

HISTOPATHOLOGICAL SPECTRUM OF THYROID LESIONS IN THE SOUTH-WEST PART OF PUNJAB- A TERTIARY CARE CENTER STUDY

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ABSTRACT

Objective: The objective is to study histomorphological patterns of thyroid lesions and to classify various thyroid malignant neoplasms according to the World Health Organization (WHO) classification.

Methods: The present observational study was done in the department of pathology in a tertiary care institute in 254 thyroid specimens to study histomorphological patterns of thyroid lesions and to classify various thyroid malignant neoplasms according to the WHO classification over 7 years from January 01st, 2010 to December 31st, 2016.

Results and Discussion: The most common age group affected was between the 2nd and 3rd decades. Females were more commonly affected than males and females: Male was 5:1. of the 254 cases, 221 were nonneoplastic and 33 were neoplastic. Among nonneoplastic lesions, the most common lesion was multinodular goiter with 121 (47.63%) cases, followed by Colloid goiter 63 (24.80%), adenomatoid goiter- 19 (7.48%), lymphocytic thyroiditis/Hashimoto's thyroiditis (HT) 17 (6.69%) and only 1 (0.39%) case was found to be of thyroglossal cyst. Among neoplastic lesions, follicular adenoma-24 (9.45%) was the most common lesion, then papillary carcinoma-7 (2.76%) cases, of which 2 (0.79%) were follicular variants of papillary carcinoma, medullary carcinoma - 1 (0.39%), and paraganglioma only 1 (0.39%) case.

Conclusion: The histological spectrum of thyroid diseases in the Malwa Region, Punjab, is similar to that seen around the globe and the region. Iodine deficiency has been identified as a significant public health problem, especially in the Sub Himalayan region of India. The consequences of persisting iodine deficiency are goiter, hyperavidity of the thyroid for iodide, and subclinical hypothyroidism during pregnancy and early infancy. Similarly, clinical evaluation of goiter should be thorough and use all means, especially histopathological study of the specimens, to arrive at a definitive diagnosis, as thyroid carcinoma is not uncommon.

Keywords: Papillary, Hypothyroidism, Hashimoto.

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INTRODUCTION

The thyroid gland is unique among all other endocrine glands. Because of its superficial location, it is the only gland that is amenable to direct physical examination, cytological examination, and histological examination. In India, too, there is a significant burden of thyroid diseases. According to projections from various studies on thyroid diseases, it has been estimated that about 42 million people in India are suffering from thyroid diseases [1].

Thyroid nodules are common in clinical practice, and they occur in 4–7% of the population. They are 4 times more common in females as compared to males and can be caused by a variety of thyroid disorders. The median age at diagnosis is 47 years, with a peak in women at 45–49 years and in men at 65–69 years. Most of the nodules are benign, and only 5% are considered to be malignant [2]. Multinodular/nodular goiter is one of the most common presentations of various thyroid diseases. An estimated 4–7% of the adult population is affected by one or more palpable thyroid nodules; most of these nodules are benign [3,4].

Overall, thyroid nodules are more common in women, in older individuals, in those with a history of radiation exposure, or in those with certain diets rich in goitrogens or deficient in iodine [5]. Long-standing goiter is regarded as one of the most frequent risk factors

for the development of thyroid cancer [6]. HT is known to be the most common cause of nonendemic goiter. An average of 1–1.5 in 1000 people have this disease with female preponderance with a ratio of 10–20: 1. It occurs at any age, including children, but is most common between 30 and 60 years of life. Subacute lymphocytic thyroiditis (painless thyroiditis) occurs at any age, most often in middle-aged adults and in women [7].

Carcinoma of the thyroid gland is uncommon, accounting for only 1% of all human cancers. They occur primarily in young- and middle-aged individuals, more in females with approximately 1,22,000 new cases per year worldwide. Thyroid cancers account for 3.3–17% of all thyroid diseases, and patients with thyroid nodules are at risk of 1.5–38.1% of thyroid cancers [8]. Thyroid cancer is one of the fastest-growing cancers in US, with a 240% increased incidence over the past three decades [9].

Papillary carcinoma, the most common histological type of thyroid cancers, occurs in females as well as males, most common in the 3rd, 4th, and 5th decades of life. It comprises 80% of all thyroid cancers, followed by follicular cancer, which accounts for 10%, but are more frequent in areas with dietary iodine deficiency, where they constitute 25–40% of thyroid cancers. These occur most commonly after the 4th decade of life.

Medullary carcinoma (MTC) accounts for about 5–10% of all thyroid cancers, followed by anaplastic carcinoma, which accounts for 1–2%

and occurs during the 6th and 7th decades of life. Primary thyroid lymphomas and primary thyroid sarcomas are rare [10].

The prevalence of carcinoma is lower in multinodular goiter (MNG) than in solitary thyroid nodule (STN). Malignancy is seen in only up to 11% of patients with MNG and is usually an incidental finding in thyroidectomy specimens, and in 3–33% of patients with STN [11].

METHODS

The present observational study was done in the department of pathology in a tertiary care institute in 254 thyroid specimens to study the histo-morphological pattern of thyroid lesions in different age groups and in both sexes and to classify various thyroid malignant neoplasms according to World Health Organization classification, over 7 years from January 01st, 2010 to December 31st, 2016 after getting clearance from the Institutional Ethical Committee.

Inclusion criteria

All the thyroid specimens were received in the department of pathology from January 01st, 2010 to December 31st, 2016.

Exclusion criteria

Degenerated tissue, inadequate tissue.

Details of the cases were obtained from the departmental records, and preoperative biochemical thyroid profile (T3, T4, thyroid-stimulating hormone) if available, was noted. The hematoxylin- and eosin-stained slides were reviewed by two pathologists for histopathological diagnosis. The thyroid lesions were divided according to nonneoplastic and neoplastic lesions, which were further divided into benign and malignant lesions. The distribution of histological diagnosis was studied with respect to age groups, sex, and clinical presentation. All statistical calculations were done using Statistical Packages for the Social Sciences 17 software.

RESULTS

The present study was undertaken on 254 cases, who presented to the Adesh Institute of Medical Sciences and Research with thyroid lesions, over a period of 7 years in the department of pathology.

The most common age group affected was between the 2nd and 3rd decades. Females were more commonly affected as compared to males and female: Male was 5:1.

Two hundred and fifty-four cases were studied, of which, 221 were non-neoplastic and 33 were neoplastic. Among nonneoplastic lesions, the most common lesion was MNG with 121 (47.63%) cases, followed by Colloid goiter 63 (24.80%), adenomatoid goiter- 19 (7.48%), lymphocytic thyroiditis/HT 17 (6.69%) and only 1 (0.39%) case was found to be of thyroglossal cyst. Among neoplastic lesions, follicular adenoma- 24 (9.45%) was the most common lesion, then papillary carcinoma- 7 (2.76%) cases, of which 2 (0.79%) were follicular variant of papillary carcinoma, MTC - 1 (0.39%) and paraganglioma only 1 (0.39%) case, as shown in Table 1.

The minimum age of patients included in the study was 15 and the maximum was 68 years. Furthermore, the mean age was 37.3±9.07 years, as depicted in Table 2. Majority of patients, i.e., 212 (83.46%), were female, while only 42 (16.54%) were male. Female: male ratio was 5:1.

According to our study, MNG was the most common lesion and was seen most commonly in the age group of 31–40 years, followed by 21–30 years (Figs. 1 and 2). Colloid goiter is seen next to MNG, more commonly in 31–40 years, followed closely in the 2nd-3rd decade. Follicular adenoma was also seen most commonly in 31–40 years (11 out of 24), 21–30 years, followed by equal distribution in age groups of 11–20 and 51–60 years with two patients out of 24 patients (Figs. 3 and 4).

Table 1: Percentages and frequencies of various lesions

Diagnosis	Frequency	Percentage
Multinodular goiter	121	47.63
Colloid goiter	63	24.80
Follicular adenoma	24	9.45
Adenomatoid goiter	19	7.48
Lymphocytic thyroiditis	17	6.69
Papillary carcinoma	5	1.97
Follicular variant of papillary carcinoma	2	0.79
Medullary carcinoma	1	0.39
Paraganglioma	1	0.39
Thyroglossal cyst	1	0.39
Total	254	100

Table 2: Age wise distribution of thyroid lesions

Age	Diagnosis	Frequency	Percentage
11–20	Follicular adenoma	2	0.79
	Multinodular goiter	2	0.39
21–30	Multinodular goiter	27	10.63
	Colloid goiter	16	6.30
	Follicular adenoma	5	1.97
	Lymphocytic thyroiditis	4	1.57
	Adenomatoid goiter	2	0.79
31–40	Papillary carcinoma	2	0.79
	Multinodular goiter	66	25.98
	Colloid goiter	37	14.57
	Follicular adenoma	11	4.33
	Lymphocytic thyroiditis	10	3.94
	Adenomatoid goiter	9	3.54
	Papillary carcinoma	3	1.18
	Paraganglioma of thyroid	1	0.39
41–50	Multinodular goiter	13	5.12
	Colloid goiter	10	3.94
	Adenomatoid goiter	5	1.97
	Follicular adenoma	4	1.57
	Lymphocytic thyroiditis	2	0.79
	Medullary carcinoma	1	0.39
51–60	Multinodular goiter	10	3.94
	Follicular adenoma	2	0.79
	Adenomatoid goiter	2	0.79
	Lymphocytic thyroiditis	1	0.39
	Thyroglossal cyst	1	0.39
61–70	Multinodular goiter	3	1.18
	Follicular variant of papillary carcinoma	2	0.79
	Adenomatoid goiter	1	0.39



Fig. 1: Gross picture of multinodular goiter

A maximum number of cases are seen in females, with the most number of cases of MNG contributing to 104 (40.94%) followed by colloid goiter-51 (20.08%) cases. Both follicular adenoma and adenomatoid goiter constituted- 17 (6.69%) cases each. Only 14 (5.51%) cases were of lymphocytic thyroiditis, 4 (1.57%) cases were of papillary carcinoma, 2 (0.79%) cases were of follicular variant of papillary carcinoma whereas MTC, paraganglioma, and thyroglossal cyst each constituted

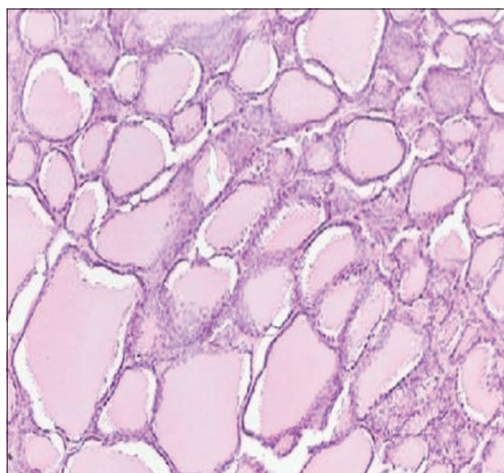


Fig. 2: H- and E-stained slide (×10), showing multinodular goiter



Fig. 3: Gross picture of follicular adenoma

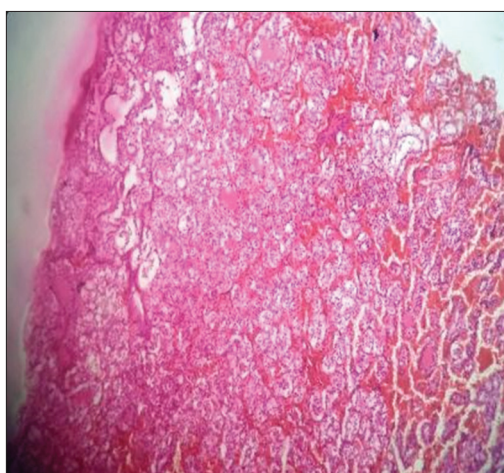


Fig. 4: H- and E-stained slide (×10), Follicular Adenoma showing capsule

only 1 (0.39%) case. In males, the most common lesion found is MNG constituting- 17 (6.69%) cases, followed by colloid goiter 12 (4.72%), follicular adenoma- 7 (2.76%), lymphocytic thyroiditis- 3 (1.18%), Adenomatoid goiter- 2 (0.79%) cases whereas papillary carcinoma constituted only 1 (0.39%) case (Figs. 5 and 6). Table 3 shows a detailed distribution of thyroid lesions.

Among both neoplastic and non-neoplastic lesions, the maximum number of cases were found in the age group of the 3rd decade followed by the 2nd and 4th decades.

DISCUSSION

The reported incidence of both neoplastic and non-neoplastic lesions in surgically treated thyroid diseases varied widely between different geographical areas of the world, as seen in various studies. Our study was in concordance with the following studies.

A study was conducted by Sankaran [12], in which 127 cases were observed in which the percentage of nonneoplastic lesions was 85.8% and neoplastic was 14.2%.

The study conducted by Rahman *et al.* [13] in Dhaka, on 108 thyroidectomy specimens found that nonneoplastic lesions (81.4%) were more common as compared to neoplastic lesions, which were only 18.52%. This could be explained by the fact that thyroid cancers are relatively rare tumors, accounting for only 0.5–1% of all cancers worldwide. However, it represents the most common endocrine



Fig. 5: Gross picture of papillary carcinoma showing papillary excrescences

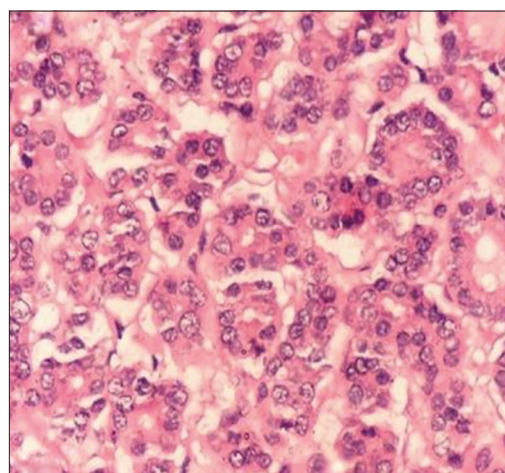


Fig. 6: H- and E-stained slide (×40), papillary carcinoma

Table 3: Gender-wise distribution of various thyroid lesions

Gender	Diagnosis	Frequency	Percentage
Female	Multinodular goiter	104	40.94
	Colloid goiter	51	20.08
	Follicular adenoma	17	6.69
	Adenomatoid goiter	17	6.69
	Lymphocytic thyroiditis	14	5.51
	Papillary carcinoma	4	1.57
	Follicular variant of papillary carcinoma	2	0.79
	Medullary carcinoma	1	0.39
	Paraganglioma of thyroid	1	0.39
	Thyroglossal cyst	1	0.39
	Male	Multinodular goiter	17
Colloid goiter		12	4.72
Follicular adenoma		7	2.76
Lymphocytic thyroiditis		3	1.18
Adenomatoid goiter		2	0.79
Papillary carcinoma		1	0.39

malignancy with variable geographical incidence around the world and 5-10% of all thyroid nodules are carcinomas [9].

The prognosis for thyroid carcinoma is worse in endemic goiter regions, in comparison with regions with an adequate dietary iodine intake and are more problematic in males as compared to females.

The mean age of patients included in our study was 37.3±9.07 years, with a minimum age of 15 years and a maximum of 68 years. The maximum number of patients, i.e., 212 (83.46%), were females and only 42 (16.54%) were males. Female: male ratio was 5:1.

In our study, a maximum number of cases were of 31-40 years age group consistent with the mean age of 37.3 years, which is in concordance with the studies done by Albasri *et al.* [14], Fahim *et al.* [8], Veyseller *et al.* [15], and Misiakos *et al.* [16].

Female preponderance is also seen in all the studies. It is due to the fact that thyroid disorder is female-prone owing to the presence of estrogen receptors in the thyroid tissue. Hormonal factors, lactation suppressant drugs, and fertility medications have also been implicated in the high incidence of Thyroid carcinomas in females [17].

Lesions with respect to age and sex

In our study, 254 cases were studied, of which 221 (87%) were non-neoplastic and 34 (13%) were neoplastic lesions. Among non-neoplastic lesions, the most common age group affected was the 3rd decade of life, constituting 122 (55.2%) cases. Females were predominantly affected, constituting 187 cases (73.6%) and males were only 34 (13.3%).

Among neoplastic lesions, the most common age group affected was the 3rd decade, constituting 15 (45.45%) cases, followed by the 2nd and 4th decades, constituting 7 (21.21%) and 5 (15.15%) cases, respectively. Among neoplastic lesions, benign neoplastic lesions constituted 24 (9.44%) cases, with female preponderance constituting 17 (6.7%) cases, while only 7 (2.75%) cases were males, whereas malignant neoplastic lesions were only 9 (3.54%) cases with female preponderance constituting 8 (3.15%) cases and only 1 (0.39%) was male.

In an Indian study by Khadilkar and Maji [18], 100 cases of STNs were studied, of which 66% were nonneoplastic and 34% were neoplastic. Among the neoplasms, 21% were malignant and 13% were benign. The age incidence ranged from 20 to 50 years for nonneoplastic lesions and 20-40 years for neoplasms. A female preponderance was seen for both nonneoplastic and neoplastic conditions.

Histopathological diagnosis

In the present study, the most common lesion in our study was MNG which constituted 121 (47.63%) hemithyroidectomy or thyroidectomy

specimens. The most common age group affected by this lesion was the 3rd decade of life, constituting 66 cases (25.98%). Females were predominantly affected, constituting 104 (40.94%) cases and only 17 (6.69%) were males. According to the biochemical profile, MNG constituted only euthyroid patients in our study.

Similar findings were also seen in a study done by Hanumanthappa *et al.*, [17] on 220 cases, 100 were of MNG. Out of these cases, 85 (85%) were females and 15 (15%) were males, with a striking female predominance. A majority of the patients were in the 3rd (35%) and 4th (30%) decade of life.

The next most common lesion in our study was colloid goiter/colloid nodule, which constituted 63 (24.80%) cases in lobectomy or hemithyroidectomy specimens, more commonly seen in 3rd decade 37 (14.57%) cases, followed by 2nd and 4th decades of life. Females were more commonly affected, constituting 51 (20.08%) cases and only 12 (4.72%) were seen in males. Most of the patients were euthyroid in our study.

There was a wide range in the incidence of the colloid goiter reported by several authors. In a study conducted by Sankaran [12], the incidence of colloid goiter was 36%. The average age is 33 years, with female preponderance.

Adenomatoid goiter was seen in 19 (7.48%) cases, with more common in the age group of 31-40 years 17 (6.69%) females were affected as compared to 2 (0.79%) males. All the patients studied under this lesion were euthyroid.

In a study conducted by Sherine *et al.* [19], a total of 845 cases were studied. The reviewed cases were classically categorized into two main groups: nonneoplastic (494; 58.5%) and neoplastic (351; 41.5%). The age of the studied cases ranged from 13 to 93 years with a mean age of 39.4 years. Lymphocytic thyroiditis/HT, constituted 17 (6.69%) cases out of 254 cases. The most common age group affected by this lesion was 31-40 years. Females 14 (5.51%) were more affected as compared to males 3 (1.18%). In a study by VL Ramesh and Shwetha [20], 120 thyroidectomy specimens were observed. The most common age group affected was between the 3rd and 5th decades. Females were predominantly affected.

HT is an autoimmune inflammatory disease characterized by widespread lymphocytic infiltration, fibrosis, parenchymal atrophy, and oxyphilic changes.

Follicular adenoma was the most common lesion, constituting- 24 (9.45%) cases. The most common age group affected was 31-40 years. Females were more commonly affected, constituting 17 (6.69%) and 7 (2.76%) were males. Out of 24 cases of follicular adenoma, all the cases were euthyroid except 2 cases, which were hyperthyroid. A study by Virk *et al.* [21] shows follicular adenoma (65%) to be more common than colloid goiter (30%).

Papillary carcinoma was the second most common neoplastic lesion seen, constituting 7 (1.97%) cases, of which 2 cases were follicular variants of papillary carcinoma. 31-40 years of age group was commonly affected by this lesion, constituting 3 (1.18%) cases, followed by 2 (0.79%) in the age group of 21-30 years. Females 4 (1.57%) were more common as compared to males 1 (0.39%) case. All the patients of papillary carcinoma were euthyroid in our study.

Papillary thyroid carcinoma was reported in the literature to be the most common histological subtype of thyroid cancer, followed by follicular carcinoma [22]. Most tumors manifested in the age group of 20-50 years. The female-to-male ratio was 4:1

MTC constituted only 1 (0.39%) case in the age group of 41-50 years. Female was affected by this lesion with an euthyroid profile. MTC constitutes only 5-10% of all thyroid malignancies. The mean age at presentation is 50 years. This is in concordance with our study in which the age of the patient was 48 years [19].

Our study was in concordance with the study done by Ijomone *et al.* [23] on 133 thyroidectomy specimens. MTC was seen in only two cases. In our study, there was no such association seen.

Paraganglioma and thyroglossal cyst constituted only 1 (0.39%) case each in the age group of 31–40 years and 51–60 years, respectively. Only females were affected by both the lesions, who were euthyroid. One case was reported by Ferri *et al.*, of primary paraganglioma of the thyroid in a 63-year-old female who presented with a 6-month history of right-sided STN. It is a very rare neuroendocrine tumor. Only 24 cases have been reported in the literature [24].

In our study, 1 case of thyroglossal cyst was seen. Similarly, in a study by Ramesh and Shwetha [20], 42 of 120 thyroidectomy specimens, the most common age group affected was between the 3rd and 5th decades. Females were predominantly affected. Only 1 (0.83%) case of thyroglossal duct cyst was seen.

Majority of thyroid cancers seen in our study had pre-existing nodular hyperplasia, implying that prolonged goiter is a possible risk factor for thyroid malignancy in a backdrop of population with chronic iodine deficiency.

Thus, thyroid malignancies are not very common and carcinomas are more frequent than sarcomas. In our study, only carcinomas were seen which accounted for only 3.54%. Non-neoplastic were more common than neoplastic lesions.

CONCLUSION

The histological spectrum of thyroid diseases in Malwa Region, Punjab, is similar to that seen around the globe and the region. Iodine deficiency has been identified as a significant public health problem, especially in the Sub Himalayan region of India. The consequences of persisting iodine deficiency are goiter, hyper avidity of the thyroid for iodide, and subclinical hypothyroidism during pregnancy and early infancy.

Appropriate measures should be taken to reduce the iodine deficiency states in the diet to alleviate the social and medical consequences of the Nodular goiter. Similarly, clinical evaluation of goiter should be thorough, and use all means, especially histopathological study of the specimens, to arrive at a definitive diagnosis, as thyroid carcinoma is not uncommon. The exposure to ionizing radiation and the availability of more sensitive diagnostic tests may be the possible explanations for a worldwide increase in the incidence of thyroid carcinoma.

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AUTHOR'S CONTRIBUTION

Dr. Jasmine Kaur: Developing concept for research, designing study, literature search, data acquisition, analysis and conclusion, manuscript preparation. Dr. Arnav KR Roychoudhury: Data analysis and conclusion, manuscript preparation, editing and reviewing. Dr. Nikita Goyal: Data analysis and reviewing. Dr. Anshul Gupta: Manuscript preparation, data statistical analysis, and editing. Dr. Vijay Suri: Developing study design, data statistical analysis and reviewing.

CONFLICT OF INTEREST

Nil.

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