นิพนธ์ต้นฉบับ . Original Article

อัตราการรอดชีวิตและปัจจัยทางคลินิกร่วมในมะเร็งกระเพาะอาหารระยะลุกลามที่ไม่สามารถผ่าตัดได้หรือระยะแพร่กระจาย: การวิเคราะห์ย้อนหลังจากฐานข้อมูลทะเบียนมะเร็งสถาบันเดียว (การศึกษา CARES-GC)

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Overall Survival and Associated Clinical Factors in Unresectable Locally Advanced or Metastatic Gastric Cancer: A Retrospective Analysis from the Single Institute Cancer Registry (The CARES-GC Study)

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บทคัดย่อ

หลักการและวัตถุประสงค์: มะเร็งกระเพาะอาหารยังคงเป็นปัญหาสาธารณสุขสำคัญทั่วโลก โดยเฉพาะในประเทศไทยซึ่งมีข้อมูลจริงจากการปฏิบัติงานค่อนข้างจำกัด งานวิจัยนี้มีวัตถุประสงค์เพื่อประเมินอัตราการรอดชีวิตโดยรวมที่ 1 ปี และปัจจัยทางคลินิกที่สัมพันธ์กับผลลัพธ์การรอดชีวิตในผู้ป่วยมะเร็งกระเพาะอาหารระยะลุกลามหรือแพร่กระจาย

วิธีการศึกษา: เป็นการศึกษาแบบย้อนหลังจากฐานข้อมูล Cancer Registry and Survival (CARES) ของโรงพยาบาลมหาราชนครราชสีมา โดยรวบรวมผู้ป่วยที่ได้รับการวินิจฉัยว่าเป็นมะเร็งกระเพาะอาหารระยะลุกลามหรือแพร่กระจายช่วงปี พ.ศ. 2561–2566 และติดตามการรอดชีพจนถึงวันที่ 31 ธันวาคม 2567 วัตถุประสงค์หลักของการศึกษา คือ ศึกษาอัตราการรอดชีพที่ 1 ปี และทำการวิเคราะห์ปัจจัยที่สัมพันธ์กับการรอดชีพที่ 1 ปี ด้วยวิธีการถดถอยลอจิสติกทั้งแบบตัวแปรเดียวและพหุตัวแปร นอกจากนี้จะทำการวิเคราะห์หาระยะเวลาการรอดชีพและช่วงความเชื่อมั่น โดยวิธี Kaplan-Meier เพื่อเป็นวัตถุประสงค์เชิงสำรวจ

ผลการศึกษา: จากผู้ป่วยทั้งหมด 306 ราย อัตราการรอดชีพอย่างหยาบที่ 1 ปีเท่ากับร้อยละ 10.5 โดยมีค่ามัธยฐานการรอดชีพอยู่ที่ 2.60 เดือน (95% CI: 2.03–3.16) ผู้ที่ได้รับการผ่าตัดร่วมกับเคมีบำบัดมีการรอดชีพนานที่สุด (12.95 เดือน, 95% CI: 5.57–20.32) ในขณะที่ผู้ที่ได้รับการดูแลแบบประคับประคองมีการรอดชีพสั้นที่สุด (1.81 เดือน, 95% CI: 1.45–2.16) ปัจจัยที่สัมพันธ์กับการรอดชีพอย่างมีนัยสำคัญทางสถิติ ($p < 0.05$) ได้แก่ ระยะเวลาของอาการก่อนวินิจฉัย (OR: 0.87, 95% CI: 0.76–1.00, $p = 0.042$), การได้รับเคมีบำบัด (OR: 0.28, 95% CI: 0.11–0.76, $p = 0.012$), และการผ่าตัดแบบหายขาด (OR: 0.15, 95% CI: 0.05–0.45, $p = 0.001$)

สรุป: อัตราการรอดชีพที่ 1 ปี ของผู้ป่วยมะเร็งกระเพาะอาหารระยะลุกลามหรือแพร่กระจายในการศึกษานี้ เท่ากับร้อยละ 10.5 โดยมีค่ามัธยฐานการรอดชีพ 2.60 เดือน ซึ่งน้อยกว่าการศึกษาอื่นๆ ก่อนหน้า การได้รับเคมีบำบัด การผ่าตัด และการมาพบแพทย์เร็ว มีความสัมพันธ์กับผลลัพธ์การรอดชีพที่ดีขึ้น แม้ว่าผลลัพธ์ของการรักษา ทั้ง 2 วิธี จะช่วยเพิ่มอัตราการรอดชีพ แต่ก็ยังมีผู้ป่วยได้รับการรักษาน้อย ผลลัพธ์นี้สะท้อนถึงความจำเป็นในการศึกษาปัจจัยที่เป็นอุปสรรคต่อการรักษา และปรับปรุงการเข้าถึงการรักษาเพิ่มเติมในผู้ป่วยกลุ่มนี้

คำสำคัญ: มะเร็งกระเพาะอาหาร, การอยู่รอด, ระยะลุกลาม, ประเทศไทย

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Abstract

Background and Objective: Gastric cancer (GC) remains a primary global health concern with poor survival outcomes, especially in Thailand, where real-world data are limited. This study aimed to evaluate the 1-year overall survival (OS) and identify prognostic factors among Thai patients with advanced GC.

Materials and Methods: A retrospective, single-center cohort study was conducted using the Cancer Registry and Survival (CARES) database of Maharat Nakhon Ratchasima Hospital. Patients diagnosed with advanced GC from 2018 to 2023 were included and followed up until December 31, 2024. The primary outcome was 1-year OS, and prognostic factors related to 1-year OS were analyzed using univariable and multivariable logistic regression. The median OS was planned to be analyzed using Kaplan-Meier estimation as an exploratory analysis.

Results: Among 306 patients, the crude 1-year OS rate was 10.5%, with a median OS of 2.60 months (95% CI: 2.03–3.16). Patients who received both surgery and chemotherapy had the longest median survival (12.95 months, 95% CI: 5.57–20.32), while those on best supportive care had the shortest (1.81 months, 95% CI: 1.45–2.16). Independent predictors of 1-year survival included symptom duration (OR: 0.87, 95% CI: 0.76–1.00, p = 0.042), chemotherapy (OR: 0.28, 95% CI: 0.11–0.76, p = 0.012), and curative surgery (OR: 0.15, 95% CI: 0.05–0.45, p = 0.001).

Conclusion: The 1-year survival rate for advanced GC in our study was 10.5%, with a median OS of 2.60 months, which is lower than in other studies. Chemotherapy, curative surgical intent, and earlier symptom detection were linked to better survival outcomes. While both treatment options have demonstrated benefits in enhancing survival rates, the percentage of patients receiving these treatments remains low, highlighting the need to identify barriers to care and improve management strategies for this population.

Keywords: gastric cancer, survival, advanced-stage, Thailand.

Introduction

Gastric cancer (GC) is a significant global health burden and is among the leading causes of cancer-related mortality. In Thailand, it is the 13th most common cancer; however, despite its relatively low incidence, it remains the ninth leading cause of cancer-related deaths.[1] The latest GLOBOCAN data report an age-standardized incidence rate of 2.2 per 100,000 people and a mortality rate of 2.4 per 100,000 people, reflecting the aggressive nature of the disease and frequent late-stage diagnosis. Previous studies from various countries, including the United States, Thailand, Taiwan, and Brazil, have reported 1-year overall survival (OS) rates ranging from 25-30% in patients with gastric cancer, highlighting the poor prognosis of this disease[2–5]. Additionally, previous data indicate that the median survival of patients with advanced-stage gastric cancer in Thailand is only approximately 1 to 3 months[6,7]. These findings underscore the urgent need for further research on survival outcomes and prognostic factors in the Thai population.

Several clinical and pathological factors influence the survival of patients with advanced gastric cancer. Older age, poor performance status, deeper tumor invasion, extensive lymph node involvement, and histological subtypes such as signet ring cell carcinoma are associated with worse outcomes[3,8,9]. The extent of metastatic disease, particularly involvement of the peritoneum, bone, or brain, further reduces survival, with a median overall survival in these patients often less than eight months[10]. Additionally, nutritional status, particularly low BMI, has been linked to poorer prognosis, likely because of its impact on treatment tolerance and disease progression[11,12]. Although these prognostic factors are well documented in Western and East Asian populations, data on Thai patients remain scarce, necessitating further investigation.

This study aimed to address this gap by analyzing real-world survival outcomes, especially in our institution, and prognostic factors in patients with advanced-stage gastric cancer treated at Maharat Nakhon Ratchasima Hospital. The primary objective was to determine the one-year overall survival rate, whereas the secondary objective was to evaluate the associations between clinical factors and overall survival at 12 months.

Materials and methods

Study design and participants

This study was a retrospective, single-center cohort analysis utilizing data from the Cancer Registry and Survival (CARES) database, a centralized cancer registry system of the institution, along with the electronic medical records (EMRs) at Maharat Nakhon Ratchasima Hospital. Physicians initiate the process by identifying cases, followed by trained staff entering and correcting standardized data using ICD-O and ICD-10 coding systems, including details such as pathological results, treatment modalities, and death status. Then, the physicians verify the data to ensure its accuracy, completeness, and reliability. The study included individuals who were diagnosed with gastric cancer between January 1, 2018, and December 31, 2023. The participants included adult patients (≥18 years old) diagnosed with locally advanced gastric cancer who were not candidates for surgery or radiation, and individuals diagnosed with stage IV gastric cancer. Individuals with incomplete medical records, no definitive staging results, an absence of an official pathological diagnosis, or those lost to follow-up immediately after the diagnosis were excluded from the study. This study followed the strengthening the reporting of observational studies in epidemiology (STROBE) guidelines. The study protocol was approved by the Maharat Nakhon Ratchasima Hospital Institutional Review Board (MNRH IRB) (Protocol No. 67144, COA no. 134/2024) and registered in the Thai Clinical Trial Registry (TCTR Reg. no. TCTR20241001002).

Procedures and Outcomes

Baseline demographic and clinical characteristics, including age, sex, presentation history, Eastern Cooperative Oncology Group (ECOG) performance status, tumor stage, histological subtype, metastatic sites, treatment modalities, comorbidities, and laboratory parameters, were collected from medical records. Survival data were obtained from the CARES database, which records the date of death or last follow-up visit. Study data were collected and managed via REDCap electronic data capture tools hosted at the Medical Education Center, Maharat Nakhon Ratchasima Hospital[13,14]. Research Electronic Data Capture (REDCap) is a secure, web-based software platform designed to support data capture for research studies, providing: 1) an intuitive interface for validated data capture, 2) audit trails for tracking data manipulation and export procedures, 3) automated export procedures for seamless data downloads to standard statistical packages, and 4) procedures for data integration and interoperability with external sources. The primary endpoint was crude 1-year overall survival, defined as the proportion of patients alive at 12 months after diagnosis, regardless of cause of death. Survival status was determined up to the data cutoff date of 31 December 2024. Secondary outcomes included the associations of clinical factors—such as age, Eastern Cooperative Oncology Group (ECOG) performance status, tumor characteristics, metastatic burden, and body mass index (BMI)—with 12-month survival. The median overall survival was analyzed, including comparative of treatment modalities, as an exploratory endpoint.

Statistical analyses

The sample size was calculated using the Cochran formula to estimate the population proportion with absolute precision[(15)]. On the basis of a previous study, we hypothesized that a 1-year survival rate of 25%, a 95% confidence level, and an absolute precision of 5% were used to determine the minimum required sample size of 289 patients. To account for potential missing data or loss to follow-up, the final target sample size was increased to 318 patients.

For the association analysis of clinical factors, Green's formula ($N > 50 + 8m$, where m represents the number of predictors) was employed[16], establishing a minimum requirement of 130 patients for 10 intended predictors, including age, sex, underlying disease, stage, site of metastasis (peritoneal or bone), poorly differentiated tumor, history of weight loss, BMI, Eastern Cooperative Oncology Group (ECOG) score, and treatment received. A sample size of 318 patients surpassed the requisite threshold, making it sufficient for survival estimation and association studies.

Descriptive statistics were used to summarize patient characteristics. Continuous variables are presented as the means with standard deviations (SDs) or medians with interquartile ranges (IQRs), depending on the data distribution. Categorical variables are reported as frequencies and percentages.

The primary endpoint was the 1-year overall survival (OS) rate, collected by crude rate from database. Median OS was analyzed as an exploratory endpoint, estimated using the Kaplan–Meier method with 95% confidence intervals (CIs). Survival curves between treatment options were compared using the log-rank test, and prognostic factors for OS over the entire follow-up period were assessed using Cox proportional hazards regression for adjusted analysis.

For the secondary endpoint, the association between clinical features and the 12-month survival status (alive versus deceased at 12 months) was assessed utilizing multivariable logistic regression. Logistic regression was selected because the 12-month survival represents a fixed, binary outcome, whereas Cox regression is generally more suitable for analyzing time-to-event data throughout the entire follow-up period. Candidate variables for multivariable analysis were selected based on their clinical relevance and statistical significance in univariable analyses. Statistical significance was established at $p < 0.05$.

Results

A total of 351 patients with gastric cancer were identified through a hospital database search. After matching with the CARES database and applying the eligibility criteria, 45 patients were excluded for various reasons: 15 patients were excluded due to early-stage disease and receiving definitive treatment, 14 patients were excluded due to misdiagnosis, 9 patients lacked definitive staging information, 5 patients had no official pathological reports, and 2 patients had incomplete medical records, including weight and height. After exclusion, 306 patients were ultimately included in the analysis.

Among the 306 patients included in the study, 178 (58.2%) were male, with a mean age of 62.39 ± 14.24 years. The most common clinical presentations were dyspepsia/abdominal pain (196, 64.1%), early satiety (105, 34.3%), and weight loss (100, 32.7%). The median duration from symptom onset to diagnosis was 2 months (IQR: 1–3 months). The mean BMI was 19.39 ± 4.05 kg/m², and 95 (31.0%) patients had an ECOG performance status of ≥2. Common underlying diseases included hypertension (80, 26.1%), dyslipidemia (40, 13.1%), and diabetes mellitus (37, 12.1%), with a median Charlson Comorbidity Index (CCI) of 7 (IQR, 6–8).

With respect to histopathology, 195 (63.7%) patients had adenocarcinoma, and 73 (23.9%) had signet ring cell carcinoma. Tumor differentiation was poorly differentiated in 196 (64.1%) patients. Thirty-five (11.4%) patients experienced venous thromboembolism (VTE), 13 (4.2%) had pulmonary embolism, 14 (4.6%) had intra-abdominal thrombosis, and 14 (4.6%) had deep vein thrombosis. With respect to staging, most patients (256 patients, 87.1%) had advanced stage disease. The most common site of metastasis was the peritoneum (186, 72.7%), followed by distant lymph nodes (73, 28.5%), liver (64, 25.0%), lung (38, 14.8%), and bone (24, 9.4%). The treatment data revealed that 35 (11.4%) patients underwent curative surgery and that 53 (17.3%) received chemotherapy. Further details of the patients' baseline characteristics and disease-specific treatments are summarized in Table 1 and Table 2.

Table 1 Patient characteristics (n = 306)

	Total cases n (%)
Male	178 (58.2)
Age (year) – mean ± SD	62.39 ± 14.24
Alcohol intake status	48 (15.7)
Smoking status	
Former	38 (12.4)
Active smoker	14 (4.6)
Clinical Presentation	
Dyspepsia/Abdominal pain	196 (64.1)
Early satiety	105 (34.3)
Weight loss	100 (32.7)
Bleeding	87 (28.4)
Obstruction	55 (18.0)
Duration (months) – median (IQR)	2 (1 - 3)
BMI (kg/m^2) – mean ± SD	19.39 ± 4.05
Underlying disease	
HT	80 (26.1)
DLP	40 (13.1)
DM	37 (12.1)
Charlson Comorbidity Index, CCI – median (IQR)	7 (6 - 8)
ECOG ≥ 2	95 (31.0)
Pathological report	
Adenocarcinoma	195 (63.7)
Signet ring cell carcinoma	73 (23.9)
Undifferentiated carcinoma	17 (5.6)
Adenocarcinoma, diffuse type	10 (3.3)
Adenocarcinoma, intestinal type	5 (1.6)
Others	6 (1.9)
Differentiation	
Well differentiation	26 (8.5)
Moderately differentiation	50 (16.3)
Poorly differentiation	196 (64.1)
Not report	34 (11.1)
VTE events	35 (11.4)

Table 1 Patient characteristics (n = 306) (Cont.)

	Total cases n (%)
Staging	
Locally advanced	38 (12.9)
Advanced	256 (87.1)
Metastatic site[a]	
Peritoneum	186 (72.7)
Distant LN	73 (28.5)
Liver	64 (25.0)
Lung	38 (14.8)
Bone	24 (9.4)
Receiving treatment	
Best supportive care	236 (77.1)
Chemotherapy only	35 (11.4)
Curative surgery only	17 (5.6)
Curative Surgery with Chemotherapy	18 (5.9)

[a] Percentage summation may exceed 100 because some patients have multiple metastasis sites.

* Indicates significance at $p < 0.05$.

Table 2 Disease-specific treatment - Chemotherapy regimen and surgical procedure.

Receiving chemotherapy	**Total cases (n= 53) n (%)**
Cisplatin/5-FU	27 (50.9)
Carboplatin/5-FU	15 (29.4)
5-FU/Leucovorin	5 (9.8)
FOLFOX or CapeOx	4 (7.8)
Other regimen	2 (3.9)
Receiving surgery	**Total cases (n= 35) n (%)**
Gastric manipulation	
Total Gastrectomy	27 (77.1)
Subtotal Gastrectomy	7 (20.0)
Other	1 (2.9)
Lymph node manipulation	
D2	20 (57.1)
D1	9 (25.7)
Other/Unspecified	6 (17.1)

In terms of the primary outcome, the crude 1-year overall survival (OS) rate for the study population was 10.5% (32 patients), with a median OS of 2.60 months (95% CI: 2.03–3.16 months). Survival outcomes varied significantly among the treatment groups. Patients who received no surgery or chemotherapy (No Sx/CMT) had a significantly shorter survival of 1.81 months (95% CI: 1.45–2.16 months), and those who received chemotherapy only (CMT only) had a significantly longer survival of 7.69 months (95% CI: 6.05–9.33 months). Patients who underwent curative surgery only (Sx only) had a median survival of 2.83 months (95% CI: 0.62–5.03 months), whereas those who received both curative surgery and chemotherapy (Sx/CMT) had the longest survival of 12.95 months (95% CI: 5.57–20.32 months). The Kaplan-Meier survival curve is shown in Figure 1, and further details on the survival outcomes are provided in Table 3. Additional analysis of various factors affecting overall survival, analyzed by Cox proportional hazard, shows that the peritoneal metastasis and receiving treatment, any of surgery or chemotherapy, are the significant factors, as shown in the supplement table S1.

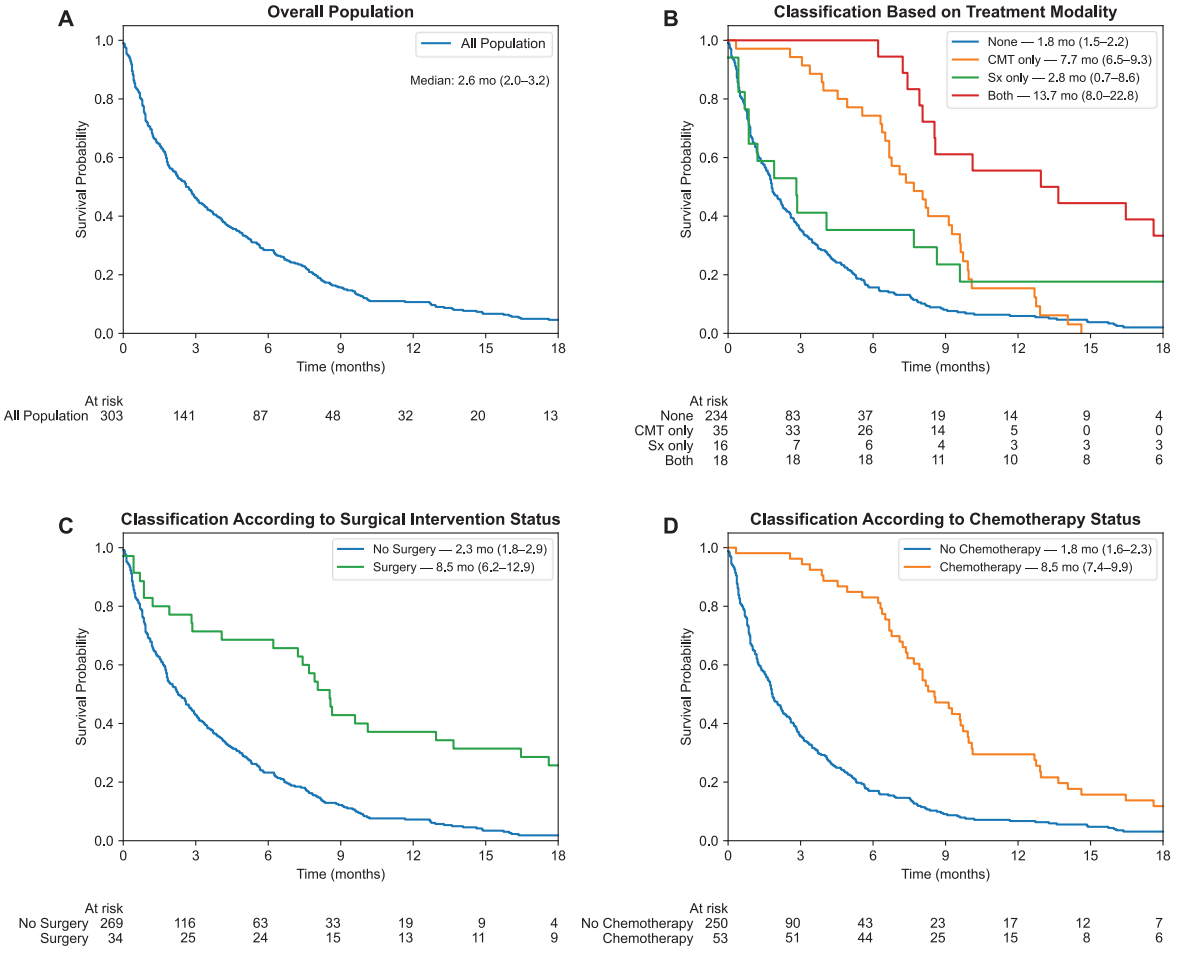

Figure 1 Kaplan-Meier estimation of survival in patients with advanced gastric cancer across various treatment modalities. A) Analysis of the overall population B) Classification based on treatment modality C) Classification according to surgical intervention status D) Classification according to chemotherapy status

Table 3 Median OS and survival rates across various time points by Kaplan–Meier estimation and Cox proportional hazards regression.

	Median OS, months (95% CI)	Hazard ratio (95% CI)	p-value
Best supportive care	1.81 (1.45 - 2.16)	Ref	
Chemotherapy only	7.69 (6.05 - 9.33)	0.45 (0.31 - 0.65)	< 0.001*
Surgery only	2.83 (0.62 - 5.03)	0.61 (0.37 - 1.01)	0.054
Surgery with Chemotherapy	12.94 (5.57 - 20.32)	0.22 (0.13 - 0.38)	< 0.001*
Overall population	2.60 (2.03 - 3.16)	-	-
	Survival rate across various time points, (%)		
	3 months, n (%)	6 months, n (%)	12 months, n (%)
Best supportive care	83 (35.2)	37 (15.7)	14 (5.9)
Chemotherapy only	33 (94.3)	26 (74.3)	5 (14.3)
Surgery only	7 (41.2)	6 (35.3)	3 (17.6)
Surgery with Chemotherapy	18 (100.0)	18 (100.0)	10 (55.6)
Overall population	141 (46.1)	87 (28.4)	32 (10.5)

* Indicates significance at $p < 0.05$.

Clinical characteristics, presentation, and various factors were evaluated via univariable logistic regression to determine their associations with 12-month survival. In 34 cases (11.1%) in which pathological grading data were not available, multiple imputations were utilized to mitigate bias before logistic regression analysis was conducted. In the univariable analysis, significant predictors of 12-month survival were identified as dyspepsia/abdominal pain (OR: 0.30, 95% CI: 0.11–0.80, p = 0.016), symptom duration (OR: 0.86, 95% CI: 0.78–0.95, p = 0.002), receiving chemotherapy (OR: 0.18, 95% CI: 0.08–0.40, p < 0.001), and curative surgery (OR: 0.13, 95% CI: 0.06–0.29, p < 0.001). The multivariable analysis incorporated predetermined factors alongside variables that were found to be significant in the univariable analysis. Following adjustment, symptom duration (OR: 0.87, 95% CI: 0.76–1.00, p = 0.042), chemotherapy (OR: 0.28, 95% CI: 0.11–0.76, p = 0.012), and curative surgery (OR: 0.15, 95% CI: 0.05–0.45, p = 0.001) were identified as significant independent predictors of survival at 12 months. Additional information is presented in Table 4.

Table 4 Univariable and multivariable logistic regression analyses of factors associated with survival at 12 months.

	Univariable analysis		Multivariable analysis	
	OR (95% CI)	**p-value**	**OR (95% CI)**	**p-value**
Male sex	1.26 (0.60 - 2.62)	0.542	1.23 (0.52 - 2.88)	0.638
Age	1.01 (0.98 - 1.03)	0.615	0.99 (0.96 - 1.03)	0.608
Current alcohol user	1.90 (0.55 - 6.50)	0.307		
History of smoking	0.70 (0.38 - 1.30)	0.262		
Body mass index (BMI)	1.00 (0.91 - 1.09)	0.965	1.00 (0.90 - 1.12)	0.997
Clinical Manifestation				
Dyspepsia/Abdominal pain	0.30 (0.11 - 0.80)	0.016*	0.43 (0.15 - 1.30)	0.135
Obstruction	0.94 (0.37 - 2.42)	0.904		
Weight loss	1.08 (0.49 - 2.37)	0.855	1.54 (0.62 - 3.83)	0.351
Bleeding	0.73 (0.34 - 1.59)	0.432		
Early satiety	1.64 (0.71 - 3.80)	0.245		
Duration (months)	0.86 (0.78 - 0.95)	0.002*	0.87 (0.76 – 1.00)	0.042*
CCI Score	1.15 (0.95 - 1.40)	0.159		
ECOG ≥ 2	1.69 (0.70 - 4.06)	0.240	0.76 (0.26 - 2.20)	0.607
Pathological related				
Signet cell type	0.78 (0.34 - 1.77)	0.550	0.51 (0.19 - 1.43)	0.202
Poorly differentiated	0.86 (0.36 - 2.09)	0.744	0.73 (0.22 - 2.40)	0.605
Metastatic stage	1.40 (0.50 - 3.91)	0.521	1.62 (0.45 - 5.83)	0.459
Site of metastasis				
Liver	1.48 (0.55 - 4.02)	0.439		
Lung	4.84 (0.64 - 36.53)	0.126		
Peritoneum	1.63 (0.78 - 3.41)	0.190	2.34 (0.85 - 6.45)	0.101
Distant LN	1.78 (0.66 - 4.81)	0.254		
Bone	1.31 (0.29 - 5.85)	0.724	0.64 (0.12 - 3.41)	0.598
Ovary	0.87 (0.19 - 3.98)	0.856		
Adrenal	2.31 (0.30 - 17.86)	0.422		
Treatment-related				
Receiving Chemotherapy	0.18 (0.08 - 0.40)	<0.001*	0.28 (0.11 - 0.76)	0.012*
Receiving Curative surgery	0.13 (0.06 - 0.29)	<0.001*	0.15 (0.05 - 0.45)	0.001*

* indicates significance at $p < 0.05$.

Discussion

Gastric cancer is a health issue worldwide, and several studies have documented its prevalence, treatment, and survival rates. This study examined the survival and clinical characteristics of Thai patients with advanced disease. Our investigation revealed a 12-month overall survival rate of approximately 10.5%, combined with a median overall survival of 2.6 months, which is much lower than that reported previously. Numerous studies have indicated a median OS of 5-6 months, including Chancharoen[6] (5.3 months, 1-year OS: 31.9%), Nanthanangkul et al.[3] (5.16 months, 1-year OS: 32.15%), and Hu et al.[4] (6.2 months, estimated 1-year OS: 25–30%). The reduced survival observed in our study may be related to significant disparities in patient characteristics.

With respect to the baseline characteristics, numerous factors in our study are similar to findings from several other studies[4,6,8,9], where males constitute the predominant population. The median age of the participants was 50–60 years. Most patients present with dyspepsia and early satiety. The predominant pathological cell type was adenocarcinoma, and most cases were poorly differentiated tumors. The peritoneum is the most common site for metastasis. Nevertheless, a notable distinction in this study pertains to the stage, which primarily encompasses patients at advanced stages who have not received chemotherapy and/or surgical intervention. In our study, nearly 90% of the patients were categorized as having advanced-stage disease, which is a well-documented factor associated with decreased survival, as indicated by several resources[2,3,6,17], with fewer than 25% of patients receiving disease-specific treatment. In contrast, a previous study by Chancharoen noted that nearly half of the patients underwent surgical procedures, and approximately 70% received chemotherapy[6]. Moreover, data from the Taiwan registry indicated that 75% of patients received disease-specific treatment, whereas more than 50% underwent chemotherapy[4]. These two significant factors, less advanced-stage patients and a higher rate of treatment, were strongly correlated with survival outcomes, as indicated by higher OS in other studies and lower survival in our findings. However, when identical settings between the Taiwan registry and our findings were compared, the survival times of patients receiving the same treatment modality were strikingly similar. The Taiwan Registry study revealed that patients who underwent both surgical intervention and chemotherapy had higher survival rates than those who received other treatment modalities, including chemotherapy alone, surgery alone, and supportive care. The median survival times were 14.2 months, 7.0 months, 3.9 months, and 1.9 months, respectively. These results closely correspond with our study, which indicates a median OS of 12.95 months for patients receiving both treatment options, 7.69 months for those treated with chemotherapy alone, 2.83 months for patients who had surgery alone, and 1.81 months for individuals in the best supportive care group. This finding demonstrates the advantages of disease-specific treatment and elucidates the reasons for the shorter survival observed in this study.

To emphasize the importance of treatment, numerous studies have illustrated the benefits of systemic chemotherapy in prolonging survival, as recommended by various guidelines[18]. A systematic review and meta-analysis conducted in 2006 demonstrated the advantages of chemotherapy over best supportive care, with a hazard ratio (HR) of 0.39 (95% CI, 0.28–0.52) and a median survival of 7–10 months[19]. Despite the use of chemotherapy, the value of surgical intervention remains controversial. Several retrospective studies, including our findings, have indicated that multimodal treatment of advanced gastric cancer can increase patient survival. In addition to the results of the Taiwan database study, previous retrospective studies from Khon Kaen revealed that patients who underwent surgery followed by chemotherapy had 5-year survival rates ranging from 16% to 27% greater than those of patients who underwent surgery alone, and the 5-year

survival rate increased from 13.9% in nonsurgery patients to 21.13% in surgical candidates[3]. Data from South Korea also show better survival in patients who have undergone surgery, even those with peritoneal metastasis, with a median survival of 11 months compared with 7 months in those who did not undergo surgery[17]. Another retrospective study from Japan also indicated that cytoreductive surgery and chemotherapy can significantly improve survival rates[20]. However, the prospective randomized controlled REGATTA trial reported negative results regarding the benefits of gastrectomy followed by chemotherapy, with a median survival of 16.6 months for patients receiving chemotherapy alone versus 14.3 months for those undergoing gastrectomy followed by chemotherapy (HR 1.09, 95% CI 0.78–1.52)[21]. Nonetheless, some experts argue that the chemotherapy arm might outperform expectations, typically improving survival by approximately 7–10 months. Owing to contradictory information from the above studies, surgical intervention may not be recommended in all cases; however, it should be considered for certain patients if surgical intervention can enhance quality of life and help manage issues such as bleeding or obstructive symptoms.

The impact of treatment may be illustrated by the Kaplan-Meier curve, which reflects the survival patterns influenced by both surgical and chemotherapeutic interventions. Each strategy has the potential to increase survival rates, as evidenced by the rightward shift of the curve. Chemotherapy is characterized by a gradual decline in survival over the initial six months, coinciding with the duration of chemotherapy administration, which may correlate with a delay in disease progression. However, following the cessation of chemotherapy sessions, a pronounced decline in survival was noted, mirroring the patterns observed in best supportive care. Conversely, surgical intervention resulted in a sharp decrease in survival during the first three months, followed by subsequent trends aligned with those observed in supportive care. This initial rapid decline may reflect postoperative complications that adversely affect the survival of patients, particularly those who are less fit. Conversely, patients who do not experience such complications may demonstrate a survival advantage, as indicated by the upward trajectory of the curve. Among patients who received both treatments, those who were in good physical condition and tolerated chemotherapy well tended to exhibit significantly improved efficacy, as evidenced by a plateau in survival during the initial six months, followed by a decline that aligned with the normal disease progression characteristics typically observed in supportive care patient survival patterns.

In our study, the factor significantly associated with 12-month survival, aside from treatment modality, was symptom duration. The duration of symptoms reflects the severity and progression of the disease. Patients who present to the hospital with severe symptoms such as acute gastrointestinal bleeding typically have a shorter symptom period and are likely to have a lower survival rate. Conversely, patients with prolonged symptoms typically experience slower illness development and hence have an extended survival period. Regrettably, after categorizing individuals based on whether symptoms occur before or after one month, the Cox hazard ratio and logistic regression odds ratio were not statistically significant (univariable OR 0.684, p = 0.351; multivariable OR 0.40, p = 0.078). This suggests a complex interaction between the chief complaint symptoms and the duration, rather than the duration alone. Other pathological factors, such as poorly differentiated and signet ring cell features, which have been shown to affect survival in several studies, were not significant in this study. This may be due to several reasons, such as obscuration from the treatment, which has a greater magnitude of benefits, and the evaluation time being too late to evaluate. Exploratory evaluation of the associations between the aforementioned pathological features and the 3-month survival rate revealed that both poorly differentiated and signet ring cell features tended to

be associated with shorter survival, i.e., less than 3 months, but not significantly (unpublished data).

Finally, only approximately 20% of patients received disease-specific treatments, such as surgery and/or chemotherapy, which is a significantly lower proportion than that reported in other studies[3–6]. The limited number of treated patients likely contributed to the suboptimal overall survival outcomes within our cohort. Several factors could explain this finding. Initially, a significant number of patients may not have been in an optimal clinical state for receiving treatment; for example, they may exhibit poor performance status and malnutrition. Performance and nutritional status frequently affect treatment decisions, which are generally evaluated through body weight and various other clinical parameters. Second, patient preference plays a crucial role. On the basis of our observations and observations in Thailand[22], many Thai patients are reluctant to undergo chemotherapy and surgery because of various beliefs, including fear of side effects, concerns about physical fitness, and misconceptions that treatment may accelerate tumor progression. These factors highlight the need for further research on patient awareness, beliefs, and decision-making processes to enhance treatment and improve survival outcomes. Furthermore, this study employs Logistic Regression as a secondary endpoint instead of the more conventional and widely recognized Cox regression method, due to its suitability for future applications in constructing predictive models for identifying individuals who may have a limited survival period. Logistic regression is deemed more advantageous and easier to interpret than Cox regression in this context.

This study provides valuable real-world data on survival outcomes and prognostic factors in Thai patients with advanced gastric cancer, addressing a critical gap in regional research. By analyzing the clinical characteristics and treatment patterns, the findings highlight the low treatment rate (23%) and its significant impact on survival, emphasizing the need for improved patient education and access to therapy. However, as a single-center study, the generalizability of the results may be limited because the treatment availability and patient demographics may differ across healthcare settings. Additionally, although the retrospective design poses inherent challenges, such as missing data and potential selection bias, the primary objective of estimating the 1-year overall survival rate was descriptive. It included all consecutive eligible patients from the institutional registry, thereby minimizing selection bias. Only 16 of the 351 identified cases (4.6%) with incomplete essential data were excluded. At the same time, minor missing variables—such as pathological reports lacking tumor differentiation details—were addressed through multiple imputations to enhance the robustness of the analysis. Furthermore, the study did not account for unmeasured confounders such as socioeconomic status and healthcare accessibility, which could have influenced treatment decisions and survival outcomes. Despite these limitations, this study provides crucial insights into the real-world burden of advanced gastric cancer and underscores the urgent need for strategies to improve treatment uptake and patient survival.

Conclusions

At our institution, the overall 1-year survival rate for advanced gastric cancer patients is 10.5%, with a median survival of 2.60 months. The key contributing factors include receiving treatment, like chemotherapy, and the duration of symptoms before diagnosis. Furthermore, the notably low proportion of patients receiving active therapy highlights an urgent need to address barriers to treatment access, optimize referral pathways, and enhance patient education to improve outcomes. Future multicenter prospective studies integrating nutritional, performance, and molecular parameters are warranted to refine prognostic stratification and guide individualized therapeutic approaches for advanced gastric cancer in the Thai population.

Acknowledgment

In this study, we utilized perplexity (Claude Sonnet 3.5 engine) to assist in literature searches for specific research questions. All the information retrieved through this AI tool underwent thorough human verification. Grammarly and Paperpal were used to correct the language and improve readability. The authors take full responsibility for the integrity of the content and affirm that AI does not diminish the intellectual contributions of the research team. Throughout this study, we maintained our commitment to academic integrity and ethical research practices. The authors declare that they have no conflicts of interest or external funding.

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