Original Article

Survival Rate of Patients with Stomach Cancer and its Effective Factors in Yazd Province

Najib Allah Baeradeh[1], Mohammad Hassan Lotfi[1*], Hossein Fallahzadeh[1], Saeed Kargar[2], Hassan Salman Roghani[3]

[1.] Department of Statistics and Epidemiology, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
[2.] Department of General Surgery, Breast Diseases Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[3.] Department of Digestive Disease, Internal Ward, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

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Abstract

Introduction: Cancers are the second cause of death in the world after cardiovascular diseases. Cancer of the stomach is one of the most important forms of cancer worldwide. It is the fourth most common form of cancer and the second most common cause of death in the world. There is a wide variation in the survival of gastric cancer among and even within countries. In this study we seek to investigate survival rate and the factors influencing the survival of gastric cancer in Yazd province.

Materials and Methods: This is an observational (the analytical type) study which has been conducted using the methods of longitudinal and survival study. The study population includes all patients diagnosed with gastric cancer in Yazd province between the years 2006 to 2010. The samples were selected by the census method and all the patients diagnosed with gastric cancer between the years 1384 to 1388 (estimated to be about 136 cases) have been studied. After collecting the data and coding them, they were inserted to the software SPSS 16, STATA 12. To investigate the survival and the factors influencing the survival time of patients which are the main objective of this study, Kaplan-Meier method was used and Cox proportional hazards model was fitted to the data. To compare survival function in different subgroups, the log rank test or generalized Wilcoxon test was used.

Results: From a total of 136 patients with gastric cancer, 91 cases were male (66.9%) and 45 females (33.1%), respectively. The mean age of patients was 62.33 ±1.45 years at the time of diagnosis. The Average (5% Trimmed Mean) and the median survival of patients with gastric cancer in both sexes were 26.16 and 19 months, respectively. The probability of survival at 1, 3 and 5 years after diagnosis of stomach cancer in both sexes using the Kaplan-Meier was 61.3, 31.2, %24.5, respectively. In multivariate analysis using Cox proportional hazards model, the variable of Job (P-value=0.03) was identified as the factor influencing the survival of patients with gastric cancer.

Conclusion: Although the survival rate of patients with gastric cancer in Yazd province is desirable level, intervention measures can increase this amount

Keywords: Stomach Cancer; Survival Rate; COX Model; Yazd Province

[*] **Corresponding Author; Tel:** 09133582982, **Email:** lotfi56359@yahoo.com

Introduction

Cancers are the second cause of death in the world after cardiovascular disease [1]. They are the second and third leading cause of death in developed and less developed countries, respectively [2]. Cancer of the stomach is one of the most important forms of cancer worldwide. It is the fourth most common form of cancer and the second most common cause of death in the world [3].

It is one of the most prevalent forms of cancer in developing countries. Over 70% of new cases of stomach cancer deaths occur in developing countries [4]. According to international estimates, more than 930,000 new cases of gastric cancer are diagnosed annually. And approximately 700,000 patients annually die from the disease [2].

According to global statistics, in 2008, 989,600 new cases of stomach cancer were diagnosed and an estimated 738,000 deaths occurred during the year due to this form of cancer. That is to say, approximately 8% of new cases and 10% of all deaths were caused by this form of cancer in the world [4]. Gastric cancer is the sixth most common cause of death by cancer in the United States of America. And 24,800 new cases and 14,400 deaths from cancer occurred in 1988 in the United States of America [5]. The age-standardized incidence rate (ASR) of gastric cancer in developed countries is 16.7 and 7.3 per hundred thousand in men and women, respectively. The (ASR) of gastric cancer in less developed countries is 21.1 and 10 per hundred thousand in men and women, respectively [6].

There is a wide variation in the incidence of gastric cancer among and even within countries. In Japan, Korea and China which are areas with a high risk of gastric cancer, the age standardized incidence rate is 20 per hundred thousand. Italy, Germany and the Netherlands are areas with an average incidence of stomach cancer [3]. The highest incidence of gastric cancer has been seen in East Asia so that the incidence of cancer in China and Japan is 35 percent per hundred thousand whereas it is 5 per hundred thousand in America [7].

Gastric cancer is a common cancer of the digestive system in Iran and the world [8]. It comprises 51% of all gastrointestinal cancers and has been the main cause of death from cancer of the gastrointestinal tract in 2004 in Iran [9]. After skin cancer, it stands in the second rank among Iranian men while in women it is the fourth. In general, it holds the third place in both sexes (according to the nationwide report in 2010). The age-standardized incidence of this cancer in men and women is 16.01 and 7.87 per hundred thousand, respectively [6]. According to the nationwide report in 2009, gastric cancer was the sixth most common cancer in men of Yazd, while it was the eighth most common cancer in women of Yazd [1]. According to a report in 2010, gastric cancer was the fifth most common cancer in men and women of

Yazd which indicates an increase of the incidence of cancer in the province [6].

Stomach cancer incidence and survival have had major variations worldwide [10, 11] so that 5-year cancer survival rate in European countries is higher than that in American countries (23 percent in Europe and 20 percent in America) [12]. On the whole, 5-year survival in European countries is between 10 and 30 percent [13] while it is 15 to 28 percent in the United States of America. Survival range in developing countries varies between 7 to 17 percent [12, 14]. Studies conducted in Iran have reported the 5-year survival to be about 11 to 17 percent [8, 15, 16]. The incidence of gastric cancer in men is higher than women, but the relative survival in women higher than that in men [15, 17, 18]. Many factors including poor diet, the consumption of fruits and vegetables, low socioeconomic status, presence of H. pylori [19] and also such variables as disease stage, the patient's age, presence of metastasis, type of surgery, age at diagnosis, and sex are influential on the survival of patients with gastric cancer [15, 20-22]. Mass screening has not been recommended for gastric cancer, but it is possible to identify susceptible individual groups at-risk and areas with a high incidence of cancer using endoscopic screening [23, 24].

The warning signs of gastric cancer are important because one of the reasons for low survival of patients is that they are diagnosed with the disease at an advanced stage [21]. In this study, considering the importance of stomach cancer and the importance of survival data for evaluating the effects of therapy and also the fact that various studies in Iran and around the world have demonstrated different survival rates for this cancer, we seek to investigate survival rate and the factors influencing the survival of gastric cancer in Yazd province so that we can help increase the survival rate of these patients with timely intervention measures in the future.

Materials and Methods

This is an observational (the analytical type) study which has been conducted using the methods of longitudinal and survival study. The study population includes all patients diagnosed with gastric cancer in Yazd province between the years 2006 to 2010. The samples were selected by the census method and all the patients diagnosed with gastric cancer between the years 1384 to 1388 (estimated to be about 136 cases) have been studied. All patients diagnosed with morphological types of gastric cancer in Yazd province were selected as inclusion criteria. And patients with gastric cancer who were not residents of Yazd province, cancer patients who had died for any reason other than gastric cancer, and patients with two primary cancers simultaneously were selected as the exclusion criteria. In this study, after coordination with cancer experts and gaining the necessary permission from the provincial health center, information related to gastric cancer patients was received. The researchers also referred to the HIS of Shahid Sadoughi and Shah Wali Hospitals and getting a list of cancer patients

during the years mentioned above matched them with the file in the health center. Hence, the patients were identified and information on the social and demographic factors (gender, age, family history of gastric cancer, family, residence, occupation, education) and behavioral factors (smoking, drugs) was obtained by a questionnaire whose validity had been confirmed by experts through rereading the records of patients in the hospitals as well as by phone calls to the patients or (in case of the patient's death) their relatives. To determine the exact time of death, the researchers referred to the Civil Registration Office of Yazd province.

After collecting the data and coding them, they were inserted to the software SPSS 16, STATA 12. To investigate the survival and the factors influencing the survival time of patients which are the main objective of this study, Kaplan-Meier method was used and Cox proportional hazards model was fitted to the data. To compare survival function in different subgroups, the log rank test or generalized Wilcoxon test was used.

Results

From a total of 136 patients with gastric cancer, 91 cases were male (66.9%) and 45 females (33.1%), respectively. The mean age of patients was 62.33 ±1.45 years at the time of diagnosis. The mean age for men was 62.86±1.52 years while it was 61.24±1.31 years for women.

The minimum age was 20 years and the maximum age was 87 years. 86 cases (63.2%) have died and the rest have been censored. Family history was found in 21 patients (15.4). The job of 31 patients (22.8%) was agriculture. In our study, 26 patients (19.1) were smokers and 16 (11.8) were drug addicts. The Average (5% Trimmed Mean) and the median survival of patients with gastric cancer in both sexes were 26.16 and 19 months, respectively. The average (5% Trimmed Mean) for women and men was 32.14 and 22.87 months, respectively. And the median was 24 and 14 months, respectively. The probability of survival at 1, 3 and 5 years after diagnosis of stomach cancer in both sexes using the Kaplan-Meier was 61.3, 31.2, 24.5%, respectively. In gender specific terms, it was 56.7, 25, 21.5% for men, respectively, and 69.7, 42.4 and 29.5% for women, respectively which indicate the high survival rate of gastric cancer in women (Figure 1). Among behavioral and demographic factors, the highest level of 5-year survival rate was 39.3 which belong to housewives and the lowest was 13.6% which belongs to Farmers. To compare the difference in survival of subgroups of variables under study, the log-rank was used. In this study it was found that the survival rate difference among the subgroups of gender, smoking status, place of residence, job, education, family history, consumption of drugs is not statistically significant ($p>0.05$) (Table 1).

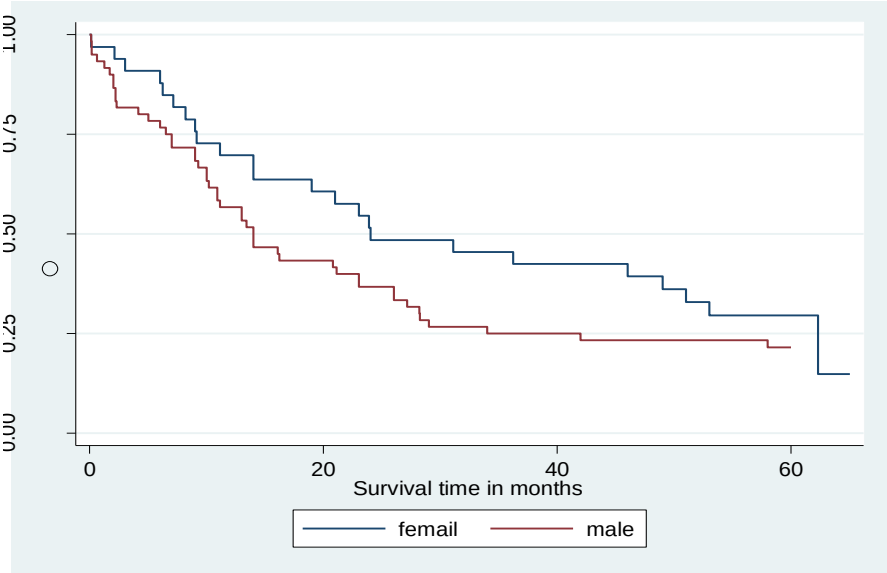

Figure 1: Estimated Kaplan - Meier survival probability in the two subgroups of gender

Table1: Distribution of demographic and behavioral variables and survival rates in patients with gastric cancer

Variable	**Frequency table**		**(Log Rank) Mantel-Cox**		
		Count, Percent	Median survival	5-year survival rate	P Log Rank
Sex	Male	(13.1) 45	14	5.21	0.161
	Female	(66.9) 91	24	29.5	
Smoking	No	(65.4)89	13	22.2	0.518
	Yes	(19.1)26	20	26.4	
Residence	City	(54.4)74	23	21.2	0.623
	Village	(19.1)36	14	24	
	Agriculture	(22.8)31	14	13.6	
Job	Housewife	(25)34	31.1	39.3	0.125
	Others	(33.1)45	16.1	24.5	
	Illiterate	(31.6)43	20	24.2	
Education	Fifth grade	(14.7)20	14	33.3	0.722
	Eighth grade and higher	(11.8)16	16	23.8	
Drug abuse	Yes	(11.8)16	11	30	0.913
	No	(70.6)96	19	23.6	
Family history	Yes	(15.4)21	26	25.9	0.446
	No	(61.8)84	14	25.5	

After measuring the difference in survival among the subgroups, the variables were analyzed using Cox proportional hazards regression model. *P-values* are two-sided and their significance level is assumed to be 0.05. In a univariate analysis, job was found to be the variable influencing the survival of patients, while the variables of gender, family size, education, family history, smoking, drug use, and age showed no significant association with survival in this study (P-value>0.0.5) (Table 2).

Table 2: The results of univariate analysis of factors affecting the survival of patients with gastric cancer using Cox proportional hazards model

Variable		Univariate Cox regression		
		HR	(95%CI)	P-value
Job	Agriculture			Group (baseline)
	Housewife	0.498	(0.252, 0.986)	0.046**
	Others	0.724	(0.388, 1.351)	0.310
Family size	Less than 5 people			Group (baseline)
	5 to 8 people	0.932	(0.476, 1.824)	0.836
	More than 8 people	1.145	(0.522, 2.512)	0.735
Education	Illiterate			Group (baseline)
	Fifth grade	0.770	(0.388, 1.529)	0.455
	Eighth grade and higher	0.831	(0.400, 1.727)	0.619
Sex	Male, female*	1.424	(0.864, 2.349)	0.166
Family history	Yes. No *	0.791	(0.430, 1.453)	0.449
Smoking	Yes. No *	1.218	(0.667, 2.225)	0.520
Drug abuse	Yes. No *	1.045	(0.473, 2.305)	0.914
Age	Less than 60 / More than 60	1.250	(0.776, 2.014)	0.360

*=Group (baseline)

In multivariate analysis using Cox proportional hazards model, the variable of Job (P-value=0.03) was identified as the factor influencing the survival of patients with gastric cancer. And the variables of gender and age had no statistically significant association with the survival of patients. Risk ratio in the subgroup of the variable of job: the risk of death among housewives is 7.97 times more than that in those working in agriculture. And

also those who are working in other jobs are 23.46 times more at risk than farmers. This increased risk is in the significant level (P-value = 0.009) (Table 3).

Table 3: The results of the multivariate analysis of factors affecting the survival of gastric cancer patients using Cox proportional hazards model

Variable		Multivariate Cox regression		
		P-value	CI 95%	HR= (RR)
	Job	0.03	Group (baseline)	
Job	Agriculture			
	Housewife	0.058	(0.9, 86.61)	8.97
	Others	0.009	(2.19, 272.43)	24.46
Sex	Male,Female*	0.153	(0.55, 44.2)	4.94
Age	Continuous	0.275	(0.97, 1.07)	1.027

*=Group (baseline)

According to the above description, evaluation and testing of the proportional hazards assumption in the Cox model are necessary and if this assumption does not hold, the results of the Cox model will be unreliable. To evaluate the Cox proportional hazards assumption, Schoenfeld Residuals Method has been used. According to this test, the assumption of proportional hazards for the variables is confirmed in the multivariate model (P-value> 0.6).

Discussion

In general, gastric cancer incidence and mortality have declined dramatically during the past 70 years [25]. Despite the recent decline, gastric cancer is still the fourth common cancer and the second leading cause of cancer deaths in the World [3]. The present study was conducted in order to demographic and behavioral factors affecting the survival of gastric cancer patients in Yazd province. The results showed that 66.9% of the patients were male which is compatible with the results of the studies by Biglarian [21], Ghadimi [22], Roushanaei [16], and MIOMIR PESIC [26]. That is, it indicates the high incidence of gastric cancer in men. The mean age of 62.86 and 61.24 years were obtained for men and women, respectively. The mean age of patients is more and less compared with that in some other studies [20, 27, 28]. The average (5% Trimmed Mean) and the median survival of patients with gastric cancer in both sexes were 26.16 and 19 months, respectively. And average (5% Trimmed Mean) was 32.14 and 22.87 months for women and men, respectively, and the median, was 24 and 14 months, respectively. The median survival is compatible with the study of Zeraati and Atoof [29, 30] and compared to some studies, it is

larger [20] or smaller [11]. The probability of survival at 1, 3 and 5 years after diagnosis of stomach cancer in both sexes using the Kaplan-Meier was 61.3, 31.2, 24.5%, respectively. In gender specific terms, it was 56.7, 25, 21.5% in men, respectively and 69.7, 42.4 and 29.5% in women, respectively. The results of this study are compatible with those of Zaraati and Attof [29, 30]. They have been higher than those of other studies in Iran [8, 15, 22, 31] and also higher than those conducted in abroad [18, 32, 33]. These results show that the five-year survival of patients with gastric cancer has been higher in Yazd province than that in other provinces and also in developing and developed countries [12]. As is shown, stomach cancer survival rate is higher in females than in males. However, the log-rank test showed no significant statistical difference. But the study of Mehrabian et al. has also shown that stomach cancer survival rate is higher in women than in men [15]. Univariate analysis showed that sex, smoking status, residence, education, family history and drug abuse are not effective on survival. In some other studies, statistically significant relationships between sex and survival of gastric cancer patients were not found [21, 29, 34]. But in Roshanaei et al.'s article, a significant relationship between gender and survival was found [16]. In a study conducted in Ardabil on gastrointestinal cancer survival and also in another study, no relationship between smoking, family history, and drug abuse on survival of gastric cancer patients was found which is consistent with our results [35, 36]. But other studies have shown that family history is highly effective on the survival of patients with gastric cancer [11, 22]. In a study, Cella & et al. found that the survival of gastric cancer is higher in people with high education levels than those with low education levels [37]. However, in another study, no significant relationship between the level of education and the patient's survival was found which is consistent with our results [38]. Finally, in the multivariate model of Cox, after entering the significant variables and p-values less than 0.1 of univariate model, the variable of job became significant. It showed that people who have agricultural jobs have a better survival which is most likely the result of doing more physical activities.

Conclusion

Although the survival rate of patients with gastric cancer in Yazd province is desirable level, intervention measures can increase this amount.

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