

## Original Research Article

# Study of diagnostic importance of fine needle aspiration cytology in various body lesions in a predominantly rural mountainous region of Jammu and Kashmir, G.M.C Doda, India

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**Received:** 25 July 2019

**Revised:** 06 December 2019

**Accepted:** 12 December 2019

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### ABSTRACT

**Background:** Fine Needle Aspiration Cytology (FNAC) is a procedure of choice as the first line of investigation in diagnosing non-neoplastic and neoplastic swellings of different areas as it has been found to be highly accurate and very useful, cost effective, offer early diagnosis after presentation and treatment. In this present study in Department of pathology, data was collected and scrutinized. Cytology of various sites including breast, head and neck, salivary glands, thyroid, lymph nodes, etc. was done.

**Methods:** FNAC is performed with the help of 21-22-gauge needle attached with 20 ml syringe by taking all aseptic precautions. Total of 70 cases were collected over a period of 4 months from April 2019 to July 2019.

**Results:** Out of total 70 samples maximum number of cases were found in 21-30 years of age (16 cases); Males were 34(49%) and females were 36(51%) in number. 38 cases (54%) were non-neoplastic, 23 cases (33%) were neoplastic and in 9 cases (13%) no opinion was made. This study included 70 cytologically diagnosed cases. Out of which 38 cases (54%) were non-neoplastic, 23 cases (33%) neoplastic and in 9 cases (13%) no possible opinion could be made due to a number of factors like: Material not corresponding of representative area, small size of lesion, wrong technique, cystic areas, hemorrhage and necrosis and small foci of neoplastic lesion.

**Conclusions:** Even though a number of limitations, FNAC has high accuracy in diagnosing benign and malignant lesions of various sites and thus reduces the period between presentation of tumours and their diagnosis which results in early management.

**Keywords:** Accuracy, Fine needle aspiration cytology, Frenzens handle, Non-neoplastic and neoplastic lesions, Tuberculosis

### INTRODUCTION

Fine needle aspiration cytology is a procedure by which small amount of tissue is obtained with the help of 22-25-gauge needle and 20 ml syringe attached to it. Martin and Ellis (1930) were the first who used Fine Needle Aspiration (FNA) technique in diagnosis of various organs' lesions. Today, FNAC has become a first line of investigation in various swelling of head and neck area and breast.<sup>1</sup> FNAC is safe, simple, rapid and relatively cheap.<sup>2</sup> This procedure

leaves no scars and there is no risk of seeding tumors along the needle tract.<sup>2</sup> It is relatively free of complications, well tolerated by patients, done on an outpatient basis and is repeatable.<sup>2</sup> In case of suspected malignancy, FNAC is the best choice as it does not cause spread of tumor through the skin tract.<sup>2</sup> FNAC can also be of therapeutic use in cystic swellings.<sup>2</sup> Previously FNAC was only a screening process but now it has become a powerful diagnostic technique.<sup>3</sup> In visceral organs including liver, kidney and ovaries FNAC is performed with the guidance of ultrasonography. The

procedure has several advantages like it is a safe procedure, requires minimal equipment's, has good compliance, cost effective, reduces hospital stay, avoids the requirement of open surgical biopsy and local and general anesthetic complications, can be performed by a well-trained cytopathologist, leaves no scar afterwards and this procedure is quite accurate.<sup>4</sup> It can differentiate non-neoplastic and neoplastic conditions and can diagnose tuberculosis accurately by applying AFB stain on aspirated smears which show beaded form of acid fast bacilli. Rapid on-Site Evaluation (ROSE) of material obtained by USG is done to look for adequate material for diagnosis.

Transbronchial Nodal Aspiration (TBNA) and (EBUS) Endo Bronchial Ultrasound methods are being used for retrieval of representative material in good institutes. Salivary glands can give rise to various benign, malignant and tumor like conditions which can be very difficult to diagnose clinically or radiologically. For salivary gland neoplasm, this procedure has high sensitivity and specificity around 90%, explaining its importance as first line diagnostic procedure in any suspected salivary gland tumor because various lesions like chronic sialadenitis, Kuttner's tumor, can mimic malignancy and the issue can be resolved by aspiration cytology. Also, FNAC has been found to be most accurate in diagnosing epithelial cysts.<sup>5</sup> In head and neck region, swellings can develop due to lesions in thyroid, parathyroid, lymph node, salivary gland, soft tissue, vessels and nerves. In various studies, the procedure has been found to be highly accurate with sensitivity and specificity being higher than 90%.<sup>6</sup> Published series of FNAC show a wide variation in diagnostic accuracy and complication rates.<sup>7</sup> This reflects the efficacy of the technique for the particular site being sampled and the expertise of those taking and examining the samples. Specimens taken by individuals who use the technique only occasionally are often of poor quality.<sup>8</sup> In lymph node lesions also the procedure is highly reliable as it can differentiate reactive hyperplasia from tuberculosis and metastatic lymph node.<sup>9-11</sup>

For thyroid lesions, the procedure is first investigation of choice as the thyroid enlargement either diffuse or nodular can occur in any thyroid lesion like colloid goiter or thyroiditis or neoplasm. Moreover, the thyroid lesion has high cosmetic importance and surgery being difficult. Also, the malignancy in thyroid is less common as compared to non-neoplastic lesion. Therefore, FNAC plays a crucial role in separating patients into operative or non-operative groups. The sensitivity and specificity has been found to be 90% by some authors.<sup>12,13</sup> Fine Needle Aspiration Biopsy (FNAB) and sampling are indicated by any of the following conditions; no response to antibiotic therapy in 4-6 weeks, (>2 cm), rapid increase in size, hard matted nodes in the posterior triangle or supraclavicular region. For suspected malignancy adjunct test are immunostaining and flowcytometry. Cytology specimens, due in part to technological advances in minimally invasive sampling techniques used by interventional radiology form an important diagnostic

material not only for treatment but also for prognosis of many tumours. The cytopathologist is becoming an increasingly important member of the clinical team in directing the care of cancer patients.

This is the era of personalized medicine, FNAC is used not only to retrieve material for diagnosis but also tumor sub typing by IHC and ancillary/molecular testing for therapy selection.

## METHODS

This study was carried out in the department of Pathology GMC Doda. Doda is a hilly predominantly rural mountainous region of Jammu and Kashmir. The town itself is situated at an altitude of 5000 feet above the sea level. The inhabitants here don't have access to specialized medical facilities, however because of the establishment of new peripheral medical college things have improved. FNAC procedure was started first time by Pathologists of GMC Doda.

### *Inclusion criteria*

- Cases of all age groups and both sexes who attended the pathology department for FNAC were included in the study.

### *Exclusion criteria*

- There were no exclusion criteria.

This study was done over a period of four months i.e., from April 2019 to July 2019. Total of 70 cases were collected over this period. It was an observational study. Reporting was done keeping in view all the present systems of reporting cytopathology. Apparatus used included 20 ml disposable plastic syringe, 22-25-gauge disposable needle, antiseptic sponges, sterile gauze pads, microscopic glass slides, local anesthetic injection.

Fine needle aspiration cytology is performed with the help of 22-25-gauge needle attached with 20 ml disposable plastic syringe and frenzen's handle by taking all aseptic precautions. The needle is introduced into the swelling after proper fixation of swelling with hand and rapid to and fro motion is applied with or without suction. After many passes, the suction pressure is released, and needle is withdrawn. The aspirated material is spread on glass slides and smears are prepared. Dry smears were stained with giemsa stain, AFB stain for Acid fast bacilli and wet smears are stained with Papanicolaou (PAP) stain. The slides were evaluated, diagnosis was made, and results were classified as non-neoplastic and neoplastic.

## RESULTS

This prospective study was conducted in hilly mountainous region of Jammu and Kashmir India in GMC Doda. A total of 70 samples were analyzed over a

period of four months from April 2019 to July 2019. The interpretation of cytological smear requires a trained pathologist or cytopathologist. The more experienced the cytopathologist the better the accuracy of the report.<sup>14</sup> The report would include cellularity of smear, cell arrangement, nuclear and cytoplasmic features and the background morphology of the smears.<sup>15</sup>

Out of total 70 samples maximum number of cases were found in 21-30 years of age (16 cases); followed by 31-40 years of age 15 cases (21%) (Table 1), 34 cases (49%) were males and 36 cases (51%) were females (Table 2). 38 cases (54%) were non-neoplastic, 23 cases (33%) were neoplastic and in 9 cases (13%) no opinion could be made. Out of total 70 samples maximum number of cases were found in 21-30 years of age 16(23%) cases; followed by 31-40 years of age 15 cases (21%).

Out of total 70 cases: 34 cases (49%) were males and 36 cases (51%) were females. Among non-neoplastic cases,

2(3%) cases were of chronic granulomatous pathology (Tuberculosis) showing Epithelioid cell collections with characteristically pale elongated sole shaped nuclei forming well-formed granulomas (Figure 1) and 36 cases (51%) were of non-specific pathology.

**Table 1: Age wise distribution of cases.**

Age group in years	Number of cases	Percentage
0-10	4	6%
11-20	15	21%
21-30	16	23%
31-40	15	21%
41-50	8	12%
51-60	8	12%
61-70	3	4%
71-80	1	1.4%
Total	70	100%

**Table 2: Sex wise distribution of cases.**

Males	Percentage	Females	Percentage	Total	Percentage
34	49%	36	51%	70	100%

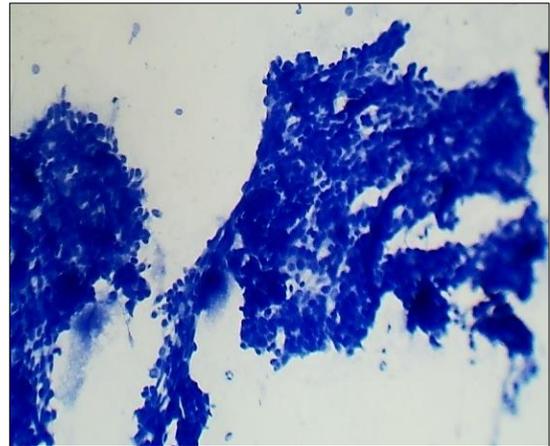
**Table 3: Number of non-neoplastic and neoplastic lesions.**

Non neoplastic		Neoplastic				No opinion possible	Total	%	
Tubercular	%	Non-specific	%	Benign	%	Malignant	%		
2	3%	36	51%	17	24%	6	9%	9	
							Percentage	70	100%
							13%		

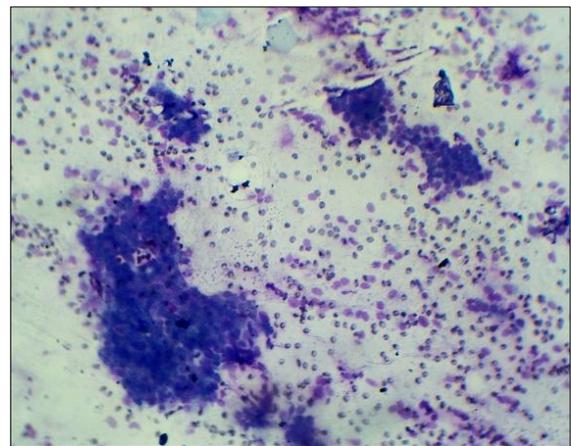
**Table 4: Cytological diagnosis of various lesions.**

Non-neoplastic lesions		neoplastic lesions		
Tuberculous	Chronic granulomatous lymphadenitis	Benign	Lipoma	
			Fibroadenoma	
Nonspecific	EIC Colloid goiter Abscess Non-specific reactive lymphadenitis Gynecomastia Acute infective sialadenitis Ganglion cyst Lymphocytic/hashimottos thyroiditis Adnexal lesion Thyroglossal cyst Epithelial hyperplasia Fat necrosis Acute suppurative lymphadenitis Degenerated lymphoid cells		Malignant	Pleomorphic adenoma
				Benign spindle cell lesion
				Hemangioma
				Ductal cell carcinoma
				Non-Hodgkin's lymphoma
				Follicular neoplasm
				Metastasis of p.d scc

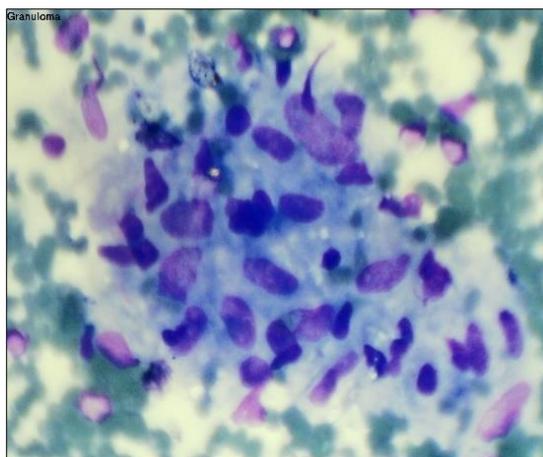
Among Neoplastic cases, 17 cases (24%) were found to be benign and 6 cases (9%) were found to be malignant (Table 3). Out of total 70 cases (100%), 38 cases (54%) were non-neoplastic, 23 cases (33%) were neoplastic and in 9 cases (13%) no opinion could be made. Among non-neoplastic lesions 2 cases (3%) were diagnosed as chronic granulomatous lymphadenitis, 36 cases (51%) were diagnosed as non-specific in the form of Gynaecomastia consisting of large staghorn sheets of benign ductal epithelial cells only (Figure 2), Epidermal Inclusion Cyst (EIC), Colloid goiter (TBSRTC Cat-II), Abscess, Non-specific reactive lymphadenitis, Acute infective sialadenitis, Ganglion cyst, Lymphocytic thyroiditis/Hoshimottos thyroiditis, Adnexal lesion, Thyroglossal cyst, Epithelial hyperplasia of breast, Fat necrosis, Acute suppurative lymphadenitis, and degenerated lymphoid cells. Among Neoplastic lesions 17 cases (24%) were diagnosed as benign which included Lipoma, Fibroadenoma Breast showing bimodal population of ductal epithelial and myoepithelial cells, large number of bare bipolar nuclei and areas of fibro myxoid stroma (Figure 3), Benign spindle cell lesion, Hemangioma, Pleomorphic adenoma showing poorly cohesive epithelial like cells associated with fibrillar fibro myxoid stroma (Figure 4) and 6 cases (9%) were diagnosed as malignant in the form of Ductal cell carcinoma showing Pleomorphic tumor cells arranged in clusters with hyperchromatic nuclei, irregular nuclear membranes and prominent nucleoli- Ductal cell carcinoma Breast (10x) (Figure 5) and (40x) (Figure 6), Non-Hodgkin's lymphoma, showing monomorphic population of malignant lymphoid cells with high nucleo-cytoplasmic ratio, irregular nuclear contours, prominent nucleoli and scant cytoplasm- Non-Hodgkin's lymphoma Lymph node (40x) (Figure 7), Follicular neoplasm of thyroid showing microfollicular cell clusters/rosettes with some nuclear hyperchromasia and coarseness against colloid free background (Figure 8) and metastatic deposits of Poorly differentiated Squamous cell carcinoma (Table 4).



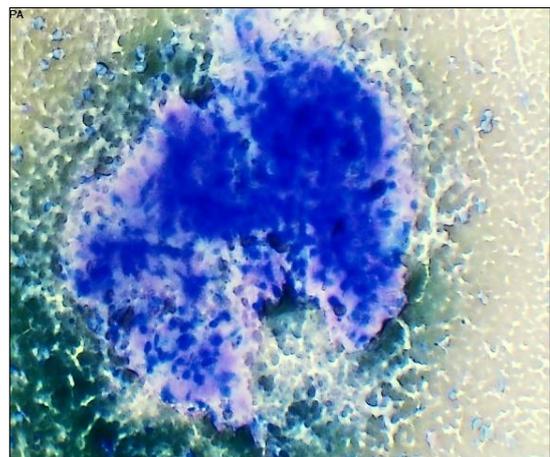
**Figure 2: Photomicrograph showing large staghorn sheet of benign ductal cells-Gynaecomastia (10x).**



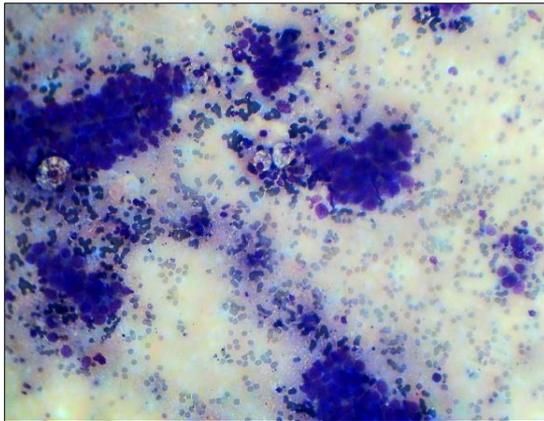
**Figure 3: Photomicrograph showing bimodal population of ductal epithelial and myoepithelial cells, large number of bare bipolar nuclei and areas of fibro myxoid stroma-Fibroadenoma Breast.**



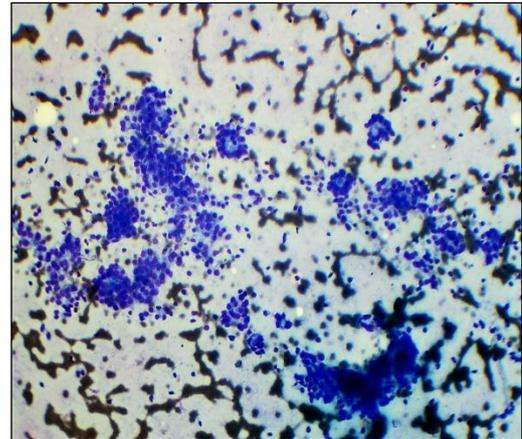
**Figure 1: Photomicrograph showing Epithelioid cell collections with characteristically pale elongated spindle shaped nuclei forming well-formed granulomas.**



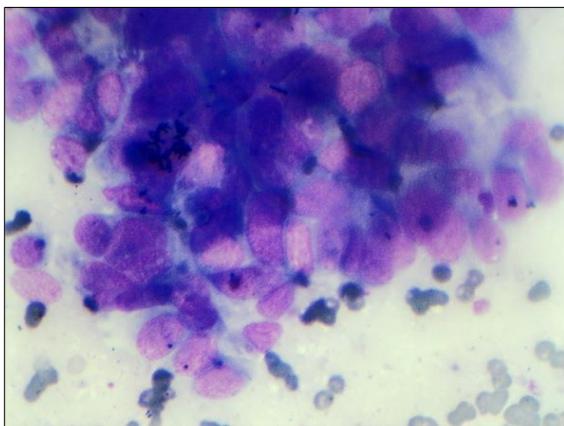
**Figure 4: Photomicrograph showing poorly cohesive epithelial like cells associated with fibrillar fibro myxoid stroma-Pleomorphic adenoma salivary gland.**



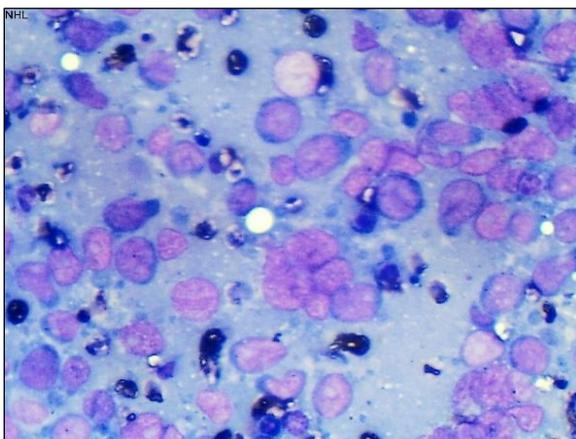
**Figure 5: Pleomorphic tumour cells arranged in clusters with H/c nuclei, irregular nuclear membranes and prominent nucleoli- Ductal cell carcinoma Breast (10x).**



**Figure 8: Predominantly microfollicular cell clusters/rosettes with some nuclear hyperchromasia and coarseness against colloid free background- Follicular Neoplasm of thyroid.**



**Figure 6: Pleomorphic tumour cells arranged in clusters with H/c nuclei, irregular nuclear membranes and prominent nucleoli- Ductal cell carcinoma breast (40x).**



**Figure 7: Monomorphic population of malignant lymphoid cells with high nucleo-cytoplasmic ratio, irregular nuclear contours, prominent nucleoli and scant cytoplasm Non-Hodgkins lymphoma Lymphnode (40x).**

## DISCUSSION

This study was conducted in hilly mountainous region of Jammu and Kashmir India in GMC Doda. This region is difficult to reach with scarcity of medical facilities. FNAC procedure was not done previously in this area. FNAC procedure was started first time by pathologists of GMC Doda.

Swellings of various organs and sites of the body are clinical presentation of various diseases. The etiology of which can be benign or malignant lesions.<sup>18</sup> In this study most cases were observed in the age group of 21-40 years. Similar observation was made by Chandawale SS et al, and Kumar H et al, Authors observed that neoplastic lesions were common in the patients above 40 years of age.<sup>19,20</sup> The study correlated with the study of Sarda AK et al.<sup>21</sup>

This study included 70 cytologically diagnosed cases. Out of which 38 cases (54%) were diagnosed as non-neoplastic, 23 cases (33%) were neoplastic and in 9 cases (13%) no possible opinion could be made. Categorisation of diagnosis is given in the table (4). Which is summarized as under:

Among non-neoplastic lesions 2 cases (3%) were diagnosed as chronic granulomatous lymphadenitis, 36 cases (51%) were diagnosed as non-specific in the form of Epidermal Inclusion Cyst (EIC), Colloid goiter, Abscess, Non-specific reactive lymphadenitis, Gynecomastia, Acute infective sialadenitis, Ganglion cyst, Lymphocytic thyroiditis/Hoshimottos thyroiditis, Adnexal lesion, thyroglossal cyst, Epithelial hyperplasia of breast, Fat necrosis, Acute suppurative lymphadenitis, and degenerated lymphoid cells.

Among Neoplastic lesions 17 cases (24%) were diagnosed as benign which included Lipoma, Fibroadenoma, Benign spindle cell lesion, Hemangioma.

Pleomorphic adenoma and 6 cases (9%) were diagnosed as malignant in the form of Ductal cell carcinoma, Non-hodgkins lymphoma, Follicular neoplasm of thyroid and metastatic deposits of Poorly differentiated Squamous cell carcinoma.

In 9 cases (13%) No opinion could be made due to a number of factors like: Material not corresponding of representative area, small size of lesion, wrong technique, cystic areas, hemorrhage and necrosis containing no viable diagnostic cells, small foci of neoplastic lesion and fibrotic lesions.

Limitations of FNAC are due to sampling error in the form of inadequate cell population.<sup>16</sup> Orrell et al, in his study noted that the diagnostic difficulties which are usually related to deviations from common cytological criteria that may occur in some lesions and others are due to the effects of the sampling procedure or of the preparation of the samples.<sup>17</sup>

## CONCLUSION

Even though a number of limitations in the form of sampling error, cytotechnologist error, inter observational error, cystic changes, necrosis with no viable cells or other factors, FNAC has high accuracy in diagnosing benign and malignant lesions of various sites and thus reduces the period between presentation of tumors and their diagnosis which results in early management. While limitations of aspiration cytology exist, they can be overcome up to some extent with the use of image guided aspiration techniques, controlling human errors and use of ancillary techniques like immunocytochemistry.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Sheikh NT, Khurshid SU. Study of diagnostic importance of fine needle aspiration cytology in various body lesions in a predominantly rural mountainous region of Jammu and Kashmir, G.M.C Doda, India. Int J Res Med Sci 2020;8:123-8.