

Prevalence of Thyroid Incidentaloma on Ultrasound

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Keywords Thyroid incidentaloma; Sonography; Incidental Thyroid Carcinoma; TIRADS	ABSTRACT: Background and Objectives: Thyroid is a butterfly shaped endocrine gland responsible for the regulation of body metabolism. Ultrasound is widely used for the detection of thyroid incidentaloma. Methodology: This study was conducted as a descriptive cross-sectional study among patients attending ultrasound clinics in Azadi hospitals and outpatient sonographic clinics for the assessment of the thyroid. A total 200 patients were enrolled. SPSS was used for the data analysis and a p-value of 0.05 was used as the level of significance. Results: Only 75 cases of incidentalomas were identified on sonographic assessment, others had a normal sonography; the prevalence of incidentaloma 37.5%. The majority of the incidentaloma were identified in females (84%) compared to males (16%). Around 2.7% had past history of radiation exposure. And only 2 out of the 75 cases were identified to have malignant potentials. Conclusion: Thyroid incidentaloma is reported to be a prevalent finding in literatures, similar results were seen in our study with a prevalence of 37.5%. Screening for incidentaloma using sonography can be beneficial for the early detection of incidental thyroid carcinomas as the incidence is raising overtime.
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INTRODUCTION

Thyroid is a butterfly shaped endocrine gland located in the neck and is responsible for the regulation of body metabolism through the secretion of a set of hormones T3 and T4 [1]. Over the past decades, the increasing use of imaging modalities has led to the identification of conditions patients unaware of, one of which is Thyroid Incidentaloma [2]. The disease is an asymptomatic thyroid tumor, which is small and clinically non-palpable, unexpectedly discovered during the investigation of an unrelated condition [3, 4]. The condition is detected on imaging modalities; the prevalence rate is estimated to be 67% on Ultrasonography, 15% on Computed Tomography or magnetic resonance imaging (MRI) of the neck, and 1-2% with fluorodeoxyglucose (FDG) positron emission tomography [3].

The risk of malignancy is low yet exists [3], and certain features suggests the likelihood of malignancy in Incidentaloma such as presence of Incidentaloma in childhood or adolescence, male in gender, history of exposure to radiations and family history or thyroid medullary carcinoma [4]. Increasing age, female sex, and iodine deficiency are among the factors proven to be associated with increased incidence of thyroid incidentalomas [5]. At the time autopsy it has been found that up to 60% of the patients had Thyroid incidentaloma without palpable nodules [5].

The aim of this study was identifying the prevalence of thyroid Incidentaloma on ultrasound (U/S) assessment of the neck.

Methodology

This study was conducted as a descriptive cross-sectional study among patients attending ultrasound clinics in Azadi hospitals and outpatient sonographic clinics for the assessment of the thyroid. The duration of sample collection was 3 months: from January 10th to March 10th; A total of 200 cases were collected. Necessary permissions were obtained from responsible authorities prior to the conduction of the study. The process was explained to each patient separately, and

verbal consents were obtained from all. Additionally, participants were ensured that their information would remain anonymous and only the necessary data would be used in the research. The study started with a prepared questionnaire on sociodemographic characteristics (age and gender) and was followed by a set of questions relevant to the study. The study got approval from the scientific committee of the College of Medicine at the University of Duhok. Ethical approval was obtained from the research ethics committee at the Directorate General of Health in Duhok.

Data analysis

The data were analyzed using SPSS program version 25. The age of the sampled group was described by mean and standard deviation. Descriptive statistics were obtained by SPSS. Moreover, the correlation of TIRADS to other factors was analyzed using Pearson correlation, chi-square test, and logistic regression analysis. The p-value of 0.05 was used as the level of significance.

Patient's risk

There is no potential risk/harm to patients or any study sample as the procedure consists of taking an U/S and filling a questionnaire. Moreover, all the participants will be reassured that their information will be concealed and only the final data will be shown in research and presentations.

RESULTS

Figure One shows the flow chart of the sample collection. The total number of the sample was 200. Only 75 cases of incidentalomas were identified on sonographic assessment, others had a normal sonography. Thus, the prevalence of incidentaloma 37.5%. Table 1 identifies the sonographic prevalence of non-palpable thyroid incidentalomas according to age and gender. The most prevalent age group with TI was in the age group of ≥ 60 years with a prevalence of 54.5%. however, most of the cases were identified in the age group of 20-39 years of age. The adjusted *P* value was significant (< 0.001). the prevalence among males and females were close; 38.40% and 33.30% respectively.

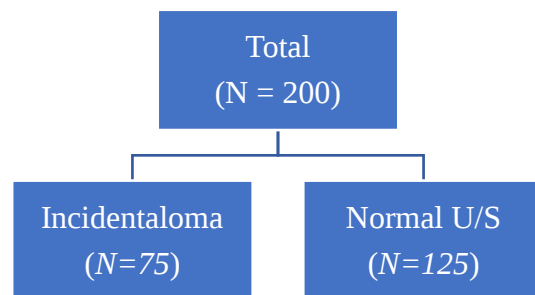


Figure 1: Flowchart of sample selection

Table 1/ Ultrasonographic prevalence and characteristics of non-palpable thyroid incidentalomas								
	Female			Male			Total	
Age group	Population	TI N	TI (%)	Population	TI N	TI (%)	Population	TI N (%)
≤ 20	9	5	55.50%	3	0	0%	12	5 (41.7)
20-39	100	32	32%	8	1	12.50%	108	33 (30.6)
40 - 59	44	20	45.45%	14	5	35.70%	58	25 (43.1)
≥ 60	11	6	54.50%	11	6	54.50%	22	12 (54.5)
Total	164	63	38.40%	36	12	33.30%	200	75 (37.5)

Table 2 shows the Sociodemographic characteristics of the sample group. The mean age was 41.28 ± 15.0 . The majority of the incidentaloma were identified in females (84%) compared to males (16%). 73.3% of them were diagnosed at outpatient clinic while 26.7% were diagnosed in Azadi hospital. among those incidentaloma cases, 58.7% had a family history suggestive of thyroid disease, 5.3% had undergone operation for thyroid gland and 2.7% had past history of radiation exposure. Moreover, 20% were smokers. From the lesions identified on sonography, 32% were found on both thyroid lobes, while 42.7% were found on the right lobe and 25.3% were found on the left lobe. Around half (50.7%) of the lesions were single, the remaining where multiple. Only 2.7% of them were found to display heterogenous parenchymal abnormalities. The majority of the lesions 56% were solid, 26.7 % were cystic in nature and the remaining were both. The majority of the lesions were TIRAD 1 (5.3%) and 2 (73.3%), while TIRAD 3 (20.0%) and 4 (1.3%) accounted for less sample. Only 2 of the 75 cases were found to have malignant features.

Table 2/ Sociodemographic characteristics of the sample with Incidentaloma features

		No	Percentage (%)
Gender	Female	63	84.0
	Male	12	16.0
Place of U/S	Hospital	20	26.7
	Clinic	55	73.3
FMH of Thyroid disease	Negative	31	41.3
	Positive	44	58.7
Hx of Thyroid Surgery	Negative	71	94.7
	Positive	4	5.3
Hx of radiation Exposure	No	73	97.3
	Yes	2	2.7
Smoking	No	60	80.0
	Yes	15	20.0
Location of the lesion	Right	32	42.7
	Left	19	25.3
	Both	24	32.0
Number of lesions	Single	38	50.7
	Multiple	37	49.3
Parenchymal abnormality	Heterogenous	2	2.7
	homogenous	73	97.3
TIRAD	1	4	5.3
	2	55	73.3
	3	15	20.0
	4	1	1.3
Type of the lesion	Cyst	20	26.7
	Solid	42	56
	Both	13	17.3

Malignant	Yes	2	2.7
	No	73	97.3

Table 3 shows the prevalence of solitary thyroid nodule among different age groups. Majority of solitary nodules were diagnosed in the age group 20-39 which accounted for 50% of the lesions in that age group. While for those ≤ 20 only 7.9% of their lesions were solitary

Table 3/ Prevalence of solitary nodules among age groups		
Age group	Solitary nodules	
	N	(%)
≤ 20	3	7.90%
20-39	19	50%
40 - 59	11	28.90%
≥ 60	5	13.2

Table 4 shows the person correlation of TIRAD to other features. The correlation was significant for cases with a parenchymal abnormality ($P = 0.001$). other factors showed no significant correlation, Family history of thyroid disease ($P = 0.870$), history of thyroid surgery ($P = 0.207$), history of exposure to radiation ($P = 0.068$), smoking ($P = 0.158$), and number of lesions ($P = 0.050$).

Table 4/ Association of TIRAD to other features		
		TIRAD
FMH of Thyroid disease	Pearson Correlation	0.019
	Sig. (2-tailed)	0.870
Hx of Thyroid Surgery	Pearson Correlation	0.147
	Sig. (2-tailed)	0.207
Hx of radiation Exposure	Pearson Correlation	-0.212
	Sig. (2-tailed)	0.068
Smoking	Pearson Correlation	-0.165
	Sig. (2-tailed)	0.158
Number of lesions	Pearson Correlation	0.227*
	Sig. (2-tailed)	0.050
Parenchymal abnormalities	Pearson Correlation	-0.369**
	Sig. (2-tailed)	0.001

DISCUSSION

Thyroid incidentalomas are asymptomatic thyroid nodules identified using imaging modalities. Among the risk factors associated for the presence of thyroid nodule, female gender, increasing age, iodine deficiency and exposure to external radiation [4-5]. The aim of this study was to determine and assess the prevalence of ultrasonographic characteristics of thyroid incidentalomas among patients attending hospital or out-patient clinic.

The prevalence of incidentaloma varies with age, gender, available technology (operator and probe frequency), minimum size of the nodule and the precedence and absence of iodine deficiency in the examined population. In this sample it reported to be 37.5% higher than reported by *Moifo et*

al., 28.3% or others in Finland and Nigeria; 27% and 22.4% respectively [6-8]. The prevalence was higher among females 38.4%.

Of the 75 thyroid incidentalomas identified 56% were solid accounting for the highest followed by 26.7% as cysts, and 17.3% as mixed. Solitary nodules were most predominant in the age group 20-39, compared to ≤ 20 years with Moifo *et al.*

Regarding TIRADS classifications, From the 75 cases identified in the study, 73.3% were classified as TIRADS 2 which accounted for the highest percentage indicating the benign features of majority of incidentaloma [9]. Similar results were seen in other reports [5]. TIRADS 3 accounted for 20% of the cases and TIRADS 4 accounted for 1.3%. Presence of TIRADS 3 should be followed up while those with TIRADS 4 needs biopsy to confirm the diagnosis [9].

Upon the detection of thyroid incidentalomas, features were further analyzed for detection of malignant features. In our study we found that only 2 (2.7%) of the 75 incidentaloma cases were bearing malignant potentials on sonography and were sent for histopathology reports. These are known as Incidental Thyroid Carcinoma (ITC). These carcinomas are detected when thyroid tissues are sent for histopathology post-operatively [11]. The incidence of ITC has increased overtime and is found to be 4.62% in literatures [12]. Around 20% of the cases of being thyroid disease undergoing surgery were found to have ITC on histopathology; majority of them are Papillary thyroid carcinomas followed by Follicular carcinoma [11-12].

CONCLUSION

Thyroid incidentaloma is reported to be a prevalent finding in literatures, similar results were seen in our study with a prevalence of 37.5%. the prevalence had a tendency to increase with age and more prevalent in female gender. Most of these incidentalomas were categorized as TIRADAS 2. Despite the low prevalence of malignancy among the total population samples generally and the incidentaloma cases specifically, screening for incidentaloma using sonography can be beneficial for the early detection of incidental thyroid carcinomas as the incidence is raising overtime.

Conflict of Interest

None.

Funding

None.

References

1. Beynon, M. E., & Pinneri, K. (2016). An Overview of the Thyroid Gland and Thyroid-Related Deaths for the Forensic Pathologist. *Academic forensic pathology*, 6(2), 217–236. <https://doi.org/10.23907/2016.024>.
2. Ross D. S. (2002). Nonpalpable thyroid nodules--managing an epidemic. *The Journal of clinical endocrinology and metabolism*, 87(5), 1938–1940. <https://doi.org/10.1210/jcem.87.5.8552>.
3. Russ, G., Leboulleux, S., Leenhardt, L., & Hegedüs, L. (2014). Thyroid incidentalomas: epidemiology, risk stratification with ultrasound and workup. *European thyroid journal*, 3(3), 154–163. <https://doi.org/10.1159/000365289>.
4. Singh, S., Singh, A., & Khanna, A. K. (2012). Thyroid incidentaloma. *Indian journal of surgical oncology*, 3(3), 173–181. <https://doi.org/10.1007/s13193-011-0098-y>.
5. Jin, J., & McHenry, C. R. (2012). Thyroid incidentaloma. *Baillière's Best Practice and Research in Clinical Endocrinology and Metabolism/Baillière's Best Practice & Research. Clinical Endocrinology & Metabolism*, 26(1), 83–96. <https://doi.org/10.1016/j.beem.2011.06.004>.
6. Moifo, B., Moulion Tapouh, J.R., Dongmo Fomekong, S. et al. Ultrasonographic prevalence and characteristics of non-palpable thyroid incidentalomas in a hospital-based population in a sub-Saharan country. *BMC Med Imaging* 17, 21 (2017). <https://doi.org/10.1186/s12880-017-0194-8>.

7. Olusola-Bello, M. A., Agunloye, A. M., & Adeyinka, A. O. (2013). Ultrasound prevalence and characteristics of incidental thyroid lesions in Nigerian adults. *African journal of medicine and medical sciences*, 42(2), 125–130.
8. Karaszewski, B., Wilkowski, M., Tomasiuk, T., Szramkowska, M., Klasa, A., Obołończyk, L., Wiśniewski, P., Kosiak, W., Lewczuk, A., Berendt-Obołończyk, M., & Sworczak, K. (2006). Częstość występowania guzków incydentalnych w tarczycy w populacji mieszkańców Trójmiasta (Gdańsk, Sopot, Gdynia) [The prevalence of incidentaloma--asymptomatic thyroid nodules in the Tricity (Gdansk, Sopot, Gdynia) population]. *Endokrynologia Polska*, 57(3), 196–200.
9. Jin, J., & McHenry, C. R. (2012). Thyroid incidentaloma. *Baillière's Best Practice and Research in Clinical Endocrinology and Metabolism/Baillière's Best Practice & Research. Clinical Endocrinology & Metabolism*, 26(1), 83–96.
<https://doi.org/10.1016/j.beem.2011.06.004>.
10. Dy, J. G., Kasala, R., Yao, C., Ongoco, R., & Mojica, D. J. (2017). Thyroid Imaging Reporting and Data System (TIRADS) in Stratifying Risk of Thyroid Malignancy at The Medical City. *Journal of the ASEAN Federation of Endocrine Societies*, 32(2), 108–116.
<https://doi.org/10.15605/jafes.032.02.03>.
11. Nanjappa, N., Kumar, A., Swain, S. K., Aroul, T. T., Smile, S. R., & Kotasthane, D. (2013). Incidental thyroid carcinoma. *Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India*, 65(1), 37–39.
<https://doi.org/10.1007/s12070-012-0596-4>.
12. Maturo, A., Tromba, L., De Anna, L., Carbotta, G., Livadoti, G., Donello, C., Falbo, F., Galiffa, G., Esposito, A., Biancucci, A., & Carbotta, S. (2017). Incidental thyroid carcinomas. A retrospective study. *Il Giornale di chirurgia*, 38(2), 94–101.
<https://doi.org/10.11138/gchir/2017.38.2.094>.