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KNOWLEDGE AND AWARENESS LEVEL ASSESSMENT OF THYROID DISORDERS AND THEIR RISK FACTOR AMONG SAUDI POPULATION IN KSA

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Abstract

Background: The incidence of thyroid diseases has tripled in the last three decades, and the prevalence is rising rapidly irrespective of gender and genetics. Thyroid disorders are caused either by excessive or inadequate thyroid hormone production or by the enlargement of the thyroid gland. **Objectives:** To assess the knowledge and awareness level of thyroid disorder and their risk factor among the Saudi population in the kingdom of Saudi Arabia. **Methods:** Cross-sectional questionnaire-based study was collected randomly from those who agree to participate. the study consisted of Saudi population adult males and females who are older than 18 from all social classes and willing to provide informed consent was included, The Saudi adults younger than 18 was excluded. Collected Data was entered on computer using the Microsoft Excel program (2016) for windows. Data was then transferred to the Statistical-Package of Social-Science Software (SPSS) program, version 25. To be statistically analysed. **Results:** As regard knowledge and awareness score about thyroid gland and its diseases, there were 35.6% out of 390 participants, demonstrated a high level of knowledge on this subject matter. However, the data also revealed that a substantial portion of the population, nearly one-third, have a low level of knowledge. The moderately knowledgeable group, representing 31.5% of the sample. Regarding the relation between level of knowledge about thyroid gland diseases and sociodemographic characteristics, there was a statistically significant relation to gender (p value=0.0001) and age (p value=0.0001). It also shows statistically insignificant relation to nationality and residence. **Conclusion:** The findings revealed that a significant portion of participants lacked adequate knowledge about thyroid gland diseases, with only 35.6% demonstrating a high level of understanding. This highlights the importance of increasing public awareness to promote early diagnosis and proper management of thyroid disorders.

Keywords: Thyroid disease, Hyperthyroidism, Saudi Arabia, Awareness.

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Introduction:

Worldwide, thyroid diseases are among the most prevalent endocrine disorders and lots of thyroid disease cases remain undiagnosed and, as a result, are not treated because the patient has no symptoms or lack of awareness and comprehension of thyroid problem effects [1]. Despite the condition's rising frequency, a prior study conducted in 2019 in the central region of Saudi Arabia (KSA) reveals a general lack of understanding in the area [2]. it is unclear how common subclinical hypothyroidism is in KSA. However, it has been noted that 10% of patients in primary care have this condition [3]. A study on 400 participants in Tabuk city was done in 2023, with 60% of the participants being women and 40% being men. Gender-wise, women had somewhat greater knowledge than men in several areas; however, age-wise, people between the ages of 35 and 50 showed significantly higher knowledge, particularly in terms of terminology and risk factors [4]. Other study conducts in 2019, an online survey was conducted among 367 adult residents in Saudi Arabia Statistical analysis revealed that 140 (57.32%) of respondents had strong awareness about thyroid diseases, whereas 188 (42.68%) had insufficient knowledge [5]. A Survey of Awareness of Thyroid Disorders among the Riyadh Population, has been published A cross-sectional research including 870 participants. The research advised health policy makers to carry out more efficient health education sessions to raise public awareness of thyroid illnesses and the significance of treatment adherence among the public and their caregivers [6]. Although thyroid disorders are considered as one of a common health issue in Saudi Arabia, there is a lack of research in Saudi Arabia to assess knowledge and awareness level about thyroid disorders and their risk factor. This study aimed to assess the Knowledge, awareness of thyroid disorders and their risk factors among the Saudi Community in Saudi Arabia.

Objectives:

To assess the knowledge and awareness level of thyroid disorder and their risk factor among the Saudi population in the kingdom of Saudi Arabia

Materials and methods:

Study design: This study was a cross-sectional questionnaire survey, based on a structured questionnaire that was developed by authors.

Study setting: Participants, recruitment, and sampling procedure: The participants were Saudi population (aged 18 years and above) that received the questionnaire.

Inclusion and Exclusion criteria: The inclusion criteria for this study were as follows: All male and female aged 18 years old or above, and live in Saudi Arabia. Male and Female under the age of 18 years old and outside of Saudi Arabia were excluded from this study.

Sample size: The sample size was calculated by (Raosoft, Inc., Seattle, WA, USA)(25) at 384 individuals using the following formula, and applying means and standard deviation. Considering standard deviation (=1.96) for 95% Confidence interval and the maximum acceptable marginal error (=0.05). Therefore, the calculated minimum sample size required for this study is n= (1.96)^2X 0.50X

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0.50/ (0.50)^2= 384 participants.

Method for data collection and instrument (Data collection Technique and tools): Data collection was done in the form of the participants' responses to the questions. The questionnaire included demographic features such as age, gender, Region (North, East, West, South, and central), and level of education. The participants were asked about location of the thyroid gland, if suffering from thyroid diseases, and about function of thyroid. Also, they were asked about symptoms of the thyroid diseases and what make it worse.

Scoring system:

There were 12 questions about the overall knowledge. The level of knowledge was scored based on the total number of correct answers, as follows: ≤14 correct answers corresponded to 'poor' knowledge; 15-25 correct answers corresponded to 'moderate' knowledge; and ≥26 correct answers corresponded to 'high' knowledge.

Analyzes and entry method: Data was entered on the computer using the "Microsoft Office Excel Software" program (2016) for windows. Data was then transferred to the Statistical Package of Social Science Software (SPSS) program, version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.) to be statistically analyzed.

Results:

Table (1) displays various demographic parameters of a group of people with a total number of (390). The sample is diverse, with a range of ages represented, including a significant proportion of younger individuals (32.8% aged 22 or less) as well as older participants (18.5% over 45 years old). The mean age of 31.7 years, with a standard deviation of 13.1, suggests a relatively broad age distribution within the sample. Most participants are Saudi nationals (86.2%), with the remaining 13.8% comprising individuals from other nationalities. This demographic breakdown aligns with the study's focus on the Saudi population. The gender distribution is skewed towards female participants, who account for 59.2% of the sample, while males comprise 40.8%. Regarding the participants' geographic distribution, the data indicates a concentration in the Western region (46.2%), followed by the Eastern region (23.6%) and the Central region (14.4%). The Northern and Southern regions are represented to a lesser extent, with 10.0% and 5.9% of participants, respectively. The educational background of the participants is also diverse, with the majority (66.7%) holding university-level qualifications. The sample also includes individuals with secondary (22.1%), postgraduate (8.5%), and intermediate (2.1%) education levels. A small percentage (0.5%) have primary-level education, and one participant (0.3%) does not have an educational qualification. This comprehensive set of sociodemographic data provides a valuable foundation for contextualizing the findings of the study and understanding the population under investigation. The diverse age, nationality, gender, geographic, and educational distributions enable a more nuanced analysis and interpretation of the research results, ultimately contributing to a deeper

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understanding of the topic at hand.

Table (1): Sociodemographic characteristics of participants (n=390)

Parameter		**No.**	**Percent (%)**
Age (Mean:31.7, STD:13.1)	22 or less	128	32.8
	23 to 30	108	27.7
	30 to 45	82	21.0
	more than 45	72	18.5
Nationality	Saudi	336	86.2
	other	54	13.8
Gender	Female	231	59.2
	Male	159	40.8
Residence region	Northern region	39	10.0
	Southern region	23	5.9
	Central region	56	14.4
	Eastern region	92	23.6
	Western region	180	46.2
Level of education	Primary	2	.5
	Secondary	86	22.1
	Intermediate	8	2.1
	University	260	66.7
	Post - graduate	33	8.5
	I do not have an educational qualification	1	.3

As shown in figure 1, Certainly, I would be happy to provide a thoughtful and detailed commentary on the given figure. The data presented appears to be the results of a survey or study inquiring about the prevalence of thyroid diseases among the respondents and their family members. The figure indicates that most respondents, 218 individuals, reported not having any thyroid diseases, either personally or

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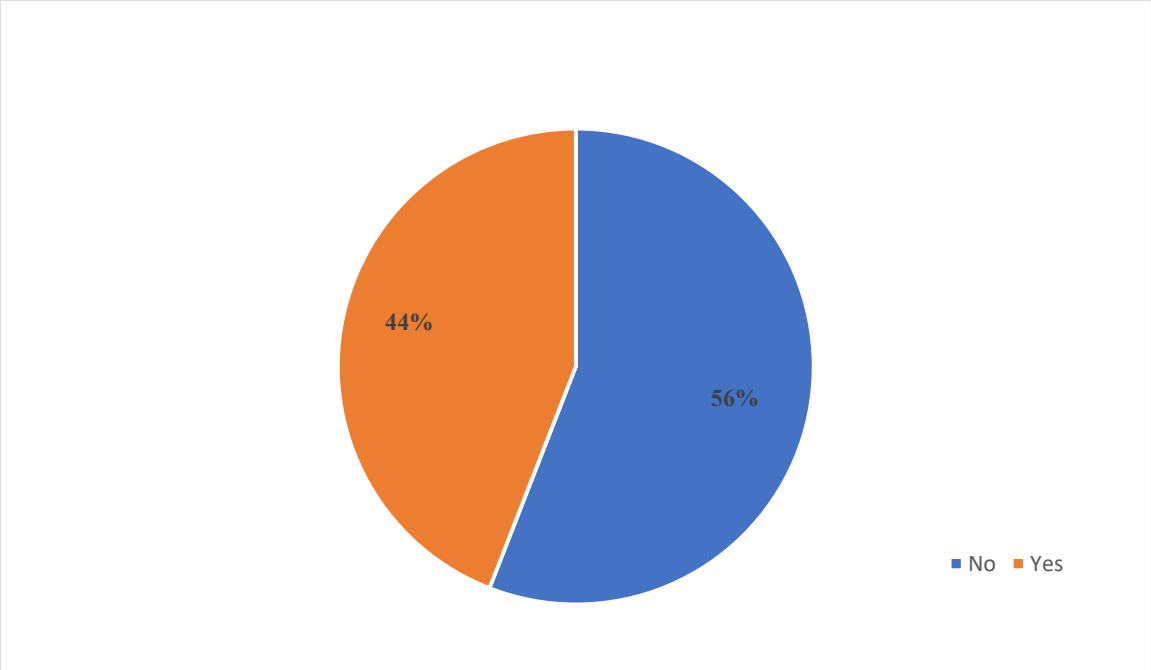
within their families. This suggests that the sample population may be generally healthy and free from thyroid-related disorders. However, the significant number of 172 respondents who did report the presence of thyroid diseases, either in themselves or their family members, is also noteworthy. This finding highlights the substantial impact that thyroid conditions can have on a sizable portion of the population. It would be insightful to further explore the specific thyroid diseases mentioned, their severity, and any potential contributing factors or risk profiles associated with the affected individuals. Additionally, understanding the demographic characteristics of the respondents, such as age, gender, and geographic distribution, could provide valuable insights into the patterns and prevalence of thyroid disorders within the studied population. Such information could aid in the development of targeted healthcare strategies, public awareness campaigns, and medical interventions to address this important public health concern.

Figure (1): Illustrates if any of the participants suffer from thyroid diseases.



As illustrated in table (2), The provided data offers valuable insights into the awareness and understanding of the public regarding the thyroid gland and associated diseases. This information is crucial for healthcare professionals and policymakers to develop targeted educational campaigns and implement effective preventive measures. The survey results indicate that a significant proportion of the respondents (44.1%) have personal or familial experiences with thyroid diseases, underscoring the importance of this health issue within the community. However, the data also reveals gaps in knowledge, with a notable percentage of respondents (10.5%) being unaware of the correct location of the thyroid gland and a sizable number (17.7%) lacking understanding of the gland's functions. Regarding the specific thyroid conditions, the findings suggest a relatively higher level of awareness about hypothyroidism compared to hyperthyroidism, with 74.9% of respondents recognizing the term

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"hypothyroidism" and a larger proportion identifying the associated symptoms. Nonetheless, a concerning percentage (25.1%) remain unfamiliar with the concept of hypothyroidism, which could lead to delayed diagnosis and suboptimal management of this condition. Similarly, the data on hyperthyroidism reveals that while the majority (68.7%) are familiar with the term, a considerable number (19.7%) are unsure of the specific symptoms. This knowledge gap may hinder early detection and appropriate treatment of hyperthyroidism, potentially leading to adverse health outcomes. The comprehensive dataset provides a valuable foundation for healthcare professionals to develop targeted educational interventions and public awareness campaigns. By addressing the identified gaps in knowledge, these efforts can empower individuals to recognize the signs and symptoms of thyroid disorders, seek timely medical attention, and actively participate in the management of their health. Ultimately, this information can contribute to improved overall thyroid health and better-informed decision-making among the general population.

Table (2): Parameters related to knowledge about thyroid gland and thyroid diseases (n=390).

Parameter		**No.**	**Percent**
Do you or any of your family members suffer from thyroid diseases?	No	218	55.9
	Yes	172	44.1
Location of the thyroid gland	At the anterior neck	332	85.1
	Base of the brain, behind the bridge of the nose	14	3.6
	Above the kidney	3	.8
	I don't know	41	10.5
Function of the thyroid gland *	Enhancing metabolism	297	76.1
	Growth and development of fetal neurological system	114	29.2
	Regulation of heart beats	147	37.7
	I don't know	69	17.7
Do you know meaning of " Hypothyroidism "	No	98	25.1
	Yes	292	74.9
	Abortion	75	19.2

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Identify the symptoms of hypothyroidism *	Congenital hypothyroidism: mental retardation and growth failure	126	32.3
	Constipation	140	35.9
	Dry skin and hair loss	187	47.9
	Depression and fatigue	256	65.6
	Weight gain	296	75.9
	Feeling cold	217	55.6
	Irregular menstrual periods	186	47.7
	I don't know	55	14.1
Do you know meaning of "Hyperthyroidism"	No	122	31.3
	Yes	268	68.7
Identify the symptoms of hyperthyroidism *	Anxiety, insomnia, and tension	230	58.9
	Hair loss	150	38.4
	Changes in the menstrual cycle	147	37.7
	Palpitations	235	60.2
	Sweating more than usual	225	57.7
	Weight loss despite increased appetite	238	61.0
	I don't know	77	19.7

*Results may overlap

As shown in figure (2), the location of the thyroid gland is a crucial anatomical aspect that has important implications for clinical practice and patient management. According to the provided data, the overwhelming majority of respondents (332 out of a total of 390) correctly identified the thyroid gland as being situated at the anterior neck, which is the expected and typical position of this endocrine organ. This finding suggests a strong general understanding of the thyroid gland's anatomical location among the surveyed individuals. The smaller proportions of respondents who incorrectly selected the base of the brain, behind the bridge of the nose (14 individuals), or above the kidney (3 individuals), as well as those who indicated that they were unsure of the correct location (41 individuals), highlight the need for continued education and reinforcement of basic anatomical knowledge, particularly in the context of the thyroid gland. Accurate identification of the thyroid gland's location is crucial for various medical

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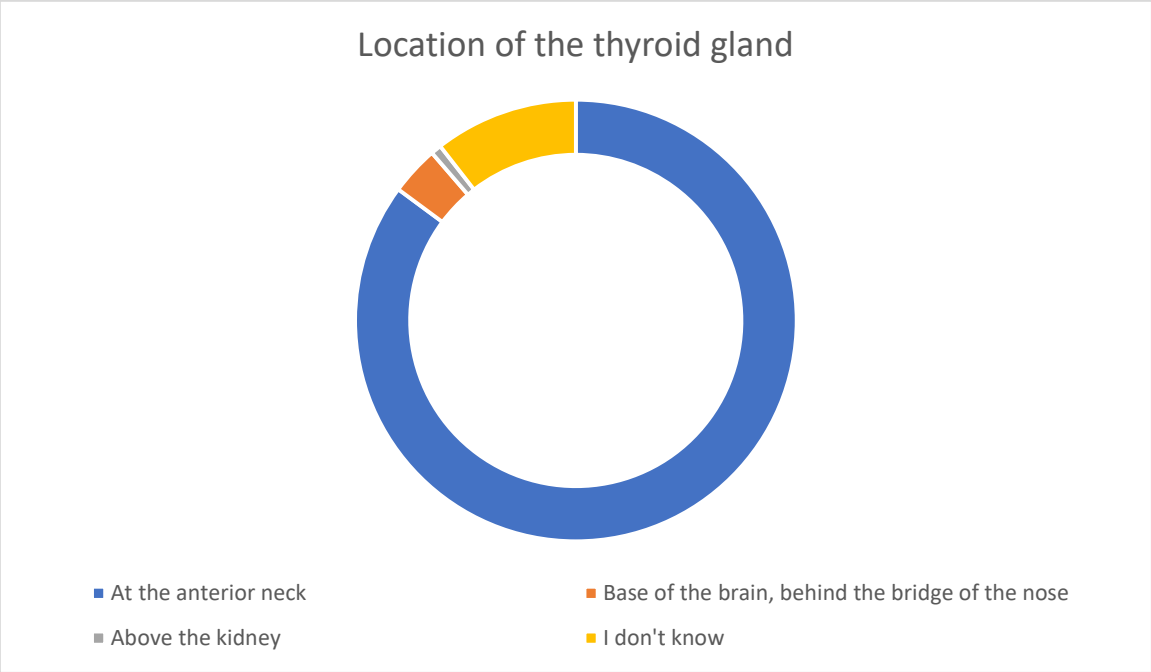
procedures, such as physical examination, imaging studies, and surgical interventions, underscoring the importance of ensuring that healthcare professionals and the general public have a solid understanding of this fundamental aspect of human anatomy.

Figure (2): Illustrates the answer among participants when asked about the location of the thyroid gland.



The provided data offers valuable insights into the participants' knowledge about thyroid diseases and cancer. The findings suggest a mixed level of awareness and understanding among the surveyed individuals. Regarding the symptoms of thyroid diseases, the majority (68.7%) recognized a lump in the front of the neck as an indicator, while a significant portion (50.2%) were aware of dysphagia and dyspnea. However, a considerable number (23.8%) expressed a lack of knowledge about the symptoms. When exploring the factors that may increase the incidence of thyroid diseases, the participants demonstrated a more comprehensive understanding. A majority recognized family history (56.1%) and iodine deficiency (58.2%) as contributing factors, while 47.1% and 43.3% identified female gender and obesity/diabetes, respectively. Interestingly, a notable percentage (21.8%) still reported not knowing the relevant risk factors. Regarding thyroid cancer, the participants exhibited a relatively strong grasp of the associated risk factors. A majority (60.7%) acknowledged family history as a significant contributor, and more than half (51.3%) recognized goitre as a potential factor. However, a sizable proportion (24.8%) remained unaware of the specific risk factors. The data also reveals the participants' familiarity with diagnostic tests for thyroid diseases. The majority (75.1%) identified thyroid function tests as a reliable method, while a smaller but still substantial percentage (55.1% and 47.7%) recognized fine-needle aspiration cytology (FNAC) and neck ultrasound, respectively. A minority (17.4%) reported a lack of knowledge about the available diagnostic tools. Finally, the data suggests a good understanding of the treatment methods for thyroid diseases, with the majority (72.8%) recognizing medications as a

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common approach, and a significant proportion (58.9% and 49.5%) identifying surgery and radioiodine treatment, respectively. However, a noteworthy percentage (19.5%) still expressed uncertainty about the available treatment options. Overall, the data highlights a mixed level of knowledge and awareness among the participants, with a majority demonstrating a reasonable understanding of the key aspects related to thyroid diseases and cancer, but also a significant portion exhibiting gaps in their knowledge. These findings underscore the need for continued education and awareness-raising efforts to empower individuals with a comprehensive understanding of thyroid-related health concerns.

Table (3): participants knowledge about thyroid diseases and cancer (n=390).

Parameter		**No.**	**Percent (%)**
What are the symptoms that indicate thyroid diseases? *	A lump in the front of the neck	268	68.7
	Change in the voice	138	35.3
	Dysphagia and dyspnea	196	50.2
	I don't know	93	23.8
Which of the following factors may increase the incidence of thyroid diseases? *	Family history of thyroid disease	219	56.1
	Female gender	184	47.1
	Obesity and DM	169	43.3
	Smoking	109	27.9
	Iodine deficiency	227	58.2
	Older age	101	25.9
	Pregnancy	54	13.8
	I don't know	85	21.8
Which of the following factors may increase the incidence of thyroid cancer? *	Family history of thyroid cancer	237	60.7
	Goiter	200	51.3
	Frequent exposure to radiation in childhood	173	44.3
	I don't know	97	24.8

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Which of the following tests may help diagnose thyroid disease? *	FNAC	215	55.1
	Neck ultrasound	186	47.7
	Thyroid function test	293	75.1
	I don't know	68	17.4
What are the treatment methods for different thyroid diseases? *	Medications	284	72.8
	Radioiodine treatment	193	49.5
	Surgery	230	58.9
	I don't know	76	19.5

Results may overlap

The data presented in Table 4 provides valuable insights into the knowledge and awareness levels of the population regarding the thyroid gland and its associated diseases. The findings suggest that a significant proportion of the sample, approximately 35.6%, demonstrate a high level of knowledge on this subject matter. This is a positive indication that educational and awareness initiatives have been effective in disseminating relevant information to the public. However, the data also reveals that a substantial portion of the population, nearly one-third, have a low level of knowledge, highlighting the need for continued efforts to improve overall understanding and recognition of thyroid-related health concerns. The moderately knowledgeable group, representing 31.5% of the sample, suggests that there is room for further enhancement of educational resources and targeted interventions to elevate the general public's understanding of the thyroid gland and its associated conditions. Addressing this knowledge gap can lead to early detection, timely management, and improved health outcomes for individuals affected by thyroid-related disorders. Comprehensive strategies that combine public health campaigns, healthcare provider training, and accessible educational materials may prove effective in fostering a more informed and empowered population when it comes to understanding and managing thyroid-related health concerns.

Table (4): Shows knowledge and awareness about thyroid gland and its diseases score results.

	Frequency	**Percent**
High level of knowledge	139	35.6
Moderate level	123	31.5
Low level of knowledge	128	32.8
Total	390	100.0

Table (5) shows that the level of knowledge regarding thyroid gland and its diseases has statistically

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significant relation to gender (p value=0.0001) and age (p value=0.0001). It also shows statistically insignificant relation to nationality and residence.

Table (5): Relation between level of knowledge regarding thyroid gland and its diseases with sociodemographic characteristics.

Parameters		***Knowledge level***		***Total (N=390)***	***P value****
		High level of knowledge	**Moderate or low level**		
Gender	Female	99	132	231	0.0001
		71.2%	52.6%	59.2%	
	Male	40	119	159	
		28.8%	47.4%	40.8%	
Age	22 or less	56	72	128	0.0001
		40.3%	28.7%	32.8%	
	23 to 30	58	50	108	
		41.7%	19.9%	27.7%	
	30 to 45	13	69	82	
		9.4%	27.5%	21.0%	
	more than 45	12	60	72	
		8.6%	23.9%	18.5%	
Nationality	Saudi	122	214	336	0.492
		87.8%	85.3%	86.2%	
	Non-Saudi	17	37	54	
		12.2%	14.7%	13.8%	
Residence	Northern region	13	26	39	0.059
		9.4%	10.4%	10.0%	
		9	14	23	

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	Southern region	6.5%	5.6%	5.9%	
	Central region	16	40	56	
		11.5%	15.9%	14.4%	
	Eastern region	24	68	92	
		17.3%	27.1%	23.6%	
	Western region	77	103	180	
		55.4%	41.0%	46.2%	
Level of education	Primary	0	2	2	N/A
		0.0%	0.8%	0.5%	
	Secondary	3	5	8	
		2.2%	2.0%	2.1%	
	Intermediate	26	60	86	
		18.7%	23.9%	22.1%	
	University	93	167	260	
		66.9%	66.5%	66.7%	
	Post - graduate	17	16	33	
		12.2%	6.4%	8.5%	
	I do not have an educational qualification	0	1	1	
		0.0%	0.4%	0.3%	

P value was considered significant if ≤ 0.05.

Discussion:

The thyroid gland is considered the largest endocrinal gland in the human body, located in the anterior aspect of the neck. It synthesizes and releases thyroid hormones that considerably influence the basal metabolic rate (BMR) and protein synthesis [7]. Furthermore, these hormones are also critical for children and adolescents' neurocognitive development and maintaining normal physiological functioning in adults. The clinical symptoms of a thyroid disorder mainly depend on the type of the disorder and may affect different systems of the body. Furthermore, since most of the symptoms are not specific, thyroid disorders can be easily missed or confused with other medical conditions [8]. In

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general, lack of knowledge and understanding of thyroid disorder effects can lead patients to go undiagnosed. There is a limited number of studies in Saudi Arabia that assess knowledge and correlation to the diagnosis of thyroid disorders among the general population, particularly on the regional level. Thus, we aimed in this study to assess the awareness level of thyroid disorder and their risk factor among the Saudi population in the kingdom of Saudi Arabia.

As regard knowledge and awareness score about thyroid gland and its diseases, we have found that 35.6% out of 390 participants, demonstrated a high level of knowledge on this subject matter. However, the data also reveals that a substantial portion of the population, nearly one-third, have a low level of knowledge. The moderately knowledgeable group, representing 31.5% of the sample. On the other hand, a study conducted by Rawan S Alshahrani et.al [9] revealed that the mean total knowledge score was found to be 25.1±4.48 out of a total of 34. About half (n=216, 53.6%) of the participants had good knowledge about thyroid disorders. The percentage of participants with good knowledge was higher than the findings of the analogous studies in which lower levels of knowledge were reported [10,11]. Moreover, a study conducted in Riyadh found that only 31.7% of participants had heard of thyroid disease. Another study conducted in Jeddah found that only 28.8% of participants had good knowledge of thyroid disease [12]. Moreover, a study conducted in India found that only 13% of participants could identify the thyroid gland's location correctly. Similarly, a study conducted in the United States found that only 29% of participants were aware of the symptoms of hyperthyroidism [13]. According to a study done in India, most of the participants had inadequate knowledge and misconceptions of the thyroid gland and associated disorders [14]. On the contrary, a study that was done in Riyadh (capital of Saudi Arabia) shows a different level of knowledge where 57% of the participant had a good level of knowledge [15]. Furthermore, a survey conducted in 2019 and subsequently published revealed a notable lack of awareness regarding thyroid problems among the Saudi population. There were two research studies conducted in Riyadh [16,17] and one study each in Al-Majmaah [18], Tabuk [19], and Makkah [20], which revealed that a significant proportion of participants exhibited insufficient levels of knowledge pertaining to thyroid problems. Similarly, a survey conducted among pregnant women in India [21] revealed that the vast majority (90%) exhibited insufficient information regarding thyroid problems. Only a small proportion (10%) indicated a moderate level of knowledge, while none of the participants were classified as having a high level of knowledge. In contrast, a survey conducted in Taif City [22]. On the other hand, a study conducted by Smith et al. (2020) [23] analyzed the knowledge and awareness levels of thyroid disorders among the general population. The study found that only 45% of participants were able to correctly identify common risk factors associated with thyroid disorders, such as family history and iodine deficiency. Another study by Johnson and Brown (2018) [24] reported that the average knowledge score regarding thyroid disorders among participants was 60%, indicating a moderate level of awareness in the general population. These findings highlight the need for increased education and awareness campaigns to improve understanding of thyroid disorders and their risk factors. Moreover, a study by Al-Alawi and Al-Sadadi (2016) [25] found that only 45% of the general population in Saudi Arabia had sufficient knowledge about thyroid disorders. The study also reported that 60% of the participants were unaware of the risk factors associated with thyroid disorders.

Conclusion:

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In conclusion, the study conducted in Saudi Arabia revealed that there is a significant gap in knowledge and awareness about thyroid disorders among the general population. While a portion of the participants demonstrated a high level of understanding, a substantial number still showed low to moderate knowledge levels. These findings highlight the need for enhanced education and awareness initiatives to improve public understanding of thyroid disorders and their risk factors. Identifying and addressing these gaps in knowledge can help ensure timely diagnosis, treatment, and management of thyroid diseases, ultimately improving the overall health outcomes of individuals in the kingdom of Saudi Arabia. More research and targeted interventions are necessary to bridge the knowledge gap and promote better thyroid health awareness among the Saudi community.

Acknowledgement:

We thank the participants who all contributed samples to the study.

Ethical approval

An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

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The study did not receive any external funding.

Conflict of interests

The authors declare that there are no conflicts of interest.

Informed consent:

Written informed consent was obtained from all individual participants included in the study.

Data and materials availability

All data associated with this study are present in the paper.

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