



Assessment of Knowledge and Attitude Regarding Thyroid Disorders among Population in Taif City, Saudi Arabia

**Lotfi Fahmi Issa^{a*#}, Moayyad Fateh Alotbi^{b†}, Rami Faleh Algethami^{b†},
Abdulrahman Awadh Alharthi^{b†}, Faisal Abdullah Algarni^{b†},
Khalid Awwadh Alharthi^{b†}, Majed Adel Alosaimi^{b†},
Sultan Abdullah Algarni^{c≡} and Sawsan Abdullah Awadh AlGarni^d**

^a *Department of Family and Community Medicine, Division of Public Health and Community Medicine, Faculty of Medicine, Taif University, Taif, Kingdom of Saudi Arabia.*

^b *Faculty of Medicine, Taif University, Taif, Kingdom of Saudi Arabia.*

^c *Ministry of Defense, Saudi Arabia.*

^d *Joint Program of Family Medicine Postgraduate Studies, Al-Madinah, Saudi Arabia.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i59B34432

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/79111>

Original Research Article

**Received 10 October 2021
Accepted 16 December 2021
Published 18 December 2021**

ABSTRACT

Background: Thyroid disorders are among the commonest endocrine disorders worldwide. Attention on people's knowledge and awareness about thyroid diseases is very important in helping for early diagnosis and early treatment of these disorders. The aim of this study to assess the degree of knowledge and attitude of thyroid gland and their disorders among general population in Taif City, KSA.

Methodology: A cross-sectional study was conducted on a representative sample of 600 Saudi adults of Taif general population. A pre-designed online questionnaire was used for data collection which consists of sociodemographic data, questions regarding knowledge and awareness of thyroid disorders. All data was entered and analyzed by using SPSS program version 22.

[#]Assistant Professor

[†]Medical Student

^{*}Student

[≡]General Physician

^{*}Corresponding author: E-mail: l.issa@tu.edu.sa;

Results: A total of 600 participants responded to the online questionnaire. Majority of respondents were aged between 18 to 32 years and males' subjects were higher compared to the male counterparts (50.8%). Mean knowledge score of participants was 36.12. Participants who scored higher were 46.3% and considered as good knowledge level. 53.7% had bad knowledge level as they scored lower than mean score knowledge.

Conclusion: Our study population show relatively good knowledge level compared to previous literature. Knowledge score was significantly associated with gender, educational level, working status and family income per month.

Keywords: Thyroid disorders; awareness; knowledge; Saudi Arabia.

1. INTRODUCTION

The thyroid gland is the largest endocrine-shaped bow tie consisting of two lobes, which are situated on the trachea, just below Adam's apple in the neck. The main functions of thyroid gland are to secrete hormones inside the human beings, control the metabolic rate, neurocognitive, protein synthesis and growth development in children. Other function of thyroid gland is secreting calcitonin hormone that plays a role in calcium hemostasis [1].

Hyperthyroidism is characterized by increased synthesis of the thyroid hormones and thyroid gland secretion whereas thyrotoxicosis refers to the clinical condition of excess thyroid hormones in circulation, regardless of source. Graves' disease is the most common cause of hyperthyroidism accompanied by toxic nodular goiter [2].

Impairment of thyroid gland to secrete their hormones cause hypothyroidism. There are two types of hypothyroidism: Primary abnormality in the thyroid gland itself or secondary/central hypothalamic or pituitary disease. About 99% of patients with hypothyroidism are diagnosed as Primary hypothyroidism [3].

The World Health Organization (WHO) estimates that over than 190 million people suffer from iodine deficiency disorders [4]. In the developed countries, the prevalence of hypothyroidism, the most popular type of thyroid dysfunction is 4 -5% [5]. While thyroid dysfunction typically develops over course of their lifetime in more than 12 percent of the US population, true thyroid emergencies are rare [6].

For evaluate and screen thyroid functions and help to diagnose thyroid disorders, the most common test is a "thyroid function test panel" which is appear level of thyroid-stimulating

hormone (TSH), Free T4 (thyroxine) and Free T3 or total T3 (triiodothyronine) [3].

Autoimmune thyroiditis, dietary iodine deficiency, previous thyroid surgery or irradiation, intake of drugs, such as lithium, and pituitary, and hypothalamic disorders consider the causative factors of thyroid dysfunction [7].

According to the American Thyroid Association, all adults who are 35 years or above must be screened for thyroid disorders and the serum thyrotrophic concentration every 5 years [8]. Awareness about thyroid disease among the Indian community is low, despite of high percentage of thyroid disease among Indian population comparing to other countries [9]. Previous studies conducted on Saudi population suggested limited awareness about this disease among Saudi general population as studies carried out by Alhazmi in 2020 among Makkah city population and by Khalifa in Riyadh city in 2019 that found poor knowledge among most of the participants regarding risk factors and prevention of thyroid diseases, and about the clinical characteristics of thyroid disease the knowledge was moderate.

For the farthest, we know there are no studies that done in Taif city about assessment of population knowledge and awareness regarding thyroid disorders, so we conduct this study that aims to assess the degree of knowledge and attitude of thyroid disorders among the Saudi population to develop awareness measures for tackling the problem.

2. PARTICIPANTS AND METHODS

2.1 Study Designs and Settings

A cross sectional population-based study was conducted in Taif, KSA from June 2021 to November 2021. Taif city is located on the

eastern slopes of the Al-Sarawat Mountains above Makkah and Jeddah, and it is elevated about 5,600 ft meters above sea-level. According to the Central Department of Statistics and Information, residents of Taif are 1109, 84 (884,107 Saudi and 225,739 non-Saudi) [10]. Taif city was divided into four regions: East, West, North, and South. The study will include a representative sample all Participants in Taif city during the time period of the study.

2.2 Study Subjects

The study included 600 participants males and females who live in Taif city will be chosen by simple random sample with confidence level 95%, margin of error 5%.

2.3 Inclusion Criteria

The following were considered as inclusion criteria:

- People who are living in the city of Taif and
- Participants who are 18 years old or over.

2.4 Exclusion Criteria

The following were considered as exclusion criteria:

- Those who did not give their consent,
- People working in the health field, and
- Adolescents younger than 18.

2.5 Sample Size and Sampling Technique

A random stratified sampling technique was followed.

The minimum sample size for this study has been decided according to Swinscow, as follows:

$$n = Z^2 \times P \times Q$$

D2

Where:

n: Calculated sample size

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

$n = (1.96)^2 \times 0.50 \times 0.50 = 384$. The final sample size was 600

2.6 Study Tool

An electronic based modified self-administered questionnaire (from a previous study and validated by Almuzaini [7]) was distributed among 600 Participants resident in Taif City to be filled. The questionnaire included socio-demographic data and questions to assess knowledge about the type and functions of the thyroid gland, its disorders, factors affecting thyroid disorders, and their common manifestations.

2.7 Data Analysis and Statistical Tests

Data was analyzed using The Statistical Package of Social Science Software (SPSS) program version 22 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) for statistical analysis. Frequency and percent were used for categorical variables, while the mean and standard deviation were calculated for ongoing variables. Chi test and t test were used to assess the relation between different variables. A P value of < 0.05 was considered statistically significant.

Scores were assigned to the respondent's replies: 0 for no, I don't know or the wrong choice; and 1 for yes or correct choice. The total score for Knowledge was computed by summing the individual scores for questions 5 to 20.

3. RESULTS

In this study, a total of 600 participants responded to the online questionnaire. Majority of respondents were aged between 18 to 32 years and males' subjects were higher compared to the male counterparts (50.8%). Furthermore, 59.7% of the subjects had a university degree and 10.5% of the subjects were unemployed (Table 1).

In regards to the questions concerned with the type and functions of the thyroid gland and the potential causes for its disorder. Respondents were more aware of the following: thyroid is an endocrine gland (69.8%), and thyroid dysfunction affects blood cholesterol level (49.7%). Poor knowledge was found as regards a confirmed relationship between smoking and thyroid disturbances where only (13.8%) of the subjects answered no which was the correct

answer. Furthermore, (30%) of participants knew that thyroid dysfunction is not a genetic disease (Table 2).

According to (Table 3); mean knowledge score of participants was 36.12. Participants who scored higher were 46.3% and considered as good knowledge level. 53.7% had bad

knowledge level as they scored lower than mean score knowledge.

As illustrated in (Table 3): knowledge score was significantly associated with gender, educational level, working status and family income per month (P= 0.002, P= 0.028, P= 0.003 and P= 0.004 respectively).

Table 1. Sociodemographic characteristics of participants (n=600)

Parameter	No.	Percent
Age	• 18- 32 years old	313 52.2
	• 33 - 50 years old	178 29.7
	• More than 50	109 18.2
Gender	• male	305 50.8
	• female	295 49.2
Education level	• Preparatory	4 7.
	• medium	14 2.3
	• secondary	97 16.2
	• university	358 59.7
	• Postgraduate	35 5.8
Job	• graduate	92 15.3
	• Officer	215 35.8
	• unemployed	63 10.5
	• House wife	66 11.0
	• student	184 30.7
	• retired	72 12.0
Social status	• married	300 50.0
	• single	275 45.8
	• divorced	19 3.2
	• widow	6 1.0
Family income per month	• Low < 5,000 SAR.	97 16.2
	• Average 5,000 - < 10,000 SAR.	201 33.5
	• High ≥ 10,000 SAR.	302 50.3

Table 2. Knowledge of participants thyroid disorders and associated factors (n=600)

	Yes	No	I don't no
The thyroid gland is an endocrine gland	419 69.8	37 6.2	144 24.0
Thyroid dysfunction affects brain development in children	286 47.7	85 14.2	229 38.2
Thyroid dysfunction affects the level of cholesterol in the blood	298 49.7	74 12.3	228 38.0
Thyroid dysfunction leads to heart disease	254 42.3	111 18.5	235 39.2
Exercise affects thyroid dysfunction	214 35.7	231 38.5	155 25.8
There is a confirmed relationship between smoking and thyroid disorders	267 44.5	83 13.8	250 41.7
Thyroid dysfunction is hereditary	218 36.3	180 30.0	202 33.7

Table 3. Knowledge of participants of symptoms of hyperthyroidism (n=600)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Weight loss despite a good appetite is a symptom of hyperthyroidism	54 9.0	33 5.5	163 27.2	77 12.8	273 45.5
Insomnia and lack of sleep are symptoms of hyperthyroidism	35 5.8	43 7.2	197 32.8	92 15.3	233 38.8
Increased heart rate is a symptom of hyperthyroidism	56 9.3	52 8.7	194 32.3	95 15.8	203 33.8
Inability to tolerate hot weather and wearing light clothing in cold weather are symptoms of hyperthyroidism	67 11.2	67 11.2	197 32.8	83 13.8	186 31.0
Oligomenorrhea and amenorrhea are symptoms of hyperthyroidism	62 10.3	79 13.2	249 41.5	69 11.5	141 23.5
Sudden weight gain despite loss of appetite is a symptom of hypothyroidism	40 6.7	33 5.5	128 21.3	88 14.7	311 51.8
Fatigue and drowsiness are a symptom of hypothyroidism	38 6.3	37 6.2	159 26.5	88 14.7	278 46.3
Dry skin and hair are a symptom of hypothyroidism	44 7.3	50 8.3	193 32.2	93 15.5	220 36.7
Feeling cold in hot weather is a symptom of hypothyroidism	53 8.8	55 9.2	202 33.7	92 15.3	198 33.0

Table 4. Knowledge score of participants

Mean score	36.12	
Score good knowledge	278	46.3%
Score low knowledge	322	53.7%

4. DISCUSSION

Thyroid dysfunction is one of the most common endocrine disorders. It accounts for approximately 30% to 40% of patients who visit the endocrinology clinic. Thyroid dysfunction is one of the most common problems in clinical practice and has become more prevalent throughout the world in recent decades; therefore, its

associated risk factors have received much attention. These disorders are frequently under-diagnosed [11]. In general, lack of knowledge and understanding of thyroid disorder effects can lead patients to go undiagnosed. In Saudi Arabia, the prevalence of thyroid dysfunction is constantly increasing, especially in women [12].

Table 5. Relationship between knowledge and sociodemographic features of the participants

		Knowledge score		Total (N=600)	P value
		Good knowledge	Poor knowledge		
Age	18-32 years old	134	179	313	0.186
		48.2%	55.6%	52.2%	
	33 - 50 years old	88	90	178	
		31.7%	28.0%	29.7%	
	More than 50	56	53	109	
		20.1%	16.5%	18.2%	
Gender	male	122	183	305	0.002
		43.9%	56.8%	50.8%	
	female	156	139	295	
		56.1%	43.2%	49.2%	
Education level	Preparatory	4	0	4	0.028
		1.4%	0.0%	0.7%	
	medium	8	6	14	
		2.9%	1.9%	2.3%	
	secondary	49	48	97	
		17.6%	14.9%	16.2%	
	university	172	186	358	
		61.9%	57.8%	59.7%	
Postgraduate	13	22	35		
	4.7%	6.8%	5.8%		
graduate	32	60	92		
	11.5%	18.6%	15.3%		
Working status	Officer	86	129	215	0.003
		30.9%	40.1%	35.8%	
	unemployed	21	42	63	
		7.6%	13.0%	10.5%	
	House wife	35	31	66	
		12.6%	9.6%	11.0%	
	student	92	92	184	
		33.1%	28.6%	30.7%	
	retired	44	28	72	
		15.8%	8.7%	12.0%	
Social status	married	145	155	300	0.771
		52.2%	48.1%	50.0%	
	single	121	154	275	
		43.5%	47.8%	45.8%	
	divorced	9	10	19	
		3.2%	3.1%	3.2%	
	widow	3	3	6	
		1.1%	0.9%	1.0%	
Family income per month	Low < 5,000 SAR.	39	58	97	0.004
		14.0%	18.0%	16.2%	
	Average 5,000 - < 10,000 SAR.	79	122	201	
		28.4%	37.9%	33.5%	
	High ≥ 10,000 SAR.	160	142	302	
		57.6%	44.1%	50.3%	

According to our study, mean knowledge score of participants was 36.12. Participants who scored higher were 46.3% and considered as good knowledge level. 53.7% had bad knowledge level as they scored lower than mean score knowledge. Almuzaini et al. [7] found that 57.32% of respondents had good knowledge, while 42.68% had poor knowledge about the thyroid gland and its disorders. Good knowledge was observed in questions regarding the type of thyroid gland (endocrine; by 77.9% of respondents), and thyroid dysfunction affects blood cholesterol level (62.4%). According to a study conducted in Tabuk city, the knowledge percent was close to our results which were 52% of respondents having good knowledge, while 45% have poor knowledge about the thyroid gland and its disorders. Good knowledge was demonstrated in questions on the type of thyroid gland (endocrine; by 71.4% of respondents), and the most susceptible individuals to have disorders were women; by 90.4% of respondents [13]. Another Saudi study in Hail reported that, only 6.6% among the participants did not know what the thyroid gland is, while 93.4% have chosen specific answers that are facts regarding the thyroid on different levels of knowledge [14]. A study conducted at a cosmopolitan city of central India among women to assess knowledge and awareness regarding thyroid disorders concluded that females have inadequate knowledge of thyroid gland, and associated disorders and they had myths and misconception regarding thyroid disorders [15]. Askari et al. [16] study which was conducted on general practitioners in Iran which showed that the mean knowledge score of GPs was 39.9%. According to a cross sectional study conducted by Singh A. et al. out of 200 patients, 60 % of patients knew that thyroid is a gland situated in the neck and 50 % of patients knew about hypothyroidism and hyperthyroidism. 40 % of the patients thought that the thyroid medicines could be stopped once the thyroid function is normal [17]. A study conducted by Kumar Pradeep et al. among 250 patients revealed that 35.2% and 51.2% of patients know the meaning of thyroid and hypothyroidism respectively. Only 25.6% of patients know the type of medicines used for treatment of hypothyroidism [18].

Thyroid disorder can lead to a wide range of symptoms, including hypoplasia of erythroid cells in the bone marrow or proliferation of immature erythroid progenitor cells (due to hypothyroidism), or hyperplasia (due to hyperthyroidism). In general, thyroid dysfunction

can lead to different effects on blood cells and anemia of multifarious severity and types [19-21]. In our study, hyperthyroidism manifestations' knowledge were higher in our participants as (38.8%) had the knowledge that Insomnia and lack of sleep are symptoms of hyperthyroidism, and (45.5%) agreed that Loss of weight despite good appetite is a symptom of hyperthyroidism. Almuzaini et al. [7] reported that (81%) had the knowledge that Insomnia and lack of sleep are symptoms of hyperthyroidism, and (79.7%) agreed that Loss of weight despite good appetite is a symptom of hyperthyroidism. Another study reported lower figures as only 25% of the respondents had given correct response on sign and symptoms of thyroid disorders [22]. Another Saudi study reported that participants knew that hypothyroidism is associated with weight gain (68.9%) and 63.4% of the responders believe that weight loss changes are associated with hyperthyroidism [23]. In comparison, the study by Rai et al., as around (50%) answered that weight gain is characteristic of hypothyroidism. Moreover, the study by Rai et al. showed that it is about 61% think fatigue is a symptom, while the current study concludes 81.7% agreeing with this information [15]. On the other hand, a study conducted in Saudi Arabia suggested that 25.3% of the population responded by recognizing the relationship of neck swelling, constipation, and diarrhea as symptoms of thyroid disease [24].

In our study, knowledge score was significantly associated with gender, educational level, working status and family income per month. Another study reported that age, sex, education, and occupation had no significant effect on the knowledge level of the respondents ($p > 0.05$) [7]. Another Saudi study reported that mean knowledge score among the socio-demographic profiles and previous history of thyroid disease, being a female, living in Al Ahsa, being a student, those with a previous history of thyroid disease, family history of the disease, and those who underwent thyroid gland examination were significantly more associated with having better knowledge toward thyroid diseases [23]. Compared with a study conducted in Saudi Arabia, there is no significant difference between gender in the level of knowledge [25].

5. CONCLUSION

Our study population show relatively good knowledge level compared to previous literature. Knowledge score was significantly associated with gender, educational level, working status

and family income per month. Health officials should use more effective health education methods to raise public and caregiver awareness of thyroid disorders and the importance of early detection and adequate control. Patients would be more drug-compliant, follow-up on a regular basis, and distribute accurate information to their family and friends if they were more aware of and knowledgeable about their thyroid condition.

CONSENT AND ETHICAL APPROVAL

Ethical approvals were obtained from the Research Ethics Committee of Taif University. During the research activities, each studied participant was informed about the study objectives with a stress on the confidentiality of collected data and obtaining consents from the subjects to participate in the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Fariha T. Awareness and Prevalence of Hypothyroidism in Endocrine Disordered Patients of Bangladesh. Published Online 2012.
2. De Leo S, Lee SY, Braverman LE. Hyperthyroidism. *Lancet*. 2016; 388(10047):906-918. DOI:10.1016/S0140-6736(16)00278-6
3. Khalifa A, Alotaibi A, Albahlal A, et al. General Public Awareness About Symptoms And Risk Factors of Some Thyroid Diseases In KSA, Riyadh 2019. *Int J Med Dev Ctries*. 2019;3(January):44-51. DOI:10.24911/ijmdc.51-1563109418
4. WHO. Assessment of the iodine deficiency disorders and monitoring their elimination. WHO, Geneva. Published Online 2007:1-107. DOI: ISBN 978 92 4 159582
5. Ahmad N, Panthari M, Gupta A, Chandra P, Nafees S. Prevalence of hypothyroidism among patients of Meerut, Uttar Pradesh - A hospital based study. *Int J Med Sci Public Heal*. 2013;2(3):539. DOI: 10.5455/ijmsph.2013.080320132
6. Hampton J. Thyroid gland disorder emergencies: Thyroid storm and myxedema coma. *AACN Adv Crit Care*. 2013;24(3):325-332. DOI: 10.1097/NCI.0b013e31829bb8c3
7. Almuzaini A, Alshareef B, Alghamdi S, et al. Assessment of knowledge and awareness regarding thyroid disorders among Saudi people. *Int J Med Dev Ctries*. 2019;3(September):100-106. DOI: 10.24911/ijmdc.51-1568037206
8. Stagnaro-Green A, Abalovich M, Alexander E, et al. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. *Thyroid*. 2011;21(10):1081-1125. DOI: 10.1089/thy.2011.0087
9. Pourvaghar MJ, Bahram ME, Sayyah M, et al. Adiponectin, insulin sensitivity and diabetic retinopathy in latinos with type 2 diabetes. *J Clin Endocrinol Metab*. 2016; 11(1):3348-3355. DOI: 10.4103/ijem.IJEM
10. Hamam F, Eldalo A, Albarraq A, et al. The prevalence of asthma and its related risk factors among the children in Taif area, Kingdom of Saudi Arabia. *Saudi J Heal Sci*. 2015;4(3):179. DOI:10.4103/2278-0521.171436
11. Afrin G, Misra A, Rathore B, Kumar V, Singh K, Shukla V. Study of prevalence of hypothyroidism in type 2 diabetes mellitus patients of Lucknow and surrounding areas [cited 2019 Sep 15]. Available: https://www.researchgate.net/publication/332271743_STUDY_OF_PREVALENCE_OF_HYPOTHYROIDISM_IN_TYPE_2_UNDER_PEER_REVIEW_DIABETES_MELLITUS_PATIENTS_OF_LUCKNOW_AND_SURROUNDING_AREAS
12. Alqahtani SAM. Prevalence and Characteristics of Thyroid Abnormalities and Its Association with Anemia in ASIR Region of Saudi Arabia: A Cross-Sectional Study. *Clin Pract*. 2021;11(3):494-504. Published 2021 Aug 6. DOI: 10.3390/clinpract11030065
13. Alhawiti AM, Albalawi AS, Alghamdi AA, Albalawi AA. Assessment of public knowledge regarding the differences between hyperthyroidism and hypothyroidism. *Egypt J Hosp Med*. 2018;70(9). Available: <https://doi.org/10.12816/0044689>
14. Almousa, Abdulrahman Ibrahim S., and Atheer Mohammed D. Alotaibi. Survey of

- awareness of thyroid disorders among the Riyadh population, Central Region of Saudi Arabia. The Egyptian Journal of Hospital Medicine. 2018;72(2):4039-4044.
15. Rai S, Sirohi S, Khatri AK, Dixit S, Saroshe S. Assessment of knowledge and awareness regarding thyroid disorders among women of a cosmopolitan city of central India. Ntl J Community Med. 2016; 7(3):219–22
 16. Askari S, Abdi H, Ahmadi S, et al. Knowledge of Thyroid Disorders during Pregnancy among General Practitioners in Iran. International Journal of Endocrinology and Metabolism. 2017;15(3):e55450.
 17. Singh A, et al. Knowledge, awareness and practices among patients with thyroid swelling attending cytology clinic in a medical college, Meerut. Indian Journal of clinical practice. 2014;24(8):753-755.
 18. Kumar Pradeep et al. knowledge, awareness, practice, adherence to treatment of patients with primary hypothyroidism in Delhi. Indian J Endocrinol Metab. 2017;21(3):429-433.
 19. Follin C, Yedinak C, Grossman A. Advanced Practice in Endocrinology Nursing So a Llahana.; 2019. DOI:<https://doi.org/10.1007/978-3-319-99817-6> Library
 20. Madariaga AG, Santos Palacios S, Guillén-Grima F, Galofré JC. The incidence and prevalence of thyroid dysfunction in Europe: A meta-analysis. J Clin Endocrinol Metab. 2014;99(3):923-931. DOI: 10.1210/jc.2013-2409
 21. Rai S, Sirohi S, Khatri AK, Dixit S, Saroshe S. Assessment of Knowledge and Awareness Regarding Thyroid Disorders Among Women of a cosmopolitan city of central india. Natl J Community Med. 2016;7(3):7-10.
 22. Konwar G, Deori U. Assessment of knowledge and awareness on thyroid disorders and impact of thyroid disorders during pregnancy among women in Assam. Int J Health Sci Res. 2019;9(9): 99-102
 23. Alyahya, Abdulwahab et al. "Knowledge of Thyroid Disease Manifestations and Risk Factors among Residents of the Eastern Province, Saudi Arabia." Cureus. 2021; 13(1):e13035. DOI: 10.7759/cureus.13035
 24. Survey of awareness of thyroid disorders among the Riyadh population, Central Region of Saudi Arabia. Abdulrahman Ibrahim AM. Egypt J Hosp Med. 2018; 72:4039–4044.
 25. Assessment of knowledge and awareness regarding thyroid disorders among Saudi people. Almuzaini A, Alshareef B, Alghamdi S, et al. IJMDC. 2019;3:100–106.

© 2021 Issa et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<https://www.sdiarticle5.com/review-history/79111>