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Survival rates and prognostic factors of thyroid cancer: A retrospective cohort study

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Abstract

Introduction: The most prevalent endocrine malignancy is thyroid carcinoma. Thyroid cancer is much more common than it was previously. The prognosis of people with this condition can be impacted by a number of factors.

Objectives: The purpose of this study was to assess the prognosis and survival rates of thyroid cancer patients in western Iran.

Patients and Methods: This retrospective cohort study was performed on all patients (n = 312) with diagnosing thyroid cancer based on pathology results between 2011 and 2021. Demographic and clinical information and disease staging of patients based on TNM (tumor, node, and metastasis) system were extracted from patients' medical records. Kaplan-Meier method, log-rank test, and Cox regression were used for the analysis of the data. The obtained data were analyzed in SPSS version 22.

Results: Our findings showed that the mean survival time for all participants in the study was 39.9 months. Additional analysis revealed that the mean survival time is significantly lower in people who residence in urban areas. Furthermore, men, people aged 50-80 years old, and those who were in the TNM stage I had the highest mean survival time. Based on the univariate analysis age, TNM stage are associated with risk of death in patient with thyroid cancer.

Conclusion: Death from thyroid cancer is correlated with patients' age, gender, and disease stage. Age is important risk of death. Additionally, overall survival of the patients decreases with increasing time.

Keywords: Survival, Death, Thyroid cancer

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Introduction

An expanding global issue is cancer. Since the 1990s, rapid scientific advancements in cancer diagnosis have resulted in the creation of new diagnostic techniques and cancer medicines. During this time, fewer cancers have been diagnosed and more people are surviving it (1,2). However, this problem raises the average cost of cancer therapy, thus research should be planned to shorten the expense and duration of cancer treatment (3).

The most prevalent endocrine cancer is thyroid cancer. The number of thyroid cancer cases increased from 4.9 to 14.3 per 100 000 people. This pattern might be a result of overdiagnosis, which happens when cancer is found even when there are no symptoms present or it results in an early death. Women account for more than 75% of thyroid cancer cases. It is most frequently found in adults between the ages of 20 and 55 years (4-6). The frequency of this malignancy is believed to be between 1.2 and 2.4 per 100 000 individuals in Iran, and it is three times more common in women than in men (7).

Fortunately, thyroid cancer is very treatable. The 5-year survival rate for all kinds of thyroid cancer is 97%, while

the 10-year survival rate is 85%-93%. However, the prognosis is significantly influenced by age. People under 45 years old have a significantly better prognosis than patients over 45 (8).

Female gender, age (peak incidence in the 40s or 50s for women, 60s or 70s for men), radiation exposure, iodine shortage, family history of thyroid cancer, probably high TSH, and a number of genetic disorders are all risk factors for thyroid cancer (8,9).

Papillary carcinoma (80%-90%), follicular carcinoma (5%-10%), medullary carcinoma (3-5%), anaplastic carcinoma (less than 5%), and other (1-2%) are the subtypes of thyroid cancer. Understanding the type of thyroid cancer is crucial for determining the disease's prognosis and the best course of treatment (10).

After examining the patient's symptoms, such as a lump or swelling in the neck, persistent hoarseness or voice changes, difficulty breathing or swallowing, and a persistent cough that is not connected to a cold, thyroid cancer may be identified (8).

Overall, physical examination, evaluation of personal and family history, laboratory tests, and imaging are used

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■ Implication for health policy/practice/research/medical education

Thyroid cancer is most prevalent endocrine malignancy. This retrospective cohort study aimed to investigate the prognosis and survival rate of patients with thyroid cancer on all patients (312 people) diagnosed with thyroid cancer based on pathology results between 2011 and 2021. Based on the result age is important risk of death. Also, overall survival of the patients decreases with increasing time.

to diagnose thyroid neoplasms. A biopsy is performed after this to confirm the diagnosis (11,12).

Historical diagnosis and patient age are the two most crucial elements in determining the staging and prognosis of thyroid cancers.

Numerous staging and clinical prognostic scoring techniques exist. The TNM (tumor, node, and metastasis) staging approach, however, is preferred over the alternative systems by the American Joint Committee on Cancer (13).

Surgery is usually the major form of treatment for thyroid cancer because it usually involves removing the entire thyroid gland as well as the tumor. Radiation therapy, chemotherapy, and targeted therapy are further therapies (14).

Objectives

Considering the increase in the incidence of thyroid cancer in the past few decades and the effect of many factors on the recurrence of this disease, this study sought to investigate the survival rate and the factors affecting the prognosis of patients with thyroid cancer in Hamadan during the years 2011–2021.

Patients and Methods

Study design

This retrospective cohort study was performed from 2011 to 2021, in Hamadan province, the west of Iran. The study included all patients (n=312) with a pathology-based diagnosis of thyroid cancer, independent of age or gender. Patients who passed away for unrelated reasons and instances that were unreachable during the study period were eliminated.

A checklist containing the demographic and clinical details of patients before surgery was used to gather the data needed for this investigation. Additionally, using the TNM approach, illness staging was assessed and recorded (13).

During this time, each patient was closely monitored, and the disease's recurrence rate, patient mortality from thyroid cancer, and imaging techniques were all evaluated.

Statistical analysis

The qualitative data were presented using frequency and percent, and quantitative data were described as the mean and standard deviation. We used the Kaplan-Meier method to measure the survival rate of the patients. Differences

in the Survival rate were explored by the Log-Rank test. Finally, a cox-proportional hazard model was conducted to evaluate the association between survival rates with independent predictors of survival. All statistical analyses were performed at a significance level of 0.05 using SPSS software, version 22 for windows (SPSS Inc., Chicago, IL).

Results

In general, 15.38% of patients were male and 84.62% of them were female. The mean age of diagnosis for male patients is 42.58 years, and the age of diagnosis of female patients is 40.76 years. According to our findings, the majority of women (34.1%) and the majority of men (35.4%) were between the ages of 50 and 80. 92% of women and 100% of males had euthyroid conditions. Most men and women do not have thyroid cancer in their families. The majority of patients (both men and women) under 55 were in stage I of the illness. Most male and female patients who were 55 years or older were, respectively, in stages II and I. None of the patients were on stage IVA. The mean number of recurrences was 0.72 in men and 0.22 in women (P value<0.001).

The highest death rate was seen in the over 80-year-old age group, in patients who were illiterate, had anaplastic cancer, were in stage IVB, and had both distant and local metastases. The papillary thyroid cancer subtype had the lowest death rate of the thyroid cancer subtypes studied (Table 1).

According to our findings, the average length of time that research participants survived was 39.9 months. Men, individuals between the ages of 50 and 80, and individuals in stage I also had the highest mean survival times. Table 2 provides more details on the mean survival time.

The results of the multivariable analysis, using the cox proportional hazard model are shown in Table 3. age, staging is associated with risk of death in patient with thyroid cancer at significant level 0.1. Simultaneous examination of variable in the multivariable cox model showed that the age has an important effect on the risk of death from thyroid cancer. Therefore, the risk of death in from thyroid cancer increases about 1.135 units by increasing every year in with increasing each year of age at the time of diagnosis Table 3.

Figure 1 shows that the probability survival is higher in women, people aged 20-35 years old, and people on the stage I. Figure 1 also shows the overall survival of the patients decreases with increasing time.

Discussion

The goal of this study was to assess the survival rate and factors influencing prognosis for thyroid cancer patients treated at the Hamadan endocrinology clinic between 2011 and 2021. The survival rate of patients with thyroid cancer using the univariate Cox regression model showed that the variables of gender, age, and TNM Stage were significantly different at the level of 0.1. The overall patient

Table 1. Clinical and demographical characteristics and number of death in patients with thyroid cancer

Variable	Number (%)	Death	P value
Gender			
Female	264 (84.61)	13	0.064
Male	48 (15.39)	6	
Age (y)			
<35	104 (33.33)	1	<0.0001
35-50	111 (35.58)	3	
50-80	94 (30.13)	13	
>80	3 (0.96)	2	
Education			
Illiterate	61 (19.6)	10	0.002
High school	121 (38.8)	7	
Diploma and post-diploma	94 (30.1)	2	
Bachelor's degree and higher	36 (11.5)	2	
Types of malignancy			
PTC	171 (54.8)	3	<0.001
Micro-PTC	41 (13.1)	2	
FTC	13 (4.2)	5	
MTC	9 (2.9)	1	
Anaplastic	1 (0.3)	1	
Hertel cell carcinoma	4 (1.9)	0	
Uncertain malignancy	1 (0.3)	0	
TNM stage			
I	259 (83.01)	4	<0.001
II	16 (5.13)	4	
III	2 (0.64)	1	
IVA	0 (0)	-	
IVB	35 (11.22)	3	
Metastases			
Regional metastases	43 (13.78)	2	0.004
Distant metastases	8 (2.56)	5	
Distant and regional metastases	3 (0.96)	2	

survival rate in the current study was 39.97%.

According to the findings of the present study, 15.38% of patients were male and 84.62% were female. Thus, the ratio of male to female is 1 to 5. This finding is consistent with many studies showing females with thyroid cancer were more likely than males. In study of Bahrami et al, this ratio was 1:4, and in the study by Khayamzadeh et al, this ratio was 1:2.5 (15,16).

In most studies, age has been reported as one of the most important and effective risk factors for the survival of the disease in patients with thyroid cancer (17).

According to the findings of the current study, the mean age at diagnosis for male patients was 42.58 years, whereas it was 40.76 years for female patients. This finding is consistent with results of other studies that indicated the age of diagnosis was under 45. Thyroid cancer is generally diagnosed at a young age. Age is one of the important determinants in patient survival in the current study. The greatest risk of death was for elderly patients. Therefore, the risk of death in individuals increases with increasing each year at the age of diagnosis of 1.135 units. Additionally in the study of Khayamzadeh et al, age was reported as one of the effective variables on patient survival (16).

Table 2. Mean of survival time in patients with thyroid cancer

Variable	Mean survival	95% confidence interval	
	Time (month)	Upper Bound	Lower Bound
Gender			
Female	28.81	27.59	30.04
Male	37.34	32.18	42.50
Age (y)			
<35	12.86	12.59	13.13
35-50	19.04	17.80	20.28
50-80	36.29	32.28	40.29
>80	3.67	2.26	5.08
TNM stage			
I	13.72	11.70	15.74
II	7.13	5.64	8.63
III	2	2	2
IVA	0	0	0
IVB	3.5	1.51	5.49

Table 3. The result multivariate Cox proportional hazards survival analysis in patient with thyroid cancer

Variable	Beta	HR	P value
Gender			
Female	-0.575	0.563	0.307
Male	-	-	-
Age (y)			
	0.127	1.135	0.033
TNM stage			
I	-2.26	0.104	0.005
II	-1.439	0.237	0.064
III	0.212	1.237	0.861
IVB	-	-	-

The thyroid cancer staging system is based on the pathology findings as well as the data from the whole-body scan that was conducted after the destruction and the neck ultrasound that was performed at the time of destruction. TNM (tumor, node and metastasis) is one of these systems that is most frequently employed, and it has 4 stages (I, II, III, and IV) (13). Patients with stage I TNM had a greater survival rate than other patients in the current study. In the study by Fardmal et al, patients with thyroid cancer in the I TNM stage had a greater survival rate than those in the other stages (II, III, and IV) (7).

Conclusion

Age, gender, and the disease's stage have an impact on how long thyroid cancer patients live. Death risk varies with age. Additionally, patients' overall survival rates decline as time goes by.

Limitations of the study

There were some limitations in our study. First, estimation of survival rate requires reliable sources of data obtained from the prospective design while we

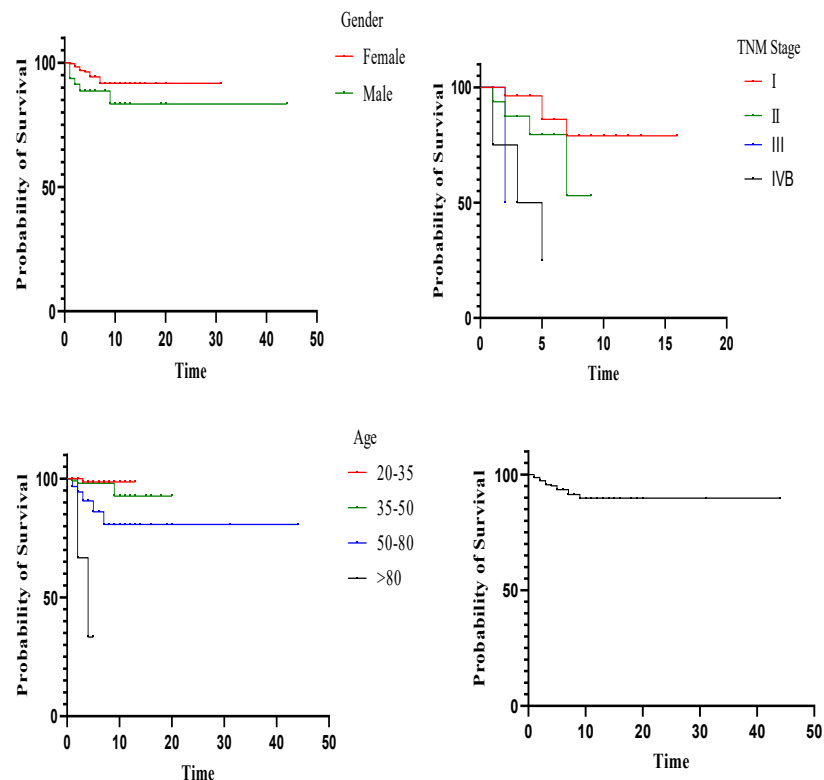


Figure 1. Kaplan–Meier estimate of the surviving function.

conducted a retrospective cohort study. Second, data on potential confounding variables, such as the availability of health insurance and the severity of the disease, were not accessible. Third, this research was carried out in a particular region of Iran. On the other hand, there might be some unknown genetic or environmental factors influencing the results; therefore, the findings might not be completely generalizable to other populations.

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Authors' contribution

SB did data validation and source preparation and participated in conceptualization, writing—original draft preparation, writing—review and editing, project administration and data curation. AS contributed significantly to the methodology and formal analysis. AA contributed in resources and investigation.

Conflicts of interest

The authors declare that there are no conflicts of interest.

Ethical issues

The research conducted in accordance with the tenets of the Declaration of Helsinki. The Ethics Committee of Hamadan University of Medical Sciences approved this study (IR.UMSHA.REC.1398.242). Written consent was taken from participants before any intervention. Ethical issues (including plagiarism, data fabrication and double publication) have been completely observed by the authors.

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