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Original Article

Treatment Outcomes and Prognostic Factors for Survival in Patients with Gastric Cancer: A Retrospective Study

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Abstract

Background: *Gastric cancer is the fifth most often diagnosed cancer and the third most frequent reason of cancer death worldwide. It is also associated with a lack of standard treatment strategies, particularly following first-line therapy. In Ethiopia, the survival status of gastric cancer patients was not well understood.*

Objective: *This study aimed to determine the clinical outcomes and prognostic factors for survival among gastric cancer (GC) patients in the adult oncology unit of Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia.*

Methods: *Hospital-based retrospective cohort study was conducted on 164 study participants recruited from patient registry between 1 January 2016 to 31 December 2020. Data was collected using a structured tool from medical records and telephone interviews Data analysis was performed using Descriptive and inferential statistics.*

Results: *The median (±SD) age of the study participants at diagnosis was 48.50 ±14.48 years. Adenocarcinoma accounted for 73.8% of the cases. Regarding clinical stage, 92 (56.1%) of the patients were diagnosed with stage IV and 84 (51.2%) of the cases had metastasized cancer, of which 47 (28.7%) participants presented with liver metastasis. About 40% (65) of the cases were treated with partial gastrectomy followed by bypass surgery. At the end of treatment follow-up, 110 (67.1%) of the patients were dead. A 5-year overall survival rate was 11% with a median survival time of 18.6 months. In multivariate logistic regression, ECOG ≥ 2 (AHR= 2.5, P=0.001)**,** adenocarcinoma histologic type (AHR=0.4, P=0.004), ovary metastasis (AHR=2.9, P=0.035), liver + lung metastasis (AHR=2.4, P= 0.048), paclitaxel + carboplatin chemotherapy (AHR=0.3, P= 0.044) were found to significantly affect survival of the GC patients.*

Conclusion: *The survival outcome of gastric cancer is low and requires early detection in this study setting. The findings underscore the importance of early detection and tailored treatment approaches based on prognostic factors.*

Keywords: *Gastric cancer, treatment outcome, prognostic factor, Tikur Anbessa Specialized Hospital.*
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Introduction

Gastric cancer is the fifth most often diagnosed cancer and the third most frequent reason for cancer death worldwide (1). It is also associated with a lack of standard treatment strategies, particularly following first-line therapy. In Ethiopia, the survival status of gastric cancer patients is not well understood. Gastric cancer (GC) is the fifth most often diagnosed cancer and the third most frequent cause of cancer death worldwide.

In 2020, more than 1,089,000 new cases and 770,000 patients died of GC worldwide (2). This could be attributed to lack of standard treatment strategies, particularly following first-line therapy(2).Risk factors for GC include male gender (incidence is double), Helicobacter pylori infection, tobacco use, atrophic gastritis, partial gastrectomy, and Ménétriers disease (3).

There is a large variation in the incidence of GC in different geographical regions. While the incidence of GC is high in China, Japan, and Korea, it is relatively low in most of Europe, North America, and Africa (4). The World Health Organization (WHO) estimates a 15%

increase in non-communicable illnesses worldwide, with more than a 20% increase occurring in Africa between 2010 and 2020. Mali, West Africa, is ranked 15th (5).

The highest prevalence of GC is found in a region comprising Rwanda, Burundi, Southwestern Uganda, and Eastern Kivu province of the Democratic Republic of Congo (6). There is a great deal of variation in reported incidence and mortality among individual African countries. In Ethiopia, available works in the literature place GC 9th among all cancers in incidence (7).

GC is an aggressive malignancy whose management and early detection are challenging. There is no national or institutional guideline on GC in Ethiopia, and healthcare professionals use international guidelines. Moreover, no study was previously done on the treatment pattern, histologic types, survival status, and associated factors in GC patients in Tikur Anbessa Specialized Hospital (TASH), Ethiopia. Generating evidence on histologic types, treatment patterns, treatment outcomes of various cancers, survival status, and associated prognostic factors has important practical value for patients, healthcare providers, and researchers. Hence, the objective of the study is to determine the clinical outcomes and prognostic factors for survival among GC patients in the adult oncology unit of TASH, Addis Ababa, Ethiopia.

Materials and Method

A retrospective hospital-based study design was used. Data were extracted from March 10 to July 12, 2021, from the medical charts of GC patients who attended the adult oncology unit of TASH from January 1, 2016, to December 31, 2020. The hospital, established in 1972, serves as the main referral center for the nation. It is a teaching hospital for health science students and provides management services for more than 10,000 cancer patients, including chemotherapy and radiotherapy.

Eligibility criteria

Adult patients aged ≥ 18 years old with histologically confirmed GC and, on chemotherapy were included. Whereas, the patients who had incomplete information on registration and medical charts (no information about phone number, age, sex, and residency) and those with non-carcinomatous gastric tumors were excluded.

Study variables

Treatment outcome (Death/ survival) was the dependent variable. In addition, patient-related variables (age at diagnosis and sex), disease-related variables (stage of cancer at diagnosis, histologic type /grade, duration of symptoms, Initial cancer site, and Eastern Cooperative Oncology Group performance status, ECOG PS), and medication-related variables (duration of chemotherapy (number of cycles) and type of chemotherapy regimen) were the independent variables.

Sample size determination and sampling procedure

All GC patients receiving treatment during the study period and fulfilling the inclusion criteria were included in the study. Data (no report of histopathology, treatment, phone number, and cancer stage) were incomplete for 39 patients. Finally, the records of 164 patients were used for the final analysis.

Data Sources, Collection and Management

A data abstraction form was designed based on the availability of information on patient charts and reviewing the literature and utilized to collect information on socio-demographic features, clinical and pathological characteristics, and treatment approaches used. Phone interview of patients or their families was also performed to collect current event status, date of death if they died, and the presence of co-morbidities, which were not explicitly recorded in the patient charts. Data were collected by a trained pharmacist and nurse. The instruments were pretested on 5% of the sample and appropriate modifications were performed accordingly. Quality of the data was maintained through appropriate training of the data collectors and pretesting of the instrument. Additionally, daily follow-up was made by the supervisor to confirm accuracy and consistency of the collected data.

Data Analysis

Basic descriptive statistics like frequency, proportion, mean, and median were used, and data are presented using tables and graphs. Kaplan Meier analyses with a life table were used to identify the overall survival rates and median survival time. Variations in survival among different variables were compared using the log-rank test. Before running the Cox regression model, the assumption of proportional hazard was tested, and variables with a p-value > 0.05 were considered. All variables with $p<0.2$ in the bi-variable Cox regression model were included in a multivariable Cox regression model analysis. Variables in the multivariable Cox model with a p-value < 0.05 were considered to have a significant association with survival of patients at a 95% confidence interval.

Operational definitions

ECOG PS is a prognostic factor classified as : 0 - Fully active, able to carry out all pre-disease performance without restriction, 1- Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g. light house work, office work, 2- Ambulatory and capable of all self-care but unable to carry out any work activities. Up and about more than 50% of waking hours, 3- Ambulatory and capable of all self-care but unable to carry out any work activities. Up and about more than 50% of waking hours, 4-Completely

disabled. Cannot carry on any self-care. Totally confined to bed or chair, 5- Dead (8)

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Ethics Committee of the School of Pharmacy, College of Health Sciences, Addis Ababa University (Ref No: ERB/ SOP/173/08/2020). Permission to conduct the study was also sought from the Oncology Unit of the Department of Internal Medicine, School of Medicine, College of Health Sciences, Addis Ababa University.

The School of Pharmacy Ethical Review Committee and the Oncology Unit of the Department of Internal Medicine granted waiver the need to obtain informed consent for the collection, analysis, and publication of the retrospectively obtained and anonymized data for this non-interventional study. All methods were carried out in accordance with the relevant guidelines and regulations. Only numerical identifications were used as a reference. Confidentiality and anonymity of subjects were maintained by excluding identifiers, such as names or any other personal identifiers. No disclosure of any names of the patients or healthcare providers was made in relation to the findings.

Results

Socio-Demographic Characteristics

The socio-demographic characteristics of the study participants are depicted in Table 1. Out of the 164 GC patients included in the study, males comprised 64% of the sex category with a male- to-female ratio of 1.8:1. The median age of the study participants at diagnosis was 48.50 years (with the youngest being 18 years and the oldest 87 years). Of these, 83 (50.6 %) were between 40-60 years of age, and 74 (45.1%) came from the Oromia Region. A sizable proportion of the study participants were married (143, 87.2%) (Table 1).

Table 1: Socio-demographic characteristics of gastric cancer patients treated at the Oncology Unit of Tikur Anbessa Specialized Hospital between 1 January 2016 and 31 December 2020, Addis Ababa, Ethiopia (n=164).

Variables	N (%)
Gender	
Male	105(64.0)
Female	59(36.0)
Age	
< 40 years	50(30.5)
40-60 years	83(50.6)
>60 years	31(18.9)
Region	
Oromia	74(45.2)
Addis Ababa	52(31.7)
SNNPR	24(14.6)
Amhara	12(7.3)
Dire Dawa	2(1.2)
Religion	
Orthodox	93(56.7)
Muslim	56(34.2)
Protestant	15(9.1)
Marital status	
Married	143(87.3)
Single	14(8.5)
Widowed	3(1.8)
Divorced	4(2.4)

Southern Nations, Nationalities, and Peoples' Region

Clinical and Pathological Characteristics

All the 164 GC patients had a documented initial functional status at the time of diagnosis. For instance, nearly two-third of the patients (113, 68.9%) had ECOG Performance Status score of 0-1, and almost half of the cases (87, 53%) had $\geq$ 6 months since the first symptom started. The most common site of the tumors and cancer cell type were the antrum (101, 61.6%), and adenocarcinoma (AC) (121, 73.8%), respectively. As regards to pathological grading, half (82, 50.0%) of the participants had poorly-differentiated GC. Regarding clinical stage, 92 (56.1%) of the patients were diagnosed with stage IV, and 84 (51.2%) of the cases had metastasized cancer, of which 47 (28.7%) had liver metastasis (Table 2).

Table 2: Clinical and pathological characteristics of gastric cancer patients treated at the Oncology Unit of Tikur Anbessa Specialized Hospital between 1 January 2016 and 31 December 2020, Addis Ababa, Ethiopia (n=164).

Variables	N (%)
ECOG performance at diagnosis	
ECOG 0-1	113(68.9)
ECOG ≥2	51(31.1)
Duration since the first symptom start	
<6month	77(47.0)
≥6month	87(53.0)

Site of tumor	
Antrum	101(61.6)
Body	21(12.8)
Cardia	17(10.4)
Gastro-oesophageal junction	15(9.1)
Fundus	10(6.1)
Histopathology	
Adenocarcinoma	121(73.8)
Squamous cell carcinoma	30(18.3)
Lymphoma	13(7.9)
Pathological grading	
Poorly-Differentiated	82(50.0)
Moderately-Differentiated	45(27.4)
Well-Differentiated	37(22.6)
Stage	
4	92(56.1)
3	32(16.5)
2	27(17.7)
1	13(7.9)
Recurrences	
Yes	26(15.9)
No	138(84.1)
Metastasis of disease	
Yes	84(51.2)
No	80(48.8)
Site of Metastasis (n=84)	
Liver	47(28.7)
Lung	17(10.4)
Ovary	10(6.1)
Lung and liver	10(6.1)

Eastern Cooperative Oncology Group

Treatment Approaches Used

The approaches used for treating GC patients are depicted in Table 3. Out of the 164 patients with a confirmed diagnosis of GC, 80 (48.7%) were given palliative care. Whilst 68 (41.5%) patients did not undergo surgery, about 65 (40%) of the cases were treated with partial gastrectomy followed by bypass surgery. The duration between surgery and chemotherapy for almost half (83, 50.6%), of the patients was $\geq$ 3 months. The commonest chemotherapy regimen was Cisplatin with paclitaxel (85, 51.8%) followed by Cisplatin with 5- Fluorouracil (5-FU) (49, 29.9%) (Table 3).

One hundred forty-nine (90.9%) of the cases took < 7 cycles of chemotherapy. Of the study participants, 36 (22.0%) had comorbidity and 110 (67.1%) patients died after 15.5 months of median follow-up.

Table 3: Description of the pattern of treatment used to treat gastric cancer patients at the Oncology Unit of Tikur Anbessa Specialized Hospital between 1 January

Variables	N (%)
Treatment aim	
Palliative	80(48.7)
Adjuvant	78(47.6)
Neo-adjuvant	6(3.7)
Type of surgery performed	
No surgery	68(41.5)
Partial Gastrectomy	65(39.6)
Bypass surgery	28(17.1)
Total Gastrectomy	3(1.8)
Duration between surgery and chemotherapy	
<3 months	46(28.1)
$\geq$3 months	83(50.6)
Unknown	35(21.3)
Types of chemotherapy regimens taken	
Cisplatin + Paclitaxel	85(51.8)
Cisplatin + 5 FU	49(29.9)
Paclitaxel + carboplatin	17(10.4)
CHOP	13(7.9)
Treatment change	
No	130(79.3)
Yes	34(20.7)
Co-morbidity	
No	128(78.0)
Yes	36(22.0)
Discontinuing Chemotherapy cycles	
< 7 cycles	149(90.9)
$\geq$7 cycles	15(9.1)
Follow up	
Yes	41(25.0)
No	123(75.0)
Treatment outcomes	
Dead	110(67.1)
Alive	54(32.9)

Overall Survival Rate

A 5-year overall survival rate was 11% with a median survival time of 18.6 months (1-54 months) (95% CI:16.4 -19.6). The estimated cumulative survival rates of GC patients at the 1st, 2nd, 3rd, and 4th months were 66%, 32%, 18%, and 13%, respectively. The probability of survival was highest on the first day of diagnosis of GC, but it decreased with increase in follow-up time (**Figure 1**).

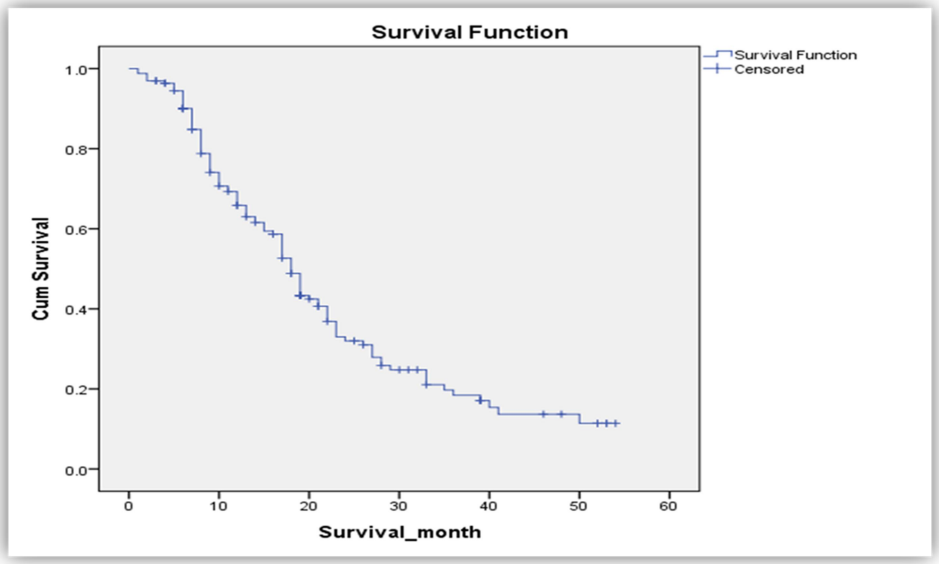

Figure 1: Kaplan Meier Plot for overall survival function in months of patients treated for gastric cancer at the Oncology Unit of Tikur Anbessa Specialized Hospital between 1 January 2016 to 31 December 2020 Addis Ababa, Ethiopia (n= 164).

Survival Estimates Among Associated Variables

(A)

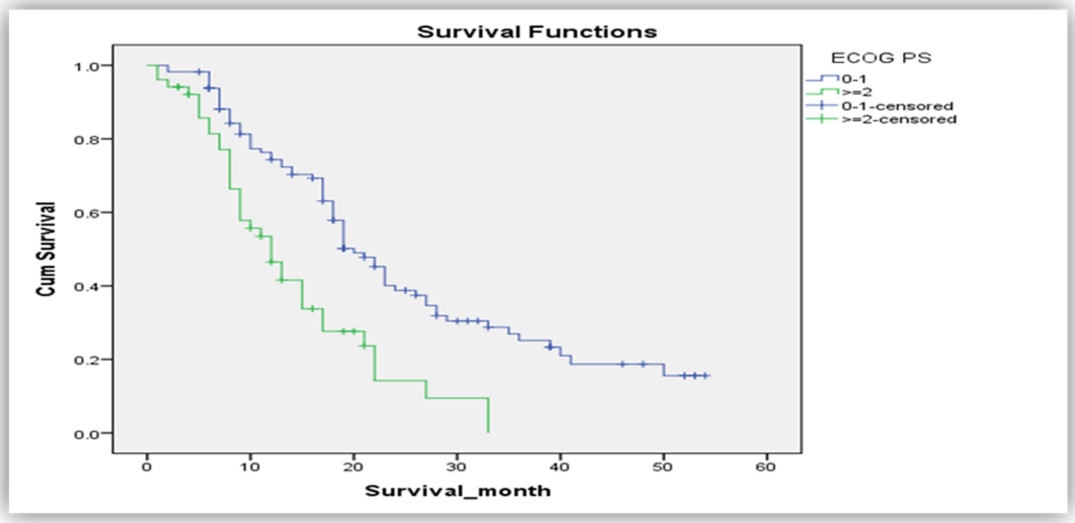

Figure 2A: The study found that the median survival time of GC having ECOG PS ≥ 2 was significantly ($p<0.001$) shorter than those with ECOG PS 0-1 (12.0 months 95% CI: 8.9-15.0).

(B).

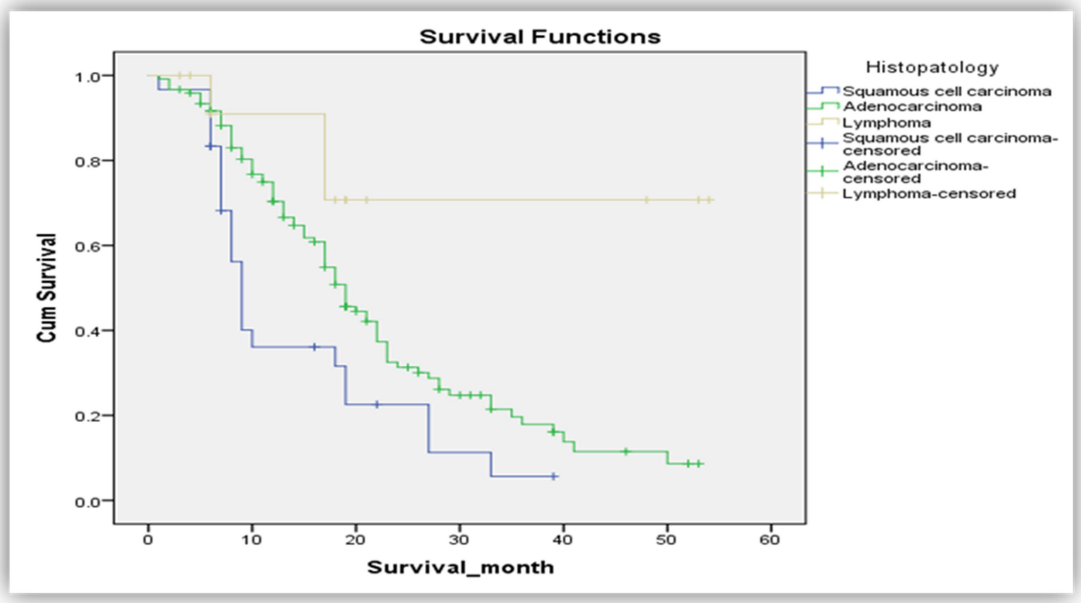

Figure 2B: Patients with AC had a shorter median survival time (22.0 months, 95% CI: 16.6- 21.3) (p< 0.004) than those with squamous cell carcinoma (SCC).

(C)

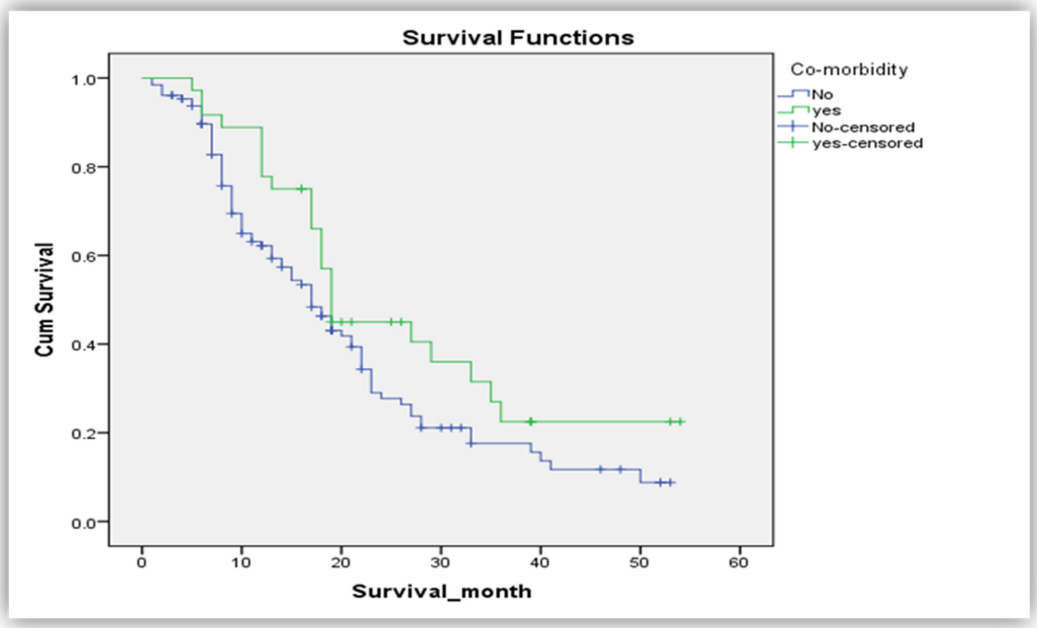

Figure 2C: Patients with comorbidity had less survival time as compared to those without comorbidity (17.0 months, 95% CI:17.6-20.4) (P < 0.037).

(D)

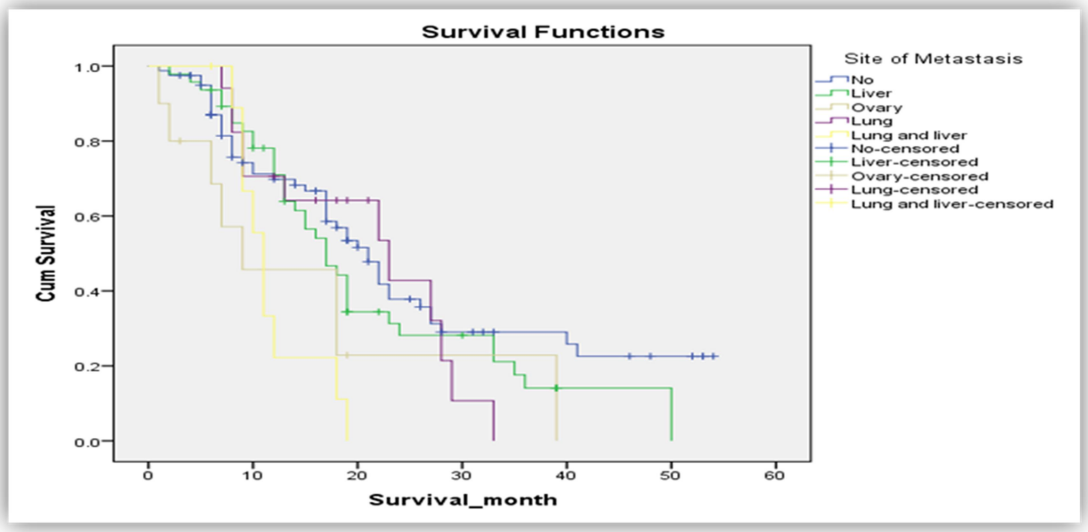

Figure 2D: Survival time for those with ovarian (9.0 months, 95% CI: 10.0-19.4) and liver + lung (11.0 months, 95% CI: 9.6-12.4) metastases was significantly lower compared to those with other sites of metastasis.

(E)

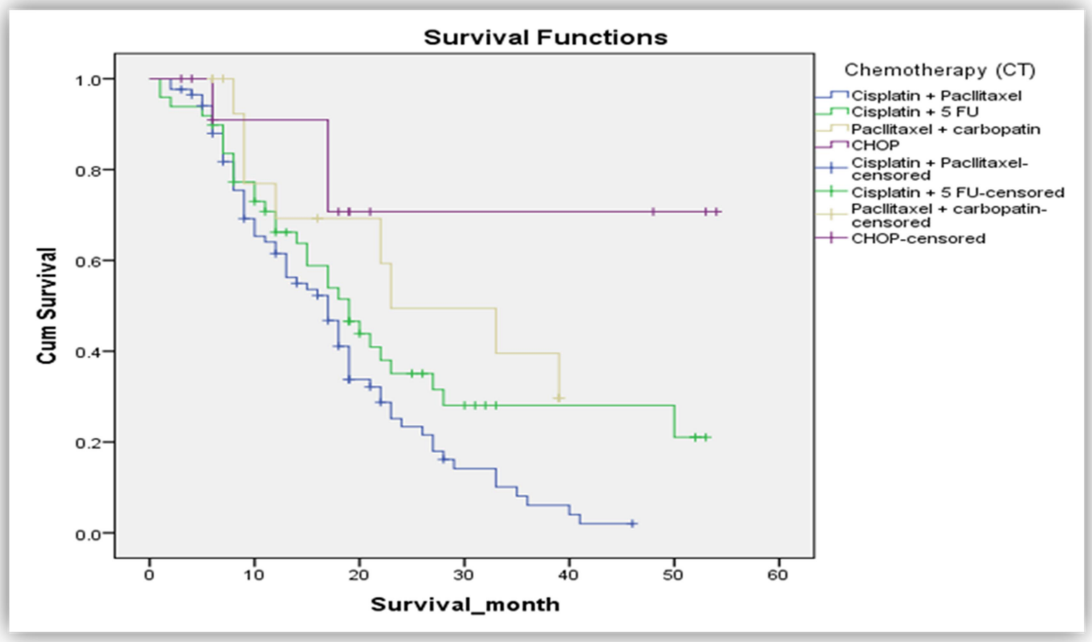

Figure 2E: Patients on paclitaxel + carboplatin had more survival time (23.0 months, 95% CI: 17.5-28.5) ($p< 0.006$) compared to those who received cisplatin + paclitaxel.

Figure 2: Kaplan-Meier survival function among different groups of gastric cancer patients: (A); ECOG PS (B); Histopathology (C); comorbidity (D); metastasis (E); Chemotherapy at Tikur Anbessa Specialized Hospital between 1 January 2016 to 31 December 2020, Addis Ababa, Ethiopia (n= 164).

Predictors of Gastric Cancer Mortality

Univariate analysis revealed that factors including age, sex, ECOG, histopathology, pathologic grading, stage, comorbidity, and metastasis site, surgical treatment modality, chemotherapy, and regimen change contribute to mortality. In multivariable analysis, ECOG PS, histopathology, comorbidity, metastasis site, and type of chemotherapy were found to have significant impact on survival ($p < 0.05$) (Table 4). Patients with ECOG PS $\geq$ 2 had 2.5 times higher risk of death (adjusted hazard ratio (AHR) =2.5, 95% CI: 1.4-4.5) as compared to those with ECOG PS 0-1 patients. Patients with AC had a 60% less chance to die (AHR = 0.4, 95% CI: 0.2-0.7) as compared to SCC. GC patients with comorbidities were 1.8-fold (AHR = 1.8, 95% CI:1.2-3.3) more likely to die compared to non-co-morbid conditions. Patients with ovarian metastasis as well as liver and lung metastases had 2.9 (AHR = 2.9, 95% CI:1.1-7.9) and 2.5 (AHR = 2.5, 95% CI:1.9-6.5) times, respectively, higher risk of death than those with-out metastasis,. Patients on paclitaxel + carboplatin had a 70% less risk of death compared to those on cisplatin + paclitaxel (AHR = 0.3, 95% CI: 0.1-0.9) (Table 4).

Table 4: Univariate and multivariate analysis of factors contributing to survival in gastric cancer patients treated at the Oncology Unit of Tikur Anbessa Specialized Hospital between 1 January 2016 and 31 December 2020, Addis Ababa, Ethiopia (n=164).

Variable	Patients		Events		Median Survival Time	Crude HR (95% CI)	Adjusted HR (95% CI)	P-value
	N	%	N	%				
Age								
<40	50	30.5	30	18.3%	18.9	1	1	
40-60	83	50.6	56	34.1%	19.2	1.3(0.7-2.1)	0.7(0.4-1.4)	0.342
>60	31	18.9	24	14.6%	17.5	1.5(0.8-2.7)	0.8(0.4-1.8)	0.654
Sex								
Male	105	64.0	74	45.1	18.0	1	1	
Female	59	36.0	36	22.0	19.0	0.6(0.4-1.0)	0.6(0.4-1.2)	0.158
ECOG								
ECOG 0-1	113	68.9	72	43.9	20.0	1	1	
ECOG ≥2	51	31.1	38	23.2	12.0	2.4(1.5-3.5)	2.5(1.4-4.5)	0.001*
Histopathology								
Squamous cell carcinoma	30	18.3	23	14.0	14.0	1	1	
Adenocarcinoma	121	73.8	84	51.2	22.0	0.5(0.3-0.7)	0.4(0.2-0.7)	0.004*
Lymphoma	13	7.9	3	1.8	42.0	0.1(0.0-0.5)	0.4(0.1-2.1)	0.292

Pathological grading								
Well-Differentiated	37	22.6	22	13.4	21.0	1	1	
Moderately-Differentiated	45	27.4	26	15.9	19.0	0.9(0.5-1.7)	0.8(0.4-1.7)	0.522
Poorly-Differentiated	82	50.0	62	37.8	17.0	1.6(1.0-2.6)	0.9(0.5-1.9)	0.915
Stage								
Stage 1	13	7.9	8	4.9	20.0	1	1	
Stage 2	27	16.5	12	7.3	23.0	0.6(0.2-1.5)	0.2(0.0-1.6)	0.07
Stage 3	32	19.5	21	12.8	18.0	1.4(0.6-2.9)	0.4(0.1-1.3)	0.136
Stage 4	92	56.1	69	42.1	17.0	1.8(0.9-3.6)	0.5(0.2-1.4)	0.198
Co-morbidity								
No	128	78.0	86	52.4	19.0	1	1	
Yes	36	22.0	24	14.6	17.0	1.4(0.9-2.3)	1.8(1.2-3.3)	0.037*
Site of Metastasis								
No	80	48.8	46	28.0	21.0	1	1	
Liver	47	28.7	35	21.3	17.0	1.3(1.8-2.0)	0.9(0.5-1.8)	0.965
Ovary	10	6.1	8	4.9	9.0	2.1(1.0-4.6)	2.9(1.1-7.9)	0.035*
Lung	17	10.3	12	7.3	23.0	1.1(0.6-2.2)	0.4(0.2-1.1)	0.100
Lung and liver	10	6.1	9	5.5	11.0	2.9(1.4-6.1)	2.4(1.9-6.5)	0.048*
Surgical Treatment Modality								
No surgery	68	41.5	49	29.9	16.0	1	1	
Total Gastrecto-my	3	1.8	1	0.6	26.0	0.3(1.0-2.3)	0.3(0.0-4.5)	0.391
Partial Gastrecto-my	65	39.6	40	24.4	23.0	0.5(0.3-0.8)	0.3(0.1-1.1)	0.067
Bypass surgery	28	17.1	20	12.2	11.0	1.0(0.6-1.7)	0.4(0.1--1.3)	0.150

Types of chemotherapy regimens taken								
Cisplatin + Paclitaxel	85	51.8	68	41.5	17.0	1	1	
Cisplatin + 5 FU	49	29.9	31	18.9	19.0	0.6(0.4-1.0)	0.6(0.3-1.1)	0.081
Carboplatin + Paclitaxel	17	10.4	8	4.9	23.0	0.4(0.2-0.9)	0.3(0.1-0.9)	0.044*
CHOP	13	7.9	3	1.8	35.0	0.2(0.0-	0.6(0.3-1.2)	0.162
Regimen change								
No	130	79.3	82	50.0	19.0	1	1	
Yes	34	20.7	28	17.1	17.0	0.7(0.5-1.1)	1.6(0.7-3.4)	0.184

Variables showing significant association with mortality

Discussion

This study assessed the outcomes of GC patients in a tertiary care hospital in Ethiopia. The male predominance (1.8:1) aligns with other studies from various countries, including US-Mexico (4), Turkey (5),Taiwan(6), Nigeria(7),and Ethiopia(8) suggesting potential gender-related risk factors, including the protective role of estrogen(9).

The median age at diagnosis was 48.5 years, with 50.6 % of patients between 40-60 years. This is concordant with the Nigerian (7) and other Ethiopian studies (8), but lower than the Taiwan study (5). This discrepancy could be due to differences in life expectancy, socio-economic status, and dietary habits, including the consumption of raw red meat and high-fat content in Ethiopia, as well as the lack of birth registration in rural areas.

Most patients were from Oromia (45.1%), consistent with previous findings(8). The proximity to TASH and limited tertiary care facilities in the region may explain this distribution. The predominant tumor location was the antrum (61.6%), consistent with studies in Nigeria (64.8%)(7) and Ethiopia (40.7%)(8) but differing from US-Mexico(4), Turkey(6), and Taiwan(5), where proximal locations were more common. This variation might be due to geographical differences, genetic polymorphisms, time trends, and lifestyle factors.

AC was the most common histopathological type (73.8%), aligning with studies in Turkey (6) Iran(10), and China(11). Half of the patients had poorly differentiated carcinoma, similar to findings in China (12) and Korea(13), indicating a high prevalence of aggressive tumor types in these populations.

Contrary to some studies, the stage of GC was not significantly associated with survival in our study, possibly due to differences in sample size, study design, and follow-up period. For instance, the Italian study showed that the 5-year overall survival decreased from 75.0% for stage 0–I to 1.7% for stage IV(6,14). Around 51.2.% of patients had metastatic cancer at presentation, similar to reports from Turkey(15), Iran(16), and Ethiopia(8). Late presentation could be attributable to the asymptomatic nature of early-stage GC, lack of screening programs, and poor healthcare accessibility, especially for patients living far from TASH.

Partial gastrectomy was performed in 39.6% of the cases, consistent with reports from China (11) and US-Mexico(4). However, studies in Japan and Iran reported higher rates of complete resection(9, 10), likely due to differences in surgical practices and healthcare infrastructure. Our study showed a survival rate of 32.9%, with death occurring in 67.1% of patients, similar to studies in Latin America (4) , Italy(17), China (11), and Turkey(18, 6). This similarity may be due to delayed diagnosis, advanced lymph node metastasis, and frequent peritoneal dissemination at first operation.

The 1-, 3-, and 5-year survival rates of GC patients were 66%, 18%, and 11%, respectively. These findings are lower than other studies due to limited healthcare access, lack of early-stage cancer screening programs, and late-stage diagnosis(4, 10, 18). Variations in study design and local cancer care may also contribute to differences in survival rates. The Kaplan-Meier survival

curves stratified by AJCC staging, with the number at risk, are presented to address this aspect.

In the multivariable Cox regression model, ECOG PS $\geq$ 2, AC histologic type, ovary metastasis, liver + lung metastasis, and paclitaxel + carboplatin were significant prognostic factors for poor survival. Patients with ECOG PS $\geq$2 had a higher risk for death than those with ECOG performance 0-1 patients. This finding is supported by studies conducted in Italy(17), Korea(19), and Japan (20), indicating that high ECOG PS is associated with poor survival outcomes across different populations.

In the current study, patients with AC were 40% less likely to die than those with SCC. This is similar to studies done in the USA (21) and China (22), which revealed that SCC had a worse chance of survival compared to AC histology, possibly due to the aggressive nature and late-stage identification of SCC.

GC patients with a comorbid condition had a 1.8 times higher risk of death than non-comorbid conditions. This is in agreement with studies conducted in Canada(23) and Nigeria (7), suggesting that comorbidities significantly impact survival by limiting treatment options and increasing complications.

In the present study, patients with ovarian metastasis and liver + lung metastasis were more likely to die and this in line with other studies conducted in Japan, showing that GC metastasis to these sites is associated with poor prognosis [24]. In addition, Kim et al. (23) and Catalano et al. (20) confirmed that multiple metastatic sites increase the risk of death.

The finding of this study demonstrates that patients on paclitaxel + carboplatin had a decreased likelihood of death than those on cisplatin + paclitaxel. This is discordant with other studies in Italy (14), and Turkey (6) ,which could be due to differences in treatment protocols availability of anticancer agents and the toxicity profile of cisplatin.

Limitation of the study

Because the data were gathered retrospectively, it is possible that not all of the relevant information from the patients' charts could be extracted. It was also difficult to generalize the findings of a small sample size study conducted at a single facility. Patients with incomplete records were excluded, which may have induced selection bias during secondary data collection.

Despite the limitations listed above, the study's main strength was that it examined the entire treatment pattern for GC in Ethiopia as well as the median survival rate to determine the patients' status using chart review and a phone interview. This study was carried out at the TASH Radiotherapy Center, the country's first and largest radiotherapy facility, which may represent the majority of the country's population.

Recommendation

There is a need for additional research to be conducted using longitudinal designs, longer durations of follow-up, larger sample size and multicentre studies to better investigate the clinical outcomes and prognostic factors for survival among GC patients in Ethiopia.

Conclusions

Patients with GC had a low five-year overall survival rate. Significant predictors of mortality included ECOG PS $\geq$2, AC histology, comorbidities, ovary and liver + lung metastases, and carboplatin + paclitaxel. Early detection and improved treatment strategies are needed to enhance survival outcomes.

Abbreviation and Acronyms

AC: Adenocarcinoma;
AOR: Adjusted Odds Ratio;
CI: Confidence Interval;
COR: Crude Odds Ratio;
GC: Gastric Cancer;
OS: Overall Survival;
PFS: Progress Free Survival;
SCC: Squamous Cell Carcinoma;
SPSS: Statistical Package for the Social Sciences;
TASH: Tikur Anbessa Specialized Hospital;
WHO: World Health Organization
ECOG: Eastern Cooperative Oncology Group

Consent for Publication

Not applicable

Availability of data and material

All relevant data are included in the article and uploaded as supporting information files. Extra data can be accessed upon reasonable request from the corresponding author.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

H.T designed and conducted the study, analyzed, and interpreted results, and drafted the manuscript. E.E and

A.B.B contributed to the conception and design of the study, analysis, interpretation, supervision, drafting the manuscript, and its critical review. A.F contributed to study supervision and review the manuscript. M.T.T contributed to enriching the manuscript. All authors approved the final version of the manuscript to be published.

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References

1. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. International journal of cancer. 2010;127(12):2893-2917.
2. Morgan E, Arnold M, Camargo MC, et al. The current and future incidence and mortality of gastric cancer in 185 countries, 2020–40: a population-based modelling study. EClinicalMedicine. 2022;47
3. Ferlay J SH, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. International journal of cancer. Dec 15 2010;127(12):2893-917. doi:10.1002/ijc.25516
4. Cordero-García E R-EA, Alpízar-Alpízar W. Predictors of overall survival after surgery in gastric cancer patients from a Latin-American country. J Gastrointest Oncol. Feb 2018;9(1):64-72. doi:10.21037/jgo.2017.10.07
5. Lin WL SJ, Chang SC, Wu PH, Huang WT, Tsao CJ. Factors predicting survival of patients with gastric cancer. Asian Pac J Cancer Prev. 2014;15(14):5835-8. doi:10.7314/apjcp.2014.15.14.5835
6. Basaran H KT, Cerkesli AK, Arslan D, Karaca S. Treatment outcomes and survival study of gastric cancer patients: a retrospective analysis in an endemic region. Asian Pac J Cancer Prev. 2015;16(5):2055-60. doi:10.7314/apjcp.2015.16.5.2055
7. Ahmed A UA, Makama JG, Mohammad I. Managment and outcome of carcinoma in Zaria, Nigeria. African health science. 2011;11(3):353-361.
8. Gebresillasse HW TG, Abule T. Gastric cancer features and outcomes at a tertiary teaching hospital in Addis Ababa, Ethiopia: A 5-year retrospective study. East and Central African Journal of Surgery. 2019;24(2):105-9. doi:10.4314/ecajs.v24i2.6
9. Park HJ AJ, Jung HY, Lim H, Lee JH, Choi KS, Kim DH, Choi KD, Song HJ, Lee GH, Kim JH. Clinical characteristics and outcomes for gastric cancer patients aged 18-30 years. Gastric Cancer. Oct 2014;17(4):649-60. doi:10.1007/s10120-013-0331-1
10. Ali ZA MM, Mohammad K, Zeraati H, Hosseini M, Naieni KH. Factors Affecting the Survival of Patients with Gastric Cancer Undergone Surgery at Iran Cancer Institute: Univariate and Multivariate Analyses. Iranian J Publ Health. 2014;43(6):800-808.
11. Zhang YF SJ, Yu HP, Feng AN, Fan XS, Lauwers GY, Mashimo H, Gold JS, Chen G, Huang Q. . Factors predicting survival in patients with proximal gastric carcinoma involving the esophagus. World J Gastroenterol. Jul 21 2012;18(27):3602-9. doi:10.3748/wjg.v18.i27.3602
12. Zhu HP XX, Yu CH, Adnan A, Liu SF, Du YK. Application of Weibull model for survival of patients with gastric cancer. BMC Gastroenterology 2011;11(1-6)(1)
13. Kwon JY YJ, Kim HJ, Kim KH, Kim SH, Lee SC, Kim HJ, Bae SB, Kim CK, Lee NS, Lee KT, Park SK, Won JH, Hong DS, Park HS. Clinical outcome of gastric cancer patients with bone marrow metastases. Cancer Res Treat. Dec 2011;43(4):244-9. doi:10.4143/crt.2011.43.4.244
14. Monti M MI, Foca F, Morgagni P, Framarini M, Passardi A, Falcini F, Frassineti GL. Retrospective analysis of gastric cancer management in a real-world setting: a single-institution experience. Tumori Journal. Apr 2020;106(2):165-171. doi:10.1177/0300891620910488
15. Zhao L LJ, Bai C, Nie Y, Lin G. Multi-Modality Treatment for Patients With Metastatic Gastric Cancer: A Real-World Study in China. Frontiers in Oncology. 2019;9:1155. doi:10.3389/fonc.2019.01155
16. Alimoghaddam K JA, Aliabadi LS, Ghaffari F, Maheri R, Eini E, Mashhadireza M, Mousavi SA, Bahar B, Jahani M, Ghavamzadeh A. . The Outcomes of Esophageal and Gastric Cancer Treatments in a Retrospective Study, Single Center Experience. International Journal of Hematology- Oncology and Stem Cell Research. 2014;8(2):9.
17. Catalano V GF, Santini D, D'emidio S, Baldelli AM, Rossi D, Vincenzi B, Giordani P, Alessandroni P, Testa E, Tonini G. Second-line chemotherapy for patients with advanced gastric cancer: who may benefit. Br J Cancer. Nov 4 2008;99(9):1402-7. doi:10.1038/sj.bjc.6604732
18. Yaprak G TOD, Doğan B, Pekyürek M. . Prognostic factors for survival in patients with gastric cancer: single instution experience. Northern Clinics of Istanbul. 2019;doi:10.14744/nci.2019.73549
19. Kim JG RB, Park YH, Kim BS, Kim TY, Im YH, Kang YK. Prognostic factors for survival of patients with advanced gastric cancer treated with cisplatin-based chemotherapy. Cancer Chemother Pharmacol. Feb 2008;61(2):301-7. doi:10.1007/s00280-007-0476-x
20. Shitara K MK, Matsuo K, Ura T, Takahari D, Yokota T, Sawaki A, Kawai H, Ito S, Munakata M, Sakata Y. .

Chemotherapy for Patients With Advanced Gastric Cancer With Performance Status 2. Gastrointestinal Cancer Research. 2009;3(6):220.
21. Akce M JR, Alese OB, Shaib WL, Wu C, Behera M, El-Rayes BF. Gastric squamous cell carcinoma and gastric adenosquamous carcinoma, clinical features and outcomes of rare clinical entities: a National Cancer Database (NCDB) analysis. Journal of Gastrointestinal Oncology. Feb 2019;10(1):85-94. doi:10.21037/jgo.2018.10.06
22. Feng F ZG, Qi J, Xu G, Wang F, Wang Q, Guo M, Lian X, Zhang H. Clinicopathological features and prognosis of gastric adenosquamous carcinoma. Scientific report. Jul 4 2017;7(1):4597. doi:10.1038/s41598-017-04563-2
23. Hoffman KE NB, Mamon HJ, Kachnic LA, Katz MS, Earle CC, Punglia RS. Adjuvant therapy for elderly patients with resected gastric adenocarcinoma: population-based practices and treatment effectiveness. Cancer. 2013;118(1):248–257. doi:10.1002/cncr.26248
24. Matsushita H WK, Wakatsuki A. Molecular and clinical oncology. Metastatic gastric cancer to the female genital tract. MOLECULAR AND CLINICAL ONCOLOGY 2016;5(5):495-499. doi:10.3892/mco.2016.1035