Yazezew Kebede, Beniam Tsegay, Hagos Abreha. *Ethiop Med J, 2017, Vol. 55, No. 4*

ORIGINAL ARTICLE

ENDOSCOPIC AND HISTOPATHOLOGICAL CORRELATION OF GASTROINTESTINAL DISEASES IN AYDER REFERRAL HOSPITAL, MEKELLE UNIVERSITY, NORTHERN ETHIOPIA

Yazezew Kebede, MD[1*], Beniam Tsegay, MD[2], Hagos Abreha, MD[1]

ABSTRACT

Background: *Gastrointestinal endoscopy service in Ethiopia is mainly limited to the capital city Addis Ababa. The service started in Ayder referral hospital, Mekelle, in 2011 after two physicians obtained six weeks unstructured, on-site training where each of them was able to perform only 20 supervised procedures. The major objective of this study was to determine the pattern of endoscopic findings of diseases in our endoscopy practice at Ayder referral hospital.*

Methods: *The study design was a facility-based retrospective cohort study. The endoscopy registry was interrogated retrospectively and analyzed using descriptive statistics.*

Results: *A total of 2,486 patients' endoscopic examinations were included in the study. Upper and lower gastrointestinal endoscopy totalled 1,994 and 492 procedures, respectively. Seventy four percent of colonoscopies and 58.7% of esophago-gastroduodenoscopies (EGD) were performed on male patients. The mean, minimum and maximum age of the study subjects was 40, 1 and 94 years of age respectively. The common EGD findings were erythema of gastric mucosa in 489 (24.5%), varices in 253 (12.7%), gastric cancer in 188(9.4%), peptic ulcer disease in 176 (8.8%) and gastroesophageal reflux disease in 96 (4.8%). The common colonoscopic findings were colorectal cancer in 114(23.2%), non-specific erythema of colonic mucosa in 78 (15.9%) and internal hemorrhoids in 37(7.5%).There was a poor correlation (0.5-57.7%) between clinical and endoscopic diagnosis; however, endoscopic diagnosis showed significant correlation (73%-100%) with histological diagnosis.*

Conclusion*: Our findings are in agreement with those of other similar cohort studies. Hence, endoscopy service in such a resource-limited setting may be expanded by giving short-term, unstructured, onsite training to physicians.*

Key words: *Gastrointestinal endoscopy, Ayder Referral Hospital, Mekelle University, histological, clinical, diagnosis*

INTRODUCTION

Gastrointestinal complaints are very common in Ethiopia. In 2012, for example, gastrointestinal (GI) symptoms were the second most common reason for patient visits to Ayder referral hospital. Gastrointestinal diseases are also known to cause significant morbidity and mortality unless they are diagnosed and treated early. Although gastrointestinal endoscopy is a major diagnostic tool for gastrointestinal disorders, it is not widely available in Ethiopia, forcing health care workers to refer patients to the capital city for endoscopic examination whenever they are challenged by the diagnosis. This exposes patients to significant, sometimes unbearable costs, in addition to the losses they suffer from being absent from work for sometimes up to a week. Many patients decline referral for reasons of financial constraints, which obliges physicians to treat these patients empirically. This inevitably leads to misdiagnosis and mismanagement of patients, which results in significant morbidities and mortalities. To address this problem, Ayder University Hospital at Mekelle University organized an on-site, unstructured, short-term training in endoscopy for its staff by inviting three gastroenterologists from Addis Ababa. Each of them stayed for two weeks making the total duration of training six weeks. Each of the trainees did 20 supervised procedures during the training period which is much lower than the requirement set by the American Society for Gastrointestinal Endoscopy (ASGE) where physicians are required to perform 130 and 140 supervised procedures for EGD and colonoscopy re-

[1] Department of Internal Medicine, School of Medicine, Mekelle University
[2] Department of Pathology , School of Medicine, Mekelle University
*Corresponding author: *yazezewkebede@yahoo.com*

spectively, before they perform the procedures independently (1). Immediately after the training, a gastrointestinal unit was established in 2011 and the hospital began to offer endoscopy services. By February 2015, more than 2,500 procedures had been performed. However these have not been reported and compared to the standard practice. Reporting this finding may have some advantages. One is sharing our locally adapted experience with similar hospitals in Ethiopia, the second is to compare our finding with the findings from other studies and the third is to share our findings with clinicians, to aid in their clinical decision making.

Objectives: The main objective of our study was to determine the pattern of endoscopic findings of diseases with the specific objectives of determining the common reasons for endoscopic examination in patients, assessing the validity of clinical diagnosis as compared to endoscopic diagnosis and verifying the correlation of endoscopic findings with the histological findings.

PATIENTS AND METHODS

The study design was a facility-based retrospective cohort study. The study was conducted in Ayder referral hospital, which is the only hospital in the region where gastrointestinal endoscopy service is provided. The study included all medical records of patients for whom gastrointestinal endoscopy was performed between July 18, 2011 to February 25, 2015. The endoscopy registry book was studied in depth. Data were coded, cleaned, entered and validated using Epi Info version 3.5.2. The SPSS version 20 software was used for data analysis. The data were entered by the investigators themselves. Descriptive statistics with mean, frequencies and percentages was used to describe and summarize the quantitative data. Sensitivities and specificities of clinical and endoscopic diagnosis were determined and compared with the histopathologic diagnosis.

Ethical Considerations: The study was approved by the Institutional Review Board (IRB) of the College of Health Sciences at Mekelle University (ERC No: 0288/2014). To protect confidentiality of patient information no identification was included in the data abstraction tool and the information collected was accessed by the study team only.

RESULTS

A total of 2,509 procedures were carried out between July 2011 and February 2015. Twenty-three records were excluded from the analysis due to having incomplete data, so that a total of 2,486 patient endoscopic procedures were analyzed. Upper and lower gastrointestinal endoscopy totalled 1,994 and 492 procedures respectively. Seventy-four percent of colonoscopies and 58.7% of esophagogastroduodenoscopy (EGD) were done in male patients. The mean, minimum and maximum age of the study subjects was 40, 1.0 and 94 years of age respectively. Common indications for EGD were peptic ulcer disease (32%), dyspepsia (13.2%), esophageal varices (10%), upper gastrointestinal bleeding (8.9%), gastric cancer (5.8%), gastric outlet obstruction (4.5%), esophageal cancer (2.6%) and gastroesophageal reflux disease (GERD) (1.5%). Common indications for colonoscopy were colorectal cancer (32.9 %), Inflammatory Bowel Disease (18.1%), Irritable Bowel Syndrome (8.7%), lower gastrointestinal bleeding (5.3%), bowel obstruction (3.5%), diarrhea (2.8%), anemia (1.6%) and constipation (0.6%).

The most common EGD findings were erythema of gastric mucosa in 489(24.5%), varices in 253 (12.7%), gastric cancer in 188(9.4%), peptic ulcer disease in 176(8.8%), gastroesophageal reflux disease in 96 (4.8%) and normal findings in 338 (17%) (Table 1).

Common colonoscopy findings were erythema of colonic mucosa in 78(15.9%), colorectal cancer in 114 (23.2%), internal hemorrhoids in 37(7.5%) and normal in 237(48.2%) (Table 2). There were no deaths or complications observed that needed medical attention or intervention during the procedures.

Table 1. Upper GI Endoscopy Findings at Ayder referral hospital, Tigray, Ethiopia (2011-2015)

Finding	Number (%)
Chronic Gastritis	489(24.5)
Normal	338(17.0)
Signs of Portal HTN	253(12.7)
Gastric Cancer	188(9.4)
Peptic Ulcer Disease	176(8.8)
Gastroesophageal Reflux Disease	96(4.8)
Gastroduodenitis	60(3.0)
Bile Reflux Disease	58(2.9)
Gastric Outlet Obstruction	47(2.4)
Hiatus Hernia	46(2.3)
Esophageal Cancer	43(2.2)
Duodenitis	31(1.6)
Esophagitis	30(1.5)
Esophageal Candidiasis	22(1.1)
Post Pyloric Stenosis	20(1.0)
Acute Gastritis	18(0.9)
Foreign Body	18(0.9)
Duodenal Mass	17(0.9)
Gastroesophagitis	16(0.8)
Achalasia	11(0.6)
Other	11(0.6)
Esophageal Stricture	3(0.2)
Esophageal Ulcer	3(0.2)
TOTAL	**1,994(100.0)**

Table 2. Colonoscopy Findings at Ayder referral hospital, Tigray, Ethiopia (2011-2015)

Finding	Number (%)
Normal	237(48.2)
Colorectal Cancer	114(23.2)
Non Specific Colitis	78(15.9)
Internal Hemorrhoids	37(7.5)
Inflammatory Bowel Disease	7(1.4)
Redundant Sigmoid	7(1.4)
Irritable Bowel Syndrome	5(1.0)
Other	4(0.8)
Diverticulitis	3(0.6)
TOTAL	**492(100.0)**

Histological analysis of biopsies of the esophagus showed squamous cell carcinoma in 10(41.7%), adenocarcinoma in 4(16.7%), acute esophagitis in 2 (8.3%), glycogenic acanthosis in 2(8.3%) and Barret's esophagitis in 1(4.2%) (Table 3). Biopsies taken from the stomach showed chronic gastritis in 72 (46.2%), adenocarcinoma of the stomach in 28 (17.9%), signet ring cell cancer in 12 (7.7%), intestinal metaplasia in 4(2.6%) and normal histology in 22 (14.1%) (Table 3). Biopsies taken from the duodenum showed dysplasia in 2(22.2%), celiac disease in 1(11.1%) stromal tumour in 1(11.1%), carcinoid tumour in 1(11.1%), duodenitis in 1(11.1%) and normal in 3 (33.3 %) cases (Table 3).

The most common histopathology for colon biopsy was chronic nonspecific colitis in 30 (30.6 %), colorectal adenocarcinoma in 27(27.6%), normal in 14 (14.3%), dysplasia 6 (6.1%) and Schistosoma colitis in 5(5.1%). There was 1(1%) case each of malignant melanoma and schistosomiasis-leishmaniasis co-infection (Table 4).

Table 3. Histopathologic Findings of Upper GI Biopsy, Ayder Referral Hospital Tigray, Ethiopia (2011-2015)

Histology type		Frequency (%)
Esophageal Biopsy		
	Squamous Cell Cancer of the Esophagus	10(41.7)
	Adenocarcinoma of the Esophagus	4(16.7)
	Acute Esophagitis	2(8.3)
	Glycogen Acanthosis	2(8.3)
	Barret's Esophagitis	1(4.2)
	Esophageal Dysplasia	1(4.2)
	Undifferentiated Malignant	1(4.2)
	Normal	1(4.2)
	Inconclusive	2(8.3)
	Subtotal	**24(100)**
Stomach Biopsy		
	Chronic Gastritis	72(46.2)
	Adenocarcinoma of the Stomach	28(17.9)
	Signet Ring Cell Cancer	12(7.7)
	Intestinal Metaplasia	4(2.6)
	Undifferentiated Malignant Tumour	4(2.6)
	Dysplasia	3(1.9)
	NHL of the Stomach	3(1.9)
	Acute Gastritis	1(0.6)
	Stomach lymphoma and Diffuse type Adeno-carcinoma	1(0.6)
	Stomach Mesenchymal Tumour	1(0.6)
	Stomach MALT	1(0.6)
	Normal	22(14.1)
	Inconclusive	4(2.6)
	Subtotal	**156(100)**
Duodenal Biopsy		
	Dysplasia	2(22.2)
	Celiac Sprue	1(11.1)
	Stromal Tumour	1(11.1)
	Duodenitis	1(11.1)
	Carcinoid Tumour	1(11.1)
	Normal	3(33.3)
	Subtotal	**9(100%)**

Table 4. Histopathologic Findings of Colon Biopsy at Ayder referral hospital, Tigray, Ethiopia (2011-2015)

Histology type	Number (%)
Chronic Non-specific Colitis	30(30.6)
Colorectal Adenocarcinoma	27(27.6)
Normal	14(14.3)
Dysplasia	6(6.1)
Schistosoma Colitis	5(5.1)
Acute Colitis	4(4.1)
Adenomatous Polyp	2(2.0)
Lymphoma	2(2.0)
Signet ring Cell Cancer	2(2.0)
Anorectal Squamous Cell Carcinoma	1(1.0)
Visceral Leishmaniasis	1(1.0)
Malignant Melanoma	1(1.0)
Benign Colonic Ulcer	1(1.0)
Schistosomiasis & Leishmaniasis Coinfection	1(1.0)
Ulcerative Colitis	1(1.0)
TOTAL	**98(100%)**

Considering GI endoscopy as a gold standard test, clinical diagnosis of gastritis, inflammatory bowel disease, colorectal cancer, gastric cancer, PUD and esophageal varices had a sensitivity of 0.5%, 28.6%, 29.8%, 30.3%, 37.5% and 57.7% respectively. The specificity ranged between 76.0% for PUD to 99.5% for gastritis. (Table 5).

Considering histopathology as a gold standard test, GI endoscopy finding of chronic gastritis, colitis, colorectal cancer and gastric cancer had a sensitivity of 47.9%, 75.0%, 87.8% and 94.7% respectively. The specificity ranged between 76.7% for gastric cancer to 92.9% for chronic gastritis. (Table 6)

Table 5. Sensitivity and Specificity of Clinical Diagnosis taking GI endoscopy as a gold standard diagnostic tool, Ayder referral hospital, Tigray, Ethiopia (2011-2015)

Clinical Diagnosis	Sensitivity	Specificity	Positive Predictive value	Negative Predictive value
PUD	37.5%	76.0%	10.3%	94.3%
Gastritis	0.5%	99.5%	30.0%	70.9%
Gastric Cancer	30.3%	96.8%	49.1%	93.2%
Colorectal Cancer	29.8%	89.7%	25.4%	91.6%
Inflammatory Bowel Disease	28.6%	84.8%	2.2%	99.0%
Esophageal Varices	57.7%	96.9%	72.6%	94.2%

Table 6. Sensitivity and specificity of GI Endoscopy taking histopathology as a gold standard diagnostic tool, Ayder referral hospital, Tigray, Ethiopia (2011-2015)

Endoscopic diagnosis	Sensitivity	Specificity	Positive predictive value	Negative predictive value
Colorectal Cancer	87.8%	88.1%	63.2%	96.9%
Gastric Cancer	94.7%	76.7%	57.4%	97.8%
Chronic Gastritis	47.9%	92.9%	79.1%	76.1%
Colitis	75.0%	79.6%	36.4%	95.3%

DISCUSSION

The ratio of male to female patients for whom the procedures were carried out was 1.6:1. This is more balanced than a similar previous study carried out in Tikur Anbesa Hospital (2).

The most common indications for EGD in our study were peptic ulcer disease (32%), dyspepsia (13.2%), esophageal varices (10%) and upper gastrointestinal bleeding (8.9%). Other studies have found simple dyspepsia to the be the most common indication (2, 3, 4). This might be due to the inaccessibility of the service in our region and as a result, patients will only present for relatively serious complaints. The other possible explanation is that the difference may not indicate an actual difference in indication but rather the clinical similarity for both clinical entities. One study actually showed that PUD, gastritis and dyspepsia have strong clinical similarity in presentation (5).

Chronic gastritis was the most common EGD finding in our study observed in 489 (24.5%) patients. This finding is comparable to a study done in Kenya, which showed prevalence of 25.8% (7). Another study also found gastritis in 21.5% of patients (8). Similarly studies from Ghana (9) and Tanzania (10) showed gastritis as being the most common finding, 32.5 % and 61.1% respectively. However, our finding is different from another study done in Ethiopia in which duodenal ulcer was the most common finding (41%) (2). This might be explained by the widely prescribed eradication therapy for *H.pylori* nowadays, which might reduce duodenal ulcer prevalence. EGD was normal in 338(17.0%) patients in our study. This is lower than what was observed in a large study conducted in Addis Ababa involving 10,000 participants which found normal histology in 28% of those tested (2).This might be due to the unavailability of the service in our locality where only patients with relatively serious problems are referred for the procedure.

Esophageal varices were found in 253 (12.7%). This is in agreement with a Kenyan study which showed a prevalence of 14% (7) but lower than the 9% reported in a prior study done in Addis Ababa (2).

The most common esophageal histopathology in our study was squamous cell carcinoma (SCC) accounting for 41.7%. SCC was the most common malignancy in other studies as well (12,13). The most common malignancy found from stomach biopsy was adenocarcinoma accounting for 17.9%. Similar findings were noted in two studies from India (12, 14).

The positive predictive value (PPV) of EGD in our study was 64.4% (95% CI: 57.5-70.4) which is in agreement with other studies from Ghana and Nigeria ,which showed PPV of 58.6% and 62.7% respectively (5,9).

Suspected colon cancer was the major reason to undertake colonoscopy examination which accounted for 32.9% of the procedures. This is in agreement with the findings from a study conducted in Nigeria where suspected colon cancer was the reason for 31.1% of patients referred for colonoscopy (6).

The most common colonoscopy finding was a normal colon (48.2%), similar with what was reported from the Nigerian study (6). The second most common finding was colorectal cancer which accounted for 23.2% of the examined cases. This is comparable to the finding from the study done in Nigeria which showed a prevalence of 13% and 7.8% for anorectal and colonic cancers respectively (6). The third most common colonoscopy finding was nonspecific colitis, which accounted for 15.9% of the patients. This might be because of the prevalent bacterial and parasitic gut infections in our country.

Clinical diagnosis bore a very low sensitivity in picking the correct diagnosis (Table 5). The sensitivity ranged from 0.5% for gastritis to 57.7% for esophageal varices. In a study done in Nigeria, gastritis was associated with the most modest sensitivity (4%) (11). The specificity of clinical diagnosis was relatively greater, ranging from 76% for peptic ulcer disease to 99.5% for gastritis. The positive predictive value (PPV) of clinical diagnosis, in our study ranged between 2.2% for Inflammatory Bowel Disease (IBD), to 72.6% for esophageal varices. The negative predictive value (NPV) also ranged between 70.9% for gastritis to 99% for IBD. In comparison, the NPV of gastritis in a study done in Nigeria was 66% (11), which is comparable to our finding. In the Nigerian study, the PPV ranged from 29% to 67.% while NPV ranged from 66% to 99% (11). Clinical diagnosis has varied sensitivity and specificity in different clinical conditions but generally speaking there is a very poor correlation between clinical and endoscopic findings. In contrast, endoscopic findings showed a good association with histology (Table 6). The sensitivity of endoscopic findings for gastritis, colitis, gastric cancer and colonic cancer was 47.9%, 75%, 94.7% and 87.8% respectively. Specificity of endoscopic findings for gastritis, colitis, gastric cancer and colonic cancer was 92.9%, 79.6%, 76.7% and, 88.1% respectively. One study from Ethiopia and a second one from Nigeria showed an overall association of 80% (12) and 79.6% (8) respectively, both of which are comparable to our findings. Another two studies also showed an association of 62.5% (13) and 68.6% (14). However, another study from Ethiopia showed an agreement of 90% between endoscopy and histology in diagnosing upper gastrointestinal malignancies (15).

Keeping in mind differences in disease prevalence, our study suggests a similar performance with other endoscopy units, validating in some fashion that the training had skills acquisition by our endoscopists. This hopefully will allow us to repeat a similar model with the aim of spreading gastrointestinal endoscopy competence in currently severely underserved areas of Ethiopia. Such proliferation will of course need to be closely monitored and framed by appropriate credentialing and quality assessment structures at the regional and national levels.

Conclusion: Common indications for EGD are peptic ulcer disease, dyspepsia, esophageal varices, upper GI bleeding and gastric cancer. The indications for colonoscopy are colonic cancer, IBD, IBS and lower GI bleeding. The most common EGD findings were chronic gastritis, esophageal varices, gastric cancer, PUD and GERD. Those of colonoscopy were colonic cancer, chronic colitis and internal hemorrhoids. Clinical diagnosis had a poor correlation with endoscopic findings but endoscopic findings displayed a significant association with histological findings in our setup.

ACKNOWLEDGEMENTS

We would like to acknowledge Mekelle University for funding the study and also Dr. Alan Barkun for editing the manuscript

REFERENCES

1. ASGE taskforce on ensuring competence in Endoscopy. Ensuring competence in Endoscopy. 2011:5-6
2. Taye M, Kassa E, Mengesha B, Gemechu T, Tsega E. Upper gastrointestinal endoscopy: a review of 10,000 cases. *Ethiop Med J.* 2004;42(2):97-107.
3. Malu AO, Wali SS, Kazmi R, Macauley D, Fakunle YM. Upper gastrointestinal endoscopy in Zaria, northern Nigeria. *West Afr J Med.* 1990;9(4):279-84.
4. Olokoba AB, Olokoba LB, Jimoh AA, Salawu FK, Danburam A, Ehalaiye BF. Upper gastrointestinal tract endoscopy indications in northern Nigeria. *J Coll Physicians Surg Pak.* 2009;19(5):327-8. doi: 05.2009/ JCPSP.327328.
5. Dakubo JC, Clegg-Lamptey JN, Sowah P. Appropriateness of referrals for upper gastrointestinal endoscopy. *West Afr J Med.* 2011;30(5):342-7.
6. Olokoba AB, Obateru OA, Bojuwoye MO, Olatoke SA, Bolarinwa OA, Olokoba LB. Indications and findings at colonoscopy in Ilorin, Nigeria. *Niger Med J.* 2013;54(2): 111–4.
7. Lodenyo H, Rana F, Mutuma GZ, Kabanga JM, Kuria JK, Okoth FA. Patterns of upper gastrointestinal diseases based on endoscopy in the period 1998-2001. *Afr J Health Sci.* 2005; 12(1-2):49-54.
8. Misauno MA, lsmaila BO, Usman BD, Abdulwahab-Ahmed A, Achinge GI. Spectrum of endoscopically diagnosed upper gastrointestinal diseases in Jos. *Sahel Med J.* 2011; 14(2):63-6.
9. Tachi K, Nkrumah KN. Appropriateness and diagnostic yield of referrals for Oesophagogastroduodenoscopy at the Korle Bu Teaching Hospital. *West Afr J Med.* 2011;30(3):158-63.
10. Segni M, Birgitta S, Venance P, Gibson S. Upper gastrointestinal endoscopic findings and prevalence of Helicobacter pylori infection among adult patients with dyspepsia in northern Tanzania. *Tanzan J Health Res.* 2014;16(1):16-22.
11. Agbakwuru EA, Fatusi AO, Ndububa DA, Alatise OI, Arigbabu OA, Akinola DO. Pattern and validity of clinical diagnosis of upper gastrointestinal diseases in south-west Nigeria. *Afr Health Sci.* 2006;6(2):98-103.
12. Rashmi K, Horakerappa MS, Karar A, Mangala G. A study on histopathological spectrum of upper gastrointestinal tract endoscopic biopsies. *Int J Med Res Health Sci*. 2013;2(3):418- 24.
13. Islam SMJ, Mostaque Ahmed ASM, Ahmad MSU, Hafiz S. Endoscopic and Histologic Diagnosis of Upper Gastrointestinal Lesions, Experience in a Port City of Bangladesh. *Chattagram Maa-O-Shishu Hospital Medical College Journal* 2014; 13(3):11-4
14. Sheikh BA, Hamdani SM, Malik R. Histopathological spectrum of lesions of upper Gastrointestinal tract- A study of endoscopic biopsies. *GJMEDPH* 2015; 4(4):1-8
15. Bane A, Ashenafi S, Kassa E. Pattern of upper gastrointestinal tumors at Tikur Anbessa Teaching Hospital in Addis Ababa, Ethiopia: a ten-year review. *Ethiop Med J.* 2009; 47(1):33-8.