



CYTOLOGICAL EVALUATION OF THYROID NODULES BY FINE NEEDLE ASPIRATION TECHNIQUES AT BHARATPUR HOSPITAL, NEPAL

Pathology

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ABSTRACT

Background: Fine Needle Aspiration Cytology (FNAC) is a minimally invasive diagnostic tool that provides cytological diagnosis in the management of thyroid nodules. The cost effectiveness of technique makes it even more suitable in resource-constrained clinical settings. **Objective:** This study aimed to evaluate the cytological patterns of thyroid nodules using FNAC in patients presenting at Bharatpur Hospital, Nepal. **Methods:** An observational study was conducted on 75 cases of thyroid nodules evaluated by FNAC from March 2022 to March 2023. Cytological data were extracted from departmental registers and analyzed using Stata 18. **Results:** Of the 75 cases, 80% were female, with a mean age of 51.1 ± 15.8 years. The most affected age group was 40–49 years (30.6%). Colloid nodules were the most prevalent diagnosis (57.3%), followed by indeterminate nodules (18.7%) and papillary carcinoma (8%). Overall, 88% were benign nodules and 12% constituted malignant nodules. **Conclusion:** FNAC remains a vital diagnostic tool, offering high diagnostic utility in identifying thyroid lesions.

KEYWORDS

thyroid nodules, FNAC, cytological diagnosis, Nepal, colloid nodules, papillary carcinoma

INTRODUCTION

Thyroid nodules are a common presentation with palpable nodules occurring in approximately 4 to 6% of the general population (1). However, with the use of high resolution ultrasonography techniques, they can be detected in almost 65% of general population (2). Similarly, in Nepal, trends indicate higher incidence rates of thyroid nodules rates among the general population (3). They demonstrate higher prevalence in females and tend to manifest predominantly during fourth decade of life. Majority of these nodules are non-neoplastic, indicating that they are typically benign or non-cancerous. However, a significant proportion of these nodules can be malignant, signifying cancerous growths within the thyroid gland (4).

Fine Needle Aspiration Cytology (FNAC) is a fundamental diagnostic procedure for thyroid nodules, widely employed in outpatient settings due to its minimal invasiveness and cost-effectiveness (5). It involves extracting cellular material from nodules for cytological examination, crucial for diagnosing the pathological conditions underlying thyroid nodules. This diagnostic clarity is particularly vital in resource-constrained environments, ensuring accurate cytological findings to inform appropriate management decisions (6).

The aim of this paper is to provide a detailed overview of the conditions causing thyroid nodules and the utility of FNAC in providing cytological diagnosis at Bharatpur Hospital, Nepal. This comprehensive understanding will inform policymakers to understand the trends in cytological diagnosis and update diagnostic services at Bharatpur Hospital and beyond in Nepal.

METHODS

A retrospective observational study was conducted in the department of pathology of Bharatpur Hospital, Chitwan, Nepal of a period between 01 March 2022 till 31 March 2023. The ethical approval for the study was provided by the Institutional Review Committee (IRC) Bharatpur Hospital with an IRC approval number 080/081-006.

FNAC procedures were conducted by pathologists under aseptic precautions using a 23-gauge needle attached to a 10-ml syringe (7). A single puncture was made into the nodule, and the needle was maneuvered within the lesion 3–4 times at varying angles and depths while maintaining consistent negative pressure. This technique was employed to optimize sample adequacy while minimizing the risk of contamination or extraneous tissue extension beyond the skin. The collected cytological material was then transferred onto glass slides, with each sample smeared across 4–6 slides. One slide was fixed in 95% ethanol and subjected to Papanicolaou staining, while the remaining slides were air-dried and stained using May-Grunwald Giemsa techniques (6). The final cytological reporting of the slides was provided by consultant pathologists at Bharatpur Hospital. A copy of the final cytological report was recorded in the register of the

pathology department of Bharatpur Hospital.

The cytological data of thyroid nodules during the study period were extracted from the departmental register following approval from the Institutional Review Committee of Bharatpur Hospital. These were entered into Microsoft Excel software for analysis. Subsequent statistical analysis was conducted using Stata B/E version 18.0.

Findings

In our study, we included a total of 75 cases who had undergone Fine Needle Aspiration Cytology (FNAC) of the thyroid nodules.

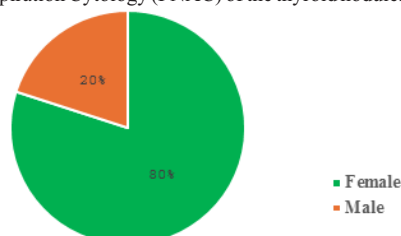


Figure 1: Sex Distribution

Among the cases, 80% (n=60) of the total cases were females and, accounting for 20% of the cases.

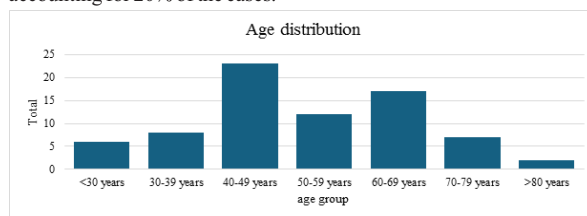


Figure 2: Age Distribution

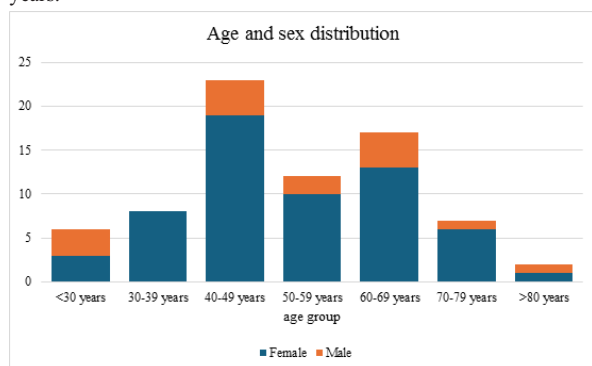
The age of the patients included in our study ranged from 4 years to 86 years. The mean age of the patients was 51.1 ± 15.8 years. The thyroid nodules were most prevalent among age group 40–49 years presenting to Bharatpur Hospital was, comprising 30.6% of the total cases. Subsequently, patients aged 60–69 years represented 22.6% of the cases.

Among the younger demographics, individuals below 30 years old constituted 8% of the cases, while those in the 30–40 years age group comprised 10.6%. Noteworthy is the significant proportion of patients falling within the 50–59 years age group, accounting for 16% of the total cases. The 70–79 years age group contributed 9.3% of the cases, whereas patients aged over 80 years constituted the smallest group, with 2.6% of the cases.

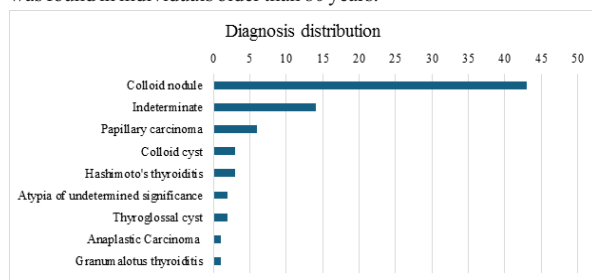
Table1: Age And Sex Distribution

Age group	Female	Male	Total
<30 years	3	3	6
30-39 years	8		8
40-49 years	19	4	23
50-59 years	10	2	12
60-69 years	13	4	17
70-79 years	6	1	7
>80 years	1	1	2
Total	60	15	75

The distribution of thyroid nodules presenting for FNAC at Bharatpur Hospital revealed a higher prevalence among females, with a total of 60 female patients. Among these, the age-specific distribution demonstrated notable occurrences within various age groups. Specifically, 19 cases (31.7%) were observed in the age group of 40-49 years, followed by 13 cases (21.7%) in the 60-69 years age group. Additionally, 10 cases (16.7%) were reported in the 50-59 years age group, while 8 cases (13.3%) were noted in the 30-39 years age group. Furthermore, 3 cases (5%) were found in individuals younger than 30 years, and 1 case (1.7%) was reported in individuals older than 80 years.

**Figure 3: Age And Sex Distribution**

Among males, a total of 15 cases were recorded. The age-specific distribution revealed varying occurrences within distinct age groups. Specifically, 4 cases (26.7%) were observed in both the age groups of 40-49 years and 60-69 years. Additionally, 3 cases (20%) were reported in individuals younger than 30 years, while 2 cases (13.3%) were noted in the 50-59 years age group. Furthermore, 1 case (6.7%) was found in individuals older than 80 years.

**Figure 4: Diagnosis distribution**

In this study, colloid nodules were the most prevalent diagnosis comprising 43 cases (57.3%).

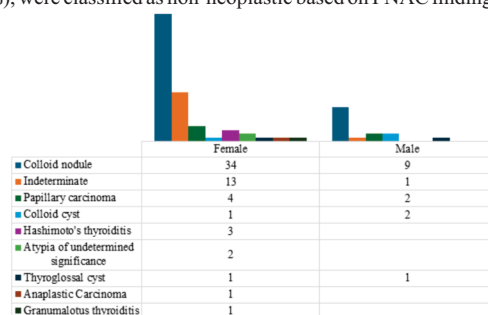
Following this, 14 cases (18.7%) were classified as Indeterminate, indicating diagnostic uncertainty. Papillary carcinoma was identified in 6 cases (8%) of the cohort.

Additionally, 4% (3 cases each) were attributed to Hashimoto's thyroiditis and colloid cyst. Furthermore, 2 cases (2.7%) were diagnosed with atypia of undetermined significance and thyroglossal cyst, respectively.

Anaplastic carcinoma and granulomatous thyroiditis were the least common, each accounting for 1.3% (1 case).

Moreover, this analysis revealed that 9 cases (12%) were diagnosed as neoplastic, indicating malignant growth, while the majority, 66 cases

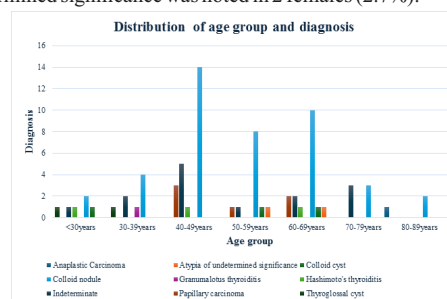
(88%), were classified as non-neoplastic based on FNAC findings.

**Figure 5: Sex And Diagnosis Distribution**

In this study, colloid nodules emerged as the predominant finding observed across both sexes. Specifically, colloid nodules were present in 34 females, accounting for 45.3% of the total female cohort, and in 9 males, constituting 12% of the total male cohort.

Indeterminate FNAC results were noted in 13 females (17.3%) and 1 male (1.3%), indicating diagnostic uncertainty in a subset of cases. Papillary carcinoma was identified in 4 females (5.3%) and 2 males (2.7%), reflecting a notable but varied incidence across genders.

Furthermore, Hashimoto's thyroiditis was documented in 3 females (4%), while anaplastic carcinoma and granulomatous thyroiditis each presented in 1 female (1.3%) respectively. Thyroglossal cysts were equally represented in 1 female (1.3%) and 1 male (1.3%). Atypia of undetermined significance was noted in 2 females (2.7%).

**Figure 6: Age Group And Diagnosis Distribution**

DISCUSSION

Fine Needle aspiration cytology is the most convenient technique in investigating thyroid lesions. It is effective in diagnosing benign or malignant pathological conditions of thyroid nodules. In the present study, thyroid nodules were more commonly observed in females compared to males. Specifically, 80% (n=60) of the total cases were females, while males accounted for 20% of the cases. Similarly, a study conducted by Nepali et al. showed a female preponderance in the occurrence of thyroid nodules (8). Furthermore, the study conducted by Kunwar et al. also revealed a higher incidence of thyroid nodules in females compared to males, further supporting the observed female preponderance in thyroid nodule prevalence. (9). In the present study, the age of patients ranged from 4 years to 86 years, with a mean age of 51.1 ± 15.8 years. This is comparable to the findings of Shrestha et al., who reported an age range of 20 to 76 years and a mean age of 48.6 ± 13.2 years (10). Similarly, Nepali et al. documented an age range of 7 to 88 years, with a mean age of 43.95 ± 15.70 years. (8).

In the present study, the majority of cases (88%, n=66) were classified as benign, while 12% (n=9) were identified as malignant. This distribution aligns closely with the findings of Bista et al., who reported 84.31% (n=43) benign cases and 15.68% (n=8) malignant cases in their FNAC-based study (11). In the present study, colloid nodules were the predominant finding, observed in 34 females (45.3% of the female cohort) and 9 males (12% of the male cohort). Similarly, the study by Nepali et al. reported colloid goiter in 54% of their cases, further highlighting the prevalence of colloid nodules as a common thyroid pathology across different populations. (8).

CONCLUSION

In conclusion, Fine needle aspiration cytology (FNAC) is widely used to diagnose the pathological conditions of thyroid nodules in

Bharatpur Hospital. This study unveiled that females in the forties predominantly presented with thyroid nodules were mostly affected by non-neoplastic colloid nodules. This study revealed the importance of cytological evaluation of both non-malignant and malignant lesions of thyroid in a tertiary hospital in Nepal. However, relatively less sample size and shorter duration of study were identified as the major limitations of this study. There is a necessity to conduct a larger prospective study to identify the broader aspects of utilisation of FNAC in diagnosing thyroid nodules more effectively.

Conflict Of Interest

None

Funding

None

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