Histomorphological Patterns of Lesions in Thyroid Specimens

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Abstract

Background: The thyroid gland is an important endocrine organ required for the regulation of the basal metabolic rate. It also plays a very important role in growth. Thyroid disorders have great importance because most thyroid diseases are curable. In any area, thyroid gland disorders have a variable incidence and prevalence depending upon several factors. The objective of the study is to find out the relation of age and gender with the frequency of various thyroid lesions.

Material and Methods: It was a descriptive, cross-sectional study carried out on thyroidectomy specimens received at histopathology laboratory of Holy Family Hospital, Rawalpindi. From January 2015 to June 2018, 242 thyroidectomy specimens were selected based on non-probability consecutive sampling. Reports with no clear-cut definitive diagnosis were excluded. Data were analyzed using SPSS 22.

Results: In our study of 242 thyroidectomy specimens, patients age ranged from 4 to 70 years. 40 to 49 years was the peak age and the mean age was 37.1 years. The female to male ratio was 6.4:1. From 242 cases, 18(7.4%) were neoplastic thyroid lesions and 224(92.6%) were non-neoplastic ones. Hyperplastic lesions were the most common in our study. The frequency of the inflammatory lesion was 4.1% with Hashimoto thyroiditis (80%) being the most common. The frequency of benign neoplasm was 2.1%. A follicular adenoma was the only benign thyroid neoplasm in our study. The frequency of malignant neoplasm was 5.4%. The most common subtype of thyroid malignancy was papillary thyroid carcinoma (76.9% of the malignant cases). Among a total of 242 cases, 83.1%(n=201) patients had only one presenting complaint (neck swelling).

Conclusion: Thyroid disorders are more common in females compared to males. The hyperplastic lesion is the most common type seen. In this study, the most common benign neoplasm is follicular adenoma and the most common malignant neoplasm is papillary carcinoma. Neck swelling is the commonest presenting complaint in our study participants.

Keywords: Neck swelling, female gender, Non-neoplastic lesions.
Introduction

The thyroid gland is present in the anterior neck consisting of two lateral lobes connected by the isthmus that lies anterior to C2 to C4. It is an important endocrine organ, which produces several hormones with thyroxine (T4), triiodothyronine (T3), and calcitonin being the dominant ones. Thyroid diseases have great importance because these are curable in nature. There is variation in incidence and prevalence of thyroid disorders in any given area depending upon many factors like age, gender, and geographical characteristics of the area. In women, thyroid diseases are 5 to 7 times more common than in men. Moreover, thyroid diseases are more prevalent in areas that are deficient in iodine. Common pathologies of thyroid encountered are hyperthyroidism, hypothyroidism, and neoplasms. Most of the thyroid nodules are due to cystic changes in nodular goiter or colloid cyst while a few of the solitary nodules are neoplastic. Goiter is the most common manifestation of thyroid disease worldwide occurring in 3% to 5% of the population. In neoplastic nodules, adenoma of the thyroid is the most common benign tumor. Thyroid lesions persisting for more than five to seven years may lead to thyroid carcinoma. Thyroid carcinomas consist of 1 to 2% of all carcinomas worldwide. Also, carcinoma of the thyroid is among the most common endocrine malignancies. Papillary carcinoma (81.3%) is the most common thyroid carcinoma followed by follicular (6.3%), medullary (6.3%), and anaplastic carcinoma (6.3%). Metastasis has been reported to be very low in the thyroid gland (0.14%). In thyroid lesion, diagnosis depends upon thorough clinical examination with thyroid function tests (TFTs) and radiological examination followed by histopathological examination for the definitive diagnosis.

Extensive research is required at large scale to determine common types of thyroid gland lesions prevalent in our region. This will not only add to the body of existing knowledge but also ensure effective management strategies. The aim of this study is to find the relation of age and gender with the frequency of various thyroid lesions.

Materials and Methods

It was a descriptive, cross-sectional Study of thyroidectomy specimens received at Histopathology Laboratory of Holy family Hospital, Rawalpindi. From January 2015 to June 2018, 242 thyroid specimens were selected based on non-probability consecutive sampling. The specimens were formalin fixed, paraffin embedded and stained with hematoxylin and eosin. The slides were analyzed by taking into account all the clinical details. All the patients who underwent any kind of thyroid surgery were included. Reports with no clear-cut definitive diagnosis were excluded. Detailed information regarding age, gender, presenting complaint and histopathological diagnosis was obtained from histopathology request forms and register. All demographic and laboratory data were recorded on a proforma. Sample size was calculated by using WHO sample size calculator. Data were analyzed by using SPSS version 22. For categorical variables, frequency tables were made, and chi square test was applied to find out the relation of age and gender with particular type of thyroid lesions.

Results

From January 2015 to June 2018, 242 thyroidectomy specimens were received. 209 (86.4%) specimens were of females and 33 (13.6%) were of males. The male to female ratio was 1:6.4 as shown in the pie chart below (Figure 2). Patients had an age from 4 to 70 years. 37.1 years was the mean age and 30 to 49 years was the peak age group as depicted in the graph below. (Figure 1)
To determine the relation of gender and thyroid lesion, a chi-square test was applied. We tested the hypothesis “There is no association among female gender and thyroid lesion” against the alternative “There is association among female gender and thyroid lesion” at a 0.05 level of significance. The results were $X^2 = 242$, $df=1$ and $p$-value=0.000. As the $p$-value was less than 0.05, we rejected our null hypothesis of absence of association between female gender and thyroid lesion. (Table 1)

Table 1: Relation of gender and thyroid lesions

| Gender | Thyroid lesion | Total | P-value |
|--------|----------------|-------|---------|
| Female | 0              | 209   | 0.000   |
| Male   | 33             | 0     | 33      |
| Total  | 33             | 209   | 242     |

To determine the relation of age and thyroid lesion, we applied a chi-square test. We tested the hypothesis “There is no association among age group ranged from 30 to 49 years and thyroid lesion” against the alternative “There is association among age ranging from 30 to 49 years and thyroid lesion” at a 0.05 level of significance. The results were $X^2 = 242$, $df=1$ and $p$-value=0.000. As the $p$-value was less than 0.05, we rejected null hypothesis of absence of association between age ranging from 30 to 49 years and thyroid lesion. (Table 2)

Table 2: Relation of age and thyroid lesions

| Age       | Thyroid lesion | Total | P-value |
|-----------|----------------|-------|---------|
| 30 to 49 years | 0          | 150   | 150     |
| Others    | 92             | 0     | 92      | 0.000   |
| Total     | 92             | 150   | 242     |

Among a total of 242 cases, 83.1% ($n=201$) patients presented with only one presenting complaint, i.e. neck swelling, and the remaining 16.9% ($n=41$) patients had more than one presenting symptoms, such as shortness of breath, difficulty in swallowing, palpitations, weight change, and sweating as mentioned on histopathology request forms received with the specimens.

From 242 thyroid specimens, 92.6% ($n=224$) were non-neoplastic and 7.4% ($n=18$) were neoplastic lesions. In our study, multinodular goiter (86.4%) was the most common thyroid lesion, and it accounted for 93.3% of all non-neoplastic cases. Among these, 182 (87%) were females and 27 (13%) were males. The ratio of females to males was 6.7:1. Ten cases (4.1%) of thyroiditis and five cases (2.1%) of congenital lesions (one of dysshormonogenetic goiter and four of thyroglossal cyst) were present in our study. 17.4% (18) of thyroid cases were neoplastic. Five cases (2.1%) of follicular adenoma were present. The ratio of male to female was 1:1.5. In this study, follicular adenoma was the only benign neoplasm. 13 cases (5.4%) of malignant neoplasm were present with male to female ratio of 12:1. The most common type of carcinoma present in our study was papillary carcinoma making 77% ($n=10$) of all neoplastic cases and all were females. Cases of anaplastic carcinoma were 3 ($n=3; 1.2\%$) as shown in Table 3. In our study, there was no case of lymphoma, follicular, and medullary carcinoma.

Table 3: Distribution of thyroid lesions based on the histopathological diagnosis

| Histopathological Diagnosis | N (%) |
|-----------------------------|-------|
| Dyshormogenetic Goiter       | 1 (0.4) |
| Thyroglossal cyst            | 4 (1.7) |
| Multinodular Goiter          | 209 (86.4) |
| Thyroiditis                  | 10 (4.1) |
| Follicular Adenoma           | 5 (2.1) |
| Papillary Carcinoma (classical) | 6 (2.5) |
| Papillary Carcinoma (follicular) | 4 (1.7) |
| Anaplastic Carcinoma         | 3 (1.2) |
| Total                        | 242 (100) |
Table 4: Gender distribution of patients with thyroid diseases

| Gender | Congenital lesions | Hyperplastic | Inflammatory | Benign | Malignant | Total |
|--------|-------------------|--------------|--------------|--------|-----------|-------|
| Female | 3                 | 182          | 9            | 3      | 12        | 209   |
| Male   | 2                 | 27           | 1            | 2      | 1         | 33    |
| Total  | 5                 | 209          | 10           | 5      | 13        | 242   |

Discussion

Out of 242 specimens’ studies, 62% were present in the age group of 30-49 years. The mean age was 37.1 years. This is similar to the past studies conducted by Modi et al\(^8\), Albasri et al\(^11\), and Joseph et al\(^13\) (Table 5). This is probably because most of the hyperplastic and neoplastic lesions are common in this age group. So, the load of thyroid lesions is tilted towards this age group.

Table 5: Comparison of mean age and peak age with other studies

| Study         | Mean Age (years) | Peak Age (years) |
|---------------|------------------|------------------|
| Modi et al\(^8\) | 37.4 years | 21-40 years |
| Albasri et al\(^11\) | 39.7 years | 31-40 years |
| Joseph et al\(^13\) | -        | 30-49 years |
| Present study | 37.1 years | 30-49 years |

Among 242 cases, 33 (13.6%) specimens were of males, and the remaining 209 (86.4%) of females. The male to female ratio was 1:6.4, similar to studies conducted by modi et al\(^8\) and Solomon et al\(^12\). (Table 6)

Table 6: Comparison of gender distribution with other studies

| Study          | Males | Females | Male: Female |
|----------------|-------|---------|--------------|
| Modi et al\(^8\) | 17%   | 83%     | 1:4.9        |
| Solomon et al\(^12\) | 13.6% | 86.4%   | 1:6.4        |
| Present study  | 13.6% | 86.4%   | 1:6.4        |

Hyperplastic thyroid lesion (86.4%) was the most common thyroid lesion in our study. It is also the most common thyroid lesion in the studies conducted by Albasri et al\(^11\) and Haque et al\(^14\) as shown in Table 7. Female: male ratio is 6:6:1.

Table 7: Comparison of incidence and gender distribution of hyperplastic lesions with other studies

| Study          | Incidence | Males | Females |
|----------------|-----------|-------|---------|
| Albasri et al\(^11\) | 68.8%   | 19%   | 81%     |
| Haque et al\(^14\) | 72.6%   | 19%   | 81%     |
| Present study  | 86.4%   | 13%   | 87%     |

Among 242 cases, 10 cases (4.1%) were of inflammatory lesions. The same number was seen in the study conducted by Albasri et al\(^11\) and Haque et al\(^14\) as shown in Table 8. The most common inflammatory lesion was Hashimoto thyroiditis (80%). Most of the patient had age from 30-49 years. Female to male ratio was 9:1.

Table 8: Comparison of incidence and gender distribution of inflammatory lesions with other studies

| Study          | Incidence | Males | Females |
|----------------|-----------|-------|---------|
| Albasri et al\(^11\) | 4.1%   | 16.7% | 83.3%   |
| Haque et al\(^14\) | 4.5%   | 0%    | 100%    |
| Present study  | 4.1%   | 10%   | 90%     |

From 242 cases, 5 (2.1%) were benign neoplasms. A similar observation was reported by Albasri et al\(^11\) All cases were of follicular adenoma. Most of the patients had age from 30-49 years. Female to male ratio was 1.5:1. (Table 9)

Table 9: Comparison of incidence and gender distribution of benign lesions with other studies

| Study          | Incidence | Males | Females |
|----------------|-----------|-------|---------|
| Albasri et al\(^11\) | 2.4%   | 14.2% | 85.7%   |
| Present study  | 2.1%   | 40%   | 60%     |

In our study, thyroid malignancy was diagnosed in 5.4% (n=13) of all cases. The finding is similar to the study conducted by Raheem et al\(^7\) (4.6%) but slightly lower than the 16% and 18% in Modi et al\(^8\) and Haque et al\(^14\) respectively as shown in Table 10. In this study, most of the patients had age from 30-49 years. Female preponderance was observed with a ratio of 12:1.

Table 10: Comparison of incidence and gender distribution of malignant lesions with other studies

| Study          | Incidence | Males | Females |
|----------------|-----------|-------|---------|
| Raheem et al\(^7\) | 4.6%   | 40%   | 60%     |
| Modi et al\(^8\) | 16%   | -     | -       |
| Haque et al\(^14\) | 18%   | -     | -       |
| Present study  | 5.4%   | 7.7%  | 92.3%   |
In our study, there were 10 cases (77%) of papillary carcinoma and it was found to be the most common malignancy. The same results were shown by Raheem et al\textsuperscript{7}, Modi et al\textsuperscript{8}, and Albasri et al\textsuperscript{11}. Another type of thyroid carcinoma seen in our study was anaplastic carcinoma (n=3; 1.2%). No case of any other type of thyroid carcinomas such as lymphoma, follicular, and medullary carcinoma was seen in our study. (Table 11)

Table 11: Comparison of incidence of Papillary carcinoma with other studies

| Study          | Incidence |
|----------------|-----------|
| Raheem et al\textsuperscript{7} | 71.4%     |
| Modi et al\textsuperscript{8}   | 81.3%     |
| Albasri et al\textsuperscript{11} | 87.8%     |
| Present study  | 76.6%     |

Papillary carcinoma was the most common type of thyroid malignancy. All patients presenting with thyroid carcinoma were females. Among the multiple histological variants, classical (60%) and follicular (40%) variant of papillary carcinoma were found in this study.

Figure 3: Hyperplastic thyroid nodule

Figure 4: Papillary carcinoma showing papillae and classical nuclear features

Conclusion

In our study, neoplastic lesions are much less as compared to non-neoplastic ones. Most of the patients have a hyperplastic lesion. Among benign neoplasm, follicular adenoma is the most common and among malignant neoplasm, papillary carcinoma is the most common carcinoma. Overall, diseases of thyroid are more common in females as compared to males.

Recommendations

Thyroid carcinoma is not rare. The clinical and radiological examination followed by a histopathological diagnosis of every patient presenting with neck swelling is necessary to rule out thyroid carcinoma. To decrease the incidence of thyroid lesions in the areas having iodine deficiency, appropriate steps should be taken. The results of this study may be considered as baseline data of thyroid lesions in Rawalpindi. Large scale study is required to find out the exact frequency of thyroid diseases in our country so that a proper plan can be established for early diagnosis and management.

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