

Diagnostic Accuracy of FNAC in Cases of Thyroid Nodules while Taking Histopathology as Gold Standard

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ABSTRACT

Aim: To find out the diagnostic accuracy of FNAC in cases of thyroid nodules while taking histopathology as gold standard.

Methods: This cross sectional study was conducted at Department of Surgery D.G Khan Hospital, D.G Khan from February 2019 to December 2019 over the period of 10 months. Total 130 patients between 20-60 years either male or female having clinically palpable solitary thyroid nodules were selected. Diagnostic accuracy, sensitivity and specificity of FNAC was calculated and results were compared the findings of histopathology by using 2x2 table.

Conclusion: Results of present study showed that females are most victim of thyroid nodules as compared to male. Diagnostic accuracy of FNAC is high. Sensitivity and specificity was 94.11% and 87.61%. Most of the patients were married. Papillary Carcinoma was most common and second common carcinoma was follicular carcinoma.

Key words: FNAC, malignant, benign, lesion, nodule

INTRODUCTION

Thyroid gland had two lateral lobes which is connected by isthmus¹. About 5% adult population of world suffered from thyroid disease². In last decade, significant increase in incidence of thyroid nodules was noted. In adult population, thyroid nodules prevalent in 4-7% patients worldwide with incidence of 0.1%³.

The most important point in evaluating thyroid nodules is to evaluate the malignancy criteria⁴. High-resolution ultrasonography (USG) device and fine needle aspiration cytology (FNAC) are basic examination methods used in the evaluation of thyroid nodules⁵.

For the evaluation of thyroid nodules, FNAC is performed as first line diagnostic test due to its simplicity, rapid and cost effectiveness^{6,7}. This procedure can be performed in outdoor of hospital. It can distinguish between benign and malignant lesions which leads to decrease thyroidectomies⁸.

The purpose of present study is to evaluate the findings of FNAC while taking histopathology as gold standard.

MATERIAL AND METHODS

This cross sectional study was conducted at Department of Surgery D.G Khan Hospital, D.G Khan from February 2019 to December 2019 over the period of 10 months. Total 130 patients between 20-60 years either male or female having clinically palpable solitary thyroid nodules were selected. Patients over 60 years, patients with multi thyroid nodules, patients with history of thyroid cancer and patients with any other systemic disease were excluded from the

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study. Ethical approval from ethical review committee was taken before commencement of study. Verbal informed consent was also taken from every patient.

History of all patients was taken and routine investigations were done. Then FNAC was performed in all selected patients and sample sent to laboratory for analysis. Then thyroidectomy was performed in all patients and sample was sent to laboratory for histopathological analysis.

Findings were noted on pre-designed performa in term of benign or malignant. Demographic profile of all the patients was also recorded.

All the collected data was entered in SPSS version 20 and analyzed. Mean and SD was calculated for age and frequencies were calculated for categorical data like gender, marital status and benign/malignant and type of malignancy.

To calculate the sensitivity, specificity, PPV, NPV and diagnostic accuracy, 2 x 2 table was plotted as:

Results of FNAC	Results of histopathology		Total
	Positive (%)	Negative (%)	
Positive	A	B	(a + b)
Negative	C	D	(c + d)
Total	(a + c)	(b + d)	(a+b+c+d)

Validity:

- "Sensitivity = $a / (a + c) \times 100$ "
- "Specificity = $d / (b + d) \times 100$ "
- "PPV = $a / (a + b) \times 100$ "
- "NPV = $d / (c + d) \times 100$ "

Diagnostic accuracy: $\frac{TP+TN}{TP+TN+FP+FN} \times 100 =$

RESULTS

Out of 130 patients with solitary nodules, 50(38%) patients were male and 80 (62%) patients were female. (Fig. 1) Selected patients were divided into two age groups i.e., age group 20-40 years and age group 41-60 years. Total

58(45%) patients belonged to age group 20-40 years and 72(55%) patients belonged to age group 41-60 years (Fig. 2) Married patients were 88 (68%) and un-married patients were 42(32%) (Fig. 3). Sensitivity and specificity FNAC was 94.11% and 87.61% respectively, PPV was 53.33% and NPV was 99% and diagnostic accuracy was 92.15%. On FNAC positive cases were 30, of which 16 cases were true positive and 14 cases were false positive. Total 100 cases were negative on FNAC, 1 case was false negative and 99 cases were true negative. On histopathology, total 17 were positive (Table 1). Papillary Ca in 9(52.94%) cases followed by follicular Ca 4(23.53%) medullary 3(17.65%) and anaplastic 1 (5.88%) (Table 2).

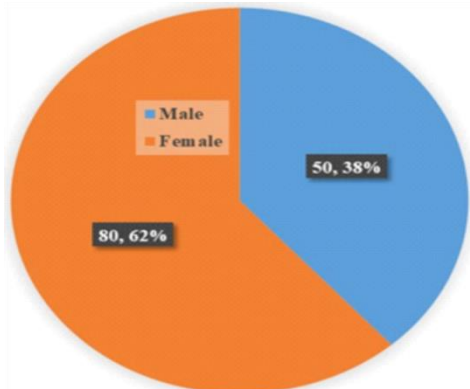


Fig. 1: Gender distribution

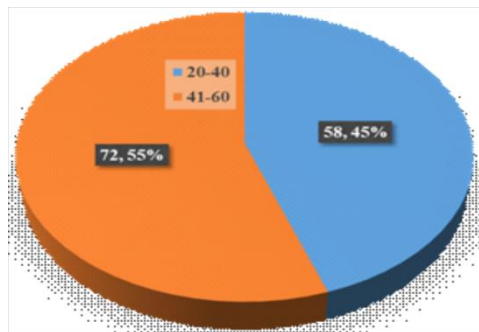


Fig. 2: Age distribution

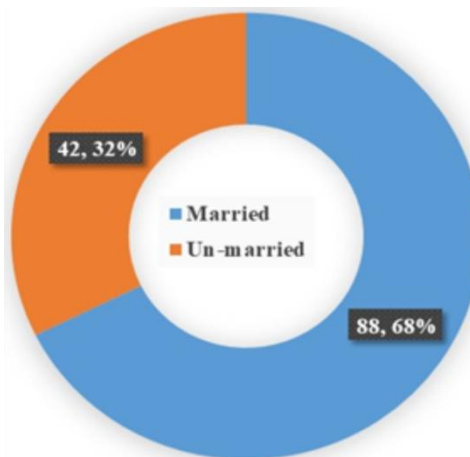


Fig. 3: Marital Status

Table 1: Cytological and histopathological diagnoses

Results of FNAC	Results of histopathology		Total
	Positive (%)	Negative (%)	
Positive	A 16	B 14	(a + b) 30
Negative	C 1	D 99	(c + d) 100
Total	(a + c) 17	(b + d) 113	(a + b + c + d) 130

- "Sensitivity = a / (a + c) x 100" = 94.11%
- "Specificity = d / (b + d) x 100" = 87.61%
- "PPV = a / (a + b) x 100" = 53.33%
- "NPV = d / (c + d) x 100" = 99%

"Diagnostic accuracy: $\frac{TP+TN}{TP+TN+FP+FN} \times 100$ " = 92.15%

Table 2: Malignant cases distribution (n = 17)

Type	Frequency(%)
Papillary Carcinoma	9(52.94)
Follicular Carcinoma	4(23.53)
Medullary carcinoma	3(17.65)
Anaplastic carcinoma	1(5.88)
Total	17(100)

DISCUSSION

Thyroid abnormalities are the commonly found clinical disorders in all over the world especially in developing countries. Malignant and benign thyroid conditions of thyroid nodules contributed high rate of morbidity and mortality among patients with thyroid diseases. Diagnostic modalities play an important role for the management of thyroid nodules⁹.

In our study, out of 130 patients with solitary nodules, 50(38%) patients were male and 80 (62%) patients were female. In one study by Mahar et al,¹⁰ out of 125 patients of thyroid nodules, 90 patients were female and 35 patients were male which in accordance with our findings. In another study by BAZAI et al⁹, out of 120 patients of thyroid nodules, 95(75%) patients were female and 30 (25%) patients were male. In study of Ozpek et al¹¹, out of 310 patients thyroid nodules, male patients were 67(21.6%) and female patients were 243(78.4%). Findings are comparable with our study.

In present study, calculated sensitivity and specificity of FNAC was 94.11% and 87.61% respectively, PPV was 53.33% and NPV was 99% and diagnostic accuracy was 92.15%. On FNAC positive cases were 30, of which 16 cases were true positive and 14 cases were false positive. Total 100 cases were negative on FNAC, 1 case was false negative and 99 cases were true negative. On histopathology, total 17 were positive. In one study by Agrawal et al,¹² diagnostic accuracy of FNAC was 90.9%, sensitivity was 76.5% and specificity was 95.9%, false positive were 2%, false negative were 4%. Findings of this study are comparable with our study. In another study by Al-Bahkalyet al¹³, FNAC was performed in cases of thyroid nodules, the sensitivity was 55.56% and specificity was 88.73% with accuracy as 79.59%. In another study by Tariq et al,¹⁴ total 50 patients with solitary nodules were selected. In this study sensitivity of FNAC was 75%, specificity was 97.6% and overall accuracy was 94%. The results of study by Mahar et al,¹⁵ showed sensitivity as 98%, specificity as 70% with diagnostic accuracy as 91%. In study of Kumari et al,¹⁶ sensitivity and specificity of FNAC

was 67.4% and 99.2% with accuracy as 94.1%. In study of Mumtaz et al,¹⁷ diagnostic accuracy, sensitivity and specificity of FNAC was 86.66%, 87% and 86.51% respectively. Positive and negative predictive values were 69.23% and 95.06%. Masereka et al¹⁸ reported sensitivity and specificity of FNAC as 61.5% and 89.5%. In study of Sinna et al¹⁹ FNAC of thyroid nodules achieved diagnostic accuracy as 93.6%, sensitivity 92.8% and specificity as 94.2%. False positive cases were 7.2% and false negative cases were 5.8%.

CONCLUSION

Results of present study showed that females are most victim of thyroid nodules as compared to male. Diagnostic accuracy of FNAC is high. Sensitivity and specificity was 94.11% and 87.61%. Most of the patients were married. Papillary Carcinoma was most common and second common carcinoma was follicular carcinoma.

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