



Knowledge, Attitude and Practice of ENT Physicians Considering Thyroid Nodules During Pregnancy: A Cross-Sectional Study

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Abstract

Background: There is limited information considering the familiarity of ENT physicians toward thyroid nodules during pregnancy. Most surveys in this field were focused on the thyroid disorders and among other population. Therefore, the aim of this study was to evaluate the knowledge, attitude, and practice of ENT physicians toward thyroid nodules during pregnancy. **Methodology:** This is a cross-sectional study that was conducted among ENT physicians in Saudi Arabia in the period between July 2022 and September 2022. The study depended on self-reported questionnaire that was distributed using Google sheets via E- mail through the Saudi Commission for Health Specialties. The questionnaire was prepared by the researchers depending on the previous literature review. The questionnaire consisted of four sections of 24 questions considering demographic factors, knowledge, attitudes, and practices toward thyroid nodules. **Results:** In this study, we were able to collect data from 385 ENT physicians. Among the participants, 60.3 % of them were at 26-35 years group and 69.6 % were males. Moreover, 75.1 % of the participants were residents, 16.6 % were consultant and 8.3 % were registrars. 43.6 % of the ENT physicians had adequate knowledge considering thyroid nodules in pregnancy while 22.3 % of the participants had positive attitude toward thyroid nodules during pregnancy and 47.0 % of the ENT physicians in this study had proactive practice toward thyroid nodules in pregnancy. Age, higher scientific degree and occupation are factors that had significant on the physicians' knowledge, attitude, and practice. **Conclusion:** Knowledge, attitude, and practices of ENT physicians toward thyroid nodules during pregnancy is not adequate. Needs for increasing the awareness of the ENT physicians throughout courses and campaigns is necessary.

Keywords: *Pregnancy, Nodule, thyroid gland, ENT physicians, Knowledge, Attitude, Practice*

Introduction

Thyroid nodules have become increasingly common worldwide where most of cases occur among women of childbearing age [1,2]. Several studies have examined the prevalence of thyroid nodules during pregnancy using ultrasonography and reported a prevalence ranged between 3 and 30 % which is correlated with increasing age and parity [3,4]. Pregnancy is known to be associated with an increase in the size of preexisting thyroid nodules in additions to the new thyroid nodule formation [5]. In a previous study, the authors showed that pregnancy double the size of preexisting thyroid nodule [6], and another study reported increased transient increase in the nodular volume during pregnancy [7]. Moreover, up to 20 % of pregnant women who developed thyroid nodule during the first trimester of pregnancy developed another nodule before delivery [3,6]. Thyroid nodules is associated with higher risk for developing more malignancy conditions where the prevalence of malignancy in patients with thyroid nodules developed during pregnancy according to different studies was ranging between 12 % and 43 % [8-10].

The initial evaluation of thyroid nodules in pregnant women is similar to the general population should include a careful history and physical examination [11]. Neck ultrasound remains the most accurate and safe imaging modality that could be used for detection of thyroid nodules, assessment of their pattern and features, and surveying cervical lymph nodes in pregnancy [5]. Sonography characteristics of thyroid nodules should be correlated to malignancy risk according to a risk stratification algorithm in order to guide decision-making considering fine-needle aspiration (FNA) biopsy [12,13].

However, pregnancy is considered a risk factor in development of thyroid nodular disorders and some studies showed that using of suppressive doses of levothyroxine is associated with modest shrinkage of up to 20 % of nodules, this practice is not recommended because of the potential risks of iatrogenic thyrotoxicosis [12,14]. Thyroid nodules that are found to be cytologically benign in pregnancy could be managed in similar way as in those in the general populations [12,13]. Pregnant women with cytologically indeterminate thyroid nodules showed be managed

conservatively during pregnancy particularly since no prospective studies were found to evaluate the prognosis of these women and because most of these nodules are found later to be benign [12].

Thyroid nodules produce additional amount of thyroxine and the extra thyroxine can cause symptoms of an overproduction of thyroid hormones (Hyperthyroidism) [15]. Maternal hyperthyroidism during pregnancy is associated with miscarriage, preterm birth, low birth weight, fetal death and defective fetal neurocognitive development [16,17].

Regarding the high prevalence of thyroid disorders including thyroid nodule and their undesirable impacts on pregnant women as well as their newborns, precise evaluation, diagnosis and management are critical in those cases. However, optimal treatment of maternal thyroid disorders is significant in achievement favorable pregnancy outcomes, detection and treatment of maternal thyroid disorders during pregnancy are still controversial issues during clinicians [18-20]. Endocrinologist or ENT (ear, nose and throat) specialist or otolaryngologist should diagnosis and treat cases of thyroid nodules among pregnant women. It is important to ensure the knowledge of all physicians dealing with medical conditions of neck including ENT physicians. However, there is limited information considering the familiarity of ENT physicians toward thyroid nodules during pregnancy. Most surveys in this field were focused on the thyroid disorders and among other population [21-23]. Therefore, the aim of this study was to evaluate the knowledge, attitude, and practice of ENT physicians toward thyroid nodules during pregnancy.

Methodology

This is a cross-sectional study that was conducted among ENT physicians in Saudi Arabia in the period between July 2022 and September 2022. Sample size was calculated using a standard sample size equation $n = Z^2P(1 - P)/d^2$, [24] for an assumed proportion of 50% ($P = 0.5$). Using a 95% confidence interval ($Z = 1.96$) and a 5% margin of error ($d = 0.05$), the required sample size was estimated as 385. The study inclusion criteria including all ENT physicians regardless of the number of years of practice, all residents, registrars and consultant who worked in Saudi Arabia. Exclusion criteria included other specialties, other working staff as nurses and dentists.

The study depended on self-reported questionnaire that was distributed using Google sheets via E- mail through the Saudi Commission for Health Specialties. The questionnaire was prepared by the researchers depending on the previous literature review. The questionnaire consisted of four sections of 24 questions: section one considering of six questions considering the demographic factors of the participants including age, gender, marital status highest scientific degree, nationality and occupation. Second part of the

questionnaire was consisted of six questions that aimed to assess the level of knowledge of the participants toward thyroid nodules during pregnancy. The questions were provided by yes, no and I do not know. Moreover, the third part was prepared to assess the attitude of participants toward pregnant women with suspected nodules consisted of six questions with 5 Likert scale answers (strongly agree, agree, neutral, disagree and strongly disagree). The part four consisted of 6 questions to assess the practice of ENT physicians toward pregnant women with thyroid nodules.

Considering knowledge part, all correct answers would be rewarded by one point while wrong answers and I do not know answers would take zero point, the sum of the answers was calculated to give a score between 0 and six. The participant needed answering four questions correctly at least to be classified having adequate knowledge. Terms in attitude and practice that indicated good practice and attitude would score higher scores to provide a score of attitude part between 0 and 24 points and practice between 0 and 5 points. Having attitude score of more than 16 and practice score of more than 3 were associated with positive attitude and proactive practice.

All participates had to agree to participate in the study where consent was incorporated into the survey as well as indication of the aims of the study and the right of the participate to withdraw at any time without any obligation. However, only completed questionnaires were used in the analysis. Participants' anonymity was assured where personal information of the participants was not required in this study. No rewards were given for participating in the study.

MS Excel was used for data entry, cleaning and coding while SPSS version 26 was used to perform the data analysis. Frequency and percentages were used for description of categorical variables while mean and standard deviation were used for numerical variables. T test and chi test were used to compare the different physician factors as gender, nationality and age with respect to the total score of the knowledge, practice and attitude. All statements will be considered significant when p value is lower than 0.05.

Results

In this study, we were able to collect data from 385 ENT physicians. Among the participants, 60.3 % of them were at 26-35 years group and 69.6 % were males. Moreover, 68.3 % of the participants were married and 29.9 % were single. Furthermore, 48.8 % of the participants were Saudi Arabian physicians and 56.1 % had bachelor's degree while 29.1 % had high diploma, 9.9 % had master's degree, 3.1 % had PhD and 1.8 % had board in medicine. Moreover, 75.1 % of the participants were residents, 16.6 % were consultant and 8.3 % were registrars (Table 1).

Table 1: Demographic factors of the participants (N=385)

		Count	Percent
Age	< 25	63	16.4
	26-35	232	60.3
	36-45	75	19.5
	> 45	15	3.9
Gender	Male	268	69.6
	Female	117	30.4
Marital status	Single	115	29.9
	Married	263	68.3
	Divorced/Widow	7	1.8
Nationality	Saudi	188	48.8
	Non-Saudi	197	51.2
Highest scientific degree	PhD in medicine	12	3.1
	Board in medicine	7	1.8
	Master's degree in medicine	38	9.9

	High diploma in medicine	112	29.1
	Bachelor's degree in medicine	216	56.1
Occupation	Resident	289	75.1
	Registrars	32	8.3
	Consultant	64	16.6

Considering knowledge toward thyroid nodules in pregnancy, 68.3 % of the participants knew that thyroid nodules are common among pregnant women while 49.1 % of them knew that pregnancy is associated with increase in the size of preexisting thyroid nodules and 52.2 % knew that pregnancy is associated with new thyroid nodule formation. Moreover, almost three quarter of the participants knew that neck ultrasound is safe in diagnosis of thyroid nodules

during pregnancy however, only one third of the participants knew that surgery is not the first-line management in case of benign thyroid nodules during pregnancy and 84.7 % had the knowledge that inadequate management of the thyroid nodules is associated with poor pregnancy outcomes. In general, 43.6 % of the ENT physicians had adequate knowledge considering thyroid nodules in pregnancy (**Table 2**).

Table 2: The knowledge of ENT physicians toward thyroid nodules in pregnancy

Knowledge	Count	Percent	Count	Percent
Thyroid nodules are common among pregnant women (correct)	263	68.3	122	31.7
Pregnancy is known to be associated with an increase in the size of preexisting thyroid nodules (Correct)	189	49.1	196	50.9
Pregnancy is known to be associated with new thyroid nodule formation (Correct)	201	52.2	184	47.8
Neck ultrasound is not safe in diagnosis of thyroid nodules during pregnancy (Wrong)	283	73.5	102	26.5
Surgery is the first-line management in case of benign thyroid nodules (Wrong)	128	33.2	257	66.8
Inadequate management of thyroid nodules is associated with poor pregnancy outcomes (Correct)	326	84.7	59	15.3
Total knowledge:	Adequate		168	43.6
	Inadequate		217	56.4

Considering attitude of the ENT physicians toward thyroid nodules during pregnancy, we found that 43.6 % of the physicians agreed that ENT physicians have significant role in diagnosis and management of thyroid nodules while 29.4 % of them thought that pregnant women with thyroid disorders should not be referred to endocrinologist. Moreover, 45.7 % of the participants thought that ENT physicians should provide the pregnant women with thyroid nodules with proper treatment and 24.2 % of them would refer

pregnant women with improper thyroid lab tests to endocrinologist. Furthermore, almost half of the participants agreed that ENT physicians' work is significantly related with thyroid disorders and 27.5 % reported that they will have some doubts and fears from dealing with pregnant women suspected by thyroid nodules. In general, 22.3 % of the participants had positive attitude toward thyroid nodules during pregnancy (**Table 3**).

Table 3: Attitude of the ENT physicians toward thyroid nodules during pregnancy

Attitude	Strongly agree/ agree		Neutral		Disagree/ Strongly disagree	
	Count	Percent	Count	Percent	Count	Percent
ENT physicians have a significant role in diagnosis and management of thyroid nodules	168	43.6	149	38.7	68	17.7
Pregnant women with thyroid disorder should be referred to Endocrinologist	89	23.1	183	47.5	113	29.4
ENT physicians should provide the pregnant women with thyroid nodules with proper treatment	176	45.7	124	32.2	85	22.1
ENT physicians should refer pregnant women with improper thyroid hormonal lab tests to endocrinologist	93	24.2	181	47.0	111	28.8
ENT physicians' work is significantly related with thyroid disorders	189	49.1	102	26.5	94	24.4
I will have some doubts and fears from dealing with pregnant women suspected by thyroid nodules	106	27.5	56	14.5	223	57.9
Attitude	Positive		86		22.3	
	Negative		299		77.7	

Considering practice, we found that 78.2 % of the participants would refer patients with malignant thyroid nodules to endocrinologist while 69.6 % would ask for lab thyroid tests according to symptoms and 55.1 % reported that they examine the thyroid size and appearance in the regular examination of patients. Moreover, 67.3 % of the participants reported that they will not refer all pregnant

women with suspected thyroid nodules to endocrinologist and 35.3 % would provide patients with confirmed thyroid nodules with proper medications (**Figure 1**). In general, 47.0 % of the ENT physicians in this study had proactive practice toward thyroid nodules in pregnancy.

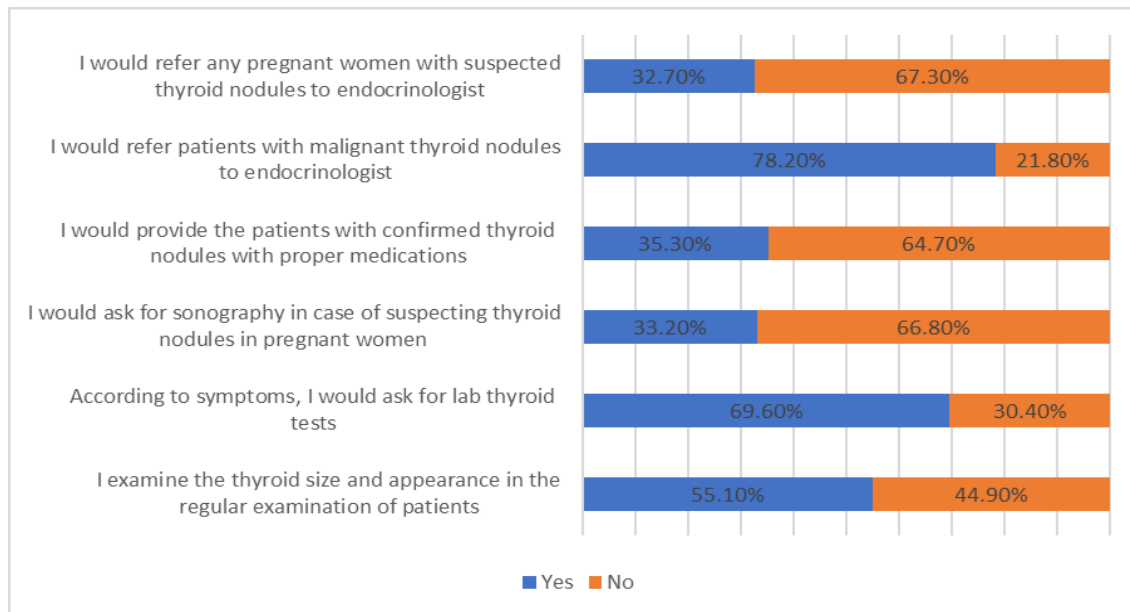


Figure 1: The practice of the ENT physicians toward thyroid nodules in pregnancy

Age is a significant factor that affect knowledge, attitudes and practice of the participants toward thyroid nodules where older age is associated with better knowledge (P=0.042), more positive attitude (P=0.002) and more proactive practice (P=0.001). Higher scientific degree and occupation are other factors that had significant on the physicians’ knowledge, attitude, and practice. Higher education among the participants was associated with better outcomes where those had PhD in their specialty had higher

knowledge (91.7 %, P=0.043), more positive attitude (58.3 %, P=0.023) and more proactive practice (83.3 %, P=0.021) compared with 33.8 %, 19.0 % and 39.8 % of those with basic bachelor’s degree respectively. Moreover, residents had the lowest knowledge, attitude and practice (38.4 %, 12.8 % and 42.6 %) compared with 46.9 %, 50.0 % and 53.1 % in registrars and 65.6 %, 51.6 % and 64.1 % in consultants in knowledge, attitude, and practice respectively (P=0.027, 0.012 and 0.001).

Table 4: The relation between demographic factors of the participants with knowledge, attitude, and practice.

Variables		Knowledge				P-value	Attitude				P-value	Practice				P-value
		Adequate (n=168)		Inadequate (n=217)			Positive (n=86)		Negative (n=299)			Proactive (n=181)		Inadequate (n=204)		
		Count	Percent	Count	Percent		Count	Percent	Count	Percent		Count	Percent	Count	Percent	
Age	< 25	17	27.0	46	73.0	0.042*	6	9.5	57	90.5	0.02*	16	25.4	47	74.6	0.001*
	26-35	93	40.1	139	59.9		41	17.7	191	82.3		107	46.1	125	53.9	
	36-45	46	61.3	29	38.7		29	38.7	46	61.3		47	62.7	28	37.3	
	> 45	12	80.0	3	20.0		10	66.7	5	33.3		11	73.3	4	26.7	
Gender	Male	121	45.1	147	54.9	0.634	60	22.4	208	77.6	0.923	125	46.6	143	53.4	0.982
	Female	47	40.2	70	59.8		26	22.2	91	77.8		56	47.9	61	52.1	
marital status	Single	32	27.8	83	72.2	0.035*	26	22.6	89	77.4	0.215	51	44.3	64	55.7	0.068
	Married	133	50.6	130	49.4		59	22.4	204	77.6		129	49.0	134	51.0	
	Divorced/Widow	3	42.9	4	57.1		1	14.3	6	85.7		1	14.3	6	85.7	
Nationality	Saudi	83	44.1	105	55.9	0.916	42	22.3	146	77.7	0.865	90	47.9	98	52.1	0.912
	Non-Saudi	85	43.1	112	56.9		44	22.3	153	77.7		91	46.2	106	53.8	
Highest scientific degree	PhD in medicine	11	91.7	1	8.3	0.043*	7	58.3	5	41.7	0.023*	10	83.3	2	16.7	0.021*
	Board in medicine	5	71.4	2	28.6		3	42.9	4	57.1		5	71.4	2	28.6	
	Master’s degree in medicine	26	68.4	12	31.6		12	31.6	26	68.4		21	55.3	17	44.7	

	High diploma in medicine	53	47.3	59	52.7		23	20.5	89	79.5		59	52.7	53	47.3	
	Bachelor's degree in medicine	73	33.8	143	66.2		41	19.0	175	81.0		86	39.8	130	60.2	
Occupation	Resident	111	38.4	178	61.6	0.027*	37	12.8	252	87.2	0.012*	123	42.6	166	57.4	0.001*
	Registrars	15	46.9	17	53.1		16	50.0	16	50.0		17	53.1	15	46.9	
	Consultant	42	65.6	22	34.4		33	51.6	31	48.4		41	64.1	23	35.9	

On the other hand, gender, nationality and marital status of the participants had no significant effects on the knowledge, attitude, and practice except for marital status where married participants had significantly higher knowledge level (P=0.035) (Table 4).

Discussion

Thyroid cancer is the second common diagnosed malignancy during pregnancy with prevalence of 14 cases per 100,000 pregnancies [25]. Thyroid nodules could be associated with high risk for developing thyroid cancer, therefore, it is important to proper diagnosis and management of thyroid nodules among pregnant women. However, it is considered a huge challenge for clinicians to diagnosis and treating these patients which require special consideration and attention for both the patients and her developing newborn [1]. This study aimed to assess the knowledge, attitudes and practices of the ENT physicians toward thyroid nodules in pregnant women.

In this study, we found that less than half of the participants had proper knowledge considering thyroid nodules in pregnancy. In a previous study conducted among general practitioners, the authors found that only 30 % of the participants had adequate level of knowledge considering thyroid disorders [23]. Moreover, another study conducted among 322 clinicians from different disciplines, showed that 73.1% of endocrinologists, 32.7% of family physicians, and 17.8% of obstetricians had accurate knowledge regarding TSH levels during pregnancy [26]. In general, the main protocols for diagnosis and treating of thyroid cancer and nodules in pregnancy are the same as in case of non-pregnancy with some restrictions as not using of the radioactive Iodine (RAI) as a part of therapy [27,28]. Neck ultrasound is considered the definitive tool for assessment of thyroid nodules and is considered safe in pregnancy [29]. In our study, almost three quarter of the ENT physicians knew that ultrasound is safe and should be considered in the diagnosis of thyroid nodules in pregnant women. Easy access to modern diagnostic tools as ultrasound examination could be one of the reasons for the higher incidence of thyroid nodules and cancer in the recent decades [30,31].

Total thyroidectomy is the main treatment in case of thyroid malignancy [27] however, in pregnancy, considerations of maternal and fetal outcomes should be taken before making decisions about surgery. According to the ATA and Endocrine society, thyroidectomy should be delayed in most cases until the post-partum period [27,32]. In this study, only one third of the ENT physicians knew that surgery could be delayed in case of benign thyroid nodules.

According to different studies, ENT physicians have a significant role in diagnosis and treatment of thyroid nodules [33-35]. Based on the type of the nodules and the severity of the symptoms, ENT physicians may recommend different options of treatments and in some cases ENT specialists may resort to surgery [36]. In this study, less than half of the physicians knew that they have a significant role in diagnosis and management of thyroid nodules where most of them had neutral position considering referral to endocrinologists. In general, less the quarter of the participants had adequate attitude toward diagnosis and management of thyroid nodules in pregnant women. This could be explained that many physicians may be no qualified with treatment of pregnant women. In this study, almost quarter of the participants reported that they had fears when dealing with pregnant women. Fears from have some

practices that may affect the mothers and state of pregnancy and fetal health may reduce the physicians' attitude for diagnosis and management. Instead, they would refer patients to other physicians especially to endocrinologists.

In this study, we reported 47.0 % of the ENT physicians in this study had proactive practice toward thyroid nodules in pregnancy. Most of the participants reported regular examination of thyroid gland during the regular examinations, and 35.3 % would provide patients with confirmed thyroid nodules with proper medications. However, only 33.2 % of them would ask for sonography in case of suspecting thyroid nodules. Thyroid ultrasound should be preformed in all patients with suspected or known to have thyroid nodules to confirm the presence of nodules and evaluation for additional nodules and cervical lymph nodes [37].

Older age, more educated participants and those other than residents were found to significantly have higher levels of knowledge, attitudes, and practices. This indicates that increasing the information provided in the higher educating process (other than the regular bachelor's degree) could help in increasing the knowledge, attitudes and practices of ENT physicians.

This study had some limitations including the depending on self-reported questionnaire which may lead to some personal bias because some participants may provide randomly answers for the questions. Another limitation is the distribution of the questionnaire using online mean in which sampling bias toward younger participants may be occurred.

In conclusion, knowledge, attitude, and practices of ENT physicians toward thyroid nodules during pregnancy is not adequate. Needs for increasing the awareness of the ENT physicians throughout courses and campaigns is necessary.

Ethics approval and consent to participate

The study was conducted after having the ethical approval of no. 1562, for 25/5/2022 from the ethical institution of Ministry of Health, Kuwait. All participates had to agree to participate in the study where consent was incorporated into the survey as well as indication of the aims of the study and the right of the participate to withdraw at any time without any obligation. However, only completed questionnaires were used in the analysis. Participants' anonymity was assured where personal information of the participants was not required in this study. No rewards were given for participating in the study.

List of abbreviations

ENT: Eat, nose and throat
 FNA: Fine-needle aspiration
 ATA: American Thyroid Association

Data Availability

All data is available upon request from the main author.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper

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Authors' contributions

HF was the main contributor authors and was responsible in collecting data and major contributor in writing the manuscript. SA was responsible for collecting data, analysing and interpreting the results of questionnaire. AB was responsible for preparing the questionnaire, validated it, and help in its distribution. BA was responsible for reviewing the literature review, distributing the data, and preparing the manuscript.

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Not Applicable

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