

Public Awareness of Thyroid Cancer among General Population of Saudi Arabia



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Introduction

Thyroid cancer represents the most common endocrine cancer which accounts for more than 3.5% of all cancer cases worldwide [1]. As per Global Cancer Observatory (GLOBOCAN) statistics for the year 2020, thyroid cancer was the ninth most common cancer overall and was reported in 586,000 cases globally [2]. The rate of thyroid malignancies is three times higher in females [3]. Papillary carcinoma is the most common histological type followed by follicular, medullary and anaplastic carcinoma [4]. A particular cause of concern is the continuous rise in the incidence of thyroid malignancies in the past few decades, more so in high and middle-income countries [5]. Saudi Arabia, the largest country in the Arabian Peninsula, is the home to more than 35 million inhabitants [6]. Global Burden of Disease (GBD) data shows that during thirty years period from 1990 to 2019, there were 23,846 diagnosed cases of thyroid cancer in Saudi Arabia [7]. More than two thousand deaths were also recorded in the same period. Currently, thyroid cancer is the third most common cancer in Saudi Arabia with a mortality rate of around 1.5% [8]. Rapid increase in the incidence of thyroid malignancy in Saudi population during the last few decades is believed to be linked to obesity and radiation exposure [9].

The magnitude of the impact of thyroid malignancies on Saudi population necessitates the employment of measures to counter the burgeoning rise in the incidence of this life-threatening disease. Creating awareness among the general population is the foremost step. A recent study has shown a suboptimal level of knowledge among Saudi women regarding thyroid cancer where more than half of the participants considered thyroid cancer to be uncommon [10]. Another cross-sectional study conducted

in the Eastern province of Saudi Arabia depicted that 44.7% of the population had poor knowledge about the clinical features and risk factors of thyroid malignancy [11]. In an online survey conducted in Taif, it was observed that more than 42% of the population had poor knowledge about thyroid disorders. The authors recommended awareness campaigns and educational programs for the general population [12]. Even more alarming results were reported from a study in Riyadh, where almost 70% of the population was deficient in knowledge about thyroid cancer [13].

While previous studies have highlighted a suboptimal level of thyroid cancer awareness among the Saudi population, the extent and nature of this knowledge gap across different demographic groups and regions remain unclear. This study aims to address this gap by conducting a comprehensive, nationwide assessment of thyroid cancer awareness, including knowledge of symptoms, risk factors, and attitudes towards seeking medical help. The specific objective of this study is to determine the level of thyroid cancer awareness among different demographic groups in Saudi Arabia and identify the primary sources of information influencing this awareness. By answering these questions, we aim to provide insights that will enable the development of targeted, effective public health strategies and educational interventions to address the rising incidence of thyroid cancer in Saudi Arabia.

Methods

Study design

This cross-sectional study utilized an online form of a validated questionnaire to measure the awareness of the general

population of Saudi Arabia regarding thyroid cancer. The study targeted the general population of Saudi Arabia, with data collection conducted through an online survey. The study was conducted from May 2023 to October 2023.

Study population

The study included all Saudi individuals aged 18 years and above. The criteria for participant selection in this study were as follows: All Saudi individuals of both genders aged 18 years and above were included. However, the study excluded healthcare workers, students specializing in healthcare, individuals with a previous diagnosis of thyroid cancer, those who had undergone thyroidectomy, and non-Arabic speakers.

The sample size target of 3,000 participants was determined to ensure adequate representation of the general population of Saudi Arabia. This large sample size was necessary to increase the generalizability of the study findings and to provide a comprehensive understanding of the awareness of thyroid cancer among the population. Furthermore, the use of convenient sampling technique, which relies on individuals with internet and social media access, may introduce selection bias. While this larger sample size aimed to include participants from various regions of Saudi Arabia, it is important to note that the convenience sampling method used in this study may still introduce bias and limit the generalizability of the findings to the entire Saudi population.

Data collection

The data collection tool consisted of a recently pretested questionnaire that measured the awareness about thyroid cancer among the Saudi population. The demographic section included questions regarding previous diagnosis of thyroid cancer or surgeries to ensure the application of the eligibility criteria. In addition to sociodemographic characteristics, the questionnaire included 15 items assessing knowledge regarding thyroid cancer, as well as inquiries about the source of information. The questionnaire was developed based on an extensive literature review [14-16] and underwent multiple iterations to ensure face and content validity. Data collection was performed using "Google forms," with the Arabic version of survey distributed through a link connected to the survey tool. Social media including (WhatsApp, Twitter, and Telegram) were used to distribute the link of the study. Prior to accessing the questionnaire, participants received a message detailing the study's nature, purpose, and target population. As an incentive, select participants were offered discount coupons for their participation.

Statistical analysis

The statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS, version 29.0). Categorical variables were presented using frequency tables and percentages, while continuous variables were presented using the median and interquartile range (IQR) after assessing normal distribution with the Shapiro test. The reliability of the awareness statements was evaluated using Kuder Richardson (KR-20) test and demonstrated

a high reliability of 0.86. After summing the awareness scores, three categories were created based on the percentage of correct answers: low levels of awareness (0%-49%), moderate levels (50%-74%), and high levels ($\geq 75\%$). The outcome variable was the total scores. Differences in awareness levels between groups were analyzed using the Mann-Whitney and Kruskal-Wallis tests. A significance level of 0.05 was used to determine statistical significance.

Ethical considerations

Ethical approval was obtained from the institutional review board (IRB) of XXXXX. Participants were provided with a full explanation of the study's purpose and target population before obtaining informed consent. All collected data were handled anonymously and treated confidentially to protect participants' privacy, and the data were used for research purposes only.

Results

The total analyzed responses were 3,473 from all regions of Saudi Arabia. The age distribution of the participants ranged from 18 years old to 55 years and older, with the highest age group being 18-24 years old (24.6%). Slightly over half of the participants were male (51.8%) while the remaining were female (48.2%), more than half of participants were single (53.6%) and the majority had a university education (68.0%). In terms of income, the largest proportion of participants fell within 5,001-10,000 SAR income range (35.6%). The detailed demographic characteristics are shown in (Table 1). Upon gathering more background information, a majority of participants (79.3%) have heard about thyroid cancer. Moreover, 12.2% of participants reported having relatives who have been diagnosed with thyroid cancer, and 16.1% of participants were uncertain about whether their relatives have been diagnosed with thyroid cancer. When asked about seeking medical attention, an overwhelming majority (85.4%) would visit their doctor if they noticed a lump in their neck, while a small percentage (3.0%) would not seek medical help, and 11.6% of participants were unsure about whether they would visit their doctor in such a scenario.

Participants were given multiple statements regarding thyroid cancer to measure the awareness level. While responses varied widely across the statements, the responses of the participants are shown in (Table 2). With a total of 15 awareness questions about thyroid cancer, the total score ranged from "0" to "15", with a median and interquartile range (IQR) of 3 (1-7). The scores were further categorized according to the percentage of correct answers with the majority (77%) having low levels of awareness. The results of the awareness questionnaire are demonstrated in (Figure 1). Among the participants, the most common sources of information about thyroid cancer were social media, with 59.9%, followed by the internet, which was used by 56.2% of participants. Relatives were also a commonly mentioned source, with 43.1%, and friends were mentioned by 42.4% of participants, while only 9.2% relied upon doctors for information about thyroid cancer. The majority of each age group had low awareness, peaking at

82.2% in the 25-34 age group. More males (83%) than females (70.6%) had low awareness, but females had higher moderate to good awareness. Single participants had lower awareness (84.1%) than married ones (68.8%), but married participants had better moderate and good awareness. People with no formal education had 71.4% low awareness, with the highest low

awareness (81.3%) among high school graduates. Those earning 5,000 SAR or less had 67.5% low awareness, which increased with income, peaking at 86.3% for those earning 5,001-10,000 SAR. Sociodemographic characteristics significantly correlated with awareness level (P-value<0.001). Results are further detailed in (Table 3).

Table 1: Demographic Characteristics of Participants.

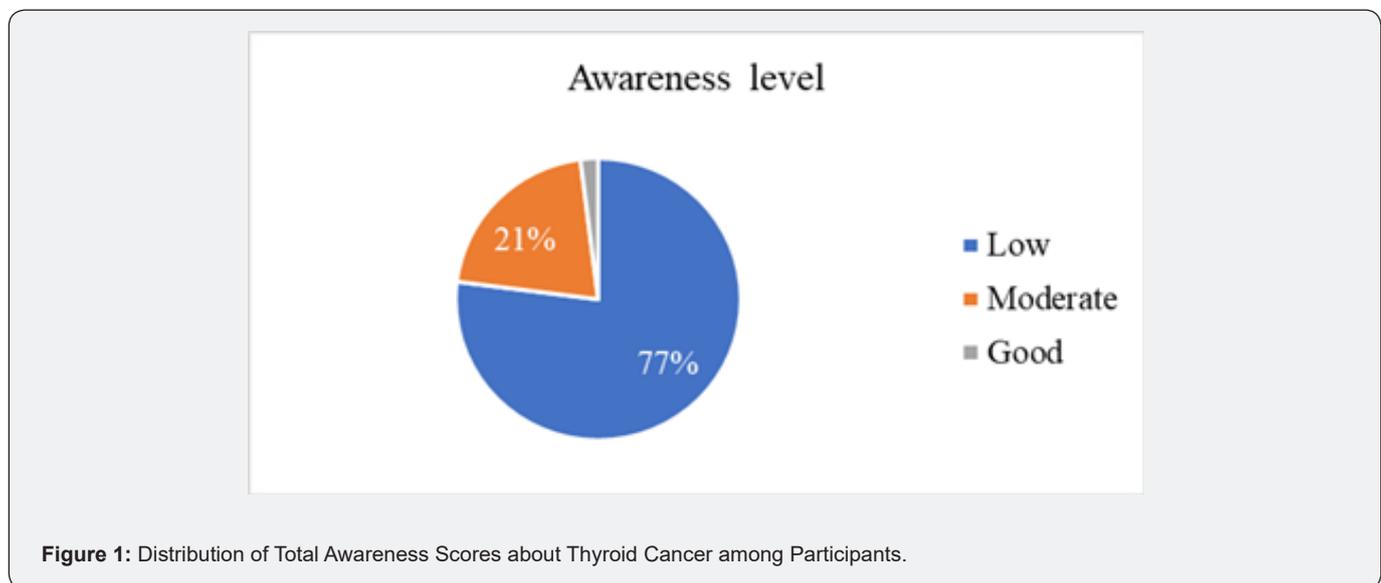
Variable	Groups	N	%
Age	18 Years old	77	2.20%
	19-24 Years old	856	24.60%
	25-34 Years old	807	23.20%
	35-44 Years old	734	21.10%
	45-54 Years old	612	17.60%
	55 Years and older	387	11.10%
Gender	Male	1798	51.80%
	Female	1675	48.20%
Marital staus	Single	1863	53.60%
	Married	1610	46.40%
Educational level	No official education	7	0.20%
	Less than highschool	65	1.90%
	Highschool	743	21.40%
	University	2363	68.00%
	Higher education	295	8.50%
Income	5,000 SAR or less	965	27.80%
	5,001-10,000 SAR	1237	35.60%
	10,001-15,000 SAR	633	18.20%
	15,000 SAR	638	18.40%

Table 2: Participants' Responses to Statements About Thyroid Cancer.

Statement	Yes	No	I do not know
Thyroid cancer is curable	1343 (38.7%)	32 (0.9%)	2098 (60.4%)
Thyroid cancer can be prevented	1414 (40.7%)	52 (1.5%)	2007 (57.8%)
Thyroid cancer is uncommon in Saudi Arabia	445 (12.8%)	295 (8.5%)	2733 (78.7%)
Thyroid cancer is more common in (males/females)	193 (5.6%)	566 (16.3%)	2714 (78.1%)
Thyroid cancer is more common in those who are older than 40 years	722 (20.8%)	149 (4.3%)	2602 (74.9%)
When thyroid cancer is detected early, it can be treated appropriately and adequately	2728 (78.5%)	23 (0.7%)	722 (20.8%)
Genetics are considered a main cause of thyroid cancer	467 (13.4%)	409 (11.8%)	2597 (74.8%)
Lifestyle is associated with an increased risk of thyroid cancer	986 (28.4%)	211 (6.1%)	2276 (65.5%)
Exposure to radiation increases the risk of thyroid cancer	846 (24.4%)	198 (5.7%)	2429 (69.9%)
Thyroid cancer manifests as a neck lump	1574 (45.3%)	41 (1.2%)	1858 (53.5%)
Noting neck lumps can help in early diagnosis of thyroid cancer	1980 (57%)	23 (0.7%)	1470 (42.3%)
Thyroid cancer can be associated with hoarsness of voice	839 (24.2%)	135 (3.9%)	2499 (72%)
Thyroid cancer can be associated with shortness of breath	818 (23.6%)	130 (3.7%)	2525 (72.7%)
Thyroid cancer can be associated with difficulty in swallowing	1037 (29.9%)	69 (2%)	2367 (68.2%)
Thyroid cancer can be associated with neck pain	1088 (31.3%)	91 (2.6%)	2294 (66.1%)

Table 3: Mean Ranks of Total Awareness Scores Based on Participants' Demographic Characteristics.

Variable	Groups	Awareness level Low (%)	Moderate (%)	Good (%)	P-value
Age	18 Years old	47 (61%)	29 (37.7%)	1 (1.3%)	<0.001
	18-24 Years old	683 (79.8%)	163 (19%)	10 (1.2%)	
	25-34 Years old	663 (82.2%)	131 (16.2%)	13 (1.6%)	
	35-44 Years old	540 (73.6%)	173 (23.6%)	21 (2.9%)	
	45-54 Years old	429 (70.1%)	172 (28.1%)	11 (1.8%)	
	55 Years and older	313 (80.9%)	63 (16.3%)	11 (2.8%)	
Gender	Male	1492 (83%)	279 (15.5%)	27 (1.5%)	<0.001
	Female	1183 (70.6%)	452 (27%)	40 (2.4%)	
Marital status	Single	1567 (84.1%)	279 (15%)	17 (0.9%)	<0.001
	Married	1108 (68.8%)	452 (28.1%)	50 (3.1%)	
Educational level	No official education	5 (71.4%)	1 (14.3%)	1 (14.3%)	<0.001
	Less than highschool	46 (70.8%)	16 (24.6%)	3 (4.6%)	
	Highschool	604 (81.3%)	132 (17.8%)	7 (0.9%)	
	University	1806 (76.4%)	508 (21.5%)	49 (2.1%)	
	Higher education	214 (72.5%)	74 (25.1%)	7 (2.4%)	
Income	5,000 SAR or less	651 (67.5%)	289 (29.9%)	25 (2.6%)	<0.001
	5,001-10,000 SAR	1067 (86.3%)	154 (12.4%)	16 (1.3%)	
	10,001-15,000 SAR	491 (77.6%)	130 (20.5%)	12 (1.9%)	
	15,000 SAR	466 (73%)	158 (24.8%)	14 (2.2%)	



The study revealed variable patterns in awareness levels based on information sources. Participants who reported consulting doctors for information about thyroid cancer demonstrated a higher level of awareness, with only 61.3% having low awareness, compared to 78.6% low awareness among those who didn't seek

information from medical professionals. The use of internet and social media as information sources was associated with lower awareness levels. Internet users showed 80.9% low awareness, compared to 72% among non-users. Similarly, social media users exhibited 82.7% low awareness, higher than the 68.5% observed

in non-users. This trend extended to informal sources as well, with those relying on information from relatives and friends showing higher rates of low awareness (82.7% and 88.3% respectively)

compared to those who didn't use these sources (72.7% and 68.8% respectively). The differences were statistically significant. Detailed results are presented in (Table 4).

Table 4: Mean Rank for Total Awareness Scores Based on Information Sources.

Groups	Awareness level			P-value
	Low (%)	Moderate (%)	Good (%)	
Doctor				
Yes	196 (61.3%)	113 (35.3%)	11 (3.4%)	<0.001
No	2479 (78.6%)	618 (19.6%)	56 (1.8%)	
Internet				
Yes	1580 (80.9%)	329 (16.9%)	43 (2.2%)	<0.001
No	1095 (72%)	402 (26.4%)	24 (1.6%)	
Relatives				
Yes	1239 (82.7%)	241 (16.1%)	18 (1.2%)	<0.001
No	1436 (72.7%)	490 (24.8%)	49 (2.5%)	
Friends				
Yes	1300 (88.3%)	162 (11%)	11 (0.7%)	<0.001
No	1375 (68.8%)	569 (28.5%)	56 (2.8%)	
Social media				
Yes	1721 (82.7%)	339 (16.3%)	21 (1%)	<0.001
No	954 (68.5%)	392 (28.2%)	46 (3.3%)	

Discussion

The findings of the present study reveal a concerning lack of awareness about thyroid cancer among the Saudi Arabian population. Interpreting these results, we can see a clear knowledge gap that could potentially impact early detection and treatment of the disease. The strikingly low percentage of participants with good awareness (2%) suggests an urgent need for public health education initiatives. This low level of awareness could be attributed to various factors such as insufficient health education programs, limited access to reliable health information, or perhaps a general underestimation of the prevalence and seriousness of thyroid cancer in the region. The findings of the present study showed that the majority of the participants had a low awareness level (77%), followed by a moderate awareness level (21%). Only 2% of the participants had a good awareness level about thyroid cancer. These findings are much lower than previous studies. For example, a study by Al Qahtani (2021) recommended establishing health education to increase awareness regarding the symptoms and risk factors of thyroid cancer. The study included 9,992 participants, with data collected over a period of four years [17].

Similarly, another study from Saudi Arabia that has utilized a similar questionnaire by Qusty et al. reported that 49.7% of the respondents had moderate to high awareness levels about thyroid cancer. They further revealed that there is an association between

the lump in the neck and thyroid cancer [16]. Some studies contrasted our findings. For example, a study by Alhazmi et al. reported that 57.32% of the participants had good knowledge about thyroid cancer. However, they did not classify the responses as low, moderate, and high as was done in the present study. They also included only responses from 367 participants which is too low for generalization of the findings [15]. Our findings were close to a study by Alyahya et al. which reported that a high level of knowledge was seen in only 14.2% of the participants and 44.7% had a low knowledge level [11]. A study conducted in India was also in line with the present as they also found that the majority of the participants had poor knowledge of thyroid cancer [18].

The reason for poor to moderate knowledge about thyroid cancer can be attributed to the slowly progressive nature of the disease. Thyroid cancer is often underdiagnosed and the disease symptoms often manifest slowly; therefore, the general population is less aware of this condition [11]. The present study also showed variable knowledge about the clinical features of the disease. For example, 45.3% of participants believed that a neck lump is seen in thyroid cancer and 57% thought that this symptom can lead to an early diagnosis of the disease. A previous study by Qusty et al. reported that 63.9% of respondents acknowledged neck lumps as a symptom of thyroid cancer and 72.1% of the participants believed that it can lead to early diagnosis [17]. Compared to our study, Alyahya et al. reported that 70.6% of the participants knew

neck lumps as a symptom of thyroid cancer [11]. In the present study, 40.7% of participants reported that thyroid cancer can be prevented. However, Alibrahim et al., in their study reported that only 4% knew that thyroid cancer can be prevented. They further reported that 30% of individuals reported genetics as the primary cause of the disease [14]. This is much higher compared to our study where only 13.4% believed that genetics has influence over thyroid cancer development.

The present study also revealed significant differences among groups based on age, gender, marital status, educational level, and income status (P -value <0.001 , for all). Females were more aware compared to men. This aligns with Syed et al. who reported that 60% of knowledgeable participants were females [19]. Another study reported a significant difference in knowledge level based on gender, favoring female participants (P -value <0.001) [17]. Almuzaini et al. reported the knowledge difference between females to males as 2.2:1.12. In the present study, this difference was 1.6:1. Furthermore, rates of low awareness indicated that those aged 18 years old were most knowledgeable, followed by the 45-54 years age group. Qutzy et al. also showed that younger respondents (18-24 years) were more knowledgeable compared to older participants [17]. However, Alyahya et al. did not find any significant difference in age groups [11]. The present study also found significant differences among single and married participants, with married individuals having higher knowledge levels. This is contrasted by a study from the Makkah Region which reported that single women had higher knowledge compared to married women. Compared to our study which focused on both male and female participants, their study only included females [14].

They did not find differences based on education level; however, it was seen in the present study. These findings suggest that targeted awareness campaigns may be necessary for different demographic groups, particularly focusing on single individuals and those with lower education levels. Another important finding of the study is that those participants who received their information from doctors had significantly higher knowledge, whereas those who received information from the internet, relatives, friends, and social media were less knowledgeable. Previous studies also described doctors as primary and most trusted sources of information; however, internet sources are still popular in seeking medical information for the Saudi population [20].

These findings have important implications for public health strategies in Saudi Arabia. First, there is a clear need for comprehensive educational programs about thyroid cancer, tailored to different demographic groups. Second, healthcare systems should leverage the trust placed in doctors by ensuring they are well-equipped to provide accurate information about thyroid cancer. Finally, there is an opportunity to develop and promote reliable online resources about thyroid cancer,

potentially through partnerships between healthcare institutions and popular digital platforms. By addressing these areas, it may be possible to significantly improve thyroid cancer awareness and potentially lead to earlier detection and better health outcomes for the Saudi population.

Conclusion

In conclusion, the present study revealed that the majority of the general population of Saudi Arabia has a low knowledge level regarding thyroid cancer. Only a small proportion of participants demonstrated accurate knowledge regarding its curability, prevention, and risk factors. Furthermore, demographic factors such as age, gender, marital status, educational level, and income significantly influenced awareness levels. Younger individuals, females, and married participants exhibited higher levels of awareness. Another key finding of the study is that participants who received their information from doctors had significantly high knowledge levels. As thyroid cancer is on the rise, there is a need to raise the awareness level of the general population. In this regard, collaborative efforts are required involving healthcare professionals, educators, and community leaders to convey information about thyroid cancer.

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