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Assessing the incidence and prevalence of thyroid disorders along with the indications of thyroid surgeries in Indian subjects

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***Abstract*---**Background: Most common endocrine disorders seen globally are Thyroid disorders which pose a high burden on the health care sector globally including in India. Assessing these disorders definitively is a challenging condition for treating physicians as no single definitive test exists for confirmatory diagnosis of thyroid disorders. However, various clinical, FNAC (Fine needle aspiration cytology), and histopathologic tests can be done to diagnose these disorders. Histopathology remains the gold standard for confirmatory diagnosis of thyroid nodules. Aims: The present retrospective clinical study was conducted to assess the incidence and prevalence of thyroid disorders along with the indications of Thyroid surgeries in Indian subjects. Materials and Methods: In 50 subjects with thyroid nodules who underwent thyroidectomy, clinical data were retrospectively collected and assessed concerning clinical and histopathologic parameters of the thyroid nodule. The collected data were assessed to form results and were expressed as mean, number, and percentage. Results: Most common finding was movement with deglutition seen in 98% (n=49) subjects followed by laryngeal crepitus in 84% (n=42) subjects, mobility in 78% (n=39) subjects, tenderness

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in 20% (n=10) subjects, and pressure effect and neck nodes in 2% (n=1) subject each. On FNAC, benign lesion was seen in 43 subjects where colloid/nodular goiter, adenomatous goiter, multinodular goiter, Hashimoto's disease, and benign follicular lesion was seen in 64% (n=32), 10% (n=5), 4% (n=2), 2% (n=1), and 6% (n=3) subjects respectively. Follicular neoplasm suspicious of malignancy was seen in 6% (n=3) subjects. In malignancy, medullary and papillary carcinoma was seen in 6% (n=3) and 2% (n=1) subject respectively. Histopathological findings suggested that Colloid /Nodular goiter, Adenomatous goiter, Multinodular goiter, Hashimoto's thyroiditis, Follicular adenoma, Papillary carcinoma, and Medullary carcinoma was seen in 60% (n=30), 18% (n=9), 4% (n=2), 4% (n=2), 4% (n=2), 8% (n=4), and 2% (n=1) subject respectively. On ultrasonography assessment of the study subjects, benign lesions were seen in 44 study subjects where cystic lesions, hyperechoic nodular goiter, anechoic goiter were seen in 30% (n=15), 44% (n=22), 14% (n=7), and 6% (n=3) study subjects respectively. Suspicious mixed echogenic nodule was seen in 6% (n=3) study subjects and malignant mixed echogenic nodule was also seen in 6% (n=3) study subjects. Conclusion: The present study concludes that clinical, FNAC, radiographic, and histopathologic methods are accurate and reliable in assessing the diagnosing the thyroid nodules with high reliability. However, the histopathologic assessment remains the gold standard for confirmatory diagnosis of these lesions.

***Keywords*---**goiter, thyroid carcinoma, thyroid disorders, thyroid nodules, thyroidectomy.

Introduction

The most common endocrine disorder seen globally is Thyroid disorder which poses a high burden on the health care sector globally including in India. Based on the previous literature data assessing the thyroid diseases it has been reported that nearly 40 million Indian subjects have thyroid disease. Thyroid disease has unique characteristics compared to other diseases concerning easy identification as even small thyroid nodules can be detected clinically, medical management accessibility, and easy diagnosis. The cornerstone of management for thyroid disorders remains the early diagnosis and management.[1]

Most commonly seen thyroid disorders are thyroid cancer or malignancies, iodine deficiency disorders or goiter, Hashimoto's thyroiditis, hyperthyroidism, and hypothyroidism. Assessing these five thyroid disorders can help in assessing the prevalence of thyroid disorders. Assessing these disorders definitively is a challenging condition for treating physicians as no single definitive test exists for confirmatory diagnosis of thyroid disorders. However, various clinical, FNAC (Fine needle aspiration cytology), and histopathologic tests can be done to diagnose these disorders. Histopathology remains the gold standard for confirmatory diagnosis of thyroid nodules.[2]

Thyroid nodules represent the definite condition in the thyroid gland which is clinically or radiologically different from normal surrounding parenchyma of the thyroid. Thyroid nodules have a high prevalence with nearly 8% of the subjects visiting the Outpatient/Endocrinology Department of Medical Institute. These nodules are commonly seen in females compared to males. Recently, literature data have reported a prevalence of nearly 12% of palpable thyroid nodules in the Indian community. Malignancies of the thyroid gland are seen rarely with the incidence of approximately 9% per 1 lakh population/year which is estimated to increase in the coming years. Distinguishing malignant thyroid nodules from benign is a vital and challenging task. However, appropriate investigations and clinical evaluation can help distinguish these lesions.[3]

With advancements in the anesthesia and surgical modalities, surgical procedures have been increased with high success rates in various specialties including thyroid surgeries including day-care surgeries where the subject is discharged on the same day as surgery. With these increases in surgeries, a tremendous increase has been observed in Thyroidectomies with a decreased proportion of the post-operative complications including recurrent laryngeal nerve palsy, hypocalcemia, airway compromise, bleeding, and/or hematoma.[4] The present study was conducted to assess the incidence and prevalence of thyroid disorders along with the indications of Thyroid surgeries in Indian subjects.

Materials and Methods

The present retrospective clinical study was conducted to assess the incidence and prevalence of thyroid disorders along with the indications of Thyroid surgeries in Indian subjects. The study was conducted on the subjects visiting at Department of ENT and Head and Neck surgery M.P. Shah Government medical college Jamnagar Gujarat after obtaining clearance from the concerned Ethical committee.

The study included 50 subjects from both genders who underwent thyroid surgeries in the institute for different pathologies & were assessed from the previous medical records taken from the Department of Otorhinolaryngology and Head and Neck surgery of the Institute. These subjects were randomly selected. The inclusion criteria were subjects having thyroid pathology and were managed surgically for non-malignant or malignant thyroid pathology. The exclusion criteria were subjects where revision thyroid surgery was done.

For all the study subjects, who underwent elective thyroidectomy were included and the subjects who had incomplete data were excluded from the study. The data was collected till procedure, discharge, or 2 months of surgery, whichever was after. Preoperatively, all subjects underwent IDL (indirect Laryngoscopy) to evaluate their vocal cord status.

After final inclusion, detailed history was recorded for all 50 subjects followed by clinical examination along with thyroid function tests. Based on the thyroid hormone levels, subjects were medically treated to reach a euthyroid state. After achieving a euthyroid state, subjects underwent thyroidectomy. To assess the extent and size of thyroid lesions, USG (ultrasonography) was done on all the

subjects. In 25 subjects randomly, FNAC (USG guided) was done. In subjects with suspected malignancy or retrosternal extension, Ct was done to see the tumor spread to nodes in the neck or surrounding structures and tumor extent.

After final inclusion, all the subjects underwent thyroidectomy under general anesthesia and endotracheal intubation using the identical conventional procedure by a single surgeon expert in the field. Extra care was taken to avoid recurrent laryngeal nerve injury. Direct laryngoscopy was done immediately following surgery to see vocal cords. Pre and postoperatively, the subjects underwent routine blood investigations, indirect laryngoscopy, X-ray chest PA view, and lateral view-X-ray soft tissue neck. Intensive care was given to all surgically treated subjects for 48 hours.

Surgical specimens were sent for histopathologic assessment and a correlation was made between the results of cytological findings seen preoperatively. Complete thyroidectomy was done for subjects where histopathology suggested malignancy of the thyroid. In cases with nodal metastasis, neck dissection was done depending on the lymphatic spread. In subjects where complete thyroidectomy was done, calcium supplements were given. Postoperatively, after discharge, subjects were followed up every week and needed medications were given. The collected data were assessed to form results and were expressed as mean, number, and percentage.

Results

The present retrospective clinical study was conducted to assess the incidence and prevalence of thyroid disorders along with the indications of Thyroid surgeries in Indian subjects. The study included 50 subjects from both genders who underwent thyroid surgeries in the institute for different pathologies. The demographic characteristics of the study subjects are listed in Table 1. The mean age of the study subjects was 32.6±2.24 years. Majority of the study subjects were in the age of 31-40 years with 46% (n=23) subjects followed by 22% (n=11) subjects in 21-30 years, 20% (n=10) subjects in >50 years, 10% (n=5) subjects in 41-50 years, and least 2% (n=1) subject in <20 years. There were 90% (n=45) females and 10% (n=5) males in the present study. Benign lesion was seen in 90% (n=45) subjects and malignant in 10% (n=5) subjects. Most common clinical finding was neck swelling in 100% (n=50) subjects, pain in 8% (n=4) subjects, voice change in 4% (n=2) subjects, and breathing difficulty in 2% (n=1) subjects respectively (Table 1).

On clinical examination, it was seen that most common finding was movement with deglutition seen in 98% (n=49) subjects followed by laryngeal crepitus in 84% (n=42) subjects, mobility in 78% (n=39) subjects, tenderness in 20% (n=10) subjects, and pressure effect and neck nodes in 2% (n=1) subject each (Table 2). FNAC findings following BETHESDA system were analyzed, Class I, II, III, IV, and V was seen in 0, 86% (n=43), 0, 2% (n=1), and in 8% (n=4) subjects respectively (Table 2). On assessing the distribution of lesion on FNAC, benign lesion was seen in 43 subjects where colloid/nodular goiter, adenomatous goiter, multinodular goiter, Hashimoto's disease, and benign follicular lesion was seen in 64% (n=32), 10% (n=5), 4% (n=2), 2% (n=1), and 6% (n=3) subjects respectively. Follicular

neoplasm suspicious of malignancy was seen in 6% (n=3) subjects. In malignancy, medullary and papillary carcinoma was seen in 6% (n=3) and 2% (n=1) subject respectively (Table 2).

Histopathological findings suggested that Colloid /Nodular goiter, Adenomatous goiter, Multinodular goiter, Hashimoto's thyroiditis, Follicular adenoma, Papillary carcinoma, and Medullary carcinoma was seen in 60% (n=30), 18% (n=9), 4% (n=2), 4% (n=2), 4% (n=2), 8% (n=4), and 2% (n=1) subject respectively. On ultrasonography assessment of the study subjects, benign lesions were seen in 44 study subjects whereas cystic lesions, hyperechoic nodular goiter, anechoic goiter were seen in 30% (n=15), 44% (n=22), 14% (n=7), and 6% (n=3) study subjects respectively. The suspicious mixed echogenic nodule was seen in 6% (n=3) of study subjects and a malignant mixed echogenic nodule was also seen in 6% (n=3) of study subjects (Table 3). Concerning the type of surgery done in the study subjects, Hemithyroidectomy was done in 90% (n=45) of study subjects that had a benign lesion, whereas, total thyroidectomy with or without neck dissection was done in 5% (n=10) subjects with malignant thyroid lesions (Table 4).

Discussion

The present retrospective clinical study was conducted to assess the incidence and prevalence of thyroid disorders along with the indications of Thyroid surgeries in Indian subjects. The study included 50 subjects from both genders who underwent thyroid surgeries in the institute for different pathologies. The mean age of the study subjects was 32.6±2.24 years. Majority of the study subjects were in the age of 31-40 years with 46% (n=23) subjects followed by 22% (n=11) subjects in 21-30 years, 20% (n=10) subjects in >50 years, 10% (n=5) subjects in 41-50 years, and least 2% (n=1) subject in <20 years. There were 90% (n=45) females and 10% (n=5) males in the present study. Benign lesion was seen in 90% (n=45) subjects and malignant in 10% (n=5) subjects. Most common clinical finding was neck swelling in 100% (n=50) subjects, pain in 8% (n=4) subjects, voice change in 4% (n=2) subjects, and breathing difficulty in 2% (n=1) subjects respectively. These demographics were comparable to the studies of Khadra H et al[5] in 2017 and Sahmkow SI et al[6] in 2012 where authors assessed subjects with comparable demographic and disease characteristics as in the present study.

Concerning clinical examination, it was seen that most common finding was movement with deglutition seen in 98% (n=49) subjects followed by laryngeal crepitus in 84% (n=42) subjects, mobility in 78% (n=39) subjects, tenderness in 20% (n=10) subjects, and pressure effect and neck nodes in 2% (n=1) subject each. FNAC findings following the BETHESDA system were analyzed, Class I, II, III, IV, and V was seen in 0, 86% (n=43), 0, 2% (n=1), and 8% (n=4) subjects respectively. On assessing the distribution of lesion on FNAC, benign lesion was seen in 43 subjects where colloid/nodular goiter, adenomatous goiter, multinodular goiter, Hashimoto's disease, and benign follicular lesion was seen in 64% (n=32), 10% (n=5), 4% (n=2), 2% (n=1), and 6% (n=3) subjects respectively. Follicular neoplasm suspicious of malignancy was seen in 6% (n=3) of subjects. In malignancy, medullary and papillary carcinoma was seen in 6% (n=3) and 2% (n=1) subject respectively. These findings were consistent with the results of

Nayar R et al[7] in 2009 and Menon U et al[8] in 2009 where authors suggested similar clinical and FNAC findings in their subjects as in the present study.

Histopathological assessment suggested that Colloid /Nodular goiter, Adenomatous goiter, Multinodular goiter, Hashimoto's thyroiditis, Follicular adenoma, Papillary carcinoma, and Medullary carcinoma was seen in 60% (n=30), 18% (n=9), 4% (n=2), 4% (n=2), 4% (n=2), 8% (n=4), and 2% (n=1) subject respectively. On ultrasonography assessment of the study subjects, benign lesions were seen in 44 study subjects whereas cystic lesions, hyperechoic nodular goiter, anechoic goiter were seen in 30% (n=15), 44% (n=22), 14% (n=7), and 6% (n=3) study subjects respectively. The suspicious mixed echogenic nodule was seen in 6% (n=3) study subjects and a malignant mixed echogenic nodule was also seen in 6% (n=3) study subjects. Concerning the type of surgery done in the study subjects, Hemithyroidectomy was done in 90% (n=45) of study subjects that had a benign lesion, whereas, total thyroidectomy with or without neck dissection was done in 5% (n=10) subjects with malignant thyroid lesions. These results were in agreement with the findings of Islam MS et al[9] in 2010 and Sreeramulu PN et al[10] in 2012 where authors reported comparable histopathologic and ultrasonography findings as in the present study.

Conclusion

Within its limitations, the present study concludes that clinical, FNAC, radiographic, and histopathologic methods are accurate and reliable in assessing the diagnosing the thyroid nodules with high reliability. However, the histopathologic assessment remains the gold standard for confirmatory diagnosis of these lesions. The present study had a few limitations including small sample size, shorter monitoring period, and geographical area biases. Hence, more longitudinal studies with larger sample size and longer monitoring period will help reach a definitive conclusion.

Conflicts of interest: nil

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S. No	Characteristics	Percentage (%)	Number (n)
	Mean age (years)	32.6±2.24	
	Age range (years)		
	<20	2	1
	21-30	22	11
	31-40	46	23
	41-50	10	5
	>50	20	10
	Gender		
	Males	10	5
	Females	90	45
	Nature of the lesion		
	Benign	45	90
	Malignant	5	10
	Clinical presentation		
	Swallowing Difficulty	0	0
	Breathing Difficulty	2	1
	Voice change	4	2
	Pain	8	4
	Neck swelling	100	50

Table 1: Demographic characteristics of the study subjects

S. No	Findings	Percentage (%)	Number (n)
1.	Clinical findings		
a)	Neck nodes	2	1
b)	Laryngeal crepitus	84	42
c)	Pressure effect	2	1
d)	Tenderness	20	10
e)	Mobility	78	39
f)	Movement with Deglutition	98	49
2.	FNAC- BETHESDA system		

a)	Class I (Nondiagnostic or Unsatisfactory)	0	0
b)	Class II (Benign)	86	43
c)	Class III (Atypia of undetermined significance)	0	0
d)	Class IV (Follicular neoplasm or suspicious)	2	1
e)	Class V (Suspicious for malignancy)	4	2
f)	Class VI (Malignant)	8	4
3.	FNAC lesion distribution		
a)	Benign (n=43)		
i.	Colloid /Nodular goiter	64	32
ii.	Adenomatous goiter	10	5
ii.	Multinodular goiter	4	2
iv.	Hashimoto's thyroiditis	2	1
v.	Benign follicular lesion	6	3
b)	Suspicious (3) Follicular neoplasm or suspicious of malignancy	6	3
c)	Malignant		
i.	Medullary carcinoma	6	3
ii.	Papillary carcinoma	2	1
d)	Inadequate (Nil)	0	0

Table 2: Clinical and FNAC findings in the study subjects

S. No	Findings	Percentage (%)	Number (n)
1.	Histopathological findings		
a)	Colloid /Nodular goiter	60	30
b)	Adenomatous goiter	18	9
c)	Multinodular goiter	4	2
d)	Hashimoto's thyroiditis	4	2
e)	Follicular adenoma	4	2
f)	Papillary carcinoma	8	4
g)	Medullary carcinoma	2	1
2.	Ultrasonography findings		
a)	Benign (n=44)		
i.	Cystic lesion	30	15
ii.	Hyperechoic nodular goiter	44	22
ii.	Anechoic goiter	14	7
b)	Suspicious mixed echogenic nodule	6	3
c)	Malignant (n=3) Mixed echogenic nodule	6	3

Table 3: Histopathology and USG findings in the study subjects

S. No	Surgery Type	Percentage (%)	Number (n)
1.	Hemithyroidectomy	90	45
2.	Total thyroidectomy with or without neck dissection	10	5

Table 4: Surgery type in the study subjects