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A cross-sectional study among Saudi population's: Knowledge and awareness of thyroid disease

Abdulrahman Alamri[1], **Raneem Alqurashi**[2], **Najah Alyami**[3], **Moayad Shehata**[4], **Ghadah Aljohani**[5], **Mazen Althowab**[6], **Raghad Alanzi**[7], **Ali Alsquor**[4], **Khames Alzahrani**[8]

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Authors' Affiliation:
[1]Clinical Associate Professor and Consultant, Department of Surgery, College of Medicine, Najran University, Najran, Saudi Arabia
[2]Medical Student, Taif University, Taif, Saudi Arabia
[3]Medical Student, Najran University, Najran, Saudi Arabia
[4]Medical Student, King Abdulaziz University, Jeddah, Saudi Arabia
[5]Medical Student, Al-Rayan Colleges, Medina, Saudi Arabia
[6]Medical Intern, Almaarefa University, Riyadh, Saudi Arabia
[7]Medical Student, King Faisal University, Alahsa, Saudi Arabia
[8]BDS, PGD in Endo, Saudi Board of Endodontic SR, King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia

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ABSTRACT

Background: In the world, one among the most popular widely widespread medical illnesses is thyroid-disorder. People may suffer due to poor knowledge they have about symptoms and risk-factors. This article intends to evaluate the general population's awareness and knowledge of thyroid-disorders in KSA. *Methodology:* A cross-sectional online survey with different sections based on 'yes', 'no' and 'I don't know' questions was conducted amongst Saudi Arabia's general public, using a pre-designed online questionnaire. Statistical Packages for Software Sciences (SPSS) version 21 was used for all statistical analyses. *Results:* The research involved 2362 participants, with 53% being female and 47% being male. 40.7% of the participants were between the ages of 21 and 30. Most participants (97.7%) heard of thyroid gland before. 30.9% of study contributors had good-knowledge scores of thyroid-glands while 50.8% had moderate knowledge scores and 18.9% had low knowledge score. A significant association was noted between understanding of thyroid illness with both gender and age. *Conclusion:* The Saudi general population showed generally a poor level of understanding of thyroid-illness disorders compared to international Figures. Health authorities should arrange more effective health education events to promote the general public's and caregivers' comprehension of the different facets of thyroid problems, as well as the need of early detection and adequate control.

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

1. INTRODUCTION

The thyroid is a little gland at the base of the neck that serves a variety of crucial roles. The most frequent medical problem is thyroid dysfunction and hyperthyroidism is the most common form of thyroid dysfunction (Muthukumar and Mohanraj, 2019). The commonness of thyroid dysfunction

in women is significant worldwide and rises with age. Women who are postmenopausal and elderly are especially vulnerable to thyroid dysfunction related comorbidities and death (Shrestha and Shrestha, 2021). Thyroid disorder is a common endocrine disorder second to diabetes (Aladwani et al., 2019).

Thyroid disorders are one among the most popular medical conditions worldwide, in more than 110 countries, 1.6 billion people were reported to be at risk of thyroid disorders (Alyahya et al., 2021). The severity of thyroid disorder symptoms is determined by how well the thyroid-gland functions. Thyroid disorders are conditions caused by either the gland itself (primary) or other factors (secondary) that cause one of two disorders hyperthyroidism vs. hypothyroidism (Abdulrahman, 2018). The most important risk factor varies by region and is mostly controlled by dietary iodine availability; around one-third of the world's population lives in iodine-deficient areas (Alamri et al., 2020).

According to WHO, (2007) over 190 million individuals suffer from iodine deficient conditions. Hypothyroidism, the most prevalent kind of thyroid dysfunction, affects 4 to 5% of people in developed countries. While more than 12% of the US population develops thyroid malfunction during their life every 5 years, all persons aged 35 and above should be examined for thyroid-diseases (Issa et al., 2021). Previous Saudi researchers found that the knowledge regarding risk-factors and prevention of thyroid illnesses among the Saudi general community was poor in 2019 (Alyahya et al., 2021).

In Alqahtani, (2021) has been conducted in the Department of Surgery and the results were: A total of 1560 Saudi people were included in the survey. There were 741 men 47.5 percent and 819 female. The majority of the contributors were aged from 31 to 40. n=489, 31.3 percent and had completed college n=987, 63.3%. Most of the responders had moderate overall knowledge (n=647, 41.5%). The association between general knowledge and age, gender, and educational attainment was statistically significant. ($p<0.001$).

Saleh and Munji, (2021) has been published in Diwan Health Complex-Muscat; the results showed that 95precent of the contributors who took part in the study had no prior awareness of thyroid disorders. Thyroid illness education and awareness are low after diagnosis. In addition to their regular appointments, 76 % of thyroid patients reported not receiving any counseling or awareness sessions and 91.33 % of these patients said they not-been delivered any printed materials about their conditions. The health complex, according to 62.22% of thyroid patients, does not physically indicate any thyroid disease content. Mohamed et al., (2020) showed that 51.7% of women had good-knowledge, compared to 48.3% of women with low knowledge. While in Klang, 51.8% of women and 48.2% of women have good knowledge, respectively. In Shah Alam, 10.2% of women had low awareness, compared to 89.8% of women with high awareness. While in Klang, 85.1% of women have-good awareness and 14.9% had poor awareness.

Few studies in Saudi Arabia assess public knowledge about thyroid disorders diagnosis. Hence, the purpose of our article is to determine Saudi Arabian broad awareness of thyroid disorders' symptoms (risk-factors) and (preventive-measures).

2. MATERIALS AND METHODS

Study design

This observational cross-sectional study was carried out from February 2022 to November 2022 in Saudi Arabia.

Inclusion and Exclusion criteria

Inclusion criteria include all males and females aged 18-65 in Saudi Arabia. Exclusion criteria are all Saudi population below 18 and above 65.

Sample size

The sample size will estimate to be at least 384 participants, using the Qualtrics calculator with a confidence level of 95% and margin error determine as 5%. The Sample size was appraised by the formula: $n= P (1-P) * Z\alpha^2 / d^2$ with a confidence level of 95%;

n: Calculated sample size

Z: The z-value for the selected level of confidence (1- a) = 1.96.

P: An estimated prevalence of knowledge

Q: (1 – 0.50) = 50%, i.e., 0.50

D: The maximum acceptable error = 0.05.

So, the calculated minimum sample size was:

$n = (1.96)^2 X 0.50 X 0.50/ (0.05)^2 = 384.$

Method for data collection and instrument (Data collection Technique and tools)

A self-administered electronic questionnaire that included Socio-demographic characteristics such as geography, sex, aged and educational level. We asked the participants about their thyroid-gland overall knowledge they have, symptoms of hypothyroidism and hyperthyroidism, symptoms and risk-factors that indicate thyroid disease, risk-factors of thyroid-cancer, investigations and treatment. There were 25 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.

Pilot test

The questionnaire was distributed on 20 individuals and asked to fill it. This was done to test the simplicity of the questionnaire and the feasibility of the study. Data of the pilot study was excluded from the final data of the study.

Analyzes and entry method

Statistical Packages for Software Sciences (SPSS) version 21 was used for all statistical analyses (IBM Corporation, Armonk, New York). Contributors were well-versed that their participation was entirely voluntary. Before entering data, filled questionnaires were checked for completeness and accuracy. Each participant in the survey was asked to provide informed consent and no identities were recorded on the questionnaires. All of the participants' personal information was also kept confidential.

3. RESULTS

The study included 2362 participants, 53% of them were females and 47% of them were males. 40.7% of all participants aged between 21- 30 years old while 19.4% aged between 31- 40 years old. 71% had bachelor degree. 27.4% of all study participants live in southern region of the kingdom while 22.2% live in the western region (Table 1).

Table 1 Socio-demographic characteristics of participants (n=2362)

Parameter		No.	%
Gender	Male	1109	47.0
	Female	1253	53.0
Age	18-20	262	11.1
	21-30	962	40.7
	31-40	459	19.4
	41-50	414	17.5
	51-60	216	9.1
	More than 60	49	2.1
Occupation	Less than high school	53	2.2
	High school	449	19.0
	Bachelor's degree	1677	71.0
	Higher than bachelor's degree	183	7.7
Region	Southern	648	27.4
	Eastern	445	18.8
	North	281	11.9
	Western	525	22.2
	Central	463	19.6

As in Table 2 most participants (97.7%) heard of thyroid-gland before. 59.1% know that one of the functions of the thyroid-gland is to stimulate-growth in children. 68.4% reported metabolism as a function of the thyroid-gland.

Table 2 Knowledge of participants of thyroid-gland (n=2362)

Parameter	Yes	No	Don't know
Heard of the thyroid-gland	2308 97.7%	54 2.3%	0 0%
Thyroid	1946 82.4%	115 4.9%	301 12.7%
One of the functions of the thyroid-gland is to stimulate-growth in children	1396 59.1%	260 11.0%	706 29.9%
The functions of the thyroid-gland are metabolism	1616 68.4%	143 6.1%	603 25.5%

As for knowledge of symptoms of thyroid diseases in Table 3, 82.2% of participants knew that weight gain with no change in appetite is a symptom of hypothyroidism. 41.1% reported that constipation is a symptom of hypothyroidism. 61.5% reported that dry skin and hair loss are symptoms of hypothyroidism. 57% reported that palpitations are a symptom of an over active thyroid-gland. 59.6% reported that excessive sweating is a symptom of hyperthyroidism. 56.9% reported that weight loss with high appetite is a symptom of hyperthyroidism. 55.9% of participants reported that anxiety and insomnia are symptoms of hyperthyroidism.

Table 3 Knowledge of participants of symptoms of thyroid diseases (n=2362)

Parameter	Yes	No	Don't know
Weight gain with no change in appetite is a symptom of hypothyroidism	1941 82.2%	117 5.0%	304 12.9%
Constipation is a symptom of hypothyroidism	970 41.1%	343 14.5%	1049 44.4%
Dry skin and hair loss are symptoms of hypothyroidism	1452 61.5%	171 7.2%	739 31.3%
Feeling cold is a symptom of hypothyroidism	1386 58.7%	235 9.9%	741 31.4%
Palpitations are a symptom of an over-active thyroid-gland	1347 57.0%	196 8.3%	819 34.7%
Excessive sweating is a symptom of hyperthyroidism	1408 59.6%	169 7.2%	785 33.2%
Although the percentage of weight from high appetite is a symptom of hyperthyroidism	1549 65.6%	246 10.4%	567 24.0%
Anxiety and insomnia are symptoms of hyperthyroidism	1320 55.9%	189 8.0%	853 36.1%

Table 4 shows that swelling in the thyroid-gland was reported to cause thyroid disorder by 63.9% of participants. Iodine deficiency was identified as a risk factor for thyroid disease by 58.8% of participants. Smoking was reported as a risk factor of goiter by 49.9% (Figure 1). Old age was reported as a risk of thyroid disease by 42.5%. Exposure to radiation in childhood was reported as a risk-factor for thyroid cancer by 55.3%. Family history of thyroid cancer was reported as a risk-factor for thyroid cancer by 61.9%. Goiter was reported as a risk-factor for thyroid cancer by 58.5%.

Table 4 Knowledge of participants of risk-factors of thyroid diseases (n=2362)

Parameter	Yes	No	Don't know
Swelling in the thyroid-gland cause thyroid disorder	1510 63.9%	317 13.4%	535 22.7%
Iodine deficiency is a risk-factor for thyroid-disease	1390 58.8%	157 6.6%	815 34.5%
Old age is a risk-factor for thyroid-disease	1005 42.5%	577 24.4%	780 33.0%
Exposure to radiation in childhood is a risk factor for thyroid cancer	1307 55.3%	196 8.3%	859 36.4%
Family-history of thyroid-cancer is a risk factor for thyroid cancer	1463 61.9%	203 8.6%	696 29.5%
Goitre is a risk factor for thyroid cancer	1382 58.5%	248 10.5%	732 31.0%

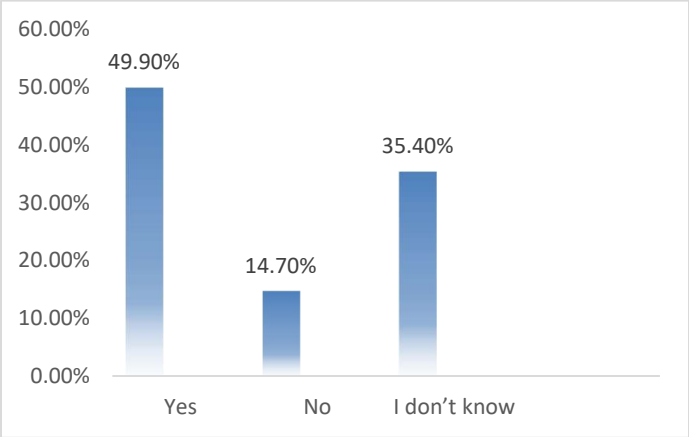

Figure 1 Knowledge of smoking as risk factor for thyroid glands among participants (n= 2362)

Of all participants, 38.6% had a thyroid test before. 75.4% reported that some thyroid-diseases need surgical intervention. 46.2% reported that radio-active-iodine is a treatment-option for thyroid disorders. 69% reported that daily diet affects thyroid function (Table 5).

Table 5 Knowledge of participants of treatment of thyroid diseases (n=*2362*)

Parameter	Yes	No	Don't know
Had a thyroid test before	912 38.6%	1450 61.4%	0 0%
Some thyroid-diseases need surgical intervention	1781 75.4%	171 7.2%	410 17.4%
Radioactive iodine is a treatment option for thyroid disorders	1092 46.2%	171 7.2%	1099 46.5%
Daily diet affects thyroid function	1630 69.0%	191 8.1%	541 22.9%

Figure 2 shows that 30.9% of study contributors had good knowledge scores of thyroid glands while, 50.8% had moderate knowledge scores and 18.9% had low knowledge score. A significant association was noted between understanding of thyroid-illness with both gender and age ($P<0.05$) but not with occupation or residence region in the Kingdom (Table 6).

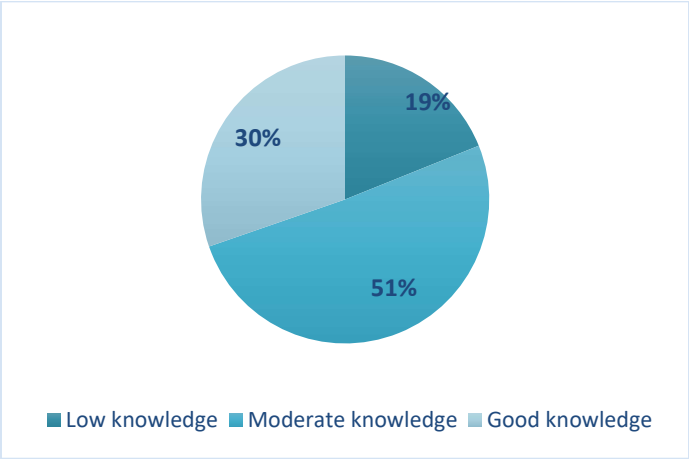

Figure 2 Knowledge scores of thyroid glands among participants (n= 2362)

Table 6 Knowledge of participants of thyroid diseases and its' association to socio-demographic characters of participants (n=2362)

		Knowledge score			Total (N=2362)	P value
		Poor knowledge	Moderated knowledge	Good knowledge		
Gender	Male	304	504	301	1109	0.001
		68.0%	42.0%	42.1%	47.0%	
	Female	143	696	414	1253	
		32.0%	58.0%	57.9%	53.0%	
Age	18 – 20	45	158	59	262	0.001
		10.1%	13.2%	8.3%	11.1%	
	21 – 30	170	443	349	962	
		38.0%	36.9%	48.8%	40.7%	
	31 – 40	91	240	128	459	
		20.4%	20.0%	17.9%	19.4%	
	41 – 50	75	220	119	414	
		16.8%	18.3%	16.6%	17.5%	
	51 – 60	48	114	54	216	
		10.7%	9.5%	7.6%	9.1%	
	More than 60	18	25	6	49	
		4.0%	2.1%	0.8%	2.1%	
Occupation	Less than high school	15	24	14	53	0.026
		3.4%	2.0%	2.0%	2.2%	
	High school	91	245	113	449	
		20.4%	20.4%	15.8%	19.0%	
	Bachelor's degree	307	851	519	1677	
		68.7%	70.9%	72.6%	71.0%	
	Higher than a bachelor's degree	34	80	69	183	
		7.6%	6.7%	9.7%	7.7%	
Region	Southern	106	344	198	648	0.001
		23.7%	28.7%	27.7%	27.4%	
	Eastern	80	239	126	445	
		17.9%	19.9%	17.6%	18.8%	
	North	40	138	103	281	
		8.9%	11.5%	14.4%	11.9%	
	Western	115	230	180	525	

		25.7%	19.2%	25.2%	22.2%	
	Central	106	249	108	463	
		23.7%	20.8%	15.1%	19.6%	

4. DISCUSSION

Thyroid gland is an endocrine organ located in the anterior aspect of the neck in front of the trachea. Thyroid disorders are the commonest endocrine diseases universally (Alzahrani et al., 2020). According to WHO, (2007) more than 190 million suffer from iodine deficiency disorders. Thyroid disorders exhibit variable presentations, including no symptomatology, small goiter, hypothyroidism, hyperthyroidism and thyroid cancer (Aladwani et al., 2019). Sixty percent of individuals with thyroid dysfunction are un-aware of their condition worldwide (Alzahrani et al., 2020). Paper was carried out from July 2022 to February 2023 in Saudi Arabia among 384 participants.

Our study showed that 30.9% of study contributors had good knowledge scores of thyroid-gland while 50.8% had moderate knowledge scores and 18.9% had low knowledge score. In Riyadh city a paper was carried out among 870 participants reported that only 6.6% don't know what the thyroid-gland is, 37.1 % said that gland lies in (the front of the neck), 24.4% know it's important for metabolism and all body functions (Abdulrahman, 2018). An online, cross-sectional and survey-based study was carried out included a random sample of 1560 Saudi men and women found that the majority (41.5%) of respondents had moderate overall knowledge; 80.5% said that gland located at the anterior neck and 19.5% don't know. 66.3% know that it is enhancing metabolism, 44.2% said it regulate of heart beats and 36.1% reported growth and development of fetal neurological system as a function of thyroid-gland (Alqahtani, 2021).

Another cross-sectional study was carried among 882 participants in the (Eastern-province) of Saudi Arabia found that the overall mean knowledge score was 8.67, were (44.7%) classified into low knowledge, (41.2%) average, and (14.2%) high (Alhawiti et al., 2018). Rendering to a paper done in India that shows similar results to previous study, most of the participants had inadequate knowledge and misconceptions of the thyroid-gland and associated disorders (Rai et al., 2016). In contrast, Almuzaini et al., (2019) showed that 42.68 percent of respondents had poor knowledge about thyroid issue diseases, compared to 57.32 percentage points of respondents who had high knowledge. Respondents were more aware that thyroid is an endocrine gland (77.9%) and thyroid dysfunction affects blood cholesterol level (62.4%) furthermore, (42.1%) of participants knew that thyroid dysfunction is not a genetic disease (Almuzaini et al., 2019).

According to a survey in Tabuk-City, 52 percent of respondents had strong knowledge, while 45% had inadequate knowledge, similar to the findings of a study in Riyadh about the thyroid-gland and its disorders (Alhawiti et al., 2018). In Malaysia, paper among 288 women in Selangor; found nearly half (51.7%) women have-good-knowledge regarding thyroid disorder and 48.3% of women have poor knowledge (Mohamed et al., 2020). 76.4% women knew that "THYROID" is a ductless gland in the body, 10.1% women did know about this and the others 13.5% have no idea about the "THYROID" also, 54.2% women answered "YES" for thyroid disorder affects brain development (Mohamed et al., 2020).

Regarding to knowledge about symptoms of hypothyroidism and hyperthyroidism, 82.2% of our study participants knew that weight gain with no change in appetite is a symptom of hypothyroidism. 41.1% reported that constipation is a symptom of hypothyroidism. 61.5% reported that dry skin and hair loss are symptoms of hypothyroidism. 57% reported that palpitations are a symptom of an over-active-thyroid-gland. 59.6% reported that excessive sweating is a symptom of hyperthyroidism. 56.9% reported that weight loss with high appetite is a symptom of hyperthyroidism. 55.9% of participants reported that anxiety and insomnia are symptoms of hyperthyroidism.

In a previous study conducted among the Saudi population; the majority know that 77.9% Weight gain as symptoms of hypothyroidism, 74.9% Depression and fatigue, nearly half of participant (54.1%) reported feeling cold, 58.1% Dry skin and hair loss, 56.3% Irregular menstrual periods 36.1% Constipation, 29.1% Abortion 28.5% Mental retardation and growth failure as symptoms of hypothyroidism. Also, the participants have a good-knowledge about symptoms of hyperthyroidism; they know Anxiety, insomnia and tension, Palpitations, Sweating more than usual, Weight loss-despite increased-appetite and Changes in the menstrual cycle as a symptom of hyperthyroidism (Alqahtani, 2021). In the KSA, Alyahya et al., (2021) show that the following indications of thyroid conditions, including fatigue, were known to respondents (81.7%), followed by neck lump (70.9%). 68.9% of respondents think feeling cold and weight gain are common symptoms of having hypothyroidism and 63% think feeling hot and weight loss are common symptoms of having hyperthyroidism (Alyahya et al., 2021).

In Riyadh, added paper found that the knowledge of the respondents was good as (81%) knew that insomnia and lack of sleep are symptoms of hyperthyroidism and (79.7%) agreed that loss of weight despite a good appetite is a symptom of hyperthyroidism

(Almuzaini et al., 2019). However, manifestations of hypothyroidism were recognized by a lower percentage of respondents (Almuzaini et al., 2019). In Tabuk city, Alhawiti et al., (2018) found that the knowledge of the respondent's regards symptoms of hyperthyroidism was poor as only half the respondents roughly identified the common manifestations of the disease. The intolerance to hot weather and menstrual disturbances with hyperthyroidism were the least identified (50.7% and 44.3%). Symptoms of hypothyroidism were distinguished by a higher percentage of respondents, especially weight gain (76% of respondents), fatigability and sleepiness (74.9%) and dryness of skin and hair (64.2%) (Alhawiti et al., 2018). In Malaysia, Mohamed et al., (2020) found that 60.1% of cases have answered "YES" for insomnia and lack of sleep as symptoms of hyperthyroidism, 20.5% answered "NO" and the others answered, 19.4% women answered, "DON'T KNOW". The symptoms of loss of weight despite good appetite in hyperthyroidism were identified by 58.7% of participants. Also, 57.3% of cases think that skin and hair dryness as the symptoms of hypothyroidism, 55.6% said that sudden increase in weight is a symptom of hypothyroidism (Mohamed et al., 2020).

Knowledge about risk-factors related to thyroid-disorders is a significant aspect. In our study, iodine deficiency was identified as a risk-factor for thyroid-disease by 58.8% of participants. Smoking was reported as a risk factor of goiter by 49.9%. Old age was reported as a risk of thyroid disease by 42.5%. Exposure to radiation in childhood was reported as a risk-factor for thyroid-cancer by 55.3%. Family-history of thyroid-cancer was reported as a risk-factor for thyroid-cancer by 61.9%. Goiter was reported as a risk-factor for thyroid-cancer by 58.5%. Algahtani, (2021) reported that most participants had poor knowledge about the risk-factors for thyroid-diseases and thyroid cancer (39.7%). High and moderate knowledge were seen in (24.9%) and (35.4%) of the surveyed subjects, respectively. Alqahtani, (2021) showed that 55.8% of respondents chose the correct answer that iodine deficiency is a risk-factor for thyroid-diseases also, female gender was identified by 58.4% of cases, family history of thyroid-disease 53.1%, obesity and diabetes mellitus 47.8%, older age 29.4% and smoking 27.8% as a risk-factors of thyroid-disease. Moreover, 37.5% of participants know frequent exposure to radiation in childhood, 49% for family-history of thyroid-cancer, 56.8% for Goiter as risk-factors of thyroid-cancer (Alqahtani, 2021). Alyahya et al., (2021) reported that Insufficient or excessive iodine intake, which is a risk-factor for thyroid-diseases, was the risk factor that respondents knew the most about 61.3 percent, then comes pregnancy and the postpartum phase 61.1 percent and radiation exposure (57.4%) also, 40.5% of responders agreed that smoking is a risk-factor for thyroid-diseases.

As regards treatment modalities of different thyroid-diseases, 75.4% of our participants reported that some thyroid-diseases need surgical intervention. 46.2% reported that radio-active-iodine is a treatment-option for thyroid-disorders. Alqahtani, (2021) found that the majority of cases 75.8% think that medication used as a treatment followed by 52.9% for surgery and 38.3% for radioiodine treatment.

Our study displayed a significant-association between knowledge of thyroid disorders with gender and age of participants. Alqahtani, (2021) show that there was a statistically significant link between the overall knowledge and age, gender and education level ($p<0.001$). Alyahya et al., (2021) reported that the knowledge of respondents was statistically significantly higher in the following variables, including being a female ($p<0.001$), being a student ($p=0.003$), while age group, nationality, marital status, educational level and annual income did not show a significant difference when compared to the overall knowledge score (all $p>0.05$). Alhawiti et al., (2018) demonstrated that respondents with good-knowledge had a significantly higher percentage in age group"20 – 35" than those with poor knowledge ($p = 0.01$).

5. CONCLUSION

The Saudi general population showed generally a poor level of knowledge of thyroid-disorders compared to international Figures. To increase the general public's and their care givers' understanding of the various aspects of thyroid disorders and the importance of their early detection and adequate control, the health authorities should hold more effective health education events. Patients would be more drug-compliant, follow-up more frequently and provide the right information to their family and friends if they were more informed about their thyroid condition.

Recommendations

We recommend that further educational campaigns should be inaugurated to raise awareness and knowledge about thyroid disorders.

Ethical approval

The research proposal was approved by the Regional Research and Ethics committee of Najran University, southern Saudi Arabia, with letter number (444-32-17827-DS).

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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