusion and ischemia (20, 23). In addition, it has been reported that radiological establishment of the appropriate location and origin of the conus artery in relation to the right ventricular outflow tract prior to surgical treatment of tetralogy of fallot is critical (25).

Table 2: Comparison of coronary artery variation among various research. RD: right dominant, LD; left dominant, CD: co-dominant, BF: bifurcation, TF: trifurcation, QF: quadrifurcation.

Authors	Method and number of samples	Third coronary artery %	Coronary artery dominance %			LCA branching %		
			RD	LD	CD	BF	TF	QF
Gajbe U L et al. (2008)	Dissection (30)	16						
Fazliogullari Z et al. (2010)	Dissection (50)	68	86	4	10	46	44	10
Kalpana R (2003)	Dissection (100)	24				47	40	11
Olabu BO et al. (2007)	Dissection (148)	35						
Erol C and Seker M (2012)	Angiography (2096)	17	86.6	9.6	3.8			
Grande N et al.(1982)	Dissection (710)		33.6	32.2	34.2			
Loukas M et al. (2006)			24.4	66.6	8.7			
Kate et al. (2008)	Angiography (1000)		85.1	8.8	6.1			
Ogeng'o JA (2014)	Dissection (208)					54.8	32.2	9.6
Leguerrier A et al. (1976)						65–70	20-30	5–10
The present study	Dissection (30)	13	63.3	23.3	13.3	56.7	26.7	16.7

The overall prevalence of the median arteries reported by different investigators has varied from 31% to 54% (13, 21, 23). Our finding (43.3%) was within this range. We did not find a significant relationship between sex and presence of medial arteries, a finding also consistent with the aforementioned studies.

Another controversial variation is a myocardial bridge in which the main artery passes through a tunnel-shaped bridge of cardiac muscle fibers. Its occurrence is highly variable and ranges from 5%-80% (29). The present study found 10% of hearts with a myocardial bridge; all were from median arteries, which was highly significant statistically. The association between myocardial bridges and the medial artery is support by the study of Fazliogullari Z et al (13), though they observed a higher prevalence (81.5%) than our study.

Coronary arterial dominance has different definitions according to different authors. In this study, dominance was based on the origin of the PIVA. In right dominance, the PIVA arose from the RCA, and in left dominance the PIVA arose from the LCx, and in codominance, there was no PIVA, but branches from both LCx and RCA supplied the posterior interventricular groove. The frequency in this investigation was 63.3%, 23.3% and 13.3% for right, left and codominance, respectively. This distribution is consistent with the studies of Erol and Seker and Kate et al (21, 30).

Variability in prevalence exists between the present study and other studies listed in Table 2. These differences may be related to operational definitions of dominance.

In conclusion, this study found different coronary artery variations among cadavers in Ethiopia. The variations included the presence of the median artery, a myocardial bridge and third coronary artery, arterial dominance and origin of the sino-atrial artery. These variations can have functional and clinical significance, for example, in coronary bypass surgery and angiography. Therefore, greater attention should be given for these variants during diagnostic investigations and surgical procedures. Further investigations should be conducted on the living individuals in order to clarify differences in observations by various researchers and clearly depict the association between coronary artery variation and cardiac diseases.

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Conflict of Interest:

Authors have no conflict of interest to declare.

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ORIGINAL ARTICLE

EXPERIENCE OF LAPAROSCOPIC UROLOGY SURGERY AT A TERTIARY HOSPITAL, ADISS ABABA, ETHIOPIA

Alemayehu Tegegn, MD[1], Maria Elena Suarez Marcillan, MD, Henok Teshome, MD[1*]

ABSTRACT

Introduction*: For several decades minimal access surgery has become the path of preference in the treatment of most surgical diseases of the urinary tract, replacing open surgery. It is a common treatment modality in developed countries, but not in developing countries.*

Objective*: To determine the outcome of laparoscopic urologic surgeries at St. Paul's Hospital Millennium Medical College*

Methods*: An institution based prospective study was conducted on patients for whom laparoscopic urology surgeries were performed from January 1, 2017 to June 30, 2017 at St Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia.*

Results*: 33 laparoscopic urology surgeries were performed in the study period. 20 were renal cysts excision, 11 were nephrectomies and the remaining 2 were ureterolithotomies. For all procedures, there was no significant blood loss (<70ml for the nephrectomies and, <10 ml for the other procedures). After laparoscopic cystectomy, the postoperative hospital stay was 24 hours and all patients had commenced work activities by 15 days. After laparoscopic ureterolithotomy, the total hospital stay was 48 hours, and both patients similarly began routine work after 15 days post op. After laparoscopic nephrectomy, all patients were discharged after 48-hours, and commenced routine work by the 21st post op day.*

Conclusion*: Minimally invasive surgery is a safe and an effective option for the treatment of renal cyst, ureterolithiasis, and pathologies requiring nephrectomy. It provides a shorter hospital stay and earlier return to work than open surgery.*

Keywords*: Retroperitoneoscopy; Renal cyst decortications; Ureterolithotomy; Retroperitoneoscopic Nephrectomy, Hand-assisted transperitoneal laparoscopic nephrectomy*

INTRODUCTION

The benign and malignant diseases of the urinary tract until more than three decades ago were treated with open surgery (retro or trans-peritoneal) until the introduction of laparoscopic surgery and endourology. Currently in the developed world laparoscopic and robotic urologic surgery is the gold standard. However, this is not the case in developing countries, where there are limited laparoscopic and endourology instruments due to high cost, and a shortage of qualified medical personnel (1).

The history of laparoscopy dates back to 1901, when Georg Kelling of Dresden, Germany performed diagnostic laparoscopy on the peritoneal cavity of a dog (2). The first transperitoneal laparoscopic nephrectomy was done by Clayman et al. in 1991 at Washington University and the retroperitoneal approach using a dissecting balloon was introduced by Gaur et al. in 1993 (3,4).

The first laparoscopic ureterolithotomy was performed by Wickham, in 1979, by a retroperitoneal approach (5). Laparoscopic renal cyst excision was first described by Hulbert in 1992 (6).

The advantages of laparoscopic surgeries include reduced postoperative pain, shorter hospital stay, earlier return to normal activities, and improved cosmesis compared with the open approach (1-6).

St Paul's hospital is a tertiary hospital located in the country's capital, Addis Ababa, Ethiopia. Improving the quality of patient care is one of its missions. Accordingly, it has expanded its advanced diagnostics modalities (Ultrasound, Computed Tomography, Magnetic Resonance, etc.), its number of laparoscopic surgical instruments and qualified and trained medical personnel for the practice of complex urological surgeries using minimal access.

[1] St. Paul's Hospital Millennium Medical College
*Corresponding Author E-mail: henokteshome2@gmail.com

The goal of the current study was to evaluate our initial experiences in laparoscopic procedures. To the best of our knowledge, there are no similar studies in Ethiopia. These findings will be helpful for the hospital and other concerned bodies in understanding the advantages of laparoscopic urology surgery and planning appropriate actions.

METHODS AND MATERIALS

Study site: The study was conducted at St. Paul's Hospital Millennium Medical College (SPHMMC) department of surgery, Urology unit. During the study period, there were 5 urologists in the department. The unit had 12 beds and operates an average of 18 patients in the major operating room (OR) four times per week.

Study design: An institution-based prospective study was conducted on patients for whom laparoscopic urology surgeries were performed from January 1, 2017 to June 30, 2017 in St Paul's Hospital Millennium Medical College, Department of Urology Addis Ababa, Ethiopia.

We conducted this study to show the outcome of minimal access urologic surgeries at SPHMMC and specifically to (i) determine the indications for the laparoscopic procedure, (ii) determine the surgical time and blood loss (iii) determine patients' postoperative course.

The source population for the study was all urology patients operated at the urology unit of SPHMMC. Patients who underwent laparoscopic procedures for urologic indications were the study populations.

All patients with renal cysts who were symptomatic or with Bosniak grade three during the study period The ureterolithotomies were performed for failed or anatomically difficult Extracorporeal Shock Wave Lithotripsy (ESWL) and Ureteroscopy (URS). After renal cyst excision (laparoscopically) one patient's pathology result was malignant, hence laparoscopic nephrectomy was done.

Data collection: Data was collected using a structured questionnaire from the time the individual patient was admitted until discharge, and also in the referral clinic. Data were collected in three separate formats. The first format assessed the sociodemographic characteristics of the patient and the indication for surgery. The second format assessed the surgical technique and the intraoperative findings including the surgical time and blood loss.

The third format assessed the postoperative course of the patient. Data were collected by the investigators themselves.

Data analysis: Collected data were checked for completeness, cleaned, coded and entered in into SPSS version 20. The results were described within tables. Intraoperative pictures were used to show the intraoperative findings and techniques.

Ethical clearance was obtained from SPHMMC IRB. Data about individual patient records was used only for the study purpose and confidentiality maintained throughout the study.

Surgical Techniques

In all cases, ultrasonography (US) and contrasted/ non contrasted computed tomography (CT) scan, were done to determine the appropriate location, size, and Bosniak classification of renal cysts (Figure 1). For simple nephrectomies, CT and US was used to evaluate renal parenchyma and in stone

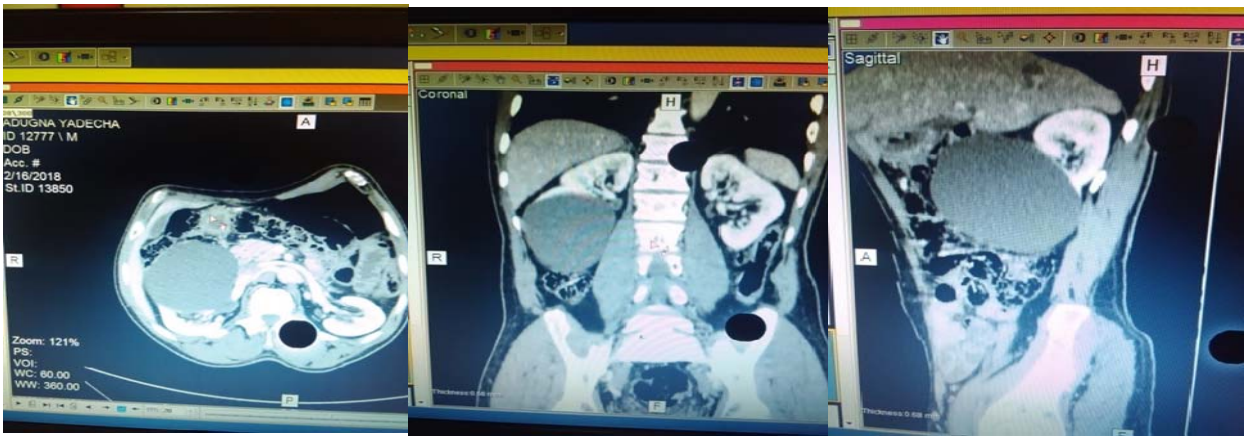


Figure 1: CT scan. Right Renal Cyst in the lower pole.

All surgeries were performed by the same two urologists (from Cuba and Ethiopia). Written consent was taken from all patients after disclosing the advantages and disadvantages of the procedures with the risk of open conversion.

All patients were operated under general anesthesia. The standard technique was used for all of the procedures. For retroperitoneal access three operating trocars (one 10 mm and two 5 mm) were used. Gaur's balloon was used afterinflation with 200 ml of normal saline to achieve adequate retroperitoneal space. CO_2 was insufflated at a pressure of 15 mm Hg.

Gerota's fascia was opened using grasping-forceps and dissector to identify the kidney and the cyst (Figure 2).

The cyst was then opened, aspirated and decortications performed with scissors or hooks using a monopolar electrosurgical unit (Figure 3). Finally, homeostasis of the edges was done and drainage inserted when needed. Urethral catheter was not inserted for the patients

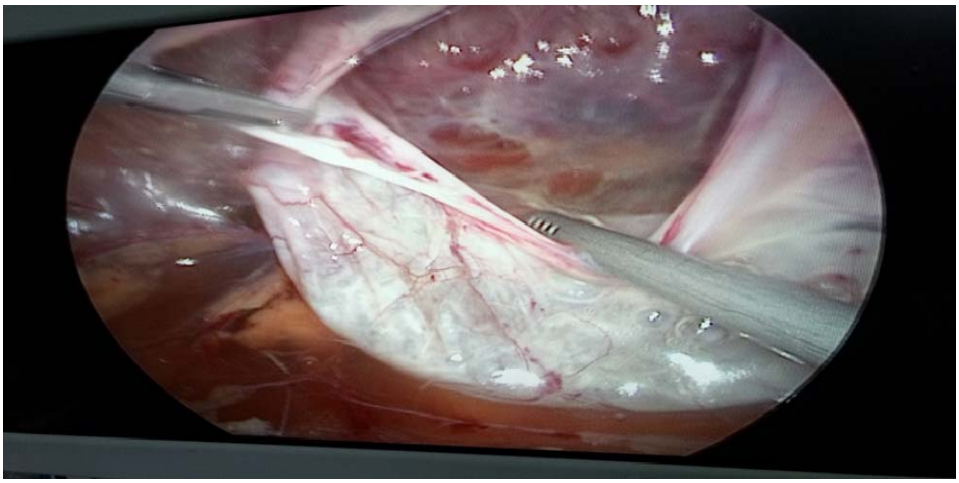


Figure 2: Right Retroperitoneoscopy: opening and drainage of a renal cyst cavity.

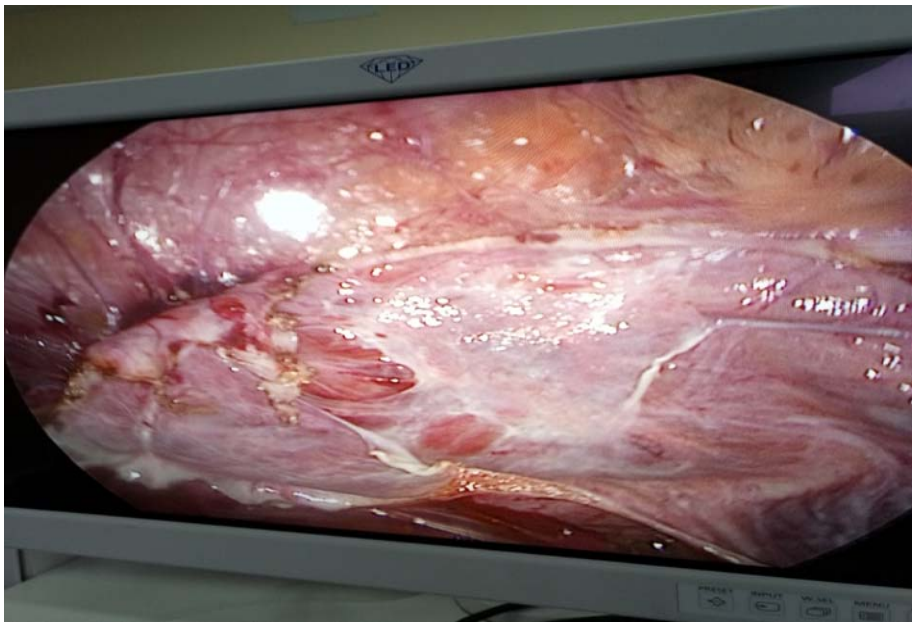
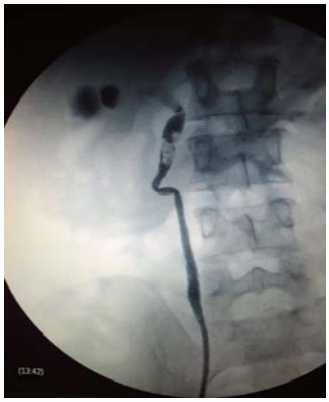


Figure 3: Right Retroperitoneoscopy: Cavity of renal cyst cleaned after decortication.

For ureterolithotomy, once the psoas muscle and ureter were located, the ureter was opened with a small incision using a hook and the stone extracted. By a joint maneuver, a guide wire was pushed up and over it and a JJ stent inserted into the kidney if it was not placed previously.

The ureteral incision was closed with 3/0 vicryl. A drain was placed in the retroperitoneal space and a urethral catheter inserted (Figure 4).

A



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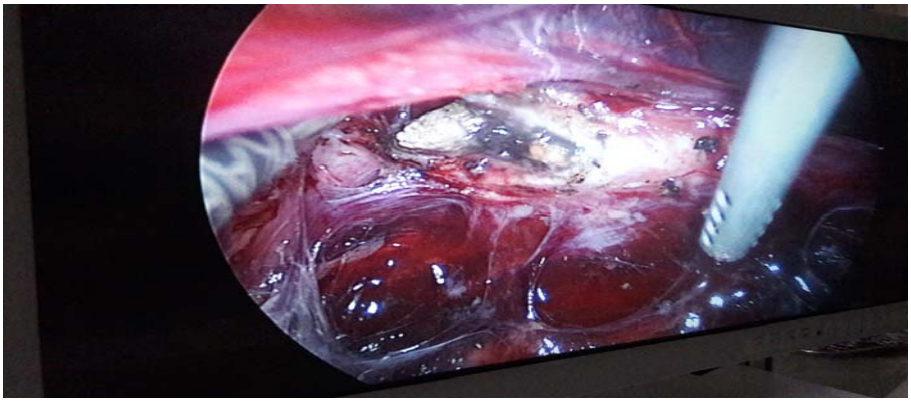

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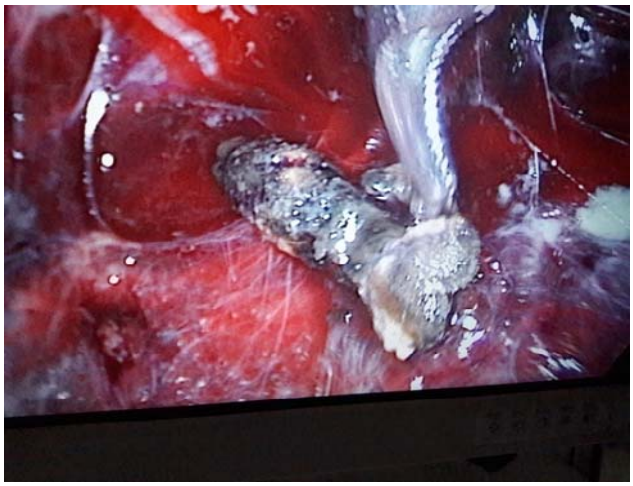

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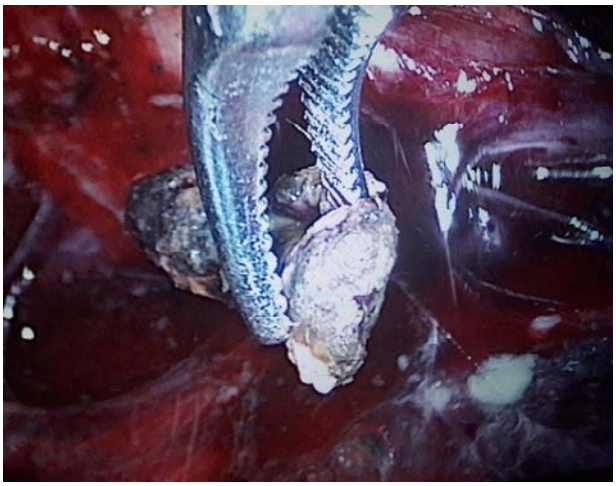

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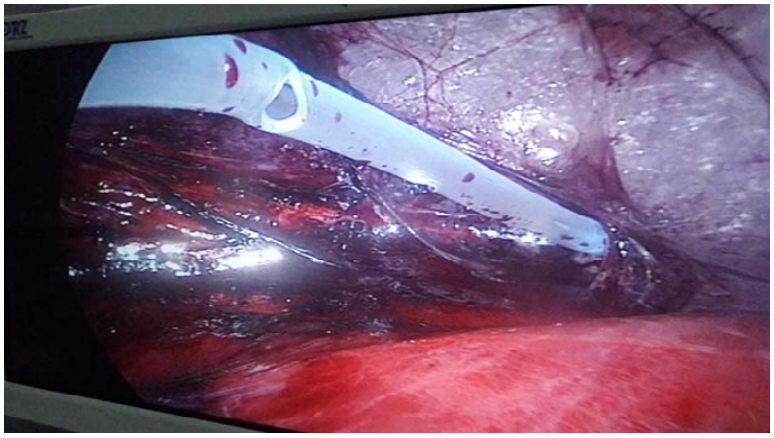

Figure 4: A: Right Retrograde Pyelography. Note stone located in the upper lumbar ureter. B: Small ureteral incision for the extraction of the stone. Note the ureteral inflammation at the site of the lithiasis. C and D: stone extraction. E: tubular drainage in place.

In laparoscopic nephrectomies, we combined the two previous procedures. The ureter was identified, dissected, ligated and sectioned. Gerota's fascia was opened and partial dissection of the kidney was done. The renal pedicle was dissected and clipped (Hemoclip) and cut with scissors. At the end of the dissection, the kidney was exteriorized through a bag via the telescope port, and morcellatión was done. The retroperitoneal space was checked and drainage placed.

For the hand-assisted radical nephrectomy, a 6 cm vertical incision was made above the umbilicus, as the hand port. Mobilization of the colon was done with an incision at the level of the Toldt line. Dissection of the kidney was done with a joint maneuver (manual and dissector), renal pedicle was dissected, clipped (Hemo-clip) and cut with scissors. The ureter was ligated and sectioned. When the dissection of the kidney was complete, it was placed in an endobag and removed entirely through the hand port.

Table 1: Characteristics of patients with renal cysts operated retroperitoneoscopically at SPHMMC: from January 1 to June 30 of 2017.

Age (Mean)		**52 years**
Sex	Male	12 (60%)
	Female	8 (40%)
Bosniak classification	I	13 (65%)
	II	3 (15%)
	IIF	3 (15%)
	III	1 (5%)
Size (Mean, longest diameter)		8.5 cm
Surgical time (mean)		64.7 minutes
Average time to return to routine work		15 days

Therefore, we did retroperitoneoscopic ureterolithotomy with complete removal of the stones. Later a JJ stent was placed. The operation time for both cases was 106 and 114 minutes. In the first post OP day we removed the urethral catheter, and the second day the retroperitoneal drain; bleeding was minimal. The total hospital stay was 48 hours. The JJ stent was removed after 2 weeks. On the 15th postoperative day both patients started their routine work.

All nephrectomies were performed entirely laparoscopically without conversion to open surgery (Table 2).

A drain was placed in the retroperitoneum and urethral catheter was inserted.

All specimens (cyst walls, morcellated and complete kidneys) were sent for histopathology, to check for malignancy.

RESULTS

In the study period, 33 urological laparoscopic surgeries were performed and analyzed, 20 were retroperitoneoscopic decortications for renal cysts (Table 1), and 11 were laparoscopic nephrectomies (10 simple and 1 radical nephrectomy) and the remaining 2 were ureterolithotomies. 32 of procedures were done by retroperitoneal access and 1 via a transperitoneal approach.

The patients were followed from 48 days to 9 months post operatively.

The mean (±SD) surgical time for laparoscopic cystectomy was 64.7 (±8.3) minutes. There was no significant blood loss (<10 ml). The postoperative hospital stay was 24 hours for all cases of renal cyst and all patients had commenced work activities by 15 days. In six months of follow up, the patients remained asymptomatic with no signs of recurrence of the cyst on follow up US and CT scan. The pathology exam of all patients showed a simple cyst, except one patient whose biopsy result was renal cell carcinoma for whom laparoscopic radical nephrectomy was done.

Two ureterolithotomies were performed, one for mid-ureteric stone after failed Extracorporeal Shock Wave Lithotripsy (ESWL) and Ureteroscopy (URS) and another for tortuous upper ureter (Figure 4) resulting in difficulty in inserting the guidewire and the ureteroscope.

The mean (±SD) operation time and blood loss for the retroperitoneoscopic nephrectomy was 120 minutes (±22.2) and 70 ml (±20.4), while for the transperitoneal approach the operation time and blood loss was 150 minutes and 60 ml respectively. The next day, retroperitoneal drains were removed and fluid diet and ambulation were started for all patients. All of them were discharged after 48-hours and commenced routine work by the 21st post op day.

In the postoperative follow-up at nine months, the patient with a renal tumor showed no signs of local and distant metastases on CT scan.

Table 2: Indications and laparoscopic approaches for patients who underwent laparoscopic nephrectomies at SPHMMC: from January 1 to June 31 of 2017.

Indications	Number and percent	Laparo-scopic approach
Hydronephrotic atrophies by pelviureteric junction (PUJ) obstruction	3 (27.2)	
Hydronephrotic atrophies secondary to stone formation	5 (45.5)	Retroperito-neoscopic approach
Hydronephrotic atrophies secondary to vascular abnormalities	2 (18.2)	
Renal Tumor	1 (9.1)	Transperito-neal approach

In our research, two retroperitoneal ureterolithotomies were done with complete stone extraction. The surgical time was 106 and 114 minutes, no significant bleeding was apparent, and hospital stay was 48 hours. In a similar study conducted by Navarro et al., the mean operation time and mean hospital stay was 110 minutes and 4.2 days respectively, which is comparable with our study (8). The median operative time of all surgeries is expected to decrease with increased surgical experience, as shown by a study conducted by Yusuf Saiffee et al. (9). Thus, we expect improvement in our operation time with increasing experience. The low number of ureterolithotomies by retroperitoneal access was because the majority of ureteric stones were treated by URS with pneumatic or laser lithotripsy, as the majority of the studies consider it as the treatment of choice (10,11).

We performed 10 nephrectomies, in spite of the perinephritis that on many occasions is present; conversion to open surgery was not necessary. The mean (±SD) operation time and blood loss for the retroperitoneoscopic nephrectomy was 120 minutes (±22.2) and 70 ml (±20.4), while for the transperitoneal approach the operation time and blood loss was 150 minutes and 60 ml respectively. The surgical time, minimal blood loss and favorable progress were similar to the studies performed by Saifee et al. and Thompson (9,12). In a study conducted by Gratzke et al. in high burden area Switzerland the operative duration was 113 (48) min during open nephrectomy, with intraoperative blood loss of 424 (361) mL and mortality rate of 16.2%; conversely, we observed a significantly lower blood loss and no mortality.

In all of the laparoscopic procedures (cystectomy, ureterolithotomy and nephrectomy) there were no intra and postoperative complications with excellent performance and recovery of all patients.

DISCUSSION

In our study the mean surgical time for laparoscopic cystectomy was 64.7 minutes. There was no significant blood loss (<10ml). The postoperative hospital stay was 24 hours for all cases of renal cyst excision. This is a shorter postoperative stay compared to a similar study conducted by Gupta et al. who reported of 24 patients who underwent laparoscopic cystectomy, the mean operating time was 95 minutes with an average hospital stay of 2.9 days (range 2–7 days) (7). We found that laparoscopic cystectomy is a good alternative for renal cyst management with good patient outcome, less postoperative stay and early return to work.

Our data support the conclusion that laparoscopic nephrectomy is a good alternative with low intraoperative blood loss, good patient outcome and less postoperative stay when compared with open nephrectomy (13).

A study conducted at SPHMMC to assess the pattern of general surgical and all urologic admissions (including the open procedures) showed the average total hospital stay for emergency urologic patients was 7.08 days. The average total hospital stay for elective urology patients was 9.4 days with an average preoperative stay of 5.3 and a post-operative stay of 4.1 days. Our study showed the maximum postoperative hospital stay was 48 hours, which is almost half of the open urologic procedures (14).

In general, our series demonstrated that minimally invasive surgery is a safe and effective option, for the treatment of renal cyst, ureterolithiasis, and pathologies requiring nephrectomy. It provides a shorter hospital stay, earlier return to work and normal activity than open surgery.

The limitation of the study was the relatively low sample size.

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ORIGINAL ARTICLE

EXPERIENCE OF COLONOSCOPY AT A TERTIARY HOSPITAL, ADISS ABABA, ETHIOPIA

Henok Teshome, MD[1*], Berhane Redae, MD[1], Henok Teklesilassie, MD[2]

ABSTRACT

Introduction*: Colonoscopy has become one of the gold standard investigation modalities for many colon and distal ileum pathologies. Its accuracy and success is highly dependent on many amendable factors such as bowel preparation and patient sedation. The quality of colonoscopy services should be measured in any institute regularly. So, this study aims to measure this quality in a tertiary hospital.*

Objective: The objective was to assess the clinical indications and colonoscopy outcomes among patients seen at St. Paul's Hospital Millennium Medical College.

Method*: Institution-based cross-sectional study was conducted among 608 patients. Data of patients who were investigated with colonoscopy at St. Paul's hospital endoscopy unit from February 1, 2016 – January 31, 2017 was analyzed.*

Results*: The mean (±SD) age of patients in the study was 45.8 (±14.6) years. Analgesia and sedation were not given for 6.1% of the patients. Inadequate bowel preparation (22%) was the sole reason for all completely abandoned colonoscopies and it was the single most preventable cause of incomplete colonoscopies. Colonoscopy completion rate was 76%. The commonest colonoscopy finding in this study was haemorrhoidal diseases (29.8%). The diagnostic yield was 72.5%. The only documented complication was post-procedure intraluminal bleeding in 2 (0.3%) patients.*

Conclusion*: There was low polypectomy, colonoscopy completion and bowel preparation rates compared to the standard. The colonoscopy completion rate was lowest for those with inadequate/poor bowel preparation with significant statistical association. The technique of bowel preparation should be revised.*

Keywords: *Colonoscopy, cecal intubation, complete colonoscopy, bowel preparation, colonic polyp*

INTRODUCTION

Colonoscopy is a safe and effective means of visual inspection of the large bowel and distal ileum from the distal rectum. It is a valuable tool for diagnosing various colonic pathologies and can be carried out for diagnostic and or therapeutic reasons (1). The colonoscope is 1.2 meters long, flexible tube, which is about the thickness of a finger with a camera and light at the tip. The tip of the scope is inserted into the anus and then is advanced slowly, under visual control, into the rectum, and through the colon usually as far as the distal ilium (2).

Colonoscopy has become the most commonly performed endoscopic procedure. The annual number of colonoscopies performed for both diagnostic and screening indications has increased rapidly as the population has grown older (3).

Colonoscopy may be done for a variety of reasons. Most often it is done to investigate the cause of blood in the stool, abdominal pain, diarrhea, and change in bowel habit or when an abnormality is found on other investigations or for screening purposes in high-risk individuals.

If the procedure is to be complete and accurate, the colon must be completely cleaned, and there are several preparation methods. Unsatisfactory bowel preparation is one of the commonest reasons for failure and inadequate visualization (3). In most institutes, colonoscopy can be performed safely with rare complications. Potential complications include bleeding, reactions to sedations used, bowel perforation, and discomfort.

The accuracy and success of colonoscopy is highly dependent on many amendable factors such as bowel preparation and patient sedation. The quality of colonoscopy service should be measured in any institute according to a standard. American Society of Gastrointestinal Endoscopy (ASGE)/American College of Gastroenterology (ACG) and European Society of Gastrointestinal Endoscopy (ESGE)/ United European Gastroenterology (UEG) task force guide line can be used as a standard.

[1] St. Paul Hospital Millennium Medical College
[2] Addis Abeba university
*Corresponding Author E-mail: henokteshome2@gmail.com

In Ethiopia, many studies have not done on colonoscopy outcome. Therefore, the aim of this study was to assess clinical indications, colonoscopy findings, failure rates and factors contributing to it and complications at St. Paul's Hospital Millennium Medical College (SPHMMC) over a period of one year. This will thus help to improve the success rate, decrease complications, and improve the quality of colonoscopy. It will also provide us with information about the burden of some gastrointestinal (GI) pathologies and lay the ground for further studies.

PATIENTS AND METHODS

This cross-sectional study was conducted at SPHMMC endoscopy unit, which is located in Addis Ababa, Ethiopia. At the time of the study, at St. Paul's Hospital endoscopy unit there were two functional endoscopy machines. On average 35-40, colonoscopies were performed per month. The study was conducted among patients who underwent colonoscopy examination at SPHMMC endoscopy unit from February 1, 2016 – January 31, 2017.

Data was collected by evaluating electronically documented colonoscopy results using a structured data collection format to assess the sociodemographic characteristics, clinical indications, colonoscopy findings, completion rates, pre-procedural preparation and complications. The success rate was evaluated based on polyp detection rate, cecum, and distal ilium evaluation.

Data were collected by the principal investigator. Data were cleaned, coded and analyzed by using IBM SPSS Statistics 23. Results were expressed in tables and graphs after analysis. Descriptive statistics were used for most variables and the Chi-square test, where necessary, was used to test the association among various variables. P-value of < 0.05 was used as a cut-off for determining statistical significance.

Ethical clearance was obtained from SPHMMC ethical review committee, and the name of the patient was not included in the study to preserve privacy.

RESULTS

In the one-year retrospective study, 608 colonoscopies were done at SPHMMC, of which 372 (61.2%) were males and the mean (±SD) age was 45.8 (±14.6) years with a range of 12 to 85 years. The commonest indications for colonoscopy were rectal bleeding (34.8%), Constipation (14.0%), Diarrhea (12.6%) and abdominal pain (10.3%) (Table 1). Others (2.8% of the indications) includes a positive occult blood test, perianal pain, recurrent perianal abscess, screening for metastasis, pain during defecation, Tuberculosis (TB) peritonitis, recurrent perianal lesions, incontinence, Family history of familial adenomatosis polyp, and a combination of the above signs and symptoms. Each of them constitutes less than 0.7% of the indications.

Table 1: Indications for colonoscopy among patients seen at St. Paul's Hospital Millennium Medical College endoscopy unit from February 1, 2016 – January 31, 2017, E.C

Indications	Frequency	Percent
Rectal Bleeding	212	34.8
Constipation	85	14.0
Diarrhea	79	12.6
Abdominal pain	61	10.3
Screening for Colorectal Cancer	32	5.3
Suspicions for Colorectal cancer (Specific reason not mentioned)	28	4.6
Mass on digital rectal examination	20	3.3
Intestinal obstruction	15	2.5
Surveillance after Polypectomy/Surgery	9	1.5
Anemia	9	1.5
In search of primary tumor (For secondaries of unknown origin)	8	1.3
Abdominal mass	8	1.3
Anal Discharge	9	1.5
Suspicious lesions on imaging	7	1.2
Rectal prolapse	6	1.0
Others	17	2.8
Not mentioned	13	2.1
Total	608	100

Preprocedural analgesia or sedative drugs were given for 93.9% of patients before colonoscopy. For the remaining 37 (6.1%) of the patients, colonoscopy was done without any medication (analgesia or sedation). Hyoscine, diazepam, and pethidine were the commonest pre-procedural single drugs used with frequencies of 35.5%, 18.8%, and 13.3%, respectively. In 15.2% of patients, a combination of two drugs (analgesics, sedative, and anti-spasmolytic drugs) were used. A combination of three drugs (hyoscine, diazepam, and pethidine) was given before colonoscopy for 4.1% of patients. Less than 1% of patients have received propofol and lidocaine spray.

In around one-half (50.5%) of the data sources, the degree of bowel preparation was not mentioned, but among the formats that had the information, 22.6% of patients had poor/inadequate bowel preparation (i.e. 11.2% of the study group). The remaining 53.2% and 24.2% had fair/good and excellent bowel preparations, respectively.

Colonoscopy, until the level of the terminal ileum, was done in only 77 (12.7%) of the patients. In the majority, 385 (63.3%), it was done till the level of the ileocecal valve. In the rest it was discontinued at the level of hepatic flexures (4.3%), rectum (4.3%), ascending colon (3.8%), sigmoid (3.3%), splenic flexures (3%) and descending colon (0.7). The procedure was completely abandoned in four (0.7%) patients. Colonoscopy completion rate (till the level of the ileocecal valve and terminal ileum) was 76%. After excluding cases with circumferential obstructing mass preventing further advancement, the adjusted colonoscopy completion rate was 80.5% (462 of 574 cases).

One hundred forty-six (24%) of colonoscopies didn't intubate the cecum (incomplete colonoscopies). The main reason for this was completely obstructing mass that prevented further advancement of the scope in 53.1% of incomplete colonoscopies (half of the obstructing masses being at the rectum). Inadequate bowel preparation was a reason in 26.6% of incomplete colonoscopies and 100% of completely abandoned colonoscopies. The other reasons were due to recurrent loops that made further advancement difficult (10.9%), none cooperative patient (6.3%) and intra luminal bleeding (3.1%).

Nearly one third (29.8%) of the colonoscopies had found haemorrhoidal diseases - (internal, external and internoexternal (Table 2).

Almost one-quarter of the colonoscopies (27.5%) were normal. One or more pathology was found in the remaining 441 patients making the diagnostic yield in this study (72.5%). Other commonly found pathology was polyp (12.8%) with a 12.8% polyp detection rate. Others (4.9%) comprised anorectal mass, multiple nonspecific ulcers with exudation, ascending colonic mass, aphthous ulcer, Kaposi sarcoma, transverse colon mass, descending colon mass, scrotal cecum, vascular ectasia, distal ilium TB features, and anal wart; each comprising less than 0.9% of patients. 84 (19.0% of patients with positive findings) had lesions that were suspicious for colorectal ca, and 65.4% of these suspicious lesions were found at the rectosigmoid area.

Table 2 : Colonoscopic findings among patients seen at St. Paul's Hospital Millennium

Colonoscopic Findings	Frequency	Percent
Normal	167	27.5
Haemorrhoidal Disease	181	29.8
Rectal mass	37	6.0
Sigmoid mass	14	2.3
Chron's disease features	14	2.3
Ulcerative colitis features	14	2.3
Redundant Colon	17	2.8
Polyp	78	12.8
Spastic bowel loops	20	3.3
None specific Inflammation signs	20	3.3
Anal fissure	15	2.4
Diverticulosis	22	3.6
Colonic Stenosis	8	1.3
Extraluminal compression	6	1.0
Caecal mass	12	2.0
Rectal prolapse	10	1.6
Schistosomiasis features	6	1.0
Fistula in ano	7	1.2
Others	30	4.9

Medical College endoscopy unit from February 1, 2016 – January 31, 2017

There was no documented mortality during colonoscopy in the study period. The only documented complication was post-procedure intraluminal bleeding in two (0.3%) of the patients. Three hundred thirty-two (54.6%) of the colonoscopies were performed by gastroenterology fellows. The remaining 236 (38.8%) and 40 (6.6%) were performed by gastroenterologists and endo surgeon. respectively.

Some 212 procedures were performed during colonoscopy, of which 171 (80.7%) were a biopsy of colonic or distal ileum lesions, 39 (18.4%) were polypectomies and two (0.9%) were hemorrhoid band ligations. Biopsies were taken in all colonoscopies which have found a mass, ulcers, nodules or there is suspicion of inflammatory bowel disease (IBD) or non-specific inflammations. A majority, 73 (42.7%), of biopsies were taken for colorectal masses followed by 26 (15.2%) for suspected IBD, 24 (14%) for multiple polyps and 16 (9.3%) for non-specific inflammations.

Complete polypectomy was done for 37 (47.4%) of patients with polyps and 100% of patients with polyps underwent either polypectomy or biopsy.

The colonoscopy completion rate was 74% and 78.7% for those with excellent and fair/good bowel preparation respectively and 61.7% for those with inadequate/poor preparation. P-value <0.05 showing a significant association between the degree of bowel preparation and colonoscopy completion rate (Table 3).

Table 3: Association between colonoscopy completion rate and degree of bowel preparation, St. Paul's Hospital Millennium Medical College, February 1, 2016 – January 31, 2017

Bowel Preparation	Level of Colonoscopy				Colonoscopy completion rate (Percent)
	Terminal ilium	Ileocecal valve	Doesn't reach Ileocecal valve	Total	
Excellent/ Good	35	145	53	233	77.3
Inadequate/ Poor	7	35	26	68	61.7
P Value=0.02					

While colonoscopy completion rate was 90% in those performed by an endo surgeon, it was 75% each for gastroenterologists and gastroenterology fellows (Table 4). But there was no statistically significant association between them, the P-value was >0.05. There was no statistically significant association between colonoscopy completion rate and pre-procedural medication use in this study (P-value was 0.2, >0.05).

Among the indications for colonoscopy: rectal bleeding, mass on digital rectal examination (DRE), suspicious lesions on imaging and suspicion for colorectal cancer produced the highest diagnostic yield (around 85% each) followed by anemia (77.8%) and abdominal mass (75%) (Table 5). Lower yields were found in patients who are screened for colorectal cancer (34.3%) and evaluated for secondaries of unknown origin (37.5%).

Table 4: Association between colonoscopy completion rate and qualification of the health professionals who performed colonoscopy, St. Paul's Hospital Millennium Medical College, February 1, 2016 – January 31, 2017, E.C

Performed by	Level of Colonoscopy				Colonoscopy completion rate (Percent)
	Terminal ilium	Ileocecal valve	Doesn't reach Ileocecal valve	Total	
Endosurgeon	2	34	4	40	90
Gastroenterologist	33	144	59	236	75
Gastroenterology Fellow	42	207	83	332	75
P Value = 0.1					

Table 5: Diagnostic yield of indications for colonoscopy among patients seen at St. Paul's Hospital Millennium Medical College endoscopy unit from February 1, 2016 – January 31, 2017, E.C

Indication	Normal	Abnormality Detected	Total	Diagnostic Yield (%)
Rectal Bleeding	31	181	212	85.3
Constipation	27	58	85	68.2
Diarrhea	27	52	79	65.8
Abdominal pain	21	40	61	65.5
Screening for Colorectal Cancer	21	11	32	34.3
Suspicion for Colorectal cancer (Specific reason not mentioned)	4	24	28	85.7
Mass on DRE	3	17	20	85
Intestinal obstruction	5	10	15	66.6
Surveillance after Polypectomy/ Surgery	3	6	9	66.6
Anemia	2	7	9	77.8
In search of primary tumor (For secondaries of unknown origin)	5	3	8	37.5
Abdominal mass	2	6	8	75
Anal Discharge	4	5	9	55.5
Suspicious lesions on imaging	1	6	7	85.7
Rectal prolapse	2	4	6	66.6

DISCUSSION

In this retrospective study conducted at SPHMMC, the mean age of patients was 45.8 years. In other studies that analyze colonoscopies done in Canada, Jamaica and Nigeria the mean age of patients were 59, 60 and 50 years (4-6). In our study, all the procedures had appropriate indications based on the standard set by ASGE/ACG, unlike the study conducted in the Rambam health care campus, 95.3% of procedures had appropriate indications (7,8). This is because all patients at SPHMMC are screened before an appointment for colonoscopy by the professional who is performing the procedure and there is a request paper for a colonoscopy which dictates the appropriate indications.

In our study, 6.1% (37) of the colonoscopies were performed without a pre-procedural medication and 67.6% of patients receive single drugs, a spasmolytic (hyoscine) being the commonly used drug. A combination of drugs was used in 19.3% of patients. In a retrospective review of 797 patients' colonoscopy reports in Canada, the majority (97%) of the procedures were performed using at least two drugs (midazolam and fentanyl). Only four procedures were performed without sedation and another four received propofol (4). During our review we couldn't find any documented reason for not using a pre-procedural medication.

But this lower use of a combination of analgesics and sedatives as a pre-procedural drug in our set up can be due to lack of appropriate standard for pre-procedural sedation and analgesics and lack of monitor machines in the endoscopy room or due to inadequate supply of drugs.

In this study, the procedure note didn't document the degree of bowel preparation in 50.5% of reports. This was too much lower than the standard, >98% documentation rate, set by ASGE/ACG (8). This low documentation rate can be mainly due to the use of different incomplete colonoscopy reporting formats (i.e. lack of a standard reporting format).

In our study, of the formats that had information about the degree of bowel preparation, 22.6% of patients had poor/inadequate bowel preparation. This is higher than the standard, ASGE/ACG and ESGE/UEG, which detects inadequate bowel preparation rate should not exceed 15% and 10 % respectively (8,9). In the retrospective study conducted in the Rambam Health campus, it was found that good or excellent bowel preparation was documented for 57.4% of procedures (7).

In this study conducted at SPHMMC with retrospective data collection, terminal ileum evaluation was done in only 12.7% of the patients. In the majority, 63.3% colonoscopy was done till the level of the ileocecal valve. Colonoscopy completion rate was 76%. After excluding cases with circumferential obstructing mass preventing further advancement, the adjusted colonoscopy completion rate was 80.5%. According to the ASGE/ACG and ESGE/UEG standard the cecum should be intubated in >90% of all cases and >95% if adjusted (8,9). Therefore, the completion rate in SPHMMC is lower than the standard, which can be explained by the lower degree of bowel preparation and most of the cases have found haemorrhoidal diseases. Therefore, further advancement was abandoned once pathology was detected.

Colonoscopy completion rate was 92%, 96%, 92.4%, 59%, 80% and 79.3% in Canadian, Jamaica, Rambam Health care campus, Ghana, South Africa and Ethiopia studies, respectively (4,5,7,10,-12). This shows that the studies done in Africa and mentioned in this literature had less than 90% completion rate (less than the standard) unlike studies done in western countries. Redundancy of the colon, inadequate bowel preparation due to the bulky nature of stools, and lack of endoscopist who performs both upper and lower gastrointestinal endoscopies at the same sitting were the major reasons put for the lower completion rate in the African studies (10-12).

The commonest colonoscopy finding in this study was haemorrhoidal diseases (29.8%) followed by a normal colonoscopy (27.5%). This study's diagnostic yield was 72.5%. In the Canadian study, the commonest finding was colonic polyp (31%) (3). In the above Nigerian study, the colonoscopic findings were normal in 24% of patients, colitis in 24%, hemorrhoids in 20%. The diagnostic yield in this study was 76%, which is comparable to our study (6). In the study done here in Ethiopia, Addis Ababa University, half of the patients had normal findings (12). The pathology detection rate of our study was comparable with the other studies and higher than the Ghanaian and Addis Ababa University studies (10,12). But the polyp detection rate of our study (12.8%) is lower than the criteria set by ASGE/ACG which should be >25% (8). However, this polyp detection rate can be acceptable depending on the prevalence of polyps in Ethiopia, so it needs further study. Since most of the patients in Western studies are old age higher prevalence of polyp is expected.

There was no documented mortality during colonoscopy in the study period.

The only documented complication was post-procedure intraluminal bleeding in two (0.3%) patients. This meets the standard set by ASGE/ACG, the incidence of perforation should be <1:500 and Incidence of post-polypectomy bleeding should be <1% (8). In a meta-analysis of twenty-three articles evaluating adverse events in older people, there was a much higher perforation (1/1000), bleeding (6.3/1000) and death (1/1000) rates (13). In a four-year study conducted in Spain higher incidence of complications was seen (1/1000 perforation rate and 1/13,493 deaths) (14). This low perforation and bleeding rate in our study can be due to lower rates of colonoscopy procedures like polypectomies and biopsy for chronic diarrhea.

In this study, even though complete polypectomy was done for only 50% of patients with polyps, 100% of patients with polyps underwent either polypectomy or biopsy. According to the standard set by ASGE/ACG, >98% of encountered polyps should be removed endoscopically /80% for ESGE (8,9). In this retrospective study, biopsy specimens were obtained in 41% of colonoscopies performed for an indication of chronic diarrhea. This is lower than the standard set by ASGE/ACG (i.e. >98% of colonoscopies performed for an indication of chronic diarrhea should have biopsy specimens obtained) (8).

Among the indications for colonoscopy in this study, rectal bleeding, mass on DRE, suspicious lesions on imaging and suspicion for colorectal cancer produced the highest diagnostic yield (around 85% each). Lower yields were found in patients who are screened for colorectal cancer (34.3%) and evaluated for secondaries of unknown origin (37.5%). In a retrospective analysis at Addis Ababa University, similarly, rectal bleeding produced the highest diagnostic yield (70%). Lower yields were found in patients with abdominal mass (33.3%), follow up colonoscopy (28.6%) and abdominal pain (26.9%) (12).

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ORIGINAL ARTICLE

SEROPOSITIVITY OF YELLOW FEVER VIRUS AMONG ACUTE FEBRILE PATIENTS ATTENDING SELECTED HEALTH FACILITIES IN BORENA DISTRICT, SOUTHERN ETHIOPIA

Eshetu Nigussie, MSc[1*], Techalew Shimelis, PhD[2], Daniel Eshetu, MSc[3], Girma Shumie, MSc[4], Wakweya Chali , MSc[4], Abraham Aseffa, MD, PhD[4], Endalamaw Gadisa, MSc, PhD[4]

ABSTRACT

Introductio*: Yellow fever (YF) is a reemerging public health threat in Ethiopia; however, there is limited information on the seroprevalence of Yellow Fever Virus (YFV) in different parts of the country and the sociodemographic factors that may predispose individuals to infection. In this study the seroprevalence and associated risk factors of YFV infection were assessed in Borena district, southern Ethiopia..*

Methods: *An institution based cross-sectional study was conducted from May to August 2016. A total of 519 consecutive acute febrile patients attending the outpatient departments of Teltelle Health Center, Yabelo and Moyale Hospitals were enrolled. Data on socio-demographic and environmental risk factors were collected using a structured questionnaire. Blood samples were collected from all participants and screened for yellow fever virus exposure using the indirect immunofluorescent assay.*

Result: *The overall prevalence of anti-YFV IgG and IgM was 12.5% and 7.3% respectively. IgG seropositivity was significantly higher among male subjects compared to females (15.7% and 9.6% respectively, AOR=1.69, 95% Cl: 1.01-2.91, p-value=0.04). A relatively higher IgM titer was observed in females compared to males (8.8% and 6) but it did not attain statistical significance (COR=1.51, 95% CI:0.78-2.95, p=0.16) . Furthermore, there was no significant association of IgG and IgM seropositivity by age.*

Conclusion *Yellow Fever Virus has public health significance in the study area. Males and those with a history of recent mosquito bites were disproportionately affected by the virus. We recommend further systematic studies to determine the environmental and host factors that determine the extent of exposure to yellow fever virus infection in the district to inform appropriate intervention measures.*

Key words*: Borena, Yellow Fever Virus, Indirect Immunofluorescent Assay, Ethiopia*

INTRODUCTION

Yellow fever virus (YFV) is an arthropod-borne virus (arbovirus) that causes yellow fever (YF) a common disease in South America and Sub-Saharan Africa (1). The virus is transmitted by the bite of infected mosquitoes belonging to the *Aedes* species in Africa and *Haemagogus* species in South America. Most infections remain asymptomatic (2, 3). Clinical YF is characterized by acute onset of fever, chills, headache, backache, generalized muscle pain, nausea and vomiting (4).

In most instances the clinical manifestation follows three phases; acute, remission and toxic phases. Most cases improve and recover within 4 to 5 days. Some cases will undergo a temporary remission phase for 24 –48 hours in which patients start to feel relief from their symptoms, and up to 15% to 25% might enter into a toxic phase after 1 to 2 days of initial recovery (5).The confirmation of YF infection requires trained laboratory personnel and specialized laboratory facilities. Laboratory criteria for diagnosis are detection of neutralizing anti-YFV antibodies or yellow fever viral genome. The standard confirmatory tests are plaque reduction neutralization test (PRNT) and reverse transcriptase-polymerase chain reaction (rt-PCR) (5). The indirect immunofluorescence assay (IIFA) to detect IgG and IgM antibodies against YFV, based on Euroimmun Biochip technology was shown to have an overall correlation of 98.7% with presence of active infection(6).

Yellow fever is becoming a re-emerging public health threat in Africa (1, 7, 8). During 2011 and 2012, major outbreaks were reported in Sudan and Uganda (9). There is a documented history of YF outbreaks in Ethiopia which dates back to the 1960s (10,11). YF re-surfaced in the country in 2013 in the Southern Nations Nationalities and Peoples Regional (SNNPR) State. The areas affected in the 2013 outbreak were the same ones, or adjacent to those affected by the outbreak from 50 years ago (12).

[1]Department of Medical Laboratory Science, Madda Walabu University, Bale Goba, Ethiopia.
[2.]School of Medical Laboratory Science, Hawassa University, Hawassa, Ethiopia.
[3]Department of Microbiology, Yirgalem Medical College, Yirgalem, Ethiopia.
[4.]Malaria and NTD Research Directorate, Armauer Hansen Research Institute, Addis Ababa, Ethiopia.
*Corresponding Author E-mail:

The most recent outbreak (2013) claimed 43 lives and necessitated a mass vaccination campaign that targeted over 527, 000 people (13).

Despite the fact that acute febrile illnesses are among the most common complaints in outpatient departments, knowledge on arboviruses including YFV is limited (14). Thus the aim of this study was to generate baseline data on the seroprevalence of YFV infection and associated risk factors in acute febrile patients visiting health facilities in the catchment area (Borena district, Oromia region, southern Ethiopia).

MATERIALS AND METHODS

Study design and site

A health facility based cross sectional study was carried out from May to August 2016 in Borena District. Three health facilities were included in the study, namely: Yabello Hospital, Moyale Hospital and Teltelle Health Center. The district is located in the southern part of Ethiopia, bordering Kenya. The climate of the district is semi-desert, the mean annual rain fall is 400-700 mm primarly from two rainy seasons (spring and autumn), and mean annual temperature ranges from 25-37^{o}C.

Study participants

All patients presenting with acute febrile illness at the outpatient departments of above mentioned health facilities during the study period were included in the informed consent. The sample size was estimated to be 519 assuming 9.2% for the prevalence of YFV (15); 3% precision in the estimate and 95% level of confidence.

Sample collection and Laboratory analysis

A pre-tested structured questionnaire was used to capture socio-demographic information. Venous blood was collected by trained health professionals at laboratory. Then the bloods samples were clotted and centrifuged at 1300 rpm (TDZ4-WS table top low speed centrifuge, Yorco). Separated sera were transported using liquid nitrogen (-196^{0}C) to Hawassa University Referral Hospital, and stored in a deep freezer (-80ºC). Sera were transported to Armaeur Hansen Research Institute (AHRI) in Addis Ababa using dry ice and screened for YFV IgG and IgM using EUROIMMUN IFT kit (Medizinische Labordiagnostika AG, Germany) according to the manufacturer's manual (16).

Data analysis

Data was double entered in REDCap data software (8.0.3.@2018, Vanderbilt University), and was analyzed using SPSS version 20 (Armonk, NY: IBM Corp).

The binary outcome variable was modeled using logistic regression. To control for possible effects of confounding, variables found to have an association with the outcome variable (P-value of 0.25) with bivariate analysis, they were entered into multivariable logistic regression model. Strength of associations between independent and outcome variables were summarized using odds ratio with corresponding 95% confidence intervals. P-value <0.05 was considered as indicator of a statistically significant association.

RESULTS

Demographic information

Out of 531 febrile patients approached, 12 were excluded 3 of whom reported a history of YF vaccination, and 9 of whom gave insufficient blood samples. Thus, 519 participants were enrolled: 39.7% from Teltelle Health Center, 36.6% from Moyale Hospital and 23.7% from Yabello Hospital. The mean age of the participants was 25.5 years (range 1 -80 years, standard deviation 15 years), and those in the age range of 15-24 years accounted for 32.4%. The proportion of female participants was 52%. A substantial proportion of the study participants were rural residents (53.6%), illiterate (60.9%), and farmers (33.9%).

Anti-YFV seropositivity segregated by socio-demographic characteristics

The overall IgG YFV seropositivity among study participants was 12.5%. IgG seropositivity of YFV was higher among males (15.7%) than among females (9.6%). Similarly, anti-YFV IgG positivity was highest (20%) among the elderly age group (above 65 years of age) and among urban residents (14.5%). (Table 1).

Overall seropositivity for anti-YFV IgM was 7.3%, higher in female subjects(8.8%) compared to male (6%) though this difference was not statistically significant (Table 2).

Furthermore higher anti-YFV IgG positivity was observed among patients recruited from Yabello (17.1%) and Moyale Hospitals (12.1%) whereas anti- YFV IgM positivity was higher in Teltelle Health Center though this did reach statistical significance (Table 3).

Table 1: Anti-YFV IgG seropositivity in relation to socio-demographic characteristics of participants (N=519) in Borena District, Southern Ethiopia, 2016.

Socio-demographic Characteristics	Number tested (%)	Number positive (%)	COR (95% CL)	AOR (95%CL)	P-value
Sex					
Male	249(48)	39(15.7)	1.74(1.02,2.95)*	1.69(1.01,2.91)*	0.04
Female	270(52)	26(9.6)	1	1	
Age (years)					
<5	29(5.6)	1(3.4)	0.14(0.01 ,1.51)	0.8(0.01,1.00)	0.06
6-14	74(14.3)	13(17.6)	0.85(0.21,3.45)	0.61(0.13,2.82)	0.52
15-24	168(32.4)	21(12.5)	0.57(0.15,2.19)	0.44(0.11,1.83)	0.26
25-34	136(26.2)	13(9.6)	0.42(0.10,1.69)	0.41(0.9,1.73)	0.23
35-44	51(9.8)	7(13.7)	0.64(0.14,2.84)	0.59(0.13,2.79)	0.51
45-54	28(5.4)	5(17.9)	0.87(0.17,4.27)	0.92(0.18,4.68)	0.92
55-64	18(3.5)	2(11.1)	0.50(0.07,3.48)	0.49(0.7,3.50)	0.48
>65	15(2.9)	3(20)	1	1	
Residence					
Rural	278(53.6)	30(10.8)	1.41(0.83,2.37)	0.87(0.45,1.68)	0.68
Urban	241(46.4)	35(14.5)	1		
Education level					
Illiterate	316(60.9)	34(10.8)	0.89(0.25,3.12)	1.07(0.24,4.81)	0.92
Primary	139(26.8)	20(14.3)	1.22(0.33,4.46)	0.99(0.23,4.32)	0.99
Secondary	39(7.5)	8(20.5)	1.89(0.45,7.95)	1.69(0.34,8.27)	0.51
College and above	25(4.8)	3(12)	1	1	
Occupation					
Farmer	176(33.9)	19(10.8)	0.89(0.24,3.24)	0.45(0.9,2.18)	0.32
Animal keeper	137(26.4)	15(10.9)	0.90(0.24,3.38)	0.47(0.10,2.21)	0.34
Employee	57(11)	7(12.3)	1.03(0.24,4.34)	0.54(0.10,2.93)	0.48
Student	67(12.9)	14(20.9)	1.94(0.51,7.42)	1.05(0.22,4.97)	0.95
Housewife	57(11)	7(12.3)	1.03(0.24,4.34)	0.79(0.15,4.26)	0.78
Others	25(4.8)	3(12)	1	1	

Table 2: Yellow fever virus IgM seropositivity in relation to age characteristics of participants (N=519) in Borena District, Southern Ethiopia, 2016.

Characteristics	Number(%) tested	Number(%) positive	COR(95% CL)	P-value
Sex				
Male	249(48)	16(6)	1	
Female	270(52)	22(8.8)	1.51(0.78-2.95)	0.16
Age (years)				
<5	29(5.6)	1(3.4)	1	
6-14	74(14.3)	8(10.8)	3.39(0.41-28.43)	0.26
15-24	168(32.4)	13(7.7)	2.35(0.29-18.67)	0.42
25-34	136(26.2)	9(6.6)	1.98(0.24-16.30)	0.52
35-44	51(9.8)	5(9.8)	3.04(0.34-27.41)	0.32
45-54	28(5.4)	2(7.1)	2.15(0.18-25.18)	0.54
55-64	18(3.5)	0(0)	0	
>65	15(2.9)	0(0)	0	
Residence				
Rural	278(53.6)	16(6)	1	
Urban	241(46.4)	22(8.8)	1.51(0.78-2.95)	0.65
Education level				
Illiterate	316(60.9)	21(6.7)	3.8(0.12-1.19)	0.10
Primary	139(26.8)	12(8.6)	0.49(0.14-1.67)	0.26
Secondary	39(7.5)	1(2.6)	0.14(0.01-1.32)	0.09
College and above	25(4.8)	4(16)	1	
Occupation				
Farmer	176(33.9)	11(6.2)	1.60(0.19-12.95)	0.66
Animal keeper	137(26.4)	10(7.3)	1.89(0.23-15.45)	0.55
Employee	57(11)	3(5.3)	1.33(0.13-13.48)	0.81
Student	67(12.9)	7(10.4)	2.80(0.33-23.99)	0.35
House wife	57(11)	6(10.4)	2.82(0.32-24.77)	0.35
Others	25(4.8)	1(4)	1	

Table 3: Seroprevalence of YFV, among study participants by health facilities in Borena district, Southern Ethiopia, 2016.

	YFV tested	YFV IgG		YFV IgM	
Study sites		Pos N (%)	COR95%CL	Pos N (%)	COR95%CL
Yabello	123	21 (17.1)	1.81 (0.95,3.48)	8 (6.5)	0.77 (0.33,1.85)
Moyale	190	23 (12.1)	1.21 (0.65,2.27	13(6.8)	0.82 (0.39,1.73)
Teltelle	206	21 (10.2)	1	17(8.3)	1

COR: Crude Odds Ratio AOR: Adjusted Odds Ratio

YFV associated factors

38.2% of the participants had heard about YFV, and 9.6% knew it is transmitted by mosquitoes. When asked about the environmental factors associated with mosquito-borne illnesses, 31.2% and 64.2% of participants respectively responded that the existence of stagnant water and trees nearby their dwelling areas were risk factors for exposure. 47.8% reported recent mosquito bites while they stayed outside during night time. Three hundred thirty (63.6%) reported they slept under mosquito nets, among these participants 20.2% and 41.4% stated they used bed nets consistently or sometimes respectively. However, only 4.1% used mosquito repellents during the day time or at night (Table 4).

Correlation between YFV seropositivity and its associated factors: YFV seropositivity was 15.7% in those who had heard about the virus and 24% in those who were aware that mosquitoes transmit the infection.

Equal positivity (14.9%) was observed among those who stated they stay out at night and those that used bed nets (Table 4). In bivariate analysis, a recent experience of having a mosquito bite (17.3%) and lack of knowledge on mode of transmission were the only factors that were significantly associated with YFV positivity. The association between recent mosquito bite and YFV infection was also statistically significant in a multivariable logistic regression analysis (AOR=3.34; 95% CI, 1.78-6.78, p=0.002). The association between lack of knowledge on mode of transmission and anti-YFV IgG seropositivity was of borderline significant (AOR= 3.01; 95%CI 0.65-1.09; p = 0.06) (Table 4).

Table 4: Anti-YFV IgG seropositivity in relation to participants knowledge about YFV and environmental risks of participants (N=519) in Borena District, Southern Ethiopia, 2016.

Characteristics	Number(%) tested	Number(%) sero-positive	COR (95% CL)	AOR(95% CL)	P-value
Heard about YFV					
Yes	198(38.2)	31(15.7)	1.57(0.93,2.64)	1.04(0.56,1.92)	0.91
No	321(61.8)	34(10.6)	1	1	
Mode of transmission					
Mosquito	50(9.6)	12(24)	2.45(1.20,4.98)	3.01(0.65,1.09)	0.06
By blood	14(2.7)	1(7.1)	0.59(0.08,4.65)	0.62(0.08,5.07)	0.66
Do not know	455(87.8)	52(11.4)	1	1	
Stagnant water					
Yes	162(31.2)	19(11.2)	1.11(0.63,1.97)	1.01(0.54,1.86)	0.99
No	357(68.8)	46(12.9)	1	1	
Trees around compound					
Yes	333(64.2)	44(13.2)	1.19(0.69,2.08)	0.95(0.51,1.78)	0.88
No	186(35.8)	21(11.3)	1	1	
Stay outside at night					
Yes	248(47.8)	37(14.9)	1.52(0.90,2.57)	1.33(0.74,2.39)	0.34
No	271(52.2)	28(10.6)	1	1	
Recent mosquito bite					
Yes	300(57.8)	52(17.3)	3.32(1.76,6.27)	3.34(1.78,6.78)*	0.002
No	219(42.2)	13(5.9)	1	1	
Bed net use					
Yes	330(63.6)	37(11.2)	0.89(0.52,1.50)	1.18(0.67,2.07)	0.58
No	189(36.4)	28(14.8)	1	1	
Repellent use					
Yes	21(4.1)	2(9.5)	0.73(0.16,3.19)	0.56(0.11,2.82)	0.48
No	498(95.9)	63(12.7)	1	1	

COR: Crude Odds Ratio AOR: Adjusted Odds Ratio *: significant at 95% CL

DISCUSSION

The prevalence of exposure to YFV as measured by anti-YFV IgG positivity among acute febrile patients in the study area was 12.5%. This is similar to reports from the Central African Republic (13.3%) (17) but lower than what was reported in Cameroon (26.9%) (18) or the Kenyan ocean coast (42%) (19). Similar lower prevalence rates have been reported in Kenya (6%), Uganda (7.5%), Nigeria (8.7%) and Guinea (2%) (20-23).

These discrepancies may be due to difference in the distribution of risk factors and variable climatic conditions by geographical regions, diversity of the studied populations, and difference in diagnostic performance of the employed laboratory methods. Moreover, lack of studies on the actual burden of YFV infection in the Ethiopian context limits comparison to studies in this country to gain perspectives on trends over time.

This study showed that gender significantly influenced the rate of YFV exposure status as measured by anti-YFV IgG levels where male participants were disproportionately infected. However, unlike this report, gender has not been found to be associated with YFV infection elsewhere (17, 19). Our findings of nearly equal risk across age groups,though somewhat more in the less sedentary age group (6-44 years), and urban setting might indicate a peridomestic type of transmission. Interestingly our data is in contrast to observations elsewhere where YFV infection showing increased exposure with age (17). Our relatively high anti-IgM and IgG seropositivity in our cohort may imply recent introduction and/or ongoing YFV transmission in our study settings.

In addition, self recall to recent mosquito bites was significantly associated with YFV seropositivity, collectively reinforcing our inference that the infection circulates in urban and rural settings and is likely that there is active ongoing peridomestic transmission in the study area. Overall, this study showed low awareness of YFV infection and its public health consequences among participants.

Thus, we recommend a community-based survey in the study and adjacent communities to verify our findings and take appropriate public health measures to avoid potential outbreaks. Studies are urgently needed to determine the environmental and host factors that determine the extent of exposure to YFV infection in the district for appropriate control and prevention planning.

Limitation of the study

Although, EUROIMMUN IFT was claimed to be highly specific, to our knowledge no data exist to rule-out cross reactivity with other flaviviruses in an endemic setting. Moreover, we have no afebrile community controls or convalescent sera, and as any health institution based study we used consecutive volunteering cases only there for, the risk of introducing bias is unavoidable. Thus, the findings of this study may not be generalized to the population in the study area.

Ethical Consideration

Ethical approval was obtained from Hawassa University College of Medicine and Health Sciences (IRB/006/08 date 27/10/2015), Oromia Regional Health Bureau (BEFO/1-8/3998 date 18/11/2015) and AHRI/ALERT. Written informed consent was sought from participants or parents/guardians in the case of minors. In addition, assent was obtained for minors between the age of 11 and 18 years.

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Conflict of Interest:

Authors have no conflict of Interest to declare.

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ORIGINAL ARTICLE

SATISFACTION AND TURNOVER INTENTION OF PHYSICIANS AND HEALTH OFFICERS IN GOVERNMENT HEALTH FACILITIES: A NATIONAL CROSS-SECTIONAL STUDY

Tegbar Yigzaw, MD, PhD*[1], Girma Temam, PhD[1], Jos van Roosmalen, MD, PhD[2], Jelle Stekelenburg, MD, PhD[3], Young-Mi Kim, EdD[1], Shelemo Shawula, MD, MPH, MSH[1], Damtew Woldemariam, MD, MSc[1], Eshete Yilma, MS[4]

ABSTRACT

Introduction: *Improving satisfaction, motivation and retention of health workers is an important policy imperative. Unsatisfied and unmotivated health workers are less likely to provide safe and quality care, satisfy their clients, and stay in their current job.*

Objective: *To assess job satisfaction and turnover intention of physicians and health officers in government health facilities and factors associated with those perceptions.*

Methods: *A national cross-sectional study was conducted involving 375 physicians and 127 health officers working in government health facilities selected randomly from the nine regional states and two city administrations based on a two-stage sampling strategy. Data were collected in 2014 using a face-to-face interview. The main variables of interest were job satisfaction, intention to leave and factors associated with job satisfaction and turnover intention. We conducted both descriptive analysis and multivariable logistic regression analysis in SPSS 24.*

Results: *Considering everything, only 39.2% of physicians and 48.8% of health officers said they were satisfied with their job. Specifically, the percentage of respondents satisfied with their salary & benefits, living conditions, facility infrastructure & supplies, management & leadership, workload, and recognition by the community were 17.5%, 40.5%, 40.7%, 47.3%, 68.6% and 86%, respectively. Moreover, 47.5% of physicians and 61.4% of health officers said they planned to leave their post within one year. Low pay, poor access to higher education, and limited opportunities for promotion were the three most important reasons for a decision to leave. The odds of job satisfaction was higher among health officers than physicians, and among respondents with more favorable rating of facility management & leadership, salary & benefits, and recognition by the community. The likelihood of intention to leave was lower among respondents with a more positive perception of facility management & leadership and their living conditions. Males, specialists and respondents working in secondary and tertiary hospitals were less likely to plan to leave. However, satisfaction with salary & benefits was not associated with turnover intention.*

Conclusions: *There is low job satisfaction and high turnover intention among physicians and health officers in the public sector. Although physicians were less likely to be satisfied than health officers, we did not find significant difference in their intention to leave their post. We recommend improving leadership and management, compensation package, living conditions and appreciation by the community to increase job satisfaction and retention.*

Key words: *satisfaction, motivation, retention, physician, health officer, Ethiopia*

INTRODUCTION

Investing in the health workforce is key to attaining global health development goals (1-3). Physicians are a vital member and leader of the health workforce, playing a critical role in delivering essential healthcare services and improving health outcomes (2-4). No wonder the number of doctors, along with nurses and midwives, is the basis for establishing minimum workforce density threshold to attain global health development goals (2). Public health officers, who do many of the primary health care tasks of physicians, are also important members of the health workforce around the world especially in Africa (5, 6). Public health officers exist in dozens of African countries (often in equal or larger number than physicians) and have different names in different countries such as non-physician clinicians, associate clinicians and clinical officers (5). In Ethiopia, the direct entry health officers receive four years of university education and are deployed mainly in health centers, while direct entry doctors are trained for six years and are deployed in hospitals.

Improving satisfaction, motivation and retention of health workers is an important policy imperative (3). Unsatisfied and unmotivated health workers are less likely to provide safe and quality care, satisfy their clients, and stay in their current job (7-10). Lower job satisfaction is also bad for health workers as it can lead to burnout, lower productivity, and mental health problems (8, 11).

[1] Jhpiego [2] Vrije Universiteit Amsterdam [3] Leeuwarden Medical Centre [4] USAID
*Corresponding Author E-mail: Tegbar.Yigzaw@jhpiego.org

High turnover of staff hurts accessibility and quality of health services, results in loss of institutional memory, and incurs huge cost to health systems (9, 12-14).

Some research evidence indicate significant problems with physician motivation and retention in Ethiopia. Despite having a very low physician density (0.03 per 1000 population) even by African standards, more than a quarter of Ethiopian-trained physicians are known to have migrated abroad (15). Intention to migrate is also high, 60% among junior doctors (16) and 53% among medical students (17). Retrospective studies have also pointed to significant attrition. A 6-year retrospective record review in East Wellega reported physician attrition rate of 47.2% (18). Another 20-year retrospective study in the largest medical college in the country found an overall turnover rate of 92.8% (19). Although these studies demonstrate high mobility of the physician workforce, the underlying reasons are not studied well. Moreover, to the best of our knowledge, there is only one study that investigated job satisfaction of doctors (16). Although the study reported that majority of them were not satisfied, its generalizability is constrained by the small sample size (88 doctors) and focus on a single graduate cohort (2004/5 graduating class). Accordingly, the primary objective of this study was to assess the satisfaction and turnover intention of physicians in Ethiopia's public health sector and factors influencing those perceptions. Recognizing the considerable task sharing with health officers, the secondary objective of our study was to compare satisfaction and turnover intention of physicians with that of health officers.

METHODS

A national cross-sectional study was conducted from 28 May to 14 June 2014, covering the nine regional states and two city administrations of Ethiopia. Although the study involved multiple categories of healthcare providers working in 227 health facilities, this manuscript focuses on physicians and health officers.

To obtain a nationally representative data, a two-stage stratified cluster sampling strategy was used. We selected health facilities in the first step and health workers in the second step. The eleven regions and city administrations were considered as strata and the 122 hospitals and 2,660 health centers as clusters. The sample government health facilities were allocated proportionally to each region. Health facilities were selected from each region/city administration using simple random sampling technique. Subsequently, data collectors received lists of available health workers from each facility and selected them randomly.

The physicians sampling frame was list of hospitals while health officers were selected from a sampling frame of facilities that included health centers and hospitals. Physicians and health officers who had been full time employees at least for 6 months in the facility were eligible for the survey.

Separate sample sizes were calculated for physicians and health officers to obtain a reliable estimate for each cadre. We applied a single proportion formula and the following assumptions: 95% level of confidence, 50% proportion (as there was no previous national estimate and to get the maximum sample size), 5% margin of error, and 1.2 design effect based on MEASURE Evaluation recommendation (20). We made further adjustment by considering a finite population correction (According to a 2013 HRIS assessment report by the FMOH, there were 2,668 doctors and 5,621 health officers in the public sector) and a 10% allowance for non-response rate. Accordingly, the calculated sample size was 432 for physicians and 468 for health officers. Based on MEASURE Evaluation recommendation for facility-based survey (20), we decided to sample four health care providers per facility making the number of required hospitals to fulfill the physician sample size to be 108. Similarly, 117 health centers and hospitals were required to achieve the health officer sample size.

Data were collected using face-to-face interview. The survey instrument was adapted from a similar study in Uganda (21). We measured overall job satisfaction by asking response to the statement "Considering everything, I am satisfied with my job". The response options were on a 5-point scale (strongly disagree=1, disagree=2, neutral=3, agree=4, and strongly agree=5). During data analysis, "Agree" and "strongly agree" responses were categorized as satisfied and percent satisfied was estimated accordingly. We also enquired about satisfaction with specific items related to the job and working and living conditions using the same 5-point scale. During analysis, we aggregated responses to specific items into thematic construct guided by the motivation and retention literature (22); namely, salary & benefits, management and leadership, facility infrastructure, work load, living conditions and recognition by the community (feeling valued and part of the local community). Except for living conditions and work load, the reliability statistics were acceptable, supporting our decision to put the items in the proposed constructs (Table 1).

Table 1: Thematic organization of items in specific job dimensions and their reliability statistics.

Job dimension and items	Reliability statistics (Cronbach's Alpha)
Salary and benefits	0.67
My salary package is fair	
My salary is fair compared to other staff with the same level	
My benefits (transport, duty allowance, housing, etc.) are fair compared with other staff at my level	
Management and leadership	0.88
I feel there are sufficient opportunities for promotion with my employer	
There is a good match for my skills and experience	
My job description is clear and up-to-date	
I receive recognition for doing good work	
My supervisor applies personnel policies and practices fairly to me	
I have a current work plan developed with my supervisor	
My annual performance appraisal is based on my work plan	
I feel that the organization values my work	
My supervisor is available when I need support	
I would encourage my family and friends to seek care here	
I have been given the training I need to succeed in my position	
I have access to coaching and mentoring when needed	
The facility takes specific measures to protect me against HIV/AIDS and other occupational hazards	
The head of the health facility is competent and committed	
I have a good relationship with co-workers	
Overall, the moral level in my team is good	
Workload	
My workload is reasonable	0.35
I can take time to eat lunch almost everyday	
Facility infrastructure	0.70
I have the supplies I need to do my job well and safely	
I have a working equipment to my job well and efficiently	
This facility has good access to drugs	
My work space is clean	
At work, I have access to safe clean water	
At work, I have good access to electricity	
At work, I have good internet connectivity	
Living conditions	0.43
At home, I have access to safe clean water	
At home, I have good access to electricity	
I have access to good schooling for my children*	
I have safe and efficient transportation to work*	
I am not worried about losing my job	
The community where I live has good shopping and entertainment	
Feeling valued and part of local community	0.72
I consider myself a part of the local community	
I feel that the community values my work	

*These two items were not included in the scale entered into logistic regression analysis as the questions were not applicable to many respondents. Entering them in the logistic regression analysis would have caused large missing

Turnover intention was measured by asking respondents if they were planning to leave their job in the next one year. The possible responses were "Yes" or "No". Study participants were also asked to rate the importance of factors in influencing a decision to leave their job. Importance was rated on a 5-point scale (not important=1, somewhat important=2, important=3, very important=4, and extremely important=5). During data analysis, we merged "very important" and "extremely important" to be interpreted as "highly important".

Data were analyzed in SPSS 24. Multivariable logistic regression analysis (using stepwise backward elimination) was performed to identify factors associated with job satisfaction and turnover intention. Sex, age, place of birth, marital status, profession, educational status, level of facility, salary & benefit construct, management and leadership construct, facility infrastructure construct, work load construct, living conditions construct, recognition by the community construct, and intention to stay were entered as independent variables in the job satisfaction model.

Preferring to treat the constructs as continuous variables, it was the mean scores for each construct that were used as independent variables in the regression analysis. The same independent variables except intention to stay were entered in the intention to leave model.

Informed verbal consent was obtained from all respondents. A trained interviewer discussed elements of the consent form, answered questions study participants had, and secured oral consent. Ethical clearance was secured from Johns Hopkins University Institutional Review Board (IRB) and further approval was obtained from the Ministry of Health of the Federal Democratic Republic of Ethiopia. We sought and obtained a waiver of signed consent from the IRB since our study posed minimal risk and did not involve patients .

RESULTS

Socio-demographic data

A total of 502 respondents (375 physicians and 127 health officers) working in 226 health facilities (107 hospitals and 119 health centers) participated in the study. The response rate was 95% for physicians but 29.9% for health officers, as we could not find the expected number of health officers in the surveyed facilities. Moreover, eight health officers working in nearby hospitals were invited as replacement when sampled health centers did not have one. The mean age of study participants was 28.5 years. Most study participants were males (75.1%), single (68.5%), urban origin (63.7%), without postgraduate qualification (90%), and working in health center, primary hospital or general hospital (80%) (Table 2).

Table 2: Socio-demographic characteristics of study participants

Variable	Physicians N (%)	Health officers N (%)	Total N (%)
Facility			
Primary hospital/ health center	89 (23.7%)	120 (94.5%)	209 (41.6%)
General hospital	186 (49.6%)	6 (4.7%)	192 (38.2%)
Tertiary hospital	100 (26.7%)	1 (0.8%)	101 (20.1%)
Sex			
Male	299 (79.7%)	78 (61.4%)	377 (75.1%)
Female	76 (20.3%)	49 (38.6%)	125 (24.9%)
Marital status			
Single	272 (72.5%)	72 (56.7%)	344 (68.5%)
Married	103 (27.5%)	55 (43.3%)	158 (31.5%)
Place of birth			
Urban	248 (66.1%)	72 (56.7%)	320 (63.7%)
Rural	127 (33.9%)	55 (43.3%)	182 (36.3%)
Duration of stay			
in current facility	337 (89.9%)	99 (78.0%)	436 (86.8%)
years or less	27 (7.2%)	19 (15.0%)	46 (9.2%)
years	11 (2.9%)	9 (7.0%)	20 (4.0%)
16 years and above			
Under obligation			
Yes	311 (82.9%)	62 (48.8%)	373 (74.3%)
No	64 (17.1%)	65 (51.2%)	129 (25.7%)
Residential			
house	24 (6.4%)	22 (17.3%)	46 (9.2%)
Own or parents'	256 (68.3%)	15 (11.8%)	271 (54.0%)
Provided by facility Rented	95 (25.3%)	90 (70.8%)	185 (36.8%)

Job satisfaction

Considering everything, 39.2% of physicians (95% CI=34.3%, 44.1%) and 48.8% of health officers (95% CI=40.1%, 57.5%) were satisfied with their job, with not statistically significant difference between the two groups. A higher percentage of respondents who were female, married, rural origin, with postgraduate qualification, working in lower level facilities and expressing intention to continue working in the current facility for at least two years said they were satisfied than their counterparts. However, the difference in job satisfaction was statistically significant for educational qualification (p=0.037) and intention to stay (p<0.001) only (Table 3).

Table 3: Cross-tabulation of categorical independent variables with the two outcome variables

Independent variables	Percent satisfied	P-value	Percent intending to leave in a year	P-value
Profession				
Medical doctor	39.2%		47.6%	
Health officer	48.8%	0.058	61.4%	0.007
Gender				
Male	39.5%		48.7%	
Female	48.0%	0.096	58.4%	0.06
Marital status				
Single	40.4%		52.8%	
Married	44.3%	0.411	47.5%	0.27
Place of birth				
Urban	38.4%		52.5%	
Rural	47.3%	0.054	48.6%	0.404
Education level				
Undergraduate	41.2%		53.8%	
Postgraduate	46.0%	0.037	26.5%	0.005
Facility level				
Primary hospital/ health	42.3%	Ref	61.8%	Ref
Center				
General hospital	42.6%	0.957	46.5%	0.002
Tertiary hospital	37.9%	0.473	27.6%	<0.001
Intention to stay >2 years				
Yes	64.1%			
No	32.8%	<0.001		

Figure 1 presents satisfaction with specific aspects of job, as measured by composite constructs. The proportion of respondents satisfied with their salary and benefits, living conditions, facility infrastructure, and management and leadership were 17.5%, 40.5%, 40.7% and 47.3%, respectively. Interestingly, however, 86.6% were pleased with the recognition by the community they serve.

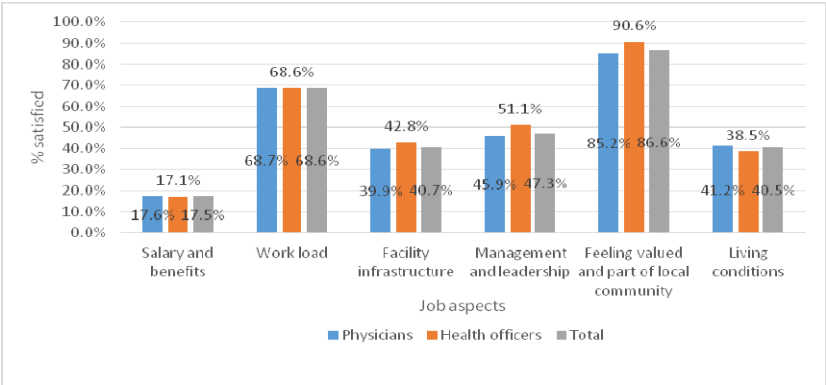

Figure 1: Physician and health officer's satisfaction with specific aspects of job constructs

A backward stepwise multivariable logistic regression was conducted in order to identify factors associated with overall job satisfaction. Five of the fourteen independent variables entered on step one were retained in the final model, of which three aspects of job (management & leadership, salary & benefits, and recognition by the community) and one background characteristic (profession) were statistically significant. Higher rating of management & leadership, salary & benefits, and recognition by the community were independently associated with increased job satisfaction. One unit increase in each of these independent variables was associated with a corresponding improvement in the odds of overall job satisfaction by 2.76, 2.65 and 1.54-folds, respectively.

Health officers were 77% more likely to be satisfied than physicians. Higher score on intention to stay for at least two years was also associated with better job satisfaction- a 38% higher likelihood of satisfaction for every unit increase in intention to stay. Although having a postgraduate education, and ratings of facility infrastructure, work load and living conditions yielded significant positive association with overall job satisfaction in bivariable analysis, they lost their significance when confounders were accounted for. Sex, age, marital status, place of birth and type of facility did not influence the likelihood of job satisfaction both in bivariable and multivariable analyses (Table 4).

Table 4: Factors associated with physicians and health officers job satisfaction in multivariable logistic regression analysis.

Variable	Crude Odds Ratio (95% CI), P-value	Adjusted Odds Ratio (95% CI), P-value
Profession		
Physician		
Health officer	1.48 (0.99, 2.22), 0.058	1.77 (1.04, 2.99), 0.034*
Sex		
Male	Ref	
Female	1.41 (0.94, 2.12), 0.096	1.60 (0.93, 2.73), 0.087
Age	1.02 (0.99, 1.05), 0.219	
Marital status		
Single	Ref	
Married	1.17 (0.80, 1.72), 0.411	
Place of birth		
Urban	Ref	
Rural	1.44 (0.99, 2.07), 0.054	1.53 (0.95, 2.47), 0.081
Educational qualification		
Undergraduate		
Postgraduate	1.64 (1.03, 2.61), 0.037	
Type of facility		
Primary hospital/ health center	Ref	
General hospital	1.01 (0.68, 1.51), 0.957	
Tertiary hospital	0.83 (0.51, 1.37), 0.473	
Intention to stay > 2 years	1.69 (1.47, 1.95), <0.001	1.38 (1.16, 1.65), <0.001*
Work load scale	1.53 (1.23, 1.90), <0.001	
Salary & benefit scale	3.09 (2.39, 3.99), <0.001	2.65 (1.95, 3.60), <0.001*
Management & leadership scale	5.46 (3.83, 7.79), <0.001	2.76 (1.85, 4.13), <0.001*
Facility infrastructure scale	2.29 (1.75, 3.0), <0.001	
Living conditions scale	1.79 (1.41, 2.27),<0.001	
Recognition by community scale	2.04 (1.56, 2.67), <0.001	1.54 (1.10, 2.16), 0.012*

Note: * denotes statistically significant associations. Adjusted odds ratio is not shown for variables which were eliminated from the model during the multivariable analysis

Intention to leave

Asked if they were planning to leave their job within one year, 47.6% of physicians (95% CI=42.5%, 52.6%) and 61.4% of health officers (95% CI=52.9%, 69.9%) answered yes. Furthermore, only 29.9% of physicians and 23.6% of health officers said they intended to stay in their facility for at least two years. A higher percent of respondents who were female, single, urban origin, with undergraduate qualification, and working in lower level facilities expressed turnover plan than their counterparts; however, the difference was statistically significant for education level and type of facility only (Table 3).

Figure 2 shows factors influencing the decision to leave a facility. Physicians rated low pay, poor access to higher education, limited opportunities for promotion, concern about safety at work, and unfair treatment by a supervisor as the top five push factors. Health officers provided a similar response: low pay, poor access to higher education, limited opportunities for promotion, high cost of living, and limited opportunities for in-service training topped the list.

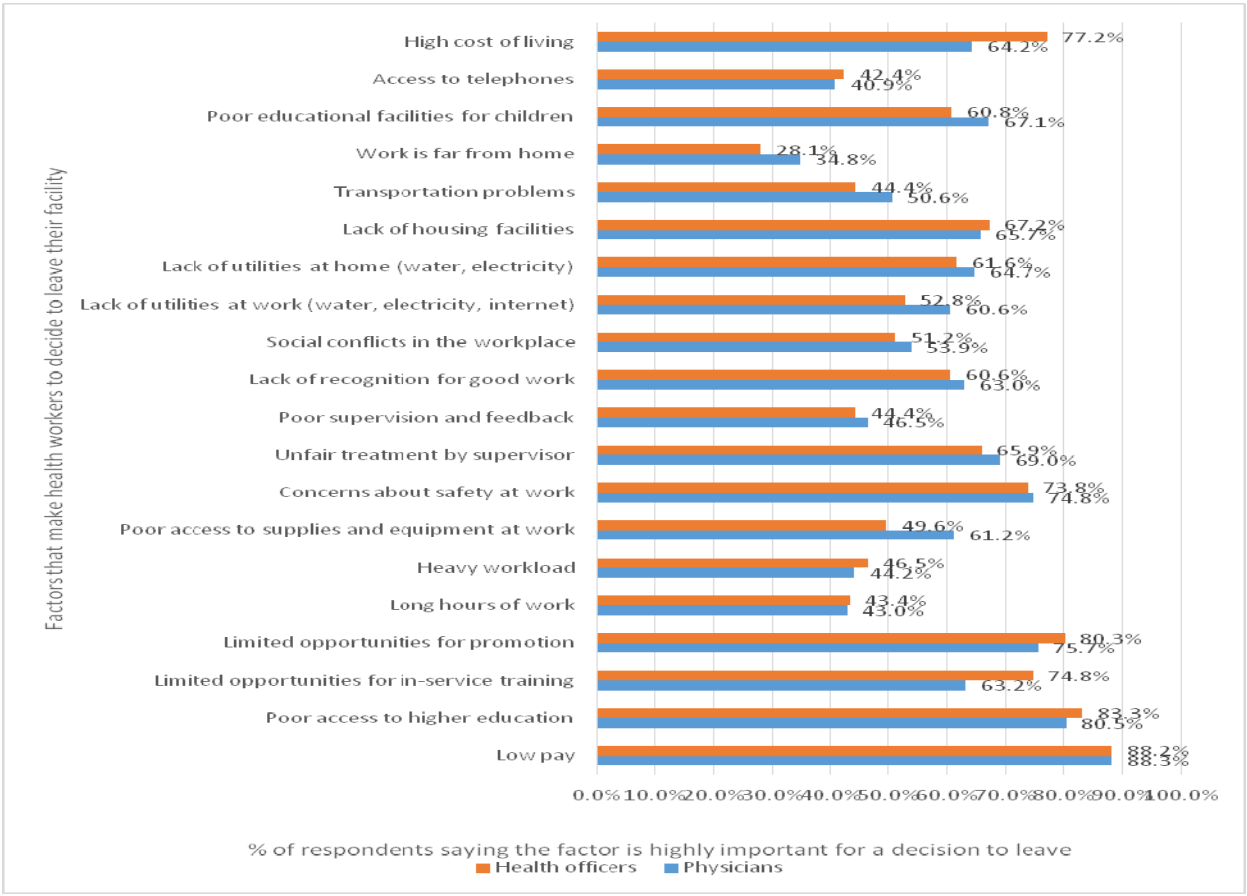

Figure 2: Factors influencing physicians and health officers decision to leave a facility

A backward stepwise multivariable logistic regression was done to identify factors associated with turnover intention. Of the thirteen independent variables entered in the model, two aspects of job (management & leadership, living conditions) and three background characteristics (sex, facility level, educational status) were significantly associated with the intention to leave. A unit increase in ratings of facility management & leadership and living conditions reduced the odds of intention to leave by 53% and 30%, respectively.

Respondents working in tertiary and secondary hospitals, respectively, were 76% and 41% less likely to want to leave compared to those working in lower levels (primary hospitals and health centers).

The chances of turnover intention was 46% lower among respondents with a postgraduate or specialty training. On the other hand, the odds of planning to quit was 77% higher among female respondents.

However, the significant negative association observed in the bivariable analyses between intention to quit and other aspects of job (salary & benefits, infrastructure & supplies, work load, and recognition by the community) were not sustained in the multivariable analysis. Age, place of birth, and marital status were also not associated with turnover intention, although the first two had significant association in bivariable analysis. Health officers were more likely than physicians to intend to leave in the bivariable analysis but the significance of this association was not maintained in the multivariable analysis (Table 5).

Table 5: Factors associated with physicians and health officers' turnover intention in multivariable logistic regression analysis.

Variable	Crude Odds Ratio (95% CI), P-value	Adjusted Odds Ratio (95% CI), P-value
Profession		
Physician	Ref	
Health officer	1.75 (1.16, 2.64), 0.007	
Sex		
Male	Ref	
Female	1.48 (0.98, 1.23), 0.06	1.77 (1.11, 2.80), 0.015*
Age	0.95 (0.92, 0.98), 0.002	
Place of birth		
Urban	Ref	
Rural	0.86 (0.59, 1.23), 0.404	
Marital status		
Single	Ref	
Married	0.81 (0.56, 1.18), 0.27	
Educational status		
Undergraduate	Ref	
Postgraduate	0.51 (0.31, 0.82), 0.005	0.54 (0.32, 0.92), 0.024*
Type of facility		
Primary hospital/ Health center	Ref	
General hospital	0.54 (0.36, 0.80), 0.002	0.59 (0.38, 0.91), 0.018*
Specialized hospital	0.24 (0.14, 0.40), <0.001	0.24 (0.13, 0.42), <0.001*
Work load scale	0.79 (0.64, 0.96), 0.021	
Salary & benefits scale	0.63 (0.51, 0.78), <0.001	0.81 (0.63, 1.04), 0.099
Management & leadership scale	0.40 (0.30, 0.53), <0.001	0.47 (0.34, 0.65), <0.001*
Facility infrastructure scale	0.58 (0.45, 0.74), 0.001	
Living conditions scale	0.52 (0.41, 0.67), 0.001	0.70 (0.53, 0.93), 0.013*
Recognition by community scale	0.83 (0.67, 1.03), 0.092	

DISCUSSION

Ethiopia's current health sector plan (2015/16-2019/20) has set ensuring quality and equity of healthcare and creating a compassionate, respectful and caring workforce as top priorities (23). Increasing retention of the health workforce is an explicit target in the health sustainable development goal (24).

Attaining these priority goals will depend to a large extent on building and retaining a motivated workforce. Accordingly, motivation and retention is rightly recognized as an important policy objective in national and global health workforce strategies (25, 26). It is against this backdrop we would like to discuss our findings on the state and drivers of satisfaction and turnover intention of physicians and health officers in Ethiopia's public sector.

According to our study, majority of physicians are not satisfied with their job and nearly half of them plan to leave in a year. Likewise majority of health officers are unsatisfied and are planning to quit their post. The lack of satisfaction is likely to dampen motivation, performance and retention of health workers as well as undermine their ability to provide person-centered care and increase patient satisfaction (7-11). The linkage between job satisfaction and intention to stay is supported by our study. Intention to leave, which is a precursor of actual turnover, is also associated with a host of negative consequences to the health system (9, 12-14).

The problem of intention to leave, however, is not limited to quitting. Even if the desire to leave may not materialize, many reluctant stayers will tend to have poor motivation and performance (27-29). Hence, the low satisfaction and high turnover intention found in our study presents considerable threats to attaining Ethiopia's goals of quality, equitable and compassionate healthcare and its progress towards the health sustainable development goal.

The low level of job satisfaction in our study (39.2% for physicians and 48.8% for health officers) is comparable to findings of most study reports from Ethiopia and elsewhere. Results from more than half a dozen local studies have reported job satisfaction prevalence among health workers in the range of 41.4%-63% (16, 30-35). The outlier was a study by Hotchkiss et al. (36), which reported higher satisfaction (79.5%). However, the comparison with local studies is constrained by the fact that prior studies from Ethiopia barely included physicians and health officers. The prevalence of job satisfaction found in our study is also in agreement with physician satisfaction in three developing countries- 37% in Uganda (21), 44.8% in India (37) and 45.7% in China (38) - but lower than the 52.1% reported from South Africa (39). The higher satisfaction in South Africa may be due to inclusion in the study of other health workers in addition to doctors.

The high magnitude of turnover intention found in our study (47.6% of physicians and 61.4% of health officers) confirms previous reports that workforce mobility is a major health system challenge in Ethiopia. Two studies had reported that half of the nurses intended to leave their job in the next year (32, 40), while another found that 54.4% of health workers were planning to leave within five years (30). Other studies had also suggested that two-thirds of pharmacy professionals (31) and 60% of nurses did not want to stay in the current facility (41).

Studies involving doctors and medical students had also found that more than half of the respondents were planning to emigrate (16,17), which is in line with a recent report that showed Ethiopia is the fifth largest source of African trained physicians to the United States (42). More tellingly, a cohort study had found that about 60% of doctors and nurses quit their first job within two years (16). Retrospective studies had also confirmed high physician attrition rates (18, 19, 43). Studies from other developing countries had also reported similarly high prevalence of turnover intention among physicians: 57% in Uganda (21), 55.2% in Iraq (44) and 41.4% in South Africa (39).

Many factors influence job satisfaction and turnover intention. In our study, a substantial percentage of physicians and health officers were unsatisfied with most aspects of their job, especially their salary and benefits, living conditions, facility infrastructure, and management and leadership. In addition, satisfaction with facility management and leadership, salary &benefits, and recognition by the community were found to be significant predictors of overall job satisfaction. Although both physicians and health officers have low job satisfaction, physicians fared worse in our study. The determinants of job satisfaction reported in this study are generally in agreement with other Ethiopian studies. A study of early career doctors and nurses had found high level of dissatisfaction with salary, chances of promotion, access to training, and working conditions (16).

Several other studies had also reported that health workers in Ethiopia were least satisfied with their salary & benefits (16, 30-36, 45-47). Some of these studies also showed that satisfaction with salary & benefits was significantly associated with overall job satisfaction and motivation (35, 36, 46). Similarly, many Ethiopian studies had indicated that job satisfaction and motivation is influenced by non-financial factors, such as promotion and development opportunities, leadership and management, recognition and appreciation by management and/or patients, work environment and interaction with colleagues, work load, and facility resources (30-36, 45-49).

With respect to push factors influencing a decision to leave one's job, low pay, poor access to higher education, and limited opportunities for promotion were the top three reasons mentioned by respondents in our study. In the multivariable analysis, satisfaction with management & leadership and with living conditions reduced the odds of intention to leave.

However, although low pay was mentioned as the number one consideration in a decision to leave and perceived adequacy of salary & benefit influenced job satisfaction, satisfaction with salary & benefit was not associated with turnover plan when confounding variables were taken into account. This may suggest that it takes more than dissatisfaction with salary & benefits to make a decision to leave. Or it may be that health workers think departure would not solve the compensation issue, as most will likely end up in the public sector which has largely consistent pay scale.

From background characteristics, the findings that having a postgraduate training and working in higher level hospitals reduced the likelihood of intention to quit make sense. Respondents whose need for further education is satisfied are more likely to be stable. Similarly, respondents located in secondary and tertiary hospitals are more likely to have better professional and economic opportunities in their place contributing to their stability. On the other hand, female health workers were more likely to plan to leave, which needs further research. However, between physicians and health officers, the odds of wanting to leave did not differ significantly. The modifiable determinants of turnover found in our study are largely in agreement with other published studies from Ethiopia. A cohort study had reported that health workers who were more satisfied with their job were less likely to leave abroad (16). Different studies had also identified lack of job satisfaction, low pay, poor access to higher education, limited opportunities for promotion, and poor work environment and group cohesion as reasons pushing health workers to consider leaving (16, 30-32, 40, 41).

Evidence from literature reviews on motivation and retention confirm the factors identified in our study. A systematic review of studies from developing countries distilled determinants of motivation and retention into financial factors, career development, continuing education, health facility infrastructure, availability of medical equipment and supplies, hospital management, and personal recognition and appreciation [(2). Other reviews of literature have also corroborated these findings, showing salaries and benefits, leadership and management style, work environment, education and training opportunities, empowerment and autonomy, and work load influence staff motivation and retention (9, 13, 50-53).

Strengths and limitations of the study

There are many studies on satisfaction of health workers in Africa and Ethiopia. However, most do not include large enough physicians in their sample and tend to be limited to fewer geographic regions and facilities. It is appreciable that our study recruited large and nationally representative sample of physicians. The comparison of physicians with health officers is also another strength. However, the inadequate sample size for health officers is a limitation and interpretation and generalizations of the findings on health officers' job satisfaction and turnover intention should be done cautiously. Although the cross-sectional study design does not allow us to establish a cause and effect relationship between factors and outcome variables, we tried to control the effects of confounders by doing multivariable analysis. Moreover, although the questionnaire was adapted from a similar survey in Uganda and most of the job satisfaction scales had good measurement reliability, the scales for work load and living conditions had low Cronbach's Alpha. This would need to be taken into account in the interpretation of our findings. Last but not least, we recognize that turnover intention may not necessarily equate with desire to leave and may not always result in exit.

Conclusions

The considerable level of dissatisfaction and turnover intention found in our study poses a serious challenge to Ethiopia's public health system and can undermine efforts to achieve health development goals. While we recognize that motivation and retention strategies should be comprehensive to address the broad range of factors frustrating health workers, our data suggest prioritizing management and leadership, compensation and benefit, living conditions, and appreciation by the community.

On the non-financial front, highest attention should be put on improving facility management and leadership. Upgrading human resource management skills of health leaders (through training and coaching) to foster positive, sound and fair leadership and management practices in the context of broader quality improvement can enhance motivation and retention of doctors and health officers. Improving living conditions such as availing good housing with reliable electricity and water supply can also be useful for retention. In view of the importance respondents placed on being valued by the community, media advocacy highlighting the positive contributions of health workers can boost motivation.

The second important aspect is related to salary. Increasing salary to a level enough to provide decent living is essential but fiscal constraints in the public sector may make the political process challenging and lengthy.

We contend that the return on investment will be worth the increased cost, as the resultant improvement in workforce motivation and performance will ensure value for money. A major barrier to making drastic salary revision in Ethiopia is that pay scale for health workers is regulated by the Ministry of Public Service and Human Resource Development, and the Ministry of Health has limited scope to maneuver. Although development partners pump huge financial resources into the health sector, this money has not been used to top up salaries. So, one policy option to consider is de -linking health workers pay scale from the Public Service and tapping into money obtained from development assistance until the country's economy is able to shoulder the expanded wage bill. Practical lessons can be drawn from other African countries, which increased health wage bill, de-linked health workforce from the Civil Service and topped-up salaries (54, 55). A less drastic but useful policy option is to supplement incomes of health workers by allowing managed dual practice. One approach is enabling health workers to see private patients in government health facilities outside regular work hours (otherwise known as private wing). Alternatively, health workers may be allowed to hold a second job outside the government facility. Both practices currently exist (16) but tend to be limited and poorly managed. Private wing is available in some facilities; however, even where it is practiced, it is marred with poor management including grievances about inclusiveness and fair distribution of revenues among all facility staff. Although many doctors have second job in private clinics, it is not officially recognized and regulated. As a result, it is not acknowledged as a benefit by doctors. And because it is unregulated, it is blamed for absenteeism from work.

We believe our study makes an important contribution to the motivation and retention literature on physicians and health officers in developing countries. It is one of the few studies from Africa, which is based on large and nationally representative sample and will hopefully stimulate further research.

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Conflict of interest

The authors have not conflict of interest to declare.

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Dori Woldu, Daniel Zewdneh, Yocabel Gorfu, Daniel Admasie. *Ethiop Med J, 2020, Vol. 58, No. 1*

CASE REPORT

EWING SARCOMA WITH UNUSUAL SKULL METASTASIS IN A FOUR-YEAR-OLD ETHIOPIAN CHILD

Dori Woldu, MD[2], Daniel Zewdneh, MD[1]*, Yocabel Gorfu, MD[1], Daniel Admasie, MD[1]

ABSTRACT

Ewing sarcoma is malignant round cell tumor, which is the second most common primary malignant bone tumor in pediatric patients. It presents with pain and swelling but some patients may present with signs and symptoms due to metastasis. The imaging modality preferred for diagnosis is conventional radiography. We report a four-year old female child from Tikur Anbessa Specialized Hospital in Addis Ababa, who had a locally advanced left tibial Ewing sarcoma with skull, scapula, pleura and pulmonary metastasis. This is, to our knowledge, the first case of Ewing sarcoma to be reported from Ethiopia.

Key words: *Ewing sarcoma, metastasis, conventional radiograph, CT, MRI*

INTRODUCTION

Ewing sarcoma is the second most common primary malignant bone tumor in children and adolescents accounting for 3% of all pediatric malignancies. It was first described by James Ewing in 1921 (1,3), as "diffuse endothelioma of bone". It is one of the two malignant round cell tumors (primitive neuroectodermal tumor) with varying degrees of neuroectodermal differentiation. It exhibits similar imaging features and on cytogenetic analysis showing specific constant reciprocal translocation between chromosomes 11 and 22. It commonly occurs in long bones but can develop in flat bones especially in children less than six years of age and older adults. Metastasis characteristically involves the lungs and bones, but other systems may also be involved. It presents with signs and symptoms mimicking infection and the imaging modality for diagnosis is convectional radiography. Computed tomography (CT) and magnetic resonance imaging (MRI) are useful in determining lung metastasis and local extent respectively. Prognosis depends on size, location, local extent and presence of metastasis at presentation. Treatment includes surgery, radiotherapy, and both pre-operative and post-operative chemotherapy.

CASE REPORT

In October 2015, a two-year-old female child presented with complaints of left proximal leg swelling and pain with inability to move of one-month duration. Physical examination revealed minimal swelling on the left proximal leg with tenderness. Laboratory data showed moderate anemia.

Plain radiograph showed a lytic permeative lesion of the proximal metaphysis of the left tibia with a wide zone of transition, a Codman type of periosteal reaction, focal cortical breach and soft tissue mass suggesting Ewing sarcoma (Figure 1). Chest radiograph was normal (Figure 2). Histology from tissue taken with incisional biopsy confirmed the diagnosis.

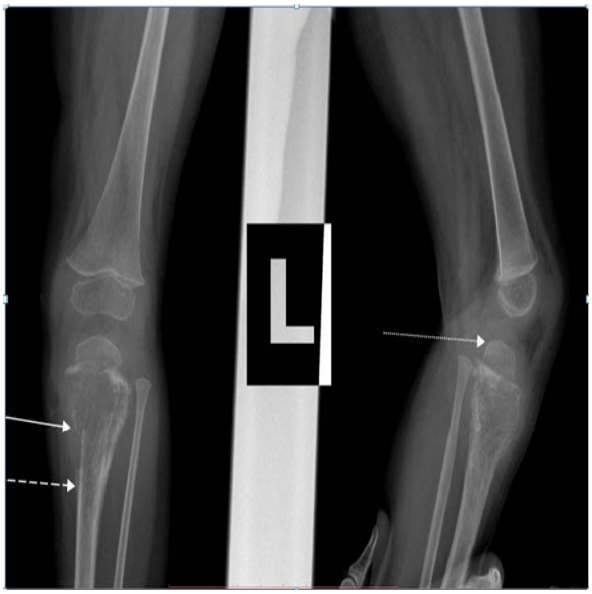

Figure 1: Left knee x-ray (AP and lateral view): Lytic permeative lesion of the left proximal metaphysis of the left tibia with wide zone of transition, codman type periosteal reaction (⟶), focal cortical breach (⟶) and minimal soft tissue component (⟶).

[1]Department of Radiology, Addis Ababa University
[2] Department of Radiology, Aksum University
*Corresponding Author E-mail: dzewdnehsolomon@yahoo.com

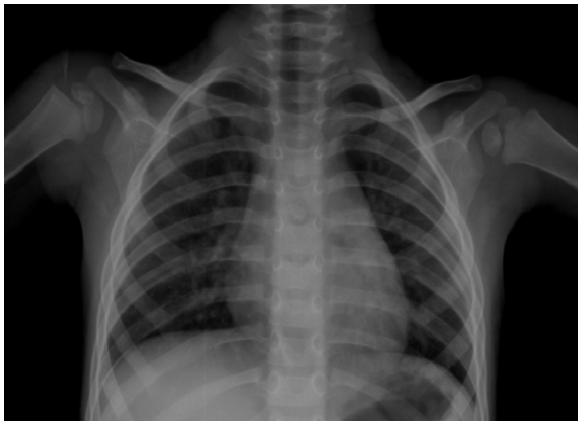

Figure 2: Chest x-ray: Unremarkable.

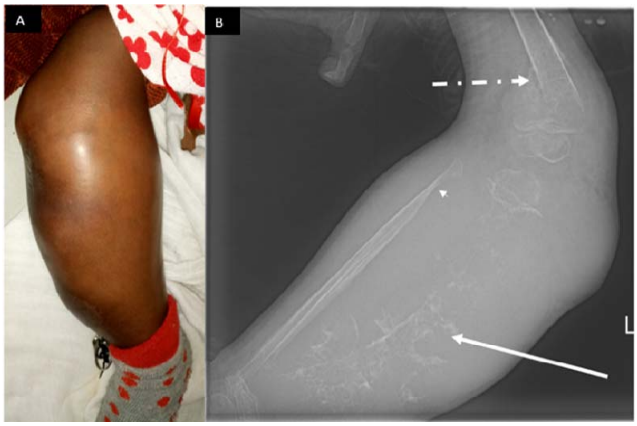

Figure 3: Photograph (A) and oblique radiography (B) of left leg: diffuse swelling of the left leg with scar on anterior aspect - from previous incisional biopsy (A) and x-ray shows destruction of the left tibia with extension to the distal femur and associated huge soft tissue mass. There is also scalloping of the proximal fibula (B).

She was put on chemotherapy but defaulted after five cycles. Two years after initial diagnosis, she presented with progressive worsening of the leg swelling and development of new swelling on the head of one-month duration. On examination, she was acutely sick looking and irritable with pale conjunctivae and lobulated tender swellings of the left leg and fixed deformity of the knee joint at ~110^{o} (Figure 3A). There was also a small scalp swelling on left parietal region firmly attached to the underlying skull vault. Laboratory data showed moderate anemia.

A radiograph of left leg showed destruction of the whole tibia with extension to the distal femur and an associated huge soft tissue mass as well as scalloping of the left proximal fibula (Figure 3B). Chest CT showed bilateral lung nodules and multiple fissural nodules of varying sizes, and bilateral nodular pleural thickening of the costal and mediastinal pleural borders and fissures (Figure 4), and a lytic permeative lesion with soft tissue component in the inferior angle of the right scapula. Brain CT showed a lytic permeative lesion involving the left parietal and posterior left frontal bones with soft tissue mass overlying the scalp and underlying extra axial extension. The greater wing of the sphenoid bone showed a lytic lesion with an extra axial soft tissue mass extension (Figure 5).

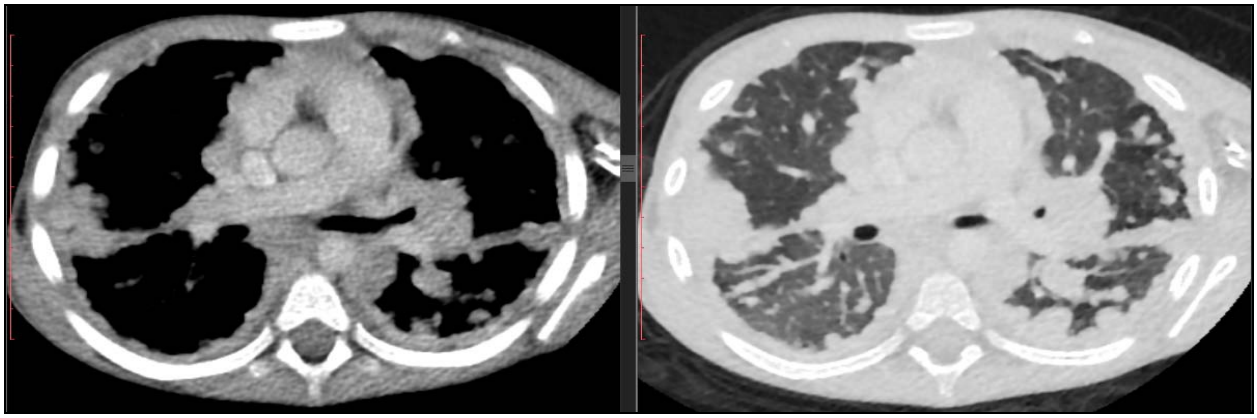

Figure 4: Chest CT scan: diffuse different size bilateral lung nodules and multiple fissural nodules. There is also bilateral nodular pleural thickening involving both the costal and mediastinal pleura, and fissures.

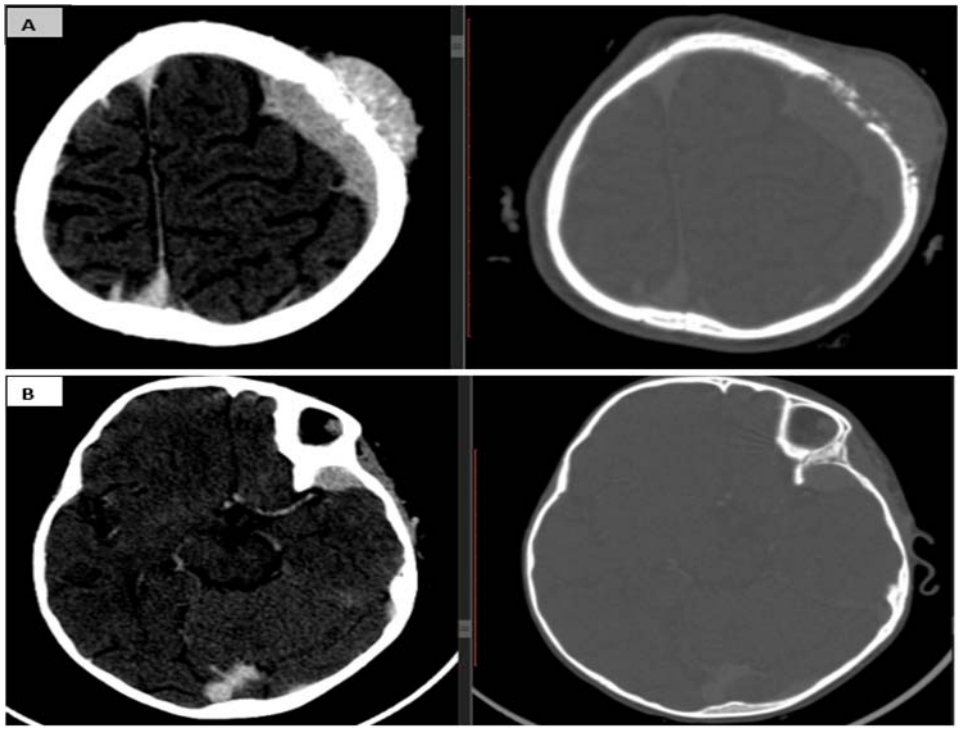

Figure 5: Contrast enhanced head CT (A & B): lytic permeative lesion involving the left parietal and posterior left frontal bones with associated heterogeneous soft tissue mass overlying scalp soft tissue swelling as well as underlying extra axial soft tissue mass (A). There is also lytic permeative lesion on the greater wing of the sphenoid bone adjacent to the left superior orbital fissure with associated extra axial soft tissue mass (B).

DISCUSSION

Ewing's sarcoma accounts for 3% of all pediatric malignancies, representing the second most common primary malignant bone cancer in children and adolescents following osteosarcoma. The incidence varies significantly with age, has a peak incidence in the second decade of life and is rare in children under five years and adults above the age of 30 (3,4). Approximately 15% of cases occur in children under 10 years. In one study the median age of diagnosis in patients less than six years of age was 42 months, 82% of which were older than 24 months (5-7).

The long bones are favored sites for primary tumor occurrence, although the axial skeleton, and extra osseous sites are common compared to osteosarcoma. In cases less than six years, axial primary tumors predominate. Ewing sarcoma arising from skull bones is rare (3,6). Ewing sarcoma usually presents as a solitary bone lesion. Multiple bone involvement has been shown to occur in the advanced stages of Ewing sarcoma, usually after pulmonary and visceral metastases manifest. On rare occasions, it involves multiple bones at the time of diagnosis (7,8).

Pain and swelling are the most common symptoms at onset. Other findings include local hot, red and tender swelling, walking disorder, neurologic impairment, respiratory symptoms, fever, and anorexia (6).

Radiographs show a classic permeative lesion with a wide zone of transition in the diaphysis or metaphysis of the long bone with reactive new bone formation that gives the lesion a sclerotic or "patchy" appearance with a soft tissue mass but no cortical breakthrough or matrix formation. There is an onion-skin type of periostitis, but can also have sunburst or amorphous types (5,11).

CT scan is better for tumor characterization in the axial skeleton for staging of lung metastasis. MRI shows low to intermediate signal intensity on both T1W and T2W images, about 32% are hyperintense on T2W images, with inhomogeneous but vivid enhancement. MRI is used for preoperative evaluation of smaller tumors (the distance between the tumor and the proximal and distal ends of the bone, whether it crosses through the growth plate or if there is involvement of the joint space, whether the tumor encases or displaces the adjacent neurovascular bundle, and if there is invasion of the adjacent muscles) and for follow-up (5,9-11). Radionuclide bone scan demonstrates a high technetium photon uptake. Similarly, it displays a high ^{18}F-fluorodeoxy glucose (^{18}F-FDG) uptake on ^{p}ositron emission tomography (PET) (9).

Imaging differential diagnosis includes osteomyelitis; Langerhans cell histiocytosis, metastatic neuroblastoma, and malignant lymphoma of the

Metastasis is clinically detectable in up to 34% of the patients at the time of initial diagnosis. Even in those patients with apparently localized primary tumors, the median time from initial treatment to the development of detectable metastasis ranges from only four to 12 months when treatment is confined to the primary site. Metastasis characteristically occurs to the lung and skeletal system with equal frequency, other sites being involved in less than 10% of cases. Metastasis to skull bones, brain and dura is rare and is seen in approximately 9% of cases. Primary involvement of the skull bones is seen more commonly than metastasis to the skull (5,8). Central nervous system spread is rare as patients do not survive long enough except where early treatment has been instituted (8).

Prognostic factors include age at diagnosis, site and size of the tumor, presence of metastasis, and general condition. Skeletal site of origin is a major outcome predictor; centrally and proximally located tumors, particularly the pelvis, have poor survival while distal extremity lesions show better prognosis.

Age >15 years at diagnosis and metastasis are also poor prognostic factors but tumor size has minimal correlation with local treatment failure. Patients with exclusive lung metastasis have better outcome than those with metastasis to other systems (with or without the lung metastasis).[10] Treatment includes resection for those with a wide margin, tumor resection followed by radiotherapy for tumors with a narrow margin, and radiotherapy for inoperable tumors. Preoperative chemotherapy helps to eradicate any micro metastases at the time of diagnosis, reduces tumor bulk facilitating excision, and in the selection of anti-tumor drugs for postoperative chemotherapy. Aggressive multidrug chemotherapy and radiotherapy, after definitive surgery, have significant roles in preventing local recurrences or systemic metastasis (8-10). Conventional radiographs are adequate to monitor progress of primary bone lesions and to screen lung metastases (11).

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TEACHING ARTICLE

BRIEF HISTORY OF MEDICAL EDUCATION IN ETHIOPIA

Amha Mekasha, MD, MSc

"If I have seen further than others, it is by standing upon the shoulders of giants"
Sir Isaac Newton

History of medical education has never been taught to medical students. Ethiopian medical community has little knowledge about the historical developments of medical education in Ethiopia because of paucity of written documents. It is a common occurrence to hear distorted stories which have developed through time from individual ideas rather than research findings. The aim of this review is to document facts as gathered from reliable source documents, living witnesses of the time and personal observations.

The beginnings of modern medicine

Before the opening of Africa to the western cultures, Africans relied on traditional medical practitioners or witch-doctors. Herbs and roots were used some of which were effective indigenous drugs. Pankhurst R. described the Ethiopian traditional medical practices as medico-magical or medico-religious (1).

In Ethiopia western medicine was limited to the palaces of the royals. In the 1521 Emperor Lebne Dingil wrote a letter to the Portuguese king requesting him to send physicians and surgeons to cure illnesses (2). Since then several foreigners, including British, Germans, Greeks and Russians have practiced medicine in Ethiopia.

There had been no modern medical doctor of Ethiopian origin until the time of Emperor Menelik II. The first Ethiopian medical doctor was Hakim Workineh also called Charles Martin who was born in 1865 in Gondar. As a small boy he was taken by Colonel Charles Chamberlain to India after the Magdala war. When Chamberlain died, Hakim Workneh was raised by Colonel Martin who paid for his education, so he is named Hakim Charles Martin after Colonel Charles and Martin. Hakim Workneh obtained his medical degree from Lahore Medical College in 1882. He served Ethiopia as a medical officer during the Adwa war against the invading Italian army. He was also a diplomat to the palace and was the physician who attended Emperor Minilik II (3).

One of the earliest doctors was Negadras Gebrehiwot Baykedagn who was born in 1886 in Adwa. He joined a Swedish school in Minkulu near Masawa. Later he went to Germany and was adopted by a rich Austrian family. He studied medicine at Berlin University. He was a member of the medical team that was treating Menelik II (4). He is most known for his contribution in the socio-economics of the country rather than a medical doctor.

Melaku Beyan was an Ethiopian medical doctor who was born in 1900 in Wollo. He graduated as a medical doctor from Howard University, USA, in 1935. During the Italian invasion Melaku Beyan served as chief medical officer of the Ethiopian army, he was also a diplomat and activist against the Italian invasion of Ethiopia (5). Since the abovementioned Ethiopian doctors, there were no Ethiopian physicians in country as late as 1955. By 1959, some 10 fully qualified physicians of national origin trained overseas returned to the country (6).

Before the Italian invasion, there were a few hospitals in the country run by foreigners, mostly Italian doctors (7). The hospitals are listed in Box 1.

During the Italian occupation the medical services aimed to meet the needs of the Italians and other white people. The medical services for the natives was based on segregation. After the victory over the occupying Italian forces, medical service was delivered in rudimentary hospitals and private practices by Italians, and few British doctors, who were mainly serving the British army (8). All hospitals were run by the government except a few that were run by missionaries.

[1] Department of Pediatrics and Child Health, School of Medicine, College of Health Sciences. Addis Ababa University
Corresponding Author E-mail: amekashaw@yahoo.com

Medical education in Ethiopia

Monekosso (9) divided the history of medical education in Africa into four phases namely: The Colonial Phase (1900–1960), the Independence Period (1960–1975), the Fall-Back Period (1975–1990) and the Scale-up Period (1990–Present). Though there are some similarities with these developments in colonial Africa, Ethiopia has undergone its own historic track of medical education according to the policies of the ruling regimes: the Imperial, the Socialist and the developmental democracy periods.

The Imperial period

In 1947, using available physicians and high school laboratories at Kotebe, the Ethiopian government started to train pharmacy assistants and dressers (health assistants). Later a school of laboratory, pharmacy and x-ray technicians were opened at Minilik II hospital (8). Similar to the colonial period in Africa missionary hospitals run by foreigners trained health assistants in their hospitals as medical assistants for their own consumption.

The aim of medical education in Africa during the colonial period was described as "The system of training is directed to the production of an assistant able to diagnose and treat with understanding the more straightforward and common disease conditions, to appreciate the possibilities of the major medicine and surgery in more expert hands, and to know sufficient of rare and less simple conditions to realize when to call an European superior to his aid" (10).

In 1953 the American "Point IV" program, a precursor to the United States Agency for International Development (USAID) and United Nation (UN) agencies agreed with Ethiopian government to set up a teaching project under the Ministry of Public Health i.e. The Gondar Public Health College.

The overall philosophy of the project was that:

- The training be directed primarily toward preventive medicine.
- The candidates must have some proficiency in curative medicine if they were to command the attention and respect of the people among whom they would work.

There were 28 men in the first year of the Gondar Public Health College. They were drawn from Ethiopian army, the Imperial Body Guard and from the National Police Force. Only one held a certificate of matriculation which would have admitted him to the University College in Addis Ababa (6). The Gondar Public Health College and Training Center was taken over by Haile Selassie I University in December 1961. Thus, the diploma course was upgraded to a bachelor degree program as of 1962 (11).

Higher education in Ethiopia started with the inauguration of the University College of Addis Ababa in 1950 which later was upgraded and granted a charter as Haile Selassie I University in 1961. According to Aklilu Habte (11) the Utah team recommended the "Land Grant University" model for the would be university. The model was created and structured based on priority on community service. The proposed model for the university also emphasized on transforming the traditional education models to modern methods.

In 1962, Dr. Weir of the Rockefeller foundation was requested by Lij Kasa, the president of Haile Selassie I University to study the need, desirability and feasibility of the establishment of a medical school in Ethiopia. The group consisted of Leroy Burney, Robert Moore and Milnes Walker. The recommendations of the commission were that the Gondar Public Health and training center be continued, strengthened and expanded; develop a plan for opening of medical school within the next decade (12).

The Rockefeller Commission visited hospitals in the country and Addis Ababa and recommended to teach preclinical years in American University of Beirut or elsewhere and the clinical years in Addis Ababa (13). In Nigeria the opposite was true in that all clinical students were transferred to teaching hospitals in the UK for their clinical training for a number of years until University College Hospital Ibadan was built and opened in 1957 (14).

The medical faculty was formally linked with universities in Edinburgh University, United Kingdom and Syracuse University, United States (8,15). A similar link was advised when the Makerere medical school was opened in Uganda (10).

The executive committee of the council of the Haile Selassie I University formally approved the formation of a Faculty of Medicine on Tuesday, March 26, 1963 based on the reports of the Rockefeller Commission and other committees (16).

Frank Howarth was approached by B. Oscar Barry, a representative of The Emperor Haile Selassie, to start a Medical school. Professor Frank Howarth, a pharmacologist from Cambridge University, was appointed as dean of the medical faculty on July 20, 1964 (15). Frank's wife Mrs. Howarth said "When approached Frank said that he had always wanted to design and run a Medical School in a third world country where with his system he could reduce the costs but still produce excellent students" (17). He was a pioneer of the integrated organ-system approach to medical education. He established medical schools in Ethiopia, Jordan, Nigeria and Yemen. After Howarth there were two British deans the last being Sir Ian Hill who was replaced by Prof Asrat Woldeyes as the first Ethiopian dean in 1973.

The following were the seven different items believed to be important for the curriculum, training program and organization of the medical faculty (18).

- Full international recognition by the promotion of links with universities abroad and invitation of external examiners.
- Clinical training especially in general medicine, general surgery, midwifery, gynecology and pediatrics. The student should particularly qualify to deal with acute emergencies of major and minor surgeries.
- Training in public health and social medicine
- Training about service in the rural areas of Ethiopia
- Integrated institute of medical sciences
- Postgraduate training
- Research

The medical school consisted of preclinical unit (Institute of medical sciences), the clinical units and medical library. Professor Howarth (20) described the teaching in preclinical units: The teaching was regional and clinically oriented. After studying an organ or system the students visit hospitals to observe in patients the changes produced by the disease and then introduced to the preventive and societal aspects of such disease. He further elaborates the intentions were:

- A reduction of course duration by elimination of teaching duplication
- Break the artificial barriers between preclinical and clinical medicine
- The presentations of data on an organ/system basis which is in accordance with the needs of the doctor at the bedside

According to Aklilu Habte (11) the first cohort of six students from 3rd year science faculty students (Teklasion Woldemariam, Shekib, Nirayo, Fisseha Teklewold, Tesfaye Gebrekidan and Asgedom) went to Beirut Sept 1963 for their preclinical education. The students returned in 1965 to continue their clinical training at Princess Tsehai Memorial Hospital (currently Armed Forces General Hospital). The first batch of Ethiopian doctors graduated in 1968. Then the faculty started to give preclinical courses at the Sidist Kilo campus until 1972.

The first full medical training started in 1966 with 22 pre-clinical students drawn from Faculty of science, graduates of public health college and science graduates from foreign universities (8). During the third batch the Ethiopian Medical students Association was formed, and its organ was "medics", Mekonen Bekele was the editor-in-chief and Mikael was the designer of the logo. Unfortunately the journal had only one issue (personal communication).

The formation of the medical school, the central medical library and the Ethiopian Medical Association (EMA) were inseparable. The EMA and the medical faculty agreed to form the central medical library in 1965 based on the agreement reached at the first annual Ethiopian medical conference. According to the terms of agreement the library offers all available services to members of the EMA while the EMA provides medical journals in exchange for the Ethiopian Medical Journal. (21) The central library was housed at Sidist Kilo campus where the Institute of

medical sciences was situated, later on it moved to the Duke of Harar Memorial Hospital second floor B wing.

The socialist period

During 1974-1976 the medical school was closed for the National Campaign program declared by the military government. Except final year medical students who were supposed to sit for qualifying examination all the other batch of students were deployed to the rural areas for two years. All students from the school of medicine were expected to treat patients. Thus, preclinical students were given a one-day training on how to give intramuscular injections at St. Paul's Hospital and a one-week course on first aid treatment. The preclinical I students had already completed pharmacology course (Later the pharmacology course was moved to preclinical year II).

In 1975 the clinical departments of the Medical Faculty moved from Princess Tsehai Memorial Hospital to the former Duke of Harar Memorial Hospital. The Hospital was built by the contribution of the Ethiopian people at a cost of just above 21 million Birr as a memorial for Prince Mekonen Haile Selassie. The hospital was inaugurated by Emperor Haile Selassie on October 1973. Before the hospital became functional its 6th floor served as a head quarter for the Rehabilitation Commission of Ethiopia during the famine of 1973/1974. The hospital started to function with 120 beds and was run by the Swiss Red Cross until the revolution of 1974. In addition, the clinical teaching was conducted at St. Paul's Hospital; psychiatry and ophthalmology were taught at Minilik II hospital. Dormitories for the medical students were at the Building College until a three story building was constructed at Tikur Anbesa Hospital premise in 1978.

In July 1977 Addis Ababa University (AAU) and the Karl Marks University (KMU) of East Germany signed an agreement on scientific and cultural cooperation which paved the way for a latter agreement in 1978 for KMU to provide Gondar medical faculty with academic staff, teaching materials and laboratory supplies. The Gondar Public Health College (GCMS) was renamed Gondar College of Medical Sciences. The first batch 107 students enrolled in 1978 in the basic sciences department which was staffed by graduate assistants. The preclinical and clinical courses were taught by East German professors (22). There were few Ethiopian doctors led by Dr. Birru Mengesha. The most distressing was the hostile learning environment when the city of Gondar was under Major Melaku Tefera reign of red terror.

During the socialist government the medical schools at Addis Ababa and Gondar continued to enroll more students from around maximum of 50 to 100 students. In 1980 the AAU medical school initiated the so-called phase curriculum, which did not go for even a year.

The 1980s were problematic political and economic time for Sub-Saharan Africa, and medical schools did not escape the general difficulties (9). On return from the National campaign after two years in 1976 almost all of the expatriate teachers left without replacement especially for preclinical courses. Only Drs. Getachew Bolodia (biochemist), Yoseph Assen (physiologist) and Messele Gedebu (microbiologist) were the remaining Ethiopian teachers for pre-clinical departments. Thus, a contingent of teachers was sent to USSR to recruit teachers. There was no single teacher for obstetrics and gynecology, though there were few from east European countries in the department as non-teaching staff. The department was run by general practitioners (Drs. Seyoum Yosef, Assefa Gebresellasie and Mekonen Bekele) who had extensive experience in gynecology and obstetrics. Later on, more Cuban and Russian professors were recruited and filled the gaps to run the learning teaching process. Furthermore, the enrollment of premedical students was double of the previous years. After the National Campaign some students did not return to the medical school; some fled to neighboring countries, imprisoned or killed and others joined the rebel groups. The students from foreign countries including Southern Rhodesia (Zimbabwe), Uganda, and India left the country due the political upheaval. The rest of the medical students had to undergo their education under the most terrifying condition popularly known as 'red terror'.

One of the important activities of the School of Medicine at Addis Ababa University was the establishment of the rural program as was emphasized from the very initiation of the medical training. Initially the rural training program was in Nekemt, Wollega until it moved to Zwai in 1978. The program further progressed to Butajira Rural Health Program, which started in 1986 with the aims to develop and evaluate a system for continuous registration of birth and deaths to generate data on fertility and mortality to provide a study base for health related researches. It started as a PHD study project of Desta Shamebo and later it grew to departmental collaboration with Umea University, Sweden.

In 1979 the AAU took a step to open postgraduate programs with the aim to meet the manpower demand for higher education (23). The objectives of specialty training included:

- Producing adequate number of doctors and other human resource for health
- Producing specialists (teachers) to train doctors in large numbers
- Improving the level of medical practice and research in hospitals
- Filling vacant posts and replacing expatriates
- Meeting the basic expectations of physicians for professional advancement and avoid "brain drain".

Postgraduate programs were opened in Internal medicine, Surgery, Anatomy, Pediatrics and Pathology. Subsequently, the other departments including gynecology & obstetrics, ophthalmology and psychiatry followed the same path. Biomedical sciences started Masters in physiology, anatomy, biochemistry, pharmacology and microbiology in the first half the 1980s. These master's program progressed to PhD programs in the early 1990s.

In 1991, spearheaded by Prof Edemariam Tesga, a new curriculum was proposed to obtain a bachelor's degree and continue with the remaining four years in clinical medicine. The aim was to create an opportunity for employment of those who could not succeed in the pre-clinical courses and also to allow the young medical school graduates to mature enough to shoulder the expected heavy responsibilities.

The third medical school was opened in Jimma with a new educational philosophy as Jimma Institute of Health Sciences (JIHS). Taking the national and international scenario into account the Ministry of Health decided to open a new school whose training should integrate training, service and research and should train different health professionals as a team (24). It was established as a school of health assistants in 1983 nursing school started. It enrolled its first medical students in 1985. The medical school started in a dilapidated military barrack and an old 150 beds hospital built by the Italians without major renovation for decades.

When the JIHS was opened there were few medical doctors Drs. Teklasion Woldemariam as the dean and an all-round teacher including biomedical sciences and Amha Mekasha as hospital director and head of clinical programs while Esayas Berhanu (biochemist) was preclinical coordinator and Mr. Mekonnen Asefa (public health specialist) as head of Community Health Department. The rest of the staff members were young Ethiopians who were bachelor degree holders. The teaching was mostly carried out by Cuban professors sometimes through interpreters. For the second batch of clinical students four polish professors were recruited to teach medical students in internal medicine, surgery, gynecology and obstetrics. The JIHS graduated the first batch of 67 medical students in December 1990 where President Mengistu Hailemariam was the guest of honor. Soon after the Socialist government was overthrown in May 1991 all the Cubans left the country and there was severe shortage of staff in teaching biomedical sciences. Later on through the agreement with the Japanese technical Cooperation to African countries Egyptian professors filled the gap in biomedical sciences.

The developmental democracy period

The major change that happened during the developmental democracy period was to increase the intake of medical students, increase in staff development and opening of new programs. With the change of the socialist government the relation with western universities was increasing paving the way for many of the staff members to go abroad for further training. A number of specialty and sub-specialty programs initiated in the early 2000 in various fields. The development of the residency program has improved the availability of specialists in cities and towns out of Addis Ababa. Newer medical schools also increased the number of their clinical staffs which later started their own residency programs.

In 1999 JIHS was amalgamated with the Jimma College of Agriculture to form Jimma University. Even after the formation of the University the medical education was under severe strain of getting adequate number of teaching staff. The clinical teaching was carried out in a hospital built by Italians which was on the verge of collapse. A new hospital was built after nearly 30 years of the medical school. However, the community based program was going well and became an example to many medical schools in Ethiopia and elsewhere in the world. The school of medicine established several international connections in due course, one of the most important being the Gilgel Gibe Field Research center. Currently the school of medicine runs both undergraduate and graduate programs in various health fields.

Recent decades have witnessed proactive measures by many governments around the world to transform their higher education from 'élite' to 'mass' systems. When the Socialist government was overthrown there were three medical schools as mentioned above. During the developmental democracy system new medical schools were opened to address the manpower need of the country at universities of Haramaya, Hawasa and Mekelle.

In 1996 Haramaya University started the medical education program in the former Harar Military Academy but without its own teaching hospital and very few young staff, though there are four general hospitals in the city of Harar.

Hawasa medical school was established as Dilla College of Teachers Education and Health Sciences under the leadership of the then dean Dr. Solomon Dimamu. In 2000 the health faculty has been moved to Hawasa University. When the medical school opened in Hawasa it had a newly constructed hospital but poorly equipped and few consultants to run specialty services.
Mekelle medical school founded in 1995 also had the opportunity to use the newly built Ayder hospital with few specialists but attempts were made to alleviate the staff shortage through international collaborations.

In 2007 St. Paul's Millennium medical school was opened with the aim to admit 30% of students from rural areas and 30% women students. The unique feature is that students must take an entrance examination and are not assigned like other university entrants by the Ministry of Education. The curriculum was designed to be initially problem based but could not take off well and was discontinued soon. Prof Gordon from Hammersmith hospital in London was responsible to lead the formation of the school with close support by the then minister of health Dr. Tedros Adhanom who was the originator of the idea of opening the school.

The mass demand for higher education and the inability of the government to cope with led to the emergence of the private sector in higher education. Private medical schools started to function including Hayat medical school, Bethel Medical School, Gambe medical school, Africa Medical School, Myungsung Christian Medical School and Sante Medical School. However, many of the newly opened private medical schools run the teaching through part-time teachers.

A New Innovative Medical Education Initiative (NIMEI) was initiated by the Federal Ministry of Health and the Federal Ministry of Education in 2008 in order to scale up and transform the doctor population ratio to meet the health care needs of the people. It aimed at educating medical doctors by enrolling graduates of health sciences and natural sciences in a shorter time than the traditional program. NIMEI was launched in February 2012 and the training is conducted in ten universities and three hospitals. The NIMEI curriculum is different in terms of uptake of students with first degree in science subjects, four years of education and is competency based and integrated (25).

Along with the massification programs for the undergraduates the number of medical schools have reached to 32. Postgraduate programs were also initiated at most of the medical schools. In addition, some medical schools have started fellowship programs in clinical medicine.

During all these years of development medical education has been facing several challenges. Many of the challenges were related to the policies of governments. Infrastructure remains to be a major challenge for almost all the schools where many medical schools were opened in hospitals that are poorly equipped. The constructions of buildings and information technology facilities are severely lagging behind schedules. Faculty recruitment, retention and development is very poor in that many schools do not have adequate staff in number and educational level to run the medical schools. The internal and external brain drain remains as a major obstacle.

In conclusion, the history of medical education in Ethiopia in its half a century existence has expanded immensely. It is recognized that written records are lacking to give more information. Hence, it is imperative that updates in the documentation of the developments of medical education should be maintained.

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EDITORIAL POLICY

Overview

Ethiopia's oldest medical journal, *The Ethiopian Medical Journal (EMJ)* is the official organ of the Ethiopian Medical Association (EMA). The EMJ is devoted to the advancement and dissemination of knowledge pertaining to the broad field of medicine in Ethiopia and other developing countries. The journal first appeared in July 1962 and has been published quarterly (January, April, July, October) without fail since then. It has been published in both online (www.emjema.org) and hard copy (ISSN0014-1755) versions.

The EMJ continues to play an important role in documenting and disseminating the progress of scientific medicine, and in providing evidence base for health policy and clinical practice in Ethiopia and Africa at large.

Our online journal is open access. The hard copies are distributed to members of the Ethiopian Medical Association. Hard copies of the Journal are distributed to institutions and organizations (internal and external) based on subscription.

Reviewing procedure

Peer reviewers

The Ethiopian Medical Journal uses a double-blind review system for all manuscripts. Each manuscript is reviewed by at least two reviewers. The reviewers act independently, and they are not aware of each other's identities. The reviewers are selected solely based on their relevant expertise for evaluating a manuscript. They must not be from the same institution as the author(s) of the manuscript, nor be their co-authors in the recent past. The purpose of peer review is to assist the author in improving papers and the Editorial Board in making decision on whether to accept or reject a manuscript. Reviewers are requested to decline if they have a conflict of interest or if the work does not fall within their expertise.

Peer review process

Manuscripts are sent for review only if they pass the initial evaluation (pre-review by the Editorial Board) regarding their style, methodological accuracy, ethical review documentation and thematic scope. A special care is taken that the initial (pre-review) evaluation is done in 3-5 days.

The Journal policy is to minimize time from submission to publication without reducing peer review quality. Currently the total period from the submission of a manuscript until its publication takes an average of six months. Peer reviewers are requested to respond within four weeks. During the review process, the Editor-in-Chief may require authors to provide additional information (including raw data) if they are necessary for the evaluation of the manuscript. These materials shall be kept confidential and must not be used for any other purposes.

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In case that the authors have serious and reasonable objections to the reviews, the Editorial Board assesses whether a review is objective and whether it meets academic standards. If there is a doubt about the objectivity or quality of review, the Editor-in-Chief will assign additional reviewer(s).

Additional reviewers may also be assigned when reviewers' decisions (accept or reject) are contrary to each other or otherwise substantially incompatible. The final decision on the acceptance of the manuscript for publication rests solely with the Editor-in-Chief.

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This is provided in the '*Guidelines to Authors'* which appear in each issue of the Journal. Authors must guarantee that their manuscripts are their original work, that they have not been published before, and are not under consideration for publication elsewhere. Parallel submission of the same paper to another journal constitutes misconduct and eliminates the manuscript from further consideration. Work that has already been published elsewhere cannot be reprinted in the Ethiopian Medical Journal

Authors are exclusively responsible for the contents of their submissions and must make sure that the authors listed in the manuscript include all and only those authors who have significantly contributed to the submitted manuscript. If persons other than authors were involved in important aspects of the research project and the preparation of the manuscript, their contribution should be acknowledged in the Acknowledgments section.

It is the responsibility of the authors to specify the title and code label of the research project within which the work was created, as well as the full title of the funding institution. In case a submitted manuscript has been presented at a conference in the form of an oral presentation (under the same or similar title), detailed information about what was published in proceedings of the conference shall be provided to the Editor-in-Chief upon submission.

Authors are required to properly cite sources that have significantly influenced their research and their manuscript. Parts of the manuscript, including text, equations, pictures, tables and graphs that are taken verbatim from other works must be clearly marked, e.g. by quotation marks accompanied by their location in the original document (page number), or, if more extensive, given in a separate paragraph.

Full references of each quotation (in-text citation) must be listed in the separate reference section in a uniform manner, according to the citation style used by the journal. References section should list only quoted/cited, and not all sources used for the preparation of a manuscript.

When authors discover a significant error or inaccuracy in their own published work, it is their obligation to promptly notify the Editor-in-Chief and cooperate with him/her to retract or correct the paper.

Authors should disclose in their manuscript any financial or other substantive conflict of interest that might have influenced the presented results or their interpretation.

By submitting a manuscript, the authors agree to abide by the Editorial Policies of the Ethiopian Medical Journal

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Editorial responsibilities

The Editor-in-Chief is responsible for deciding which articles submitted to the journal will be published. The decisions are made based exclusively on the manuscript's merit. They must be free from any racial, gender, sexual, religious, ethnic, or political bias. When making decisions the Editor-in-Chief is also guided by the editorial policy and legal provisions relating to defamation, copyright infringement and plagiarism.

Members of the Editorial Board including the Editor-in-Chief must hold no conflict of interest about the articles they consider for publication. Members who feel they might be perceived as being involved in such a conflict do not participate in the decision process for a manuscript.

The information and ideas presented in submitted manuscripts shall be kept confidential.

Editors and the editorial staff shall take all reasonable measures to ensure that the authors/reviewers remain anonymous during and after the evaluation process in accordance with the type of reviewing in use.

The Editorial Board is obliged to assist reviewers with additional information on the manuscript, including the results of checking manuscript for plagiarism.

Reviewers' responsibilities

Reviewers are required to provide the qualified and timely assessment of the scholarly merits of the manuscript. The reviewer takes special care of the real contribution and originality of the manuscript. The review must be fully objective, and the judgment of the reviewers must be clear and substantiated by arguments.

The reviewers assess manuscript for the compliance with the profile of the journal, the relevance of the investigated topic and applied methods, the scientific relevance of information presented in the manuscript, and the pres-

entation style. The review has a standard format. It is submitted through the online journal management system where it is stored permanently.
The reviewer must not be in a conflict of interest with the authors or funders of research. If such a conflict exists, the reviewer is obliged to promptly notify the Editor-in-Chief. The reviewer shall not accept for reviewing papers beyond the field of his/her full competence.
Reviewers should alert the Editor-in-Chief to any well-founded suspicions or the knowledge of possible violations of ethical standards by the authors. Reviewers should recognize relevant published works that have not been considered in the manuscript. They may recommend specific references for citation but shall not require citing papers published in the Ethiopian Medical Journal, or their own papers, unless it is justified.
The reviewers are expected to improve the quality of the manuscript through their suggestions. If they recommend correction of the manuscript prior to publication, they are obliged to specify the way this can be achieved. Any manuscript received for review must be treated as confidential document.

Ethical Considerations
Dealing with unethical behavior
Anyone may inform the Editor-in-Chief at any time of suspected unethical behavior or any type of misconduct by giving the necessary credible information/evidence to start an investigation.

- Editor-in-Chief makes the decision regarding the initiation of an investigation.
- During an investigation, any evidence should be treated as confidential and only made available to those strictly involved in the process.
- The accused will always be given the chance to respond to any charges made against them.

If it is judged at the end of the investigation that misconduct has occurred, then it will be classified as either minor or serious.

Minor misconduct (with no influence on the integrity of the paper and the journal, for example, when it comes to misunderstanding or wrong application of publishing standards) will be dealt with directly with authors and reviewers without involving any other parties. Outcomes include:

- Sending a warning letter to authors and/or reviewers.
- Publishing correction of a paper, e.g. when sources properly quoted in the text are omitted from the reference list.

Publishing an erratum, e.g. if the error was made by editorial staff.

In the case of major misconduct, the Editor-in-Chief may adopt different measures:

- Publication of a formal announcement or editorial describing the misconduct.
- Informing officially the author's/reviewer's affiliating institution.

The formal, announced retraction of publications from the journal in accordance with the Retraction Policy.

- A ban on submissions from an individual for a defined period.

Referring a case to a professional organization or legal authority for further investigation and action.

The above actions may be taken separately or jointly. If necessary, in the process of resolving the case relevant expert organizations, bodies, or individuals may be consulted.

When dealing with unethical behavior, the Editorial Board will rely on the guidelines and recommendations provided by the Committee on Publication Ethics (COPE).

Plagiarism prevention

The Ethiopian Medical Journal does not publish plagiarized papers. The Editorial Board has adopted the stance that plagiarism, where someone assumes another's ideas, words, or other creative expression as one's own, is a clear violation of scientific ethics. Plagiarism may also involve a violation of copyright law, punishable by legal action.

Plagiarism includes the following:

- Self-plagiarism, which is using one's own previous work in another context without citing that it was used previously
- Verbatim (word for word), or almost verbatim copying, or purposely paraphrasing portions of another author's work without clearly indicating the source or marking the copied fragment (for example, using quotation marks) in a way described under Authors' responsibilities;
- Copying equations, figures or tables from someone else's paper without properly citing the source and/or without permission from the original author or the copyright holder.

Any manuscript which shows obvious signs of plagiarism will be automatically rejected. In case plagiarism is discovered in a paper that has already been published by the journal, it will be retracted in accordance with the procedure described under Retraction policy, including blacklisting the author(s) .

To prevent plagiarism, the manuscripts are submitted to a plagiarism detection process. The results obtained are verified by the Editorial Board in accordance with the guidelines and recommendations of the Committee on Publication Ethics (COPE).

Retraction policy

Legal limitations of the publisher, copyright holder or author(s), infringements of professional ethical codes, such as multiple submissions, bogus claims of authorship, plagiarism, fraudulent use of data or any major misconduct require retraction of an article.

Occasionally, a retraction can be used to correct numerous serious errors, which cannot be covered by publishing corrections. A retraction may be published by the Editor-in-Chief, the author(s), or both parties consensually.

The retraction takes the form of a separate item listed in the contents and labeled as "Retraction".
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The following individuals have reviewed articles published or rejected by the Ethiopian Medical Journal during in 2019. The Editorial Board hereby acknowledges their contribution and thanks them, and any other whose names may have inadvertently been omitted, for their invaluable assistance.

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GUIDELINES FOR AUTHORS
(Updated December 30, 2019)

The *Ethiopian Medical Journal (EMJ)* is the official Journal of the Ethiopian Medical Association (EMA) devoted to the advancement and dissemination of knowledge pertaining to the broad field of medicine in Ethiopia and other developing countries. Prospective contributors to the Journal should take note of the instructions of Manuscript preparation and submission to EMJ as outlined below.

Article types acceptable by EMJ

Original Articles (*vide infra*) on experimental and observational studies with clinical relevance
Brief Communications
Case Series
Case Reports
Editorials, Review or Teaching Articles: by invitation of the Editorial Board.
Correspondences/Letters to the Editor
Monographs or set of articles on specific themes appearing in a Special Issues of the Journal
Book reviews
Perspectives,
Viewpoints
Hypothesis or discussion of an issue important to medical practice
Letter to the Editor
Commentaries
Advertisements
Obituaries

N.B. Articles are not acceptable if previously published or submitted elsewhere in print or electronic format, except in the form of abstracts in proceedings of conferences.

Content and format of articles:

Title: The title should be on a separate page. It should not have acronyms or abbreviations. The title should be descriptive and should `not exceed 20 words or 120 characters including space. The title page should include the name(s) and qualification of the author(s); the department or Institution to which the study/research is attributed and address of the corresponding Author. If the author has multiple affiliations only use the most preferred one.

1. Original Articles

2,500 words, excluding Abstracts, References, Figures and Tables. The manuscript of the Article, should appear under the following headings:

a) Abstract: The abstract of the Article is prepared on a separate paper, a maximum of 250 words; it should be structured under the titles: a) Background; b) Methods; c) Results; d) Conclusions. Briefly summarize the essential features of the article under above headings, respectively. Mention the problem being addressed in the study; how the study was conducted; the results and what the author(s) concluded from the results. Statistical method used can appear under Methods paragraph of the Abstract, but do not insert abbreviations or references in the Abstract section.

Keywords: Provide three to six key words, or short phrases at the end of abstract page. Use terms from medical subject heading of Index Medicus to assist in cross indexing the Article.

b) **Introduction :** Should provide a short background and context of the study and provide the rationale for doing the study. It should not be a detailed review of the subject and should not include conclusions from the paper.

c) **Patients or (Materials) and Methods:** should contain details to enable reproducibility of the study by others. This section must include a clear statement specifying that a free and informed consent of the subjects or their legal guardians was obtained. Corresponding author should submit a copy of institution review Board (IRB) clearance or letter of permission from the hospital or department (if IRB exempt) with the manuscript. For manuscripts on clinical trials, a copy of ethical approval letter from the concerned body should be submitted with the Manuscript. If confidential data is being used for publication (such as student grades, medical board data, or federal ethics board data), then appropriate support/ agreement letter should be included. Photos of patients should disguise the identity or must have obtained their written consent. Reference number for ethical approval given by ethics committee should be stated. In general, the section should include only information that was available at the time the plan or protocol for the study was being written; all information obtained during the study belongs in the Results section.

d) **Results:** This section should present the experimental or observational data in text, tables or figures. The data in Tables and Figures should not be described extensively in the text.

e) **Discussion:** The first paragraph should provide a summary of key finding that will then be discussed one by one in the paragraphs to follow. The discussion should focus on the interpretation and significance of the results of the study with comments that compare and describe their relation to the work of others (with references) to the topic. Do not repeat information of Results in this section. Make sure the limitations of the study are clearly stated.

f) **Tables and Figures:** These should not be more than six. Tables should be typed in triplicate on separate sheets and given serial Arabic numbers. Titles should be clearly place underneath Tables and above Figures. Unnecessary and lengthy tables and figures are discouraged. Same results should not be presented in more than one form (choose either figure or table). Units should appear in parentheses in captions but not in the body of the table. Statistical procedures, if not in common use, should be detailed in the METHODS section or supported by references. Legends for figures should be typed on separate sheets, not stapled to the figures. Three dimensional histograms are discouraged. Recognizable photographs of patients should be disguised. Authors should submit editable soft versions of the tables and figures.

g) **Acknowledgement:** Appropriate recognition of contributors to the research, not included under Authors should be mentioned here; also add a note about source of the financial support or research funding, when applicable.

h) **References**:

- The titles of journals should be abbreviated according to the style used for MEDLINE (www.ncbi.nlm.nih.gov/nlmcatalog/journals).
- References should be numbered consecutively in the order in which they are first mentioned in the text and identify references in text, tables, and legends by Arabic numerals in parentheses.
- Type the References on a separate sheet, double spaced and keyed to the text.
- Personal communications should be placed NOT in the list of references but in the text in parentheses, giving name, date and place where the information was gathered or the work carried out (e.g. personal communication, Alasebu Berhanu, MD, 1984, Gondar College of Medical Sciences). Unpublished data should also be referred to in the text.
- References with six or less authors should all be listed. If more than six names, list the first three, followed by et al.
- Listing of a reference to a journal should be according to the guidelines of the International Committee of Medical Journal Editors ("Vancouver Style') and should include authors' name(s) and initial(s) separated by commas, full title of the article, correctly abbreviated name of the journal, year, volume number and first and last page numbers.

- Reference to a book should contain author's or authors' name(s) and initials, title of chapter, names of editors, title or book, city and name of publisher, year, first and last page numbers.

The following examples demonstrate the acceptable reference styles.

Articles:

- Gilbert C, Foster A. Childhood blindness in the context of Vision 2020: the right to sight. *Bull World Health Org 2001;79:227-32*
- Teklu B. Disease patterns amongst civil servants in Addis Ababa: an analysis of outpatient visits to a Bank employee's clinic. *Ethiop Med J 1980;18:1-6*
- Tsega E, Mengesha B, Nordenfelt E, Hansen B-G; Lindberg J. Serological survey of human immuno-deficiency virus infection in Ethiopia. *Ethiop Med J 1988; 26(4): 179-84*
- Laird M, Deen M, Brooks S, et al. Telemedicine diagnosis of diabetic retinopathy and glaucoma by direct ophthalmoscopy (Abstract). *Invest Ophthalmol Vis Sci 1996; 37:104-5*

Books and chapters from books:

- Henderson JW. Orbital Tumors, 3rd ed. Raven Press New York, 1994. Pp 125-136.
- Clipard JP. Dry Eye disorders. In Albert DM, Jakobiec FA (Eds). Principles and Practice of Ophthal-mology. W.B Saunders: Philadelphia, PA 1994 pp257-76.

Website:

- David K Lynch; laser History: Masers and lasers. http://home.achilles.net/jtalbot/history/massers.htmAccessed 19/04/2001

2. **Brief Communication**

Short versions of Research and Applications articles, often describing focused approaches to solve a health problem, or prelnary evaluation of a novel system or methodology

- Word count: up to 2000 words
- Abstract up to 200 words; excluding: Abstract, Title, Tables/Figures and References
- Tables and Figures up to 5
- References (vide supra – Original Article)

3. **Case Series**

Minimum of three and maximum of 20 cases

- Up to 1,000 words; excluding: Abstract, Title, Tables/Figures and References
- Abstract of up to 200 words; structured; (vide supra)
- Statistical statements here are expressed as 5/8 (62.5%)
- Tables and Figures: no more than three
- References: maximum of 20

4. **Case Report**

Report on a rare case or uncommon manifestation of a disease of academic or practical significance

- Up to 750 words; excluding: Abstract, Title, Tables/Figures and References
- Abstract of up to 100 words; unstructured;
- Tables and Figures: no more than three
- References: maximum of 10

5. **Systematic review**

Review of the literature on topics of broad scientific interest and relevant to EMJ readers

- Abstract structured with headings as for an Original Article (*vide supra*)
- Text should follow the same format as what is required of an Original Article
- Word count: up to 8,000 words, excluding abstract, tables/Figures and references
- Structured abstract up to 250 words
- Tables and Figures up to 8

6. **Teaching Article**

A comprehensive treatise of a specific topic/subject, considered as relevant to clinical medicine and public health targeting EMJ readers

- By invitation of the Editorial Board; but an outline of proposal can be submitted
- Word limit of 8,000; excluding abstract, tables/Figures and references
- Unstructured Abstract up to 250 words

7. **Editorial**
   - By invitation of the Editorial Board, but an editorial topic can be proposed and submitted
   - Word limit of 1,000 words: excluding references and title; no Abstract
   - References up to 15.
8. **Perspectives**
   - By invitation of the Editorial board, but a topic can be proposed and submitted
   - Word limit of 1,500
   - References up to six
9. **Obituaries**
   - By invitation of the Editorial board, but readers are welcome to suggest individuals (members of the EMA) to be featured.

Preparation of manuscripts

- Manuscripts must be prepared in English, the official language of the Journal.
- On a single separate sheet, there must be the title of the paper, with key words for indexing if required, and each author's full name and professional degrees, department where work was done, present address of any author if different from that where work was done, the name and full mailing address of the corresponding author, including email, and word count of the manuscript (excluding title page, abstract, references, figures and tables). Each table/figures/boxes or other illustrations, complete with title and footnotes, should be on a separate page.
- All pages should be numbered consecutively in the following order: Title page; Abstract and keywords page; main manuscript text pages; References pages; acknowledgment page; Figure-legends and Tables
- The Metric system of weights and measures must be used; temperature is indicated in degrees Centigrade.
- Generic names should be used for drugs, followed by propriety brand name; the manufacturer name in parenthesis, e.g. diazepam (Valium, Roche UK)
- Statistical estimates e.g. mean, median proportions and percentages should be given to one decimal place; standard deviations, odds ratios or relative risks and confidence intervals to two decimal places.
- Acronyms/Abbreviations should be used sparingly and must be given in full, at first mention in the text and at the head of Tables/foot of Figure, if used in tables/figures.eg. Blood Urea Nitrogen (BUN). Interstitial lung disease (ILD).
- Use the binomial nomenclature, reference to a bacterium must be given in full and underlined - underlining in typescript becomes italics in print (e.g. *Hemophilus influenzae)*, and later reference may show a capitalised initial for the genus (e.g. *H. influenzae)*
- In the text of an article, the first reference to any medical phrase must be given in full, with the initials following in parentheses, e.g., blood urea nitrogen (BUN); in later references, the initials may be used.
- Manuscripts for submission should be prepared in Microsoft Word document file format

Submission of manuscripts

- As part of the submission process, authors are required to check off their submission's compliance with journals requirements
- All manuscripts must be submitted to the Editor-in-Chief of the Journal with a statement signed by each author that the paper has not been published elsewhere in whole or in part and is not submitted elsewhere while offered to the *Ethiopian Medical Journal*. This does not refer to abstracts of oral communications at conferences/symposia or other proceedings.
- It is the author's responsibility to proof-read the typescript or off-print before submitting or resubmitting it to the Journal, and to ensure that the spelling and numerals in the text and tables are accurate.
- Authors should submit their work through the Ethiopian Medical Journal website; ema.emj@telecom.net.et.

Conflict of interest

Authors should disclose at the time of submission of manuscripts any conflict of interest, which refers to situations in which financial or other personal considerations may compromise, or have the appearance of compromising their professional judgment in conducting or reporting the research results They should declare that there is no conflict of interest to declare if there is none,

Manuscripts review procedures

The procedures for manuscripts review include:

- Within one week of receipt of a manuscript, the Editorial Board will review it in reference to (i) conformity with the Journal's "guidelines to authors (revised version available in all issues starting January 2020)", (ii) relevance of the article to the objectives of the *EMJ*, (iii) clarity of presentation, and (iv) plagiarism by using appropriate software
- The Editorial Board has three options: accept manuscripts for external review, return it to author for revision, or reject it. A manuscript not accepted by a board member is blindly reviewed by another board member. If not accepted by both, the manuscript is rejected by the Editorial Board. Decision will be made by the suggestion of a third Editorial Board member if the decisions of first two do not concur.
- Once accepted for external review, the Editorial Board identifies one (for brief communication, case reports, and teaching articles) or two (for original articles) reviewers with appropriate expertise. The reviewers will be asked to review and return manuscripts with their comments online within two weeks of their receipt. Reviewers have four options; accept, accept with major revision, accept with minor revision, or reject.
- A Manuscript accepted subject revision as suggested by reviewers will be returned to the corresponding author. Author(s) will be given four weeks to respond to reviewers' comments, make necessary changes, and return the manuscript to the Editorial Board. A Manuscript not returned within the specified time will be considered withdrawn by the author(s).
- Manuscripts with minor revisions will be cleared by the Editorial Board and accepted for publication. Those with major revisions will be returned to external reviewers and follow the procedures as outlined for the initial review.

General information

The Editorial Board reserves the right for final acceptance, rejection or editorial correction of papers submitted. However, authors are encouraged to write an appeal to the Editor-in-Chief for reconsideration of rejected manuscripts or any other complaints they might have.

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The Editorial Board welcomes comments on the guidelines from Journal readers.

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Acknowledgment

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