

Study of Spectrum of Various Histopathological Patterns in Specimens of Thyroid Surgeries: A Combined Prospective and Retrospective Study Design

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Received: 10-03-2023 / Revised: 30-03-2023 / Accepted: 30-04-2023

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Conflict of interest: Nil

Abstract

Introduction: Among all the endocrine disorders, thyroid gland disorders are commonest in India. Thyroid lesions may be developmental, inflammatory, hyperplastic and neoplastic. To establish final diagnosis, histopathological evaluation is vital. Therefore the present study was conducted with the objective to analyse the histological spectrum of thyroid diseases, frequency of malignant lesions and their correlation with age and sex.

Material and Methods: This study was a hospital based, both prospective and retrospective type of study. It was carried out at the Department of Pathology, Sardar Patel Medical College and Associated Group of Hospitals, Bikaner for a period of five years between August 2017 and December 2022. Patients of all age groups, all kind of thyroid biopsies and thyroidectomy specimens were included in this study.

Results: Out of total of 232 cases, non-neoplastic lesions were 173(75%) and neoplastic were 59(25%). Female:Male ratio was 7.28:1. Age range was 4 to 76 years with mean age of 39.21±14.29 years. Among non-neoplastic lesions, colloid goiter cases were highest(37%). Follicular adenoma (n=28) was commonest in benign and Papillary carcinoma was highest (n=15) in malignant category.

Conclusion: Non-neoplastic lesions were 3 times of neoplastic lesions. Females were affected more. Most common affected age group was 31-40 years (26.29%). Colloid goiter was commonest in non-neoplastic lesions. Follicular adenoma was commonest in benign tumours and Papillary carcinoma was commonest in malignancies. All type of lesions were predominantly found in females.

Keywords: Thyroid, Histopathology, Carcinoma Thyroid.

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Introduction

Thyroid conditions are rather typical. Geographical differences in the prevalence of thyroid disorders are mostly caused by iodine shortage [1]. Thyroid disorders are extremely prevalent in the general population. Thyroid problems are the most prevalent endocrine condition in India [2].

Developmental, inflammatory, hyperplastic, and neoplastic thyroid abnormalities are possible. The spectrum of thyroid gland disorders includes conditions that might manifest as systemic illness (Grave's disease), a localised nodular enlargement (goitre), or a mass of tumour cells.

One or more palpable thyroid nodules affect an estimated 4% of the adult population, and the majority of these nodules are benign [3] In general, women between the ages of 40 and 50 are more likely to develop thyroid nodules, particularly if they have a history of radiation exposure, eat a diet high in goitrogens, or lack iodine [4].

The majority of thyroid lesions are non-neoplastic lesions, and just 5% of thyroid lesions are cancerous. The remainder lesions are brought on by inflammation or developmental processes [5]. The incidence of thyroid cancer, which accounts for about 1.5% of all cancer cases, is relatively low. On the other hand, it is the most prevalent type of endocrine cancer, accounting for 92% of all endocrine system disorders and malignancies [6].

Lesions of the thyroid that are inflammatory, goitrous, and cystic fall under the non-neoplastic category. For instance, lymphoepithelial cyst, a congenital abnormality, and thyroglossal cyst. Goitre in the forms of Multinodular goitre, Adenomatous goitre, and Colloid goitre are inflammatory disorders that include Hashimoto's thyroiditis. Studies on the most frequent type of goitre have produced varying findings. Colloid goitre predominated in our investigation.

Thyroid neoplastic tumours are less frequent. The most frequent benign adenomas are follicular, hyalinizing trabecular, Hurthle cell, and parathyroid. Papillary carcinoma, Follicular Carcinoma, Medullary, and Anaplastic carcinoma are the four main forms of malignant lesions. The WHO classification also includes variations such NIFTP (Noninvasive follicular thyroid neoplasm with papillary-like nuclear characteristics), which are tumours with questionable malignant potential. Modern diagnostic techniques including USG, CT, MRI scans, and Radioactive Iodine Uptake studies (RAIU) make it possible to identify micro-foci of carcinoma and make an early diagnosis of malignancies.

Material and Methods

This investigation was carried out at the pathology department of the Sardar Patel Medical College in Bikaner, Rajasthan. Cases for the OPD were taken from the surgery section of the affiliated P.B.M. Hospital in Bikaner. It was a 5-and-a-half-year study from August 2017 to December 2022 that was both retrospective and prospective. All varieties of thyroid procedures, including lobectomies, hemithyroidectomies, cyst excisions, and complete and subtotal thyroidectomies, were included.

Age, gender, thyroid hormone levels, and USG findings were all taken into account. Gross features were noted and representative sections were taken after the specimens were received. Following tissue processing, regular haematoxylin and eosin staining was carried out. Where necessary, special stains were also applied. Diagnoses were determined based on histology and connection with clinical and radiological findings.

Inclusion criteria

1. Patients of all ages, presenting with thyroid disorder related symptoms in clinical department and underwent to the surgery.

2. Patients presenting with thyroid swelling confirmed by palpation with or without normal thyroid function tests.
3. All lobectomy, Hemithyroidectomy, subtotal and near total thyroidectomy specimens with macroscopically and microscopically detected thyroid lesions.
4. Parathyroid lesions are also included.

Exclusion criteria

1. All patients, presented with thyroid swelling and related symptoms and diagnosed with other than thyroid lesion (example- enlarged lymph nodes)
2. Patients presented with abnormal thyroid function tests (Hyperthyroidism, hypothyroidism, thyroiditis), requiring only medical management.
3. Autolysed tissues.
4. Inadequate biopsies.

Results

A total of 232 specimens were received during this five and half year of duration study. Most common received specimens were of hemithyroidectomies (65%). Age range seen was 4 to 76 years with mean age of 39.21 ± 14.29 years. Females were affected more showed female: male ratio of 7.28:1. Out of total 232 cases, 204 (88%) were females while remaining 28 cases (12%) were males. In both sexes, most common affected age group was 31-40 years with 61 cases (26.29%) and 0-10 years of age group was least affected with 2 cases (0.86%). Among total of 28 cases of males, 4 were neoplastic (15%) and rest 24 (85%) were non-neoplastic. In total of 204

cases in females, neoplastic were 55 (27%) and non-neoplastic were 149 (73%).

Non-neoplastic lesions (n=173) were more than neoplastic lesions (n=59), having ratio of 3:1. By neoplastic and Non-neoplastic lesions, mainly 21-40 years of age group was affected the most followed by 41-60 years. Among Non-neoplastic lesions, Colloid goiter cases were highest, (n=64; 27.60%) followed by Adenomatous goiter (n=55;23.70%), Multinodular goiter (n=31;13.36%), Hashimoto's thyroiditis (n=12;5.17%) and thyroglossal cyst (n=11;4.74%).

Among Neoplastic cases, most commonly found cases were of Follicular adenoma, (n=28; 12.07%), followed by Papillary carcinoma (n=15; 6.47%), 6 cases of Follicular neoplasm category lesions (n=6; 2.60%, among which 1 case was clearly of Follicular carcinoma), 3 cases (1.30%), each of Hyalinising trabecular adenoma and Medullary Carcinoma. Least frequent cases were of Parathyroid adenoma (n=2; 0.86%) and 1 case (n=0.43%) of Hurthle cell adenoma and Undifferentiated carcinoma each.

In malignancies (total 20 cases), Papillary carcinoma cases were highest (n=15; 75%). Single case was in male and 14 cases were seen in females. 3 cases of Medullary carcinoma, 1 case of Anaplastic carcinoma were seen in females only.

Statistical Analysis

Data collected, analysed and then presented in tabulated forms by using Microsoft Excel 2010.

Table 1: Diagnosis of Neoplastic Lesions

Parathyroid Adenoma	02	3.39%
Follicular Adenoma	28	47.48%
Follicular Neoplasm	06	10.17%
Hyalinising Trabecular Adenoma	03	5.08%
Hurthle Cell Adenoma	01	1.69%
Papillary Carcinoma	15	25.42%
Medullary Carcinoma	03	5.08%
Undifferentiated Carcinoma	01	1.69%
Total	59	100%

Table 2: Diagnosis of Non-Neoplastic Lesions

Diagnosis	No. of Cases	Percentage
Thyroglossal Cyst	11	6.36%
Colloid Goitre	64	37%
Adenomatous Goitre	55	31.80%
Multinodular Goitre	31	17.92%
Hashimoto's Thyroiditis	12	6.92%
Total	173	100%

Table 3: Age Group Distribution of Neoplastic and Non Neoplastic

Age (Years)	Nature of Lesion				%
	Non-Neoplastic		Neoplastic		
	No.	%	No.	%	
0-20	16	76.19%	5	23.81%	100%
21-40	89	78.07%	25	21.93%	100%
41-60	53	68.83%	24	31.17%	100%
>60	15	75%	5	25%	100%
Total	173		59		

Table 4: Sex Distribution of Neoplastic and Non-Neoplastic Lesion

Sex	Nature of Lesion			
	Non-Neoplastic		Neoplastic	
	No. of Case	%	No. of Case	%
Male	24	13.87%	4	6.8%
Female	149	86.13%	55	93.2%
Total	173	100%	59	100%

Table 5: Correlation Between Histological Diagnosis And Sex

Histological Diagnosis	Sex				
	Male		Female		Total
	No.	%	No.	%	
Thyroglossal Cyst	7	25%	4	1.96%	11
Colloid Goitre	11	39.29%	53	25.98%	64
Adenomatous Goitre	5	17.86%	50	24.50%	55
Multinodular Goitre	2	7.14%	29	14.22%	31
Hashimoto's Thyroiditis	0	0%	12	5.88%	12
Parathyroid Adenoma	1	3.57%	1	0.49%	2
Follicular Adenoma	0	0%	28	13.74%	28
Follicular Neoplasm	1	3.57%	5	2.45%	6
Hyalinising Trabecular Adenoma	0	0%	3	1.47%	3
Hurthle Cell Adenoma	0	0%	1	0.49%	1
Papillary Carcinoma	1	3.57%	14	6.86%	15
Medullary Carcinoma	0	0%	3	1.47%	3
Undifferentiated Carcinoma	0	0%	1	0.49%	1
Total	28	100%	204	100%	232

Table 6: Correlation of Mean Age and Nature of Lesion

Nature Of Lesion	Mean Age(Years)	Standard Deviation (S.D.)
Neoplastic	39.89	11.595
Non Neoplastic	38.98	11.72
Total	39.21	14.299

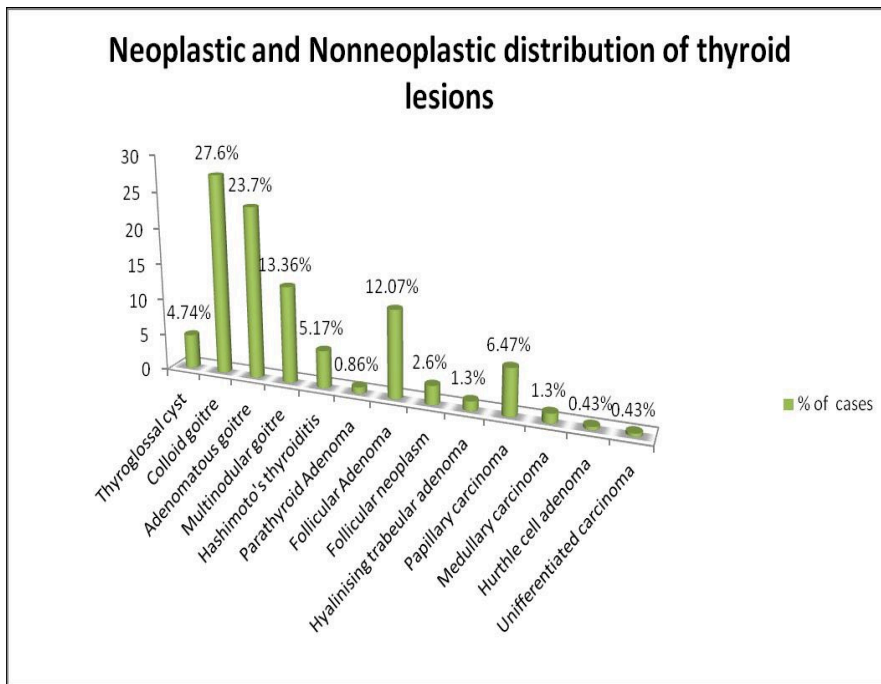


Chart 1: Distribution Of Neoplastic And Non-Neoplastic Lesions

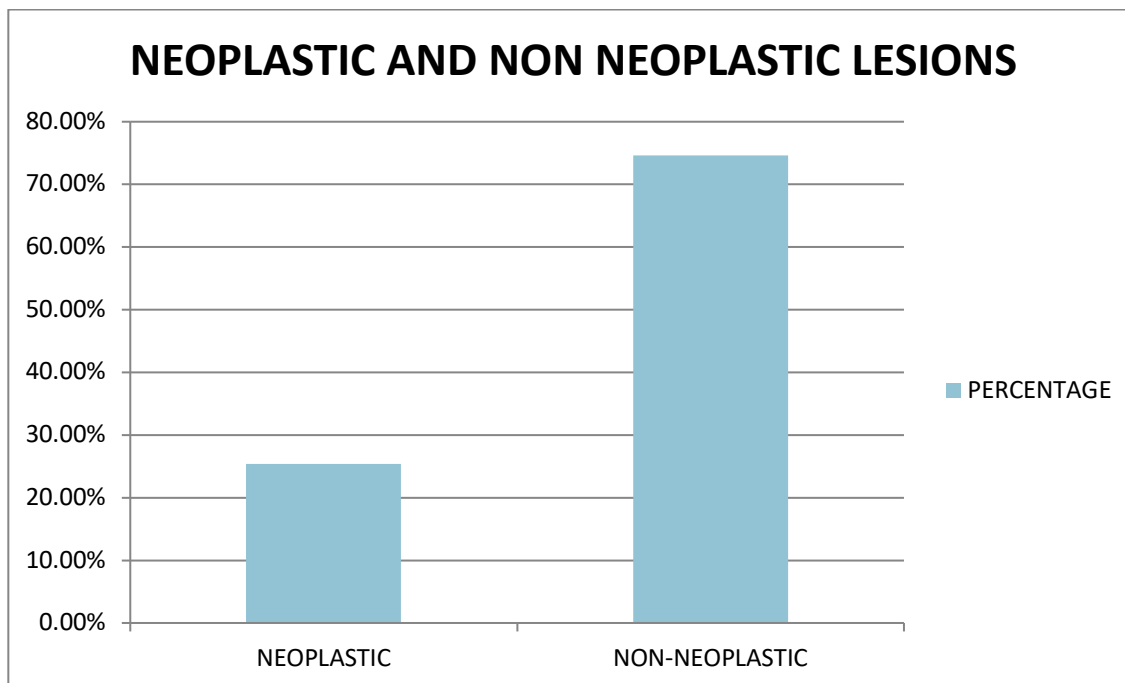


Chart 2: Neoplastic And Non-Neoplastic Lesions

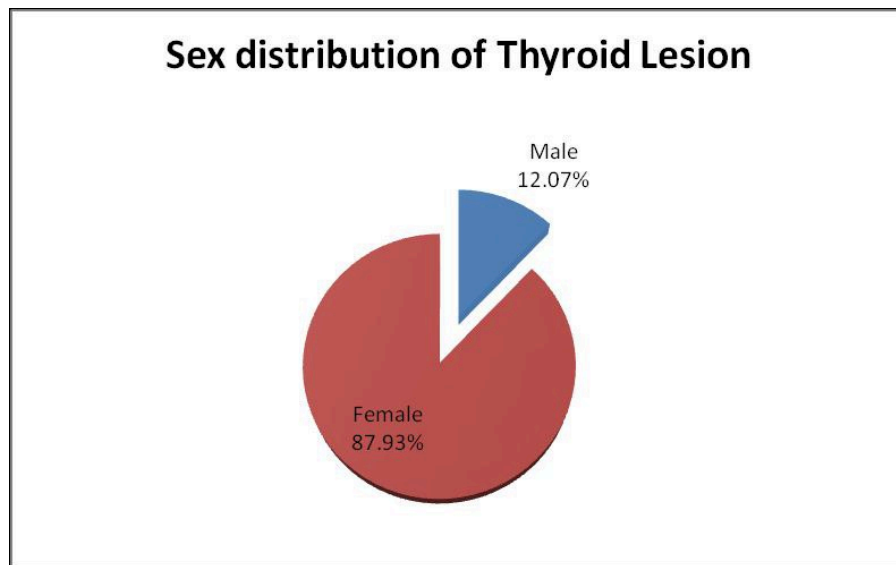


Chart 3: Sex Distribution Of Thyroid Lesions

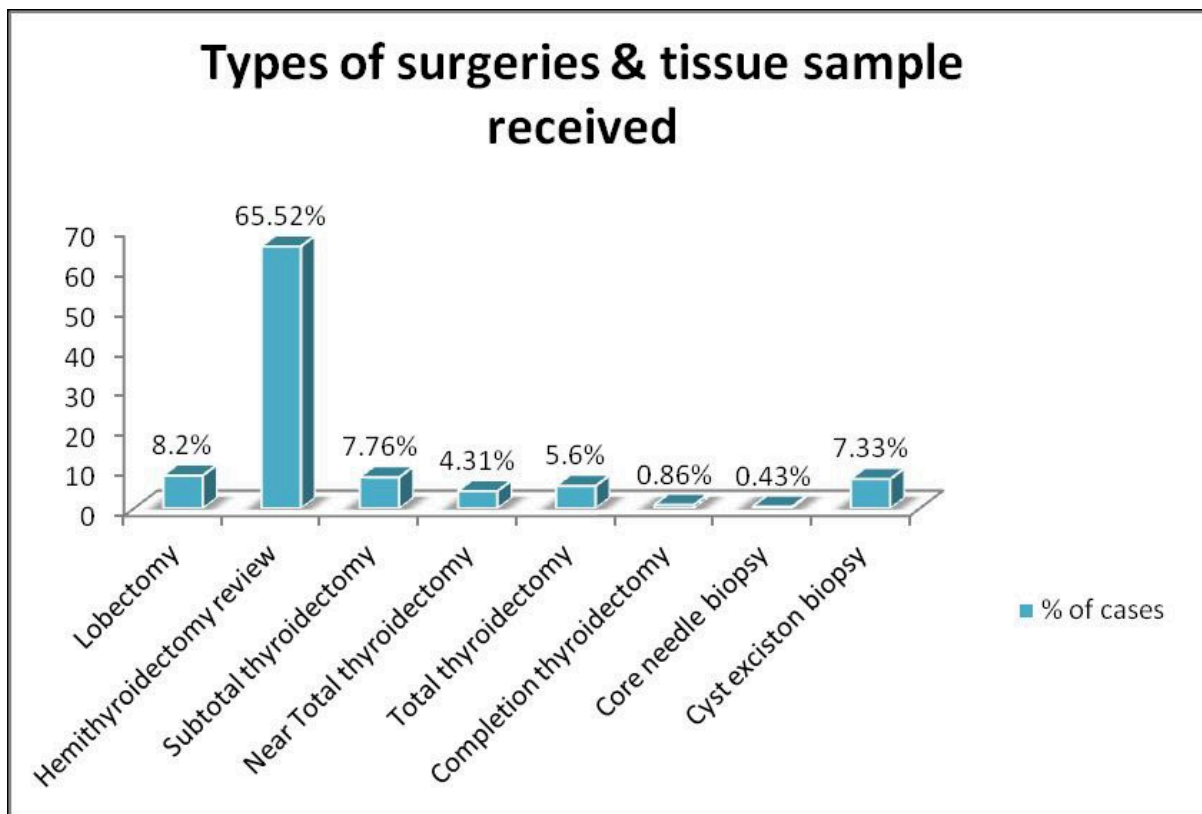


Chart 4: Types Of Surgeries And Tissue Sample Received

Discussion

This study was done in Department of Pathology, Sardar Patel Medical College, Bikaner, Rajasthan. Total 232 cases were received. Histopathological examination was done, diagnosis made and results were

evaluated. Different patterns of thyroid lesions were studied and age and sex correlation was done.

Most commonly done surgery and type of tissue sample received in our department was

of hemithyroidectomy (n=149; 65.52%). Similar results were seen in study of Saleh Al-Wageeh *et al.* (2020) in Al- Thawra Modern General Hospital, Sana'a, Yemen. They had thyroidectomy surgeries in 117 (45%) of cases, among which hemithyroidectomy cases were highest [6].

In our study, age range was 4 to 76 years. Mean age was 39.21 years. Similarly, Saleh Al-Wageeh *et al.* (2020) [6] conducted their study in Al- Thawra Modern General Hospital, Sana'a, Yemen with 260 patients, age range was 11-76 years and mean age was 40.06±13.18years. Sushel *et al* [7]. study shown 16-68 years age range with mean age of 32 years. The peak age of incidence in our study was 21-40 years age group which was in accordance with the study of Gupta A *et al* (2016) who found 21-40 years age group as the peak age for thyroid diseases [8] Islam *et al.* (2009), also showed the majority of the patients were within 21- 40 years of age [9].

Most common affected age group in our study was 31-40 years with 61 cases (26.29%). Even separately in males and females, their 31-40 years of age group was found affected the most. In the study of Talukder *et al* (2013), a retrospective cross sectional study of thyroid conducted at the department of Pathology, Enam Medical College & Hospital, Savar, Dhaka during the period from January 2006 to June 2012, showed the peak frequency of the patients in the third decade (n=39; 36.11%), followed by fourth decade (n=26; 24.07%) [10].

Female and male cases ratio in our study was 7.28:1. The other studies had some different results regarding sex prevalence. Sushel *et al.* (2009) had Female:Male ratio of 9:1 in their study at Isra University Hospital, Hyderabad [7]. Talukder *et al* had 4.68:1 ratio of female to male cases at the department of Pathology, Enam Medical College & Hospital, Savar, Dhaka [10].

There was an important analysis of neoplastic and non-neoplastic lesions of thyroid in this

study. Out of total 232 cases, total neoplastic lesions were 59 (25.43%) and remaining 173 (74.57%) cases were of non-neoplastic nature. A similar analysis was done by Talukder *et al* (2013) at the department of Pathology, Enam Medical College & Hospital, Savar, Dhaka [10]. In their study, Non-neoplastic lesions were more common, found 81.48% (n=88) cases and neoplastic lesions were 18.52% (n=20) cases. As far as individual lesion was considered, most common cases were of Colloid goiter (n=64; 37%), followed by Adenomatous goiter (n=55; 31.80%), Multinodular goiter (n=31; 17.92). Hashimoto's thyroiditis had 12 (6.92%) cases and thyroglossal cyst had 11 (6.36%) cases. Talukder *et al* (2013) also found most common cause of goiter as colloid goiter, including diffuse and nodular goiter (92.05% of all nonneoplastic lesions) and three cases (2.78%) of thyroiditis and four cases (3.7%) of thyroglossal duct cyst [10].

Neoplastic category lesions comprised of both benign and malignant entities. Individually neoplastic category had most common entity as Follicular adenoma (n=28, 47.48%) followed by Papillary carcinoma (n=15; 25.42%). Also, 6 cases (10.17%) of Follicular neoplasm category, 3 cases (5.08%) each of Hyalinising trabecular adenoma and Medullary carcinoma and 2 cases (3.39%) of Parathyroid adenoma were found. Only 1 case (1.69%), each of Hurthle cell adenoma and Anaplastic carcinoma was observed. Whereas in the study of Ambreen Beigh *et al.* (2018) results were like among total of 204 neoplastic lesions, 43 (21%) cases were of follicular adenoma and 12 (6%) cases of Hurthle cell adenoma. Papillary carcinoma was the commonest malignant tumor in their study seen in 85.14% (n=126) of all malignant lesions. 14 cases (9.45%) of follicular carcinoma and 08 cases (5.45%) of medullary carcinoma were there. No case of Anaplastic carcinoma was seen in their study [11]. In our study, Papillary carcinoma was the most common malignancy encountered, (n=15;

75%). Medullary carcinoma cases were 3 (15%) and 1 case (5%) of Anaplastic carcinoma. A study by Sushel et. Al (2009) [7] also found Papillary carcinoma to be most common (n=15; 73%) case among malignant lesions of thyroid.

The mean age among neoplastic and non-neoplastic cases was also observed in our study. The mean age in Neoplastic cases was 39.89 ± 14.19 years and in Non-neoplastic cases, it was 38.98 ± 14.37 years. The age range in neoplastic lesions was 11-70 years and in non-neoplastic lesions was 4-76 years. The results showed little difference in mean ages of both type of lesions of thyroid. Similar results were shown by studies by Ambreen Beigh et. Al (2018) [11], in which the age of patients ranged from 9-65 years in benign neoplasms with a mean age of 38.11 years and 9-74 years in malignant neoplasms with mean of 40.2 years.

Also, a study conducted by Darwish *et al.* (2006), where the age range was 21-82 years in malignant lesions and 20-69 in adenomas [12] In the study by Singh P *et al.* (2000), age range among total cases was 12-80 years and the mean age was 47 years [13] Similar results were found by Fahim *et al.* (2012) and Veyseller *et al.* (2009) [14,15].

We also considered the distribution of neoplastic lesions between males and females. A total of 28 cases of follicular adenoma, 3 cases of hyalinising trabecular adenoma, 1 case of hurthle cell adenoma, 3 cases of medullary carcinoma and 1 case of anaplastic carcinoma were all seen only in females in our study results. Only 1 case, out of total 15 cases of Papillary carcinoma, 1 case among total 6 cases of follicular neoplasm category and 1 case, out of total 2 cases of Parathyroid adenoma was seen in males.

A study by Ghartimagar D *et al* also showed female predominance (n=8; 61.53%) among total 13 cases of follicular adenoma. Hurthle cell adenoma was identified in 4 (4.04%) cases of thyroidectomy specimens with slight male

preponderance. Papillary carcinoma with a total of 60 cases where the 49 (87.5%) female cases outnumbered the 7 (12.5%) males. Nine (9.09%) cases of anaplastic carcinoma were identified in 7 females and 2 male patients. They documented a higher percentage of cases, probably due to a longer duration of study (15 years) than ours (5 years) [16].

Among non-neoplastic lesions, total of 64 cases were of colloid goiter, among which 11 (17.19%) were males and 53 (82.81%) were females. A total of 31 cases of multinodular goiter, 2 cases (6.45%) were of males and 29 cases (93.55%) were of females. 12 cases of Hashimoto's thyroiditis were all found in females. Out of total 55 cases of Adenomatous goiter, 50(90.91%) were females and 5 (9.09%) were males. Thyroglossal cyst was having total 11 cases, out of which male preponderance (7 cases, 63.64%) was seen. A study by Kumar C H et. Al [17] showed colloid goitre with 110 cases, females being more commonly affected than males with male to female ratio of 1:2.5.

Also in their study, out of 82 cases of multinodular goitre, 60 cases (26.7%) seen in females and 26 (12.4%) seen in males. 10 patients of Hashimoto's thyroiditis and 7 cases of adenomatous hyperplasia found with female preponderance. Other studies also found in concordance with our study like study by Niazi et. Al [18] and Bindra A et. Al [19].

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