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ASSESSMENT OF KNOWLEDGE AND AWARENESS OF THYROID DISORDERS RISK FACTORS AND CLINICAL MANIFESTATIONS AMONG ADULTS IN SAUDI ARABIA: A CROSS-SECTIONAL STUDY

Khalid A. Alghamdi[1], Reema Ali*[2], Mohammed Alraddadi[3], Danah Abdulaziz AL ghamdi[4], Sarah Saab[5], Kawkab M Alharbi[6], Sara Alghamdi[7] , Fatima Altayeb[8], Abdulrahman Alshami[9] , Khames T. Alzahrani[10] .

[1]Consultant Endocrinologist at Comprehensive Specialized Clinics, Ministry of Interior Security Forces Medical Services, Jeddah, Kingdom of Saudi Arabia
[2]Medical student, Najran university, Najran, Saudi Arabia.
[3]Medical student, Taibah University, Medinah, Saudi Arabia
[4]Medical Student, Al Baha University, Al Baha, Saudi Arabia
[5]Medical student, king Abdulaziz University, Jeddah, Saudi Arabia
[6]Medical intern, Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia.
[7]Medical student, Albaha University, Albaha, Saudi Arabia
[8]Medical student, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia
[9]Medical students, Mansoura University, Mansoura, Egypt.

[10]BDS, PGD Endo from Stanford University, Saudi Board of Endodontic SR, King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia.

***Corresponding author**: Reema Ali; **Email**: reee0a@gmail.com

Abstract

Background: Thyroid disorders are common, often underdiagnosed, endocrine disorders that have an effect on health and quality of life. Early identification and management of these disorders is important in Saudi Arabia, and for improving lymphoma public awareness of risk factors and its clinical manifestations is imperative. The objective of this study was to determine the level of knowledge and awareness of the risk factors and the clinical manifestations of a thyroid disorder among adults living in Tabuk, Saudi Arabia.
Methods: A self-reported online questionnaire was used in a cross-sectional study on 403 participants 18 years and older. Data were collected from June 2022 until November 2024 and analyzed with SPSS (version 25). Subjects were recruited based on inclusion criteria: Saudi Arabia and having given informed consent.
Results: The analyses were done on 403 participants, with a mean age of 30.7 years. For example, we found 77.9% gender representation of females. Overall good awareness regarding thyroid disorders was found with 53.6% scoring a mean of 25.1±4.48 out of 34 points. Interestingly 79.9% thought of the location of the thyroid gland; only 37.0% mentioned women with thyroid insufficiency could conceive normally. No significant knowledge gaps existed with respect to symptoms and medication known to induce thyroid disorders; however, only 63.9% knew the role of iodized salt in treatment. Relationships between knowledge levels and age, occupational status, region of residence and monthly income were statistically significant.

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Conclusion: The study indicates that Saudi adults are moderately aware of thyroid disorders, and further targeted educational interventions focusing on knowledge deficits are urgently needed with emphasis on fertility implications and symptoms of hypothyroidism. The quality of public knowledge can have a significant impact in terms of earlier diagnosis and better outcomes for health, but there is a need for more extensive spread of information about thyroid health in Saudi Arabia. To explore deeper demographic influences on awareness and knowledge retention further research is warranted.

Keywords: Knowledge, Awareness, Thyroid Disorders, Saudi Arabia.

Introduction:

The thyroid gland. A tiny, butterfly-shaped organ near the base of the neck thought to be the largest endocrine gland in the human body, is affected by several diseases together referred to as thyroid disorders. It produces thyroid hormones, which have a significant impact on energy levels, protein synthesis, and basal metabolic rate (BMR) [1]. Since thyroid-related conditions are the most common endocrine disease, increasing public knowledge of thyroid disorders is critical. Thyroid disorders include enlarged thyroid glands and excessive or inadequate thyroid hormone output. Primary thyroid conditions directly affect the gland, whereas secondary thyroid conditions are caused by additional factors [2]. Thyroid goiter and thyroid cancer are two of the most clinically significant subgroups of one of the most prevalent diseases in the world, thyroid illness. Iodine shortage is another prominent subtype. One of the diseases that can be predicted and prevented before they manifest clinically is thyroid problems [3]. In 2024, a cross-sectional study was conducted to evaluate the knowledge of thyroid disease manifestations and their risk factors among individuals living in Tabuk, Saudi Arabia. The study included 403 participants aged 18 years and above who participated through an electronic questionnaire from June 2022 to January 2023. The results showed a good level of awareness and knowledge regarding thyroid diseases among 53.6% of the participants, with a mean score of 25.1±4.48 out of a total of 34. However, some knowledge gaps were identified regarding the symptoms of hypothyroidism and certain medications that might induce thyroid disorders. A significant association was noticed between understanding thyroid disorders with both gender and educational level [4] A cross-sectional study was conducted in 2023 to assess the knowledge and awareness levels of thyroid disorders among the general population of Saudi Arabia. The study involved 2,362 participants aged between 18 and 65 who participated via a self-administered electronic survey from February 2022 to November 2022. The results showed a poor level of knowledge of thyroid diseases among the Saudi Arabian general population compared to international figures. Specifically, 30.9% of the population showed a good knowledge score, whereas 18.9% had a low knowledge score. However, half of the participants (50.8%) showed a moderate knowledge score. A marked association was noted between knowledge regarding the topic and both age and gender [5]. In 2022, a Saudi Arabian cross-sectional study was conducted among the general population to evaluate their knowledge, perceptions, and awareness regarding thyroid disorders. The study involved a total of 724 participants aged between 18 and 50 who participated through an online self-reported survey from November 2021 to January 2022. The results showed varying levels of knowledge among the respondents. The mean perception score was 33.02 (SD = 6.41), whereas the mean knowledge score was 4.1 (SD = 3.09). A significant association was noted between previous knowledge of thyroid disorders and the mean knowledge score. However, there was no impact of the gender of the participants on the knowledge score. Additionally, participants' demographics were not significantly associated with the perception score [6]. A survey based cross-sectional study was conducted in 2021 to assess the general population's awareness regarding thyroid disorders among the Saudi Arabian community. The study included a total of 1,560

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participants aged ≥ 20 via an online self-reported questionnaire carried out in December 2020. The results showed a moderate level of overall knowledge and a poor level of knowledge regarding thyroid disease's risk factors. The majority of participants (41.5%) reported a moderate level of knowledge. High and poor levels of knowledge were reported by 30.3% and 28.2%, respectively. A marked association was noted between overall knowledge and gender, age, and level of education. Additionally, a marked association was noted between sociodemographic characteristics and knowledge regarding thyroid disorder risk factors [7]. Due to the paucity of research on our subject, especially in Saudi Arabia. This study aims to evaluate Saudi citizens' knowledge and awareness of risk factors and clinical manifestations of thyroid disorders.

Methodology:

Study Design and Setting:

This is a cross-sectional study designed to assess the perception and understanding of risk factors and clinical manifestations of thyroid disorders among the Saudi population. The study is based on a self-reported online questionnaire developed by the authors after an extensive literature review of similar studies. The study is set in Saudi Arabia covering all the provinces to ensure a representative sample of the population. Therefore, enhancing the generalizability of the study results to the broader population of Saudi Arabia.

Sample size:

To determine the minimum number of responders required to constitute a representative sample for the entire population, sample size calculations were made. The Raosoft Sample Size Calculator was used to determine the sample size.

A target sample of 384 patients participated in the data collection (confidence level: 95%; margin of error: 5%). The sample size was estimated using the formula: $n = P(1-P) * Z\alpha\ 2 / d\ 2$ with a 95% confidence level.

Inclusion and Exclusion Criteria: The following are the inclusion criteria for this study: People living in Saudi Arabia who consent to participate in our study, both Saudi and non-Saudi citizens, and who identify as male or female and have been diagnosed with thyroid diseases.

The following are the exclusion criteria for this study: Anyone who disagrees with us who sends in incomplete questionnaires, or who is not located in Saudi Arabia.

Method for data collection, instrument, and score system:

A self-administered electronic questionnaire that included Socio-demographic characteristics such as Residential area, Gender, age, Occupation, and educational level. We asked the participants about their thyroid-gland overall knowledge they have, Knowledge about Hypothyroidism, and Knowledge of Hyperthyroidism. There were 28 questions in the questionnaire to estimate the overall knowledge, based on 'yes', 'no', and 'I don't know' answers. Based on the total amount of right responses the score of the overall knowledge was: <10 correct answers mean 'poor' knowledge; 10-19 correct answers mean 'moderate' knowledge; >19 correct answers mean 'good' knowledge. With the author's permission, some of the survey questions were relied upon from their questionnaire form [8,9].

Scoring system:

In all, 28 statements served to assess the participants' attitudes and degree of knowledge. 5 statements

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for demographics, 10 for knowledge, and 13 for awareness. One point is given for correct answers, and zero points are given for incorrect answers or "I don't know". For scoring, we utilized Like scales (Dichotomous, Three-Point, and Quality Scales) The maximum score was 40 and divided as follows: The original Bloom's cut-off points, 80.0%-100.0%, 60.0%-79%, and 59.0%, The participants divided into three groups based on their scores. knowledge score varied from 0 to 27 points and was classified into three levels as follows: those with a score of 6 or below (≤ 6) were classified as having a low level of knowledge, those with scores between 7 and 9 as having a moderate level of knowledge, and those with scores 9 or above (≥ 9) a high level of knowledge. Awareness scores varied from 0 to 13 points and were classified into three levels as follows: those with a score of 7 or below (≤ 7) were classified as having a low level of awareness, those with scores between 8 and 10 as having a moderate level of awareness, and those with scores 11 or above (≥ 11) as having a high level of awareness.

Pilot Test:
A pilot study was conducted to assess the questionnaire clarity and study procedures feasibility. The questionnaire was administered to 20 individuals who filled it as requested. However, data from the pilot study was excluded from the final data of the main study.

Analyzes and entry method:
The data was collected and entered by using "Microsoft Office Excel Software" Windows (2022). The obtained data was then transmitted and analyzed statistically by the Statistical Package of Social Science Software (SPSS) application, version 25 (IBM SPSS Statistics for Microsoft Windows, Version 25.0.).

Results:

Table (1) displays various demographic parameters of the participants with a total number of (698). Mean age of participant is 30.7 years, with substantial proportion (34.1%) older than 32 years, reflecting a youth population predominantly consisting of younger adults. Gender representation is very high with 77.9% indicating gender dynamics on the findings. Importantly, 92 percent of participants are Saudis, consistent with this cultural context and pertinence to this research in this population. The majority (68.2%) are educations and indicate a sample that is likely to offer informed views. As for occupational status more than a half (47.6%) are students, which demonstrates youth engagement in education, while the unemployment rate is 15.2%. Additionally, income distribution shows that many people (1,075) are earning less than 1,000 SAR a month, suggesting a potential challenge of socioeconomic nature. Given the chronic disease prevalence in this group of 30.9% attention is needed for health-related concerns as diabetes and thyroid diseases are among the top problems reported for this group.

Table (1): Sociodemographic characteristics of participants (n=698)

Parameter		**No.**	**Percent (%)**
Age ***(Mean: 30.7, STD: 12.3)***	21 or less	140	20.1
	22 to 23	210	30.1
	24 to 32	110	15.8
	More than 32	238	34.1
Gender	Female	544	77.9
	Male	154	22.1

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Nationality	Saudi	642	92.0
	Non-Saudi	56	8.0
Educational level	Primary school	2	.3
	Middle school	2	.3
	High school	130	18.6
	Diploma	36	5.2
	Bachelor's degree	476	68.2
	Master's degree	4	.6
	PHD	2	.3
	Postgraduate degree	44	6.3
	Uneducated	2	.3
Occupational status	Student	332	47.6
	Employed	214	30.7
	Unemployed	106	15.2
	Retired	22	3.2
	Freelancer	24	3.4
Residential region	Northern region	24	3.4
	Southern region	234	33.5
	Central region	76	10.9
	Eastern region	156	22.3
	Western region	208	29.8
Monthly income in SAR	Less than 1000	242	34.7
	1000 to 5000	176	25.2
	5001 to 10000	106	15.2
	10001 to 15000	72	10.3
	More than 15000	102	14.6
Chronic disease	No	482	69.1
	Yes	216	30.9
Chronic disease name (n=216) *	Obesity	36	16.7
	Diabetes mellitus	48	22.2
	Hyperlipidemia	28	12.9
	Hypertension	34	15.7
	Cardiovascular diseases	14	6.5
	Thyroid diseases	50	23.1
	Others	96	44.4

****Results may overlap***

As shown in figure 1, the consensus between respondents on the relationship between thyroid dysfunction and brain development presented the data. Of the total sample of 698 participants, 32% (222 participants) say they do not think thyroid dysfunction impacts brain development, whereas the vast majority, 68% (476 participants) state that it does.

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Figure (1): Illustrates if thyroid dysfunction affects brain development among participants.

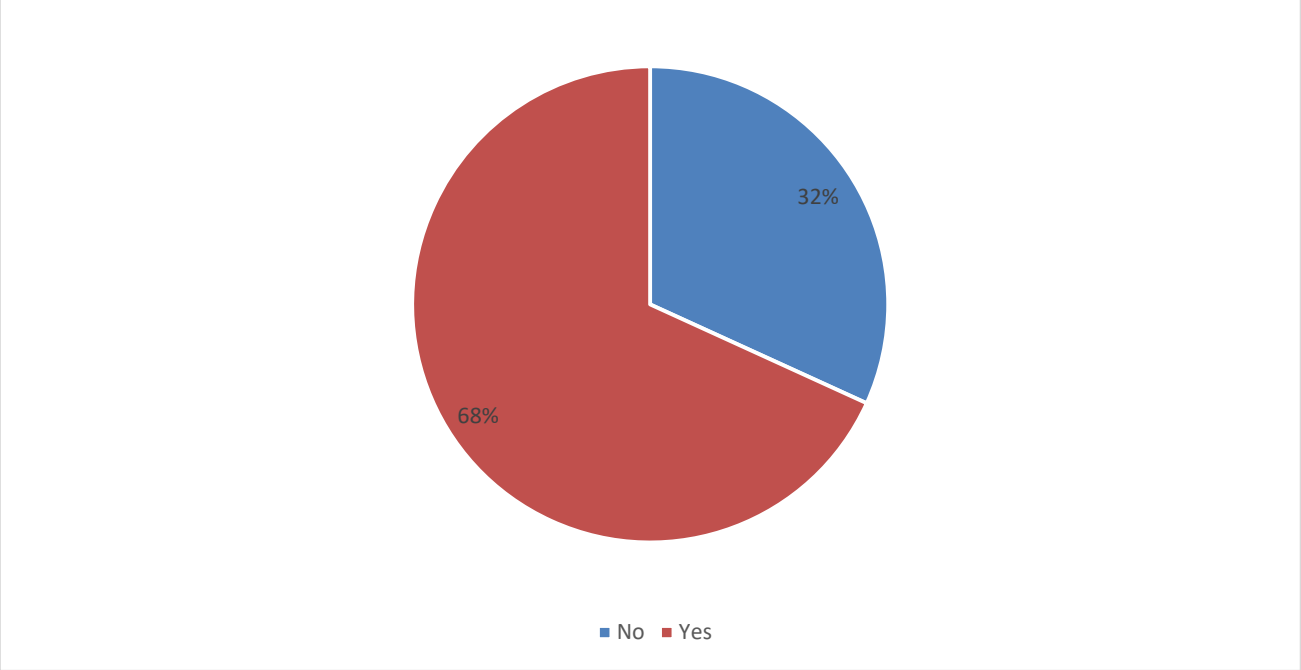

Table 2 establishes a foundation for understanding thyroid gland physiology and the implications of thyroid dysfunction on a sample of 698 participants. Of note, the population also appeared to have good foundational knowledge of the identification of an endocrine gland, with 79.9% correctly identifying the thyroid gland. On the other hand, perceptions of the effect thyroid dysfunction have less uniform level of awareness with 68.2 percent indicating they yield impact on brain development and 72.5 percent that they bring no relation to cardiac diseases. Interestingly the majority (81.1%) agreed that thyroid dysfunction influences blood cholesterol levels, or more generally, perceived connection with metabolic health. Nevertheless, the understanding of the lifestyle factors, including sports and smoking, shares a divide — 53.9% thought that sports cause thyroid dysfunction while a main majority, 70.5%, agreed that smoking was related to thyroid disturbances. Of respondents, 71.1% had recognized genetic links of postural reduction with thyroid dysfunction.

Table (2): Parameters related to knowledge of thyroid gland and thyroid dysfunction (n=698).

Parameter		***No.***	***Percent (%)***
The thyroid gland is an endocrine gland?	No	140	20.1
	Yes	558	79.9
Thyroid dysfunction affects brain development?	No	222	31.8
	Yes	476	68.2
Thyroid dysfunction results in cardiac diseases?	No	192	27.5
	Yes	506	72.5
Thyroid dysfunction affects the blood cholesterol level?	No	132	18.9
	Yes	566	81.1
Does sport affect thyroid dysfunction?	No	322	46.1
	Yes	376	53.9

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Is there a confirmed relationship between smoking and thyroid disturbances?	No	206	29.5
	Yes	492	70.5
Thyroid dysfunction is genetic?	No	202	28.9
	Yes	496	71.1
What is the thyroid gland? *	The gland lies in the front of the neck	378	54.2
	Important gland for metabolism and all body functions	336	48.1
	Important endocrine gland	352	50.4
	Important endocrine gland lies in front of the trachea	302	43.3
	I don't know	112	16.0
Function of the thyroid gland *	Regulation of body temperature, blood pressure, growth and metabolism	488	69.9
	Regulation of growth	36	5.2
	Regulation of body temperature	542	77.7
	Regulation of body temperature and blood pressure	518	74.2
	I don't know	130	18.6
Symptoms of thyroid troubles *	Neck pain, joint pain, joint weakness, excessive weight loss, fatigue, and palpitations	370	53.0
	Swelling of the neck, voice changes, constipation, and/or diarrhea for long periods	208	29.8
	Depression, confusion, lack of concentration, mood swings, anxiety	318	45.6
	Disturbance in women's menstrual cycle, recurrent miscarriage, birth of dead fetus	258	36.9
	I don't know	154	22.1

Results may overlap

As shown in figure (2), The data that were analyzed and it appears that a vast majority, 446 out of a total of 698 respondents, or approximately 63.9%, stated that iodized salt is used for hypothyroidism. Conversely, 36.1% of the 252 participants (about 252) do not subscribe to this notion.

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Figure (2): Illustrates iodized salt role in treatment of hypothyroidism among participants.

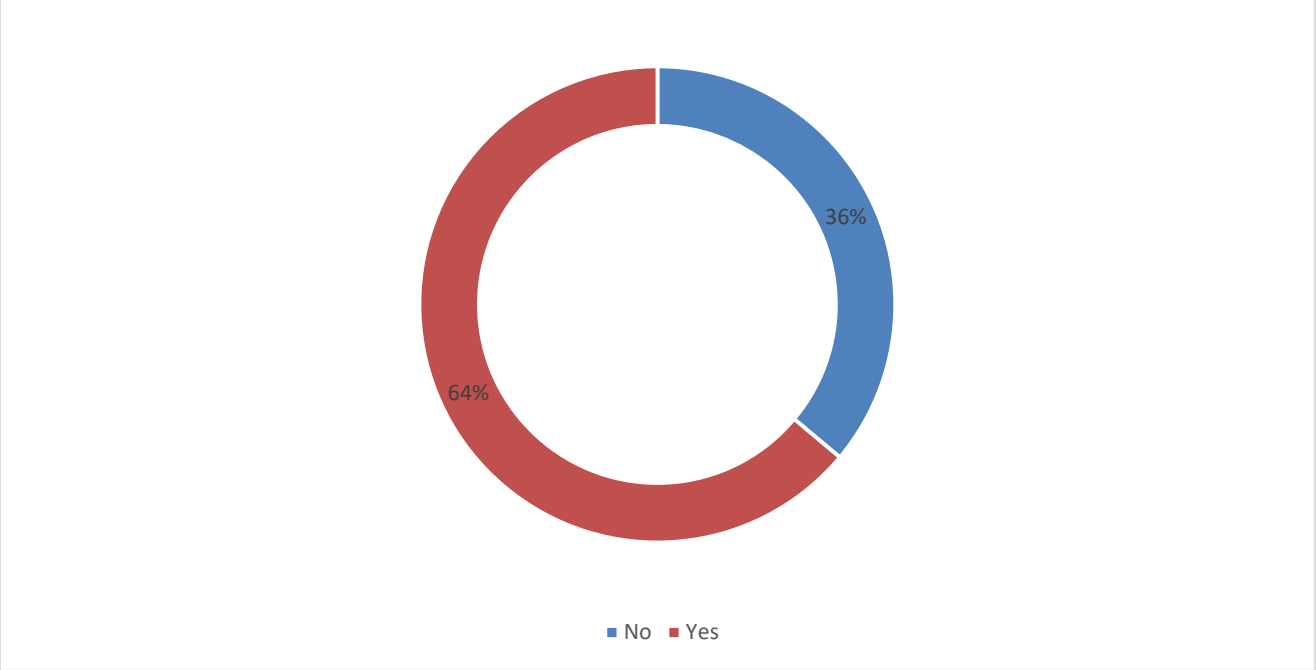

Table 3 reveals insightful revelations about participants' awareness and understanding of hypothyroidism and hyperthyroidism. One of the biggest arm of knowledge is the fact that 63.9% of the respondents are aware that iodized salt is used to treat hypothyroidism and hence a significant majority knows that nutrition has an effect on thyroid health. On the contrary, 58.2% reject the possibility that herbal remedies can be effective in treating thyroid disorders, denouncing alternative treatments. In addition, the confirmation that treatment for hypothyroidism should be continued even in the absence of normal investigations (59.6%) attests to the fact that this condition is chronic and requires life long treatment. It's interesting that only 37.0% of people believe that women with thyroid insufficiency can conceive normally, which shows that there's a widespread misconception that women can't conceive normally if they have a thyroid disease. However, for hyperthyroidism we are still highly aware, with 61.6% noting that women with the condition can still conceive normally. (91.7%) believe that hypothyroidism is not infectious.

Table (3): participants' awareness of hypothyroidism and hyperthyroidism (n=698).

Parameter		***No.***	***Percent (%)***
Does iodized salt have a role in treatment of Hypothyroidism?	No	252	36.1
	Yes	446	63.9
Herbal remedy can cure hypothyroidism?	No	406	58.2
	Yes	292	41.8
Can you stop treatment of Hypothyroidism when the investigation was normal?	No	282	40.4
	Yes	416	59.6
Can women with thyroid insufficiency conceive normally?	No	258	37.0

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	Yes	440	63.0
Are cabbage, cauliflower and soy products should be avoided in case of hypothyroidism?	No	326	46.7
	Yes	372	53.3
Is Hypothyroidism a genetic disease?	No	364	52.1
	Yes	334	47.9
Is Hypothyroidism an infectious disease?	No	640	91.7
	Yes	58	8.3
Herbal remedy can cure hyperthyroidism?	No	434	62.2
	Yes	264	37.8
Can you stop treatment of hyperthyroidism when the investigation was normal?	No	306	43.8
	Yes	392	56.2
Can women with hyperthyroidism conceive normally?	No	268	38.4
	Yes	430	61.6
Are cabbage, cauliflower and soy products should be avoided in case of hyperthyroidism?	No	416	59.6
	Yes	282	40.4
Is hyperthyroidism a genetic disease?	No	392	56.2
	Yes	306	43.8
Is hyperthyroidism an infectious disease?	No	624	89.4
	Yes	74	10.6

Table 4 presents the readers with a complete detail of the knowledge that the respondents hold about thyroid gland and thy red dysfunction. A particularly noteworthy point is that a very high number of participants, 57.3%, possessed a very good knowledge of this very important area of endocrinology. On the other hand, the findings show that 18.9 percent of the respondents had a moderate knowledge, and worrying 23.8 percent showed low knowledge.

Table (4): Shows knowledge of thyroid gland and thyroid dysfunction score results.

	Frequency	**Percent**
High level of knowledge	400	57.3
Moderate knowledge	132	18.9
Low knowledge level	166	23.8
Total	698	100.0

Table 5 depicts the level of awareness on hypothyroidism and hyperthyroidism of the studied population. Notably, only 8.9 percent of participants are noticed with a high level of awareness, which indicates that there is still sizable lack of knowledge among portion of the population of these thyroid conditions. Instead, the majority (46.7%) displays moderate awareness whereas an important fraction (44.4%) has low awareness.

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Table (5): Shows awareness level of hypothyroidism and hyperthyroidism score results.

	Frequency	**Percent**
High level of awareness	62	8.9
Moderate awareness	326	46.7
Low awareness level	310	44.4
Total	698	100.0

Table (6) shows that knowledge of thyroid gland and thyroid dysfunction has statistically significant relation to age (P value=0.0001), occupational status (P value=0.0001), region of residence (P value=0.002), and monthly income (P value=0.037). It also shows statistically insignificant relation to gender, nationality, and chronic diseases.

Table (6): Relation between knowledge of thyroid gland and thyroid dysfunction and sociodemographic characteristics.

Parameters		***Knowledge Level***		***Total (N=698)***	***P value****
		High level of knowledge	**Moderate or low knowledge**		
Gender	Female	322	222	544	0.059
		80.5%	74.5%	77.9%	
	Male	78	76	154	
		19.5%	25.5%	22.1%	
Age	21 or less	82	58	140	0.0001
		20.5%	19.5%	20.1%	
	22 to 23	156	54	210	
		39.0%	18.1%	30.1%	
	24 to 32	60	50	110	
		15.0%	16.8%	15.8%	
	More than 32	102	136	238	
		25.5%	45.6%	34.1%	
Nationality	Saudi	364	278	642	0.271
		91.0%	93.3%	92.0%	
	Non-Saudi	36	20	56	
		9.0%	6.7%	8.0%	
Education level	Primary school	0	2	2	N/A
		0.0%	0.7%	0.3%	
	Middle school	2	0	2	
		0.5%	0.0%	0.3%	
	High school	82	48	130	
		20.5%	16.1%	18.6%	
	Diploma	12	24	36	
		3.0%	8.1%	5.2%	
	Bachelor’s	276	200	476	

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	degree	69.0%	67.1%	68.2%	
	Master's degree	0	4	4	
		0.0%	1.3%	0.6%	
	PHD	0	2	2	
		0.0%	0.7%	0.3%	
	Postgraduate degree	28	16	44	
		7.0%	5.4%	6.3%	
	Uneducated	0	2	2	
		0.0%	0.7%	0.3%	
Occupational status	Student	238	94	332	0.0001
		59.5%	31.5%	47.6%	
	Employed	94	120	214	
		23.5%	40.3%	30.7%	
	Unemployed	44	62	106	
		11.0%	20.8%	15.2%	
	Freelancer	12	12	24	
		3.0%	4.0%	3.4%	
	Retired	12	10	22	
		3.0%	3.4%	3.2%	
Region of residence	Northern region	18	6	24	0.002
		4.5%	2.0%	3.4%	
	Southern region	152	82	234	
		38.0%	27.5%	33.5%	
	Central region	32	44	76	
		8.0%	14.8%	10.9%	
	Eastern region	84	72	156	
		21.0%	24.2%	22.3%	
	Western region	114	94	208	
		28.5%	31.5%	29.8%	
Monthly income	Less than 1000	148	94	242	0.037
		37.0%	31.5%	34.7%	
	1000 to 5000	102	74	176	
		25.5%	24.8%	25.2%	
	5001 to 10000	54	52	106	
		13.5%	17.4%	15.2%	
	10001 to 15000	48	24	72	
		12.0%	8.1%	10.3%	
	More than 15000	48	54	102	
		12.0%	18.1%	14.6%	
Chronic disease	No	288	194	482	0.051
		72.0%	65.1%	69.1%	
	Yes	112	104	216	
		28.0%	34.9%	30.9%	

P value was considered significant if ≤ 0.05.

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Table (7) shows awareness level of hypothyroidism and hyperthyroidism has statistically significant relation to gender (P value=0.004), age (P value=0.034), occupational status (P value=0.005), and monthly income (P value=0.025). It also shows statistically insignificant relation to nationality, region of residence, and chronic disease.

Table (7): Awareness level of hypothyroidism and hyperthyroidism in association with sociodemographic characteristics.

Parameters		***Awareness Level***		***Total (N=698)***	***P value****
		High or moderate awareness	**Low awareness level**		
Gender	Female	318	226	544	0.004
		82.0%	72.9%	77.9%	
	Male	70	84	154	
		18.0%	27.1%	22.1%	
Age	21 or less	76	64	140	0.034
		19.6%	20.6%	20.1%	
	22 to 23	126	84	210	
		32.5%	27.1%	30.1%	
	24 to 32	48	62	110	
		12.4%	20.0%	15.8%	
	More than 32	138	100	238	
		35.6%	32.3%	34.1%	
Nationality	Saudi	362	280	642	0.150
		93.3%	90.3%	92.0%	
	Non-Saudi	26	30	56	
		6.7%	9.7%	8.0%	
Education level	Primary school	0	2	2	N/A
		0.0%	0.6%	0.3%	
	Middle school	2	0	2	
		0.5%	0.0%	0.3%	
	High school	74	56	130	
		19.1%	18.1%	18.6%	
	Diploma	14	22	36	
		3.6%	7.1%	5.2%	
	Bachelor's degree	274	202	476	
		70.6%	65.2%	68.2%	
	Master's degree	0	4	4	
		0.0%	1.3%	0.6%	
	PHD	0	2	2	
		0.0%	0.6%	0.3%	

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	Postgraduate degree	24	20	44	
		6.2%	6.5%	6.3%	
	Uneducated	0	2	2	
		0.0%	0.6%	0.3%	
Occupational status	Student	196	136	332	0.005
		50.5%	43.9%	47.6%	
	Employed	114	100	214	
		29.4%	32.3%	30.7%	
	Unemployed	46	60	106	
		11.9%	19.4%	15.2%	
	Freelancer	14	10	24	
		3.6%	3.2%	3.4%	
	Retired	18	4	22	
		4.6%	1.3%	3.2%	
Region of residence	Northern region	12	12	24	0.103
		3.1%	3.9%	3.4%	
	Southern region	124	110	234	
		32.0%	35.5%	33.5%	
	Central region	38	38	76	
		9.8%	12.3%	10.9%	
	Eastern region	82	74	156	
		21.1%	23.9%	22.3%	
	Western region	132	76	208	
		34.0%	24.5%	29.8%	
Monthly income	Less than 1000	120	122	242	0.025
		30.9%	39.4%	34.7%	
	1000 to 5000	96	80	176	
		24.7%	25.8%	25.2%	
	5001 to 10000	66	40	106	
		17.0%	12.9%	15.2%	
	10001 to 15000	50	22	72	
		12.9%	7.1%	10.3%	
	More than 15000	56	46	102	
		14.4%	14.8%	14.6%	
Chronic disease	No	260	222	482	0.191
		67.0%	71.6%	69.1%	
	Yes	128	88	216	
		33.0%	28.4%	30.9%	

P value was considered significant if ≤ 0.05.

Discussion:

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The human thyroid gland, is the largest endocrine gland, is located in the front of the neck. These thyroid hormones are produced and secreted by it very much, and this has much impact on the basal metabolic rate (BMR) and protein synthesis. Moreover, these hormones serve important roles in neurocognitive development of children and adolescents and continual maintenance of normal physiological functions in adults [10]. The thyroid gland enlarges and thyroid disorders occur due to either increased or decreased thyroid hormone secretion. These are classified as primary (i.e. thyroid gland related) or secondary (non thyroid gland related) [11]. Iodine deficiency is a major causative factor for thyroid disorders. One third of world population lives in iodine deficient areas, where about 190 mn are affected with iodine deficiency disorders. People who have thyroid disorders need to treat them or they will have consequences that may negatively affect their quality of life [12]. Type of thyroid disorder has great influence on the clinical findings in which an array of different bodily systems can be affected. Additionally, thyroid disorders tend to be neglected or misdiagnosed as something else, most of which are non-specific symptoms. This is one of the most underdiagnosed and understated medical issues considered, and the absence of awareness about them among patients is a determining factor. However, a study conducted in 2019 in the KSA central region saw a wide gap in knowledge of this region when it came to thyroid conditions despite its increasing prevalence. Knowledge of thyroid disorders of many people who have thyroid dysfunction but are unaware can be useful [13]. The bottom line is that patients may not be diagnosed [14] for a reason, namely, they may not understand or know enough about the thyroid gland and its symptoms. Thus we aimed in this study to evaluate Saudi citizens' knowledge and awareness of risk factors and clinical manifestations of thyroid disorders.

We found that participants had nuanced understandings of thyroid health, with 79.9% knowing where the thyroid gland is located. While there is variability in awareness of its associated dysfunctions, there is awareness of its effect on brain development at 68.2, and a misunderstanding of its lack of relationship to cardiac pathologies at 72.5%. By contrast, a study by Alyahya et al. [15] found that 44.7 percent of their participants were lacking in understanding about thyroid disorders, indicating a general gap in knowledge availability for a number of people. Like another research done in Riyadh, it reveals the difference level of knowledge with 57% of the respondent had a good level of knowledge of Thyroid diseases. In addition, the study found that there wasn’t a discernable differentiation of gender in comparable levels of knowledge [16]. Additionally, a survey carried out among pregnant women in India [17] showed an extremely alarming 90%, had very little information to start with and not one of them had a high knowledge level. They also demonstrate regional variation in knowledge, for example a study conducted in Taif city [18] showed a more favorable overall awareness as an indication of the need to take the demographic and regional aspect of health education into account. This equates to 70.5; highlighting lifestyle factors which affect thyroid health as shown by Rawan S Alshahrani et al. [19] where 68.5; as these also accounted for increased thyroid disorders, however smoking was more recognized than iodine. Also notable, our results showed that knowledge levels were correlated with factors, including age (P=0.0001), occupational status (P=0.0001), region (P=0.002) and income (P=0.037), differences from Alshahrani et al., who found female participants had greater knowledge than male (P-value=0.002). In our research we were extremely impressed with how aware people were with regards to hypothyroidism and hyperthyroidism, 63.9% realizing that iodized salt can be used to treat hypothyroidism. Yet, despite this, there’s a significant concern that people continue to believe inaccurate things about fertility in cases of people with a thyroid disorder; only 37.0 percent believed that women with a thyroid issue could conceive normally, a discrepancy from Rayan Abubakker Qutob et al. [20] who found only 50.4 percent knew risk factors and clinical manifestations poorly. Results from our study tallied this at 57.3% reporting very good knowledge of the symptoms of a thyroid

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condition whilst studies by Rai et al. and Kayes et al. [21] indicate that there is a widespread lack of knowledge of the symptoms of a thyroid condition. Our study did show that 8.9 percent of participants had high awareness for symptom recognition for both forms of thyroid dysfunction, similar to 25.3 percent reported in Saudi Arabia where neck swelling, constipation, and diarrhea were recognized as symptoms [22]. In this comparison, Rai et al found that prevalence of certain misconceptions on thyroid related symptoms, such as weight gain and fatigue, exist amongst wider populations, indicating the need for more widespread health education initiatives.

Conclusion:

Finally, this cross-sectional study presents both good and negative of knowledge, and awareness of thyroid disorder among adults in Tabuk, Saudi Arabia. Over half of the participants showed excellent comprehension of thyroid health, but there remains significant knowledge gaps, particularly around clinical manifestations of hypothyroidism and the role of lifestyle factors in thyroid dysfunction. More important, there is a big gap in public education concerning the fertility implications of thyroid disorders. Results indicate that demographic variables, including age, occupation, regional residence and income, are strongly related to knowledge of thyroid disorders. This provides some insights on the need to better target educational interventions to address knowledge deficits and stigma reduction regarding thyroid conditions, especially to those who are vulnerable. Enhancing awareness about thyroid disorders may facilitate early diagnosis and management, ultimately improving health outcomes for those affected. Future studies are necessary to evaluate the effectiveness of these educational initiatives.

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Ethical approval:

After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

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Conflict of interests:

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability:

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

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