Survival rate of patients with gastric cancer in Hormozgan Province, Iran

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Abstract

Background: Gastric cancer is the fourth most common form of cancer and the second most common cause of death in the world. It is also one of the most common cancers leading to mortality in Iran. Therefore, this study aimed to determine the survival rate of patients with gastric cancer and its affecting factors in the south of Iran (Hormozgan province).

Methods: In this study, all patients with gastric cancer (119 patients) that were diagnosed and registered during 2008 to 2013 in Hormozgan province, were studied. All patients were followed to the end of 2015. Kaplan-Meier method and Cox proportional hazards model were used to draw survival curves and to determine the effective factors on the survival rate of surveyed patients. Moreover, Log-rank test was used to evaluate whether or not survival curves for different groups are statistically equivalent (p<0.05).

Results: The mean age of the study population was 58.9±14.91, and most of them were men (72.3% (86 persons)). After diagnosis, the survival rates for 1, 2, 3, 4, and 5 years were 62.2%, 49.4%, 43.7%, 39.7%, and 38% respectively. Survival in men were lower than women, but according to log-rank test this difference was not statistically significant (p=0.325). Also patients with advanced stage cancer had significantly lower survival in comparison to individuals with early stage disease (p<0.001). Based on multiple Cox proportional hazards model, job status of the patients and stage of cancer were effective factors on patients' survival.

Conclusion: Based on the findings of the present study, the survival rate was decreased over time after diagnosis. Stage of a cancer at the time of diagnosis is the most important factor affecting the survival of surveyed patients. This shows that there is a crucial need to diagnos the gastric cancer in early stages.

Keywords: Gastric cancer, Survival rate, Kaplan-Meier, Cox proportional hazards model, Log-rank

Introduction

Incidence rates of many cancers could increase considerably in the future and most of them will occur in developing countries (1). Gastric cancer is one of the most important and prevalent forms of cancers in the world. So

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↑What is "already known" in this topic:
Gastric cancer is the fourth most common cancer and has a poor prognosis and a high degree of mortality, with 5-year relative survival less than 30% in most countries.

→What this article adds:
In Hormozgan province, the survival rate of gastric cancer is relatively low and more than half of the patients are detected in the last stages of the disease.

that, it is the fourth most common form of cancer and the second most common cause of death in the world (2-4). In total, more than 70% of gastric cancer cases occur in developing countries, especially in Eastern Asia, which has the highest mortality rates in the world (5). Due to the high incidence and poor prognosis of gastric cancer, it is still a great health system concern in most developing countries, including Iran (6). Iran has the highest rate of gastric cancer among the middle east countries (7) and based on the "National Report of the Cancer Registry", gastric cancer is the third most common cancer in Iran after skin and breast cancers (8).

Cancer survival is a key measure of the effectiveness of health-care systems (9-11), but gastric cancer has a poor prognosis and a high degree of mortality in both sexes (6), with a 5-year relative survival less than 30% in most countries (3). Therefore, it is necessary to measure the survival rate of cancer to determine the effectiveness of interventions. Also, it should be mentioned that cancer survival rate may be different in various regions. So, the objective of this study is to evaluate the survival rate and some associated factors in patients with gastric cancer in the south of Iran.

Methods
Study population
According to the cancer registry database of Hormozgan province (a province in the south of Iran), a total of 119 patients with gastric cancer were registered during 2008 to 2013, and these patients were enrolled in the study and followed until the end of 2015.

Variable definitions
In this study, the relationship between patients' survival in early diagnosis of gastric cancer and the factors such as age at the time of diagnosis, gender, ethnicity (native to Hormozgan province, other), educational level, job status, stage of the cancer, degree of cellular differentiation, and smoking habits were taken into account. The educational level was divided into three levels: a) illiterate, b) eight levels or lower than eight levels of education, c) higher than eight levels of education (2). Job status was categorized into unemployed, simple workers, and experts or clerks(12). In the current study, patients are categorized based on TNM (Tumor Node Metastasis) system. According to the TNM system, patients were divided into two group: 1- early stage including stage 1 and 2, and 2- advanced stage including stages 3 and 4. Also based on cellular differentitation of the tumor, patients were categorized into three grade; grade I (Low Grade or well differentiated), grade II (Moderately Differentiated), grade III (high Grade or poorly differentiated).

Data Collection
The patients' demographic and clinical information were extracted from their medical folders. Further information was collected from three sources including histopathology centers, hospital reports, and private clinics. In order to assess the survival rate and complete the questionnaire, we called the patients, and if not possible, a trained person visited them at their home. If we couldn't find the patient, s/he was considered as a lost case. In this study, the survival time was set from the of time diagnosis to the event's incidence or the end of follow-up phase, and all the patients who survived until the end of the study were considered as censored observations.

Statistical analysis
Statistical analyses were applied using SPSS software version 19. Descriptive statistics included frequencies, percentages, ranges, means, median and standard deviations (SD). Survival curves were drawn with the use of the Kaplan–Meier method and the log-rank test was used to evaluate whether or not survival curves for different groups are statistically equivalent. The effect of surveyed factors (with statistical significance in univariate tests) on survival rate was assessed by multiple Cox proportional hazards model with the backward method. The significance level was set at $p<0.2$ in univariate analyses and $p<0.05$ for multivariate analyses.

Ethical considerations
The study was approved by the Ethical Committee of Iran university of medical sciences (Ethical code: IR.IUMS.REC.1394.94-01-12-25674).

Results
Totally, 119 patients with gastric cancer were registered from 2008 to 2013. The mean age of patients at the time of diagnosis was 58.9±14.91 years (Range: 24-87), and the majority of them were male (72.3% (86 persons)). The mean age of men (59.12±14.51) was higher than women (58.39±16.1), but this difference was not statistically significant (p=0.585). Other characteristics of diagnosed patients are displayed in Table 1.

At the end of the study, 70 patients (58.8%) were dead and the others were censored. The 5-year survival mean and the median were 31.48 and 24 months, respectively. Moreover, after the diagnosis the survival rates for 1, 2, 3, 4, and 5 years were 62.2%, 49.4%, 43.7%, 39.7%, and 38% respectively.

As presented in Table 1, the 5-year survival rate and median survival in women are greater than men. It was also observed that 5-year survival rate in older patients group is lower than younger patients group. Other comparisons of the 5-year survival rate among patients with different factors are presented in Table 1. Figures 1 and 2 depicts the survival based on sex and stage of the cancer. As can be seen in Figure 1, survival probabilities in men are lower than women, but according to log-rank test, this difference wasn't statistically significant (p=0.325). It was also observed that individuals with more advanced stage tumors had significantly (p<0.001) lower survival in comparison to patient with early stage tumors (Fig. 2).

Univariate analysis showed a significant associations between patients' survival and variables such as the stage of cancer, grade of the tumor, educational level, job category and smoking (Table 2).

Cox proportional hazards model showed a p value of

Table 1. Distribution of variables and 5-year survival in patients with gastric cancer

Variable	Level	No (%)	5-year survival	Median survival (month)
Total		119 (100)	-	-
Sex	Female	33 (27.7)	43.3	39
	Male	86 (72.3)	35.9	21
Age (y)	45>	22 (18.4)	77.3	NC**
	45-65	56 (47.1)	30.2	21
	65<	41 (34.5)	32.5	13
Ethnicity*	Native	74(82.2)	14.9	10
	Other	16(17.8)	23.8	16
Stage of cancer diagnosis	Early	53(44.5)	67.4	NC
	Advanced	66(55.5)	15.2	9
Grade of tumor	I	25(21.0)	34.3	17
	II	48(40.3)	46.5	52
	III	46(38.7)	31.0	14
Education level*	illiterate	43(47.8)	6.5	32
	≤8class	30(33.3)	9.1	65
	>8class	17(18.9)	57.5	NC
Job category*	Unemployed	33(36.7)	24.4	26
	Simple workers	52(57.8)	7.6	9
	Experts/clerks	5(5.5)	40.0	28
Smoking*	Yes	28 (31.1)	0.00	9
	No	62 (68.9)	0.22	14

* Some data were missing
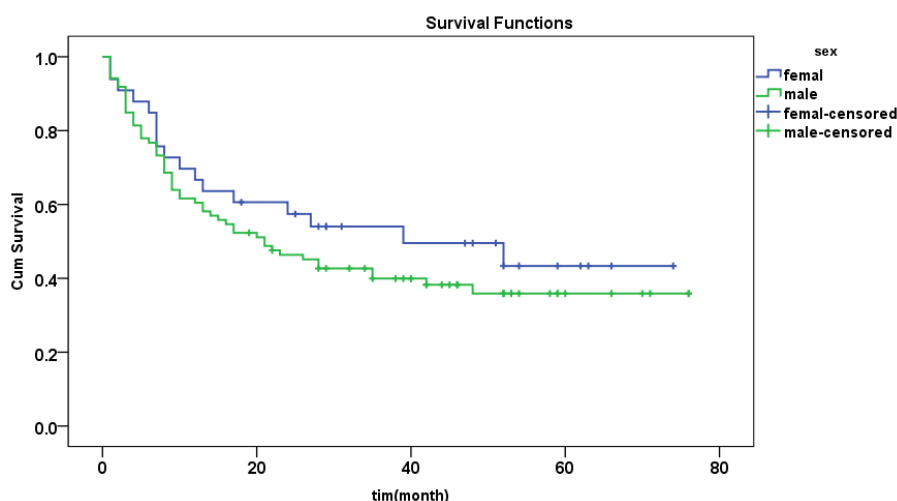** NC: Not Computed (Because the event has not occurred in more than 50% patients)

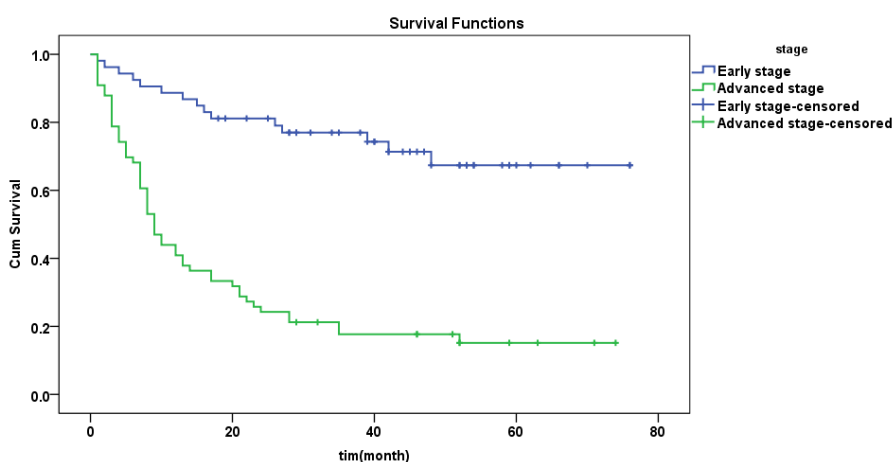*Fig. 1.* Comparison of survival probabilities in men and women with gastric cancer

Fig. 2. Comparison of survival probabilities in patients in early and advance stage of cancer diagnosis

0.051. Finally, the multiple Cox proportional hazards model showed significant relationships between job category and the stage of cancer diagnosis with patients' survival ($p<0.05$) (Table 3). According to adjusted hazard ratios that are illustrated in Table 3, the stage of cancer has the strongest relationship (hazard ratios=3.258) with

Table 2. Univariate analysis of factors affecting the survival of patients with gastric cancer using Cox proportional hazards model

Variables	Levels	Hazard ratio	95% CI	p
Sex	Male	1.310	0.758-2.263	0.333
Age	<45	1	-	-
	45-65	3.450	1.357-8.770	0.009
	>65	3.338	1.399-9.460	0.008
Ethnicity	Other	0.729	0.382-1.389	0.336
Stage of cancer diagnosis	Advanced	5.167	2.898-9.212	<0.001
Grade of tumor	I	1		
	II	0.6	0.319-1.131	0.114
	III	1.016	0.553-1.866	0.959
Education level	8class<	1		
	illiterate	3.037	1.349-6.840	0.007
	≤8class	2.733	1.178-6.337	0.019
Job category	Unemployed	1		
	Simple workers	1.931	1.144-3.260	.014
	Experts and clerks	.921	.274-3.093	0.894
Smoking	Yes	1.400	.855-2.294	0.181

Table 3. Multiple analysis of factors affecting the survival of gastric cancer patients by Backward Cox proportional hazards model

Variable	Levels	Hazard ratio	95% CI	p
Job category	Unemployed	1	-	
	Simple workers	2.104	1.163-3.804	0.014
	Experts and clerks	2.712	.573-12.832	0.208
Stage of cancer diagnosis	Advanced	3.258	1.764-6.019	<0.001

survival rate among all variables.

Discussion

Gastric cancer has a high degree of mortality in developing countries, and it is one of the main causes of cancer death in these countries (13). Lifetime of patients with gastric cancer is short and depends on some pathological, clinical, and treatment factors(14). Based on the findings of the current study, five-year survival rate of patients with gastric cancer was 38%. Previous studies have presented different results (15-17). In this regard, a meta-analysis on determinants of one, three, and five-year survival rate of patients with gastric cancer was done in Iran that showed a five-year survival rate of 17% (16). In other studies conducted in Iran (15, 17, 18), the five-year survival rate was reported from 5.4% to 30%. Therefore, the five-year survival rate in this study is higher than other studies. This issue may be due to the fact that this study was based on the data provided by cancer registry center, but the other mentioned studies had used the data provided by medical centers. In addition, the results of those studies refer back to a decade ago. Based on the results of a global study, Japan has the highest 5-year survival rate (54–58%) of gastric cancer in the world(19). Also according to the data from SEER(Surveillance, Epidemiology, and End Results) in the years 2006 to 2012, the 5-year survival rate was 30.4% (20). Results of Hiripi study conducted in Germany also showed that the five-year survival rate of patients with gastric cancer was 31.8% (4). Finally, the results of this study and other mentioned studies showed that the five-year survival rate of patients with gastric cancer in most countries (including Iran) is less than 40%.

As shown in Table 1 and Figure 1, the 5-year survival rate and the median survival in women was greater than men. These findings are compatible with the results of Baeradeh et al., Zeraati et al., and Mehrabian et al. studies (2, 8, 21). The difference in the survival rate between men

and women may be due to the reason that men in comparison to women usually neglect their general health status and therefore some of the diseases are diagnosed in later stages in men.

The findings of univariate analysis showed that sex is not an effective factor on survival (p≥0.2), but other factors had significant relationships with survival (p<0.2). The results of similar studies didn't show any significant relationship between sex and survival as well (8, 22-24). However, in Moradi et al. and Yokota et al. studies significant relationships between gender and survival of patients with gastric cancer were observed (15, 25).

Finally, the results of multiple Cox proportional hazards model showed that the patients' survival rate was statistically significant related to variables such as sthe tage of cancer and job status. But it did not show any significant relationship with other variables such as gender, age, educational level, grade of the tumor, smoking, and ethnicity.

Based on the findings of this study, stage of cancer is the most important factor affecting the survival of patients with gastric cancer, and if the cancer is diagnosed in later stages, the survival rate will decrease. Therefore, detecting cancer in earlier stages is an important factor for increasing the survival of patients. The results of Moradi et al. study showed that the stage of the gastric cancer is the most important predictor of survival (15). This result is also compatible with the findings of other studies (15, 18, 24, 26).

In three different job category, the lowest death hazard was observed in the unemployed patients after adjusting for other variables. In comparison with the unemployed, the death hazard of simple workers and experts/clerks was 2.1 and 2.7 respectively. In a study conducted in Yazd, the survival rate of the unemployed was greater than that of farmers and the farmers' survival rate was greater than the rate in some other occupations. However, the differences were not statistically significant (2). Comparison between the clerks and the unemployed in Japan showed that the

death rate in the unemployed patients was greater than that in the clerks or technicians (27). It can probably be due to the reason that these groups of people are faced with more job stress and are busier at work and pay less attention to their health and diagnosis of their medical problems.

Conclusion

The results of the present study showed that the survival rate of gastric cancer in Hormozgan province has been decreased over time after diagnosis. Stage of the cancer is the most important factor affecting the survival of surveyed patients, and more than 50% of the patients are diagnosed in more advanced stages of the disease. Therefore, it seems that screening and early diagnosis of gastric cancer are very important and can increase the survival rate of patients.

Acknowledgments

Conflict of Interests

The authors declare that they have no competing interests.

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