

Original Research Article

## **Spectrum of Superficial Lesions Diagnosed By Fine Needle Aspiration Cytology in Pediatric Population: A Retrospective Study**

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**Abstract:** Fine needle aspiration cytology (FNAC) is a safe, simple, rapid, cost effective and minimally invasive way of diagnosing inflammatory, non-inflammatory & neoplastic lesions. The necessity to perform excision biopsy is reduced in many cases, saving children from surgical complications. The present study was designed to study the spectrum of superficial lesions, aspirated in the pediatric age group, with respect to the age, sex and anatomic distribution of the lesions, also to evaluate the number of benign and malignant cytological diagnosis and correlate the cytological diagnosis with the histopathological diagnosis wherever available. The present study is a retrospective study which was undertaken in the Department of Pathology, in a tertiary care hospital in Maharashtra from July 2014 to December 2016. Total 289 cases of superficial FNAC in pediatric age group (0-16Years) were studied. Male preponderance is noted. The majority of aspirates were of a benign nature i.e.95.90% and rest i.e. 4.10% were malignant. A subdivision of FNA diagnosis according to anatomic site revealed a distinct preponderance of lymph nodes, over all other sites i.e. 58.58%, this was followed by the head and neck region (excluding lymph nodes) i.e. 23.13%. The maximum number of aspirates was lymphadenitis i.e. 64.95% out of which the majorities were reactive lymphadenitis i.e. 44.39 %. Correlation between cytological and histological diagnosis was available in only 22.01% of cases. FNAC is a safe, simple, cost-effective procedure with high diagnostic accuracy and has got a good patient acceptance. In resource limited settings, health care providers should realize the importance of FNAC as an initial screening tool in superficial lesions in pediatric population and refer patients for it appropriately.

**Keywords:** Fine needle aspiration cytology, Lymphadenitis, Superficial masses

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### **INTRODUCTION:**

Mass lesions in pediatric age group are a source of great anxiety and concern to the parents. Fine needle aspiration cytology (FNAC) has been practiced for several decades as a useful technique in the diagnosis of mass lesions [1]. A definitive operative procedure can be avoided by giving a presumptive diagnosis on FNAC. FNAC is a safe, simple, rapid, cost effective and minimally invasive way of diagnosing inflammatory, non-inflammatory & neoplastic lesions [2]. It is a well-established technique with high specificity and aid in speedy diagnosis [3], thereby limiting psychological trauma to parents.

A number of special stains, cytogenetics, cell surface markers, flowcytometry, ultra structural studies by electron microscope, cell block preparation along with immunocytochemistry can be done on cytological

smears. FNAC in pediatric population has gained acceptance due to its advantages and fewer limitations [4]. So far only a few Indian studies are done on FNAC in paediatric groups [5]. The present study was designed to study the spectrum of superficial lesions, aspirated in the pediatric age group, with respect to age, sex and anatomic distribution of the lesions. Also to evaluate the number of benign and malignant cytological diagnosis and correlate the cytological diagnosis with the histopathological diagnosis wherever it is available.

### **MATERIALS AND METHODS**

The present study is a retrospective study which was undertaken in the Department of Pathology, in a tertiary care hospital in Maharashtra from July 2014 to December 2016. Reports of 289 pediatric patients (<16years) who have undergone FNAC of superficial

and easily accessible lesions were studied retrospectively. Deep seated and USG guided FNAC are excluded from the study. Cytopathologic diagnosis was compared with histopathologic diagnosis wherever available.

**RESULTS:**

Total 289 cases of superficial FNAC in pediatric age group are studied. Out of which 21 (7.2 %) cases were inadequate. The age range we have included is 0-16 years and we subdivided this range into three groups 0-5 years, 6-11 years and 12-16 years. We had more aspirates in the older group of children i.e. 12-16 years 105/268 (39.17%) aspirates than the younger age groups. The youngest patient was 10 month old and the oldest patient was 16 years of age. The mean age was 8 years. In all three groups the majority of aspirates were of a benign nature i.e.257/268 (95.90%) and rest i.e. 11/268 (4.10%) were malignant [Table I]. The sex distribution of FNA diagnosis revealed a slight male predominance. The males were 136 /268 (50.74 %) and females 132 /268(49.26%). [Table II].

A subdivision of FNA diagnosis according to anatomic site revealed a distinct preponderance of lymph nodes, over all other sites i.e. 157/268 (58.58%), this was followed by the head and neck region (excluding lymph nodes) i.e. 62/268 (23.13%). The least number of aspirates were from the abdominal wall i.e. 2/268 (0.74%). At majority of the anatomic sites, there was a distinct preponderance of the benign diagnosis over malignant [Table III].

The benign cytological diagnosis was sub-typed as inflammatory/infectious and benign cystic lesions. The maximum number of aspirates were lymphadenitis i.e.139/214 (64.95%) out of which the

majority were reactive lymphadenitis i.e.95/214 (44.39%) followed in order by tuberculous lymphadenitis i.e. 13/214 (6.07 %), granulomatous lymphadenitis 12/214 (5.60%), acute suppurative lymphadenitis i.e.10/214 (4.67%) and acute necrotizing lymphadenitis9/214(4.20%). The other major category included the benign cystic lesions i.e. 23/214 (10.74%) comprised mostly of epidermal cysts, thyroglossal cysts, branchial cysts, epidermoid cysts, cystic hygroma and dermoid cysts. Thyroid showing 17/214 out of which12/214 colloid goiters and 05/214 cases of thyroiditis (1case of lymphocytic thyroiditis and 4 cases of Hashimoto thyroiditis) [Table IV].

Neoplastic lesions are divided into benign and malignant neoplasia. There were 43/268 (16.04%) aspirates which were showing benign neoplastic lesions, out of these the maximum number, were fibroadenomas i.e.25 /43 aspirates [Table V]. There were 11 aspirates which were positive for malignancy, out of these the maximum number were of lymphomas i.e. 5/11(45.45%) aspirates. Subtyping was possible in only two aspirates which were diagnosed as Burkitts Lymphoma and Hodgkin’s lymphoma [Table VI]. Most of the Lymphomas presented as a nodal mass in the region of head and neck and showed a monomorphic population of lymphoid cells on cytology. One case presented as a lymph node mass showing prominent vacuoles and was designated as Burkitts lymphoma on cytology.

Correlation between cytological and histological diagnosis was available in only 59/289 cases accounting for 22.01% [Table VII]. Majority of our diagnosis being benign were not subjected to surgical excision. The inflammatory lesions tend to disappear after a short period of antibiotic therapy.

**Table 1: Age Range and FNAC Diagnosis**

Age range (years)	Benign	Malignant	Total	Percentage
0-5	63	3	67	25%
6-11	94	2	96	35.82%
12-16	100	6	105	39.17%
<b>TOTAL</b>	257	11	268	100%
<b>Percentage</b>	<b>95.90%</b>	<b>4.10%</b>	<b>100%</b>	

**Table 2: Sex Distribution of FNAC Diagnosis**

Sex	No. of cases	Percentage
Males	136	50.74
Females	132	49.26
Total	268	100

**Table 3: Anatomic Sites of Aspirate**

Site	Benign	Malignant	Total	Percentage
Lymph nodes	152	5	157	58.58%
Head & Neck	57	5	62	23.13%
Breast	33	0	33	12.31%
Extremities	4	1	5	1.8%
Chest wall	3	0	3	1.11%
Abdominal wall	2	0	2	0.74%
Soft tissue and bone	6	0	6	2.23%
<b>Total</b>	257	11	268	100%

**Table 4: Benign Cytologic Diagnosis \{Inflammatory/infectious and benign cystic lesions\}**

DIAGNOSIS		No. of cases	PERCENTAGE
Reactive Lymphadenitis		95	44.39%
Tuberculous Lymphadenitis		13	6.07%
Acute suppurative Lymphadenitis		10	4.67%
Necrotising Lymphadenitis		09	4.20%
Granulomatous Lymphadenitis		12	5.60%
Colloid Goiter		12	5.60%
Thyroiditis	Hashimoto's 4	5	2.33%
	Lymphocytic 1		
Abscesses #		12	5.60%
Benign cystic lesion	Epidermal cyst-13	23	10.74%
	Thyroglossal cyst-5		
	Branchial cyst-1		
	Epidermoid cyst1		
	Cystic hygroma1		
Dermoid cyst1			
Acute suppurative lesion		5	2.33%
Acute on chronic inflammatory lesion		5	2.33%
Chronic inflammatory lesion		5	2.33%
Chronic/reactive sialoadenities		3	1.40%
Pigmented villonodular synovitis		1	0.46%
No evidence of malignancy		4	1.86%
<b>TOTAL</b>		<b>214</b>	<b>100%</b>

# Abscesses- submandibular, parotid, chest wall and thigh

**Table 5: Benign Neoplastic Cytologic Diagnosis**

DIAGNOSIS	No. of cases	PERCENTAGE
Fibroadenoma	25	58.13%
Gynacomastia	8	18.60%
Lipoma	3	6.97%
Pleomorphic adenoma	3	6.97%
Benign spindle cell lesion	1	2.32%
Giant cell tumor of bone	1	2.32%
Neurofibroma	2	4.65%
<b>TOTAL</b>	<b>43</b>	<b>100%</b>

**Table 6: Malignant Cytologic Diagnosis**

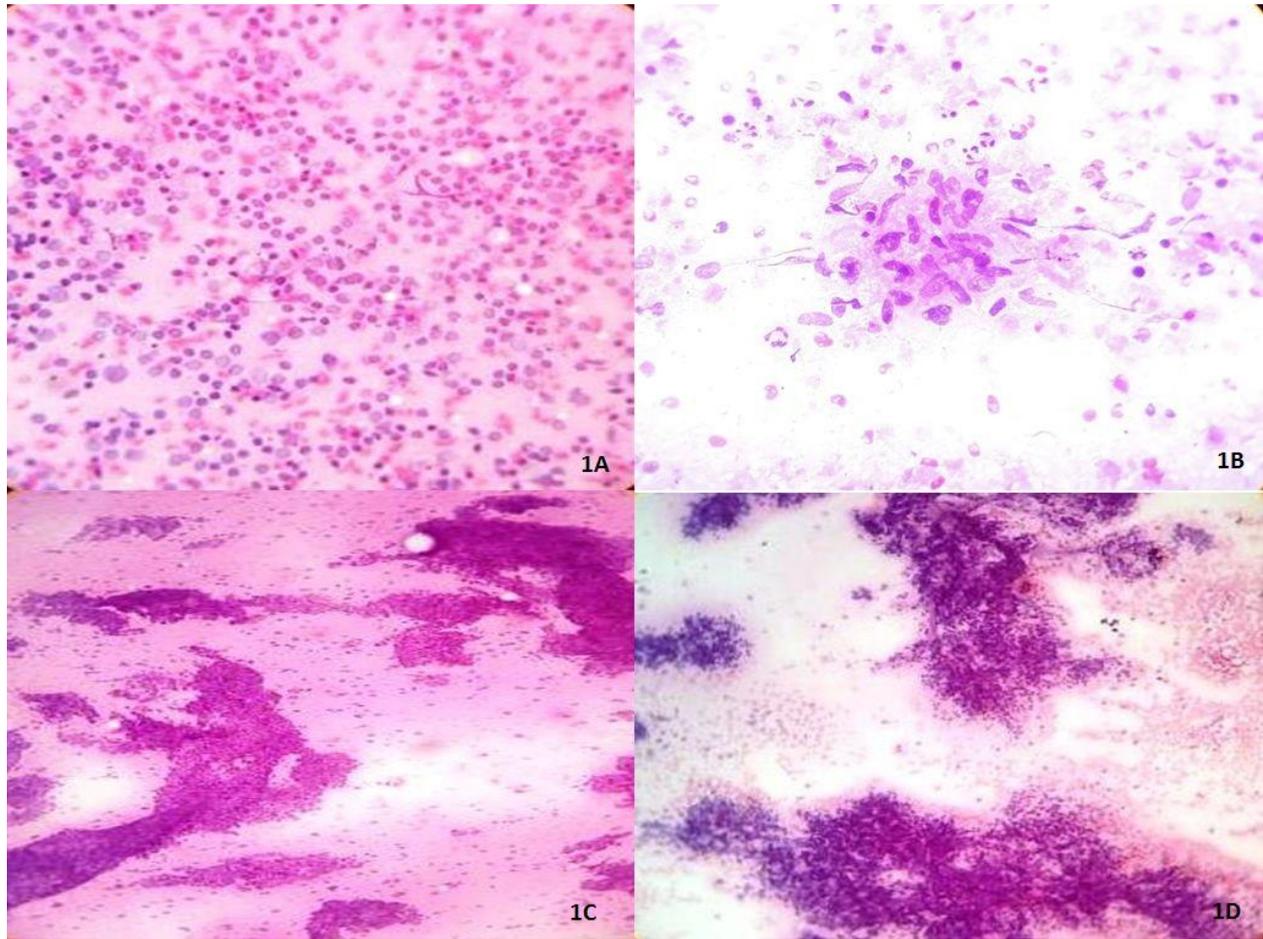
Diagnosis	Males	Females	Total	Percentage
Lymphoma	3	2	5	45.45%
RMS	0	2	2	18.18
Follicular carcinoma thyroid	0	1	1	9.09%
Metastatic lesion	1	0	1	9.09%
Round Cell Neoplasm	1	0	1	9.09%
Positive for malignant cells	0	1	1	9.09%
	5	6	11	100%

**Table 7: Correlation between Cytological and Histological Diagnosis**

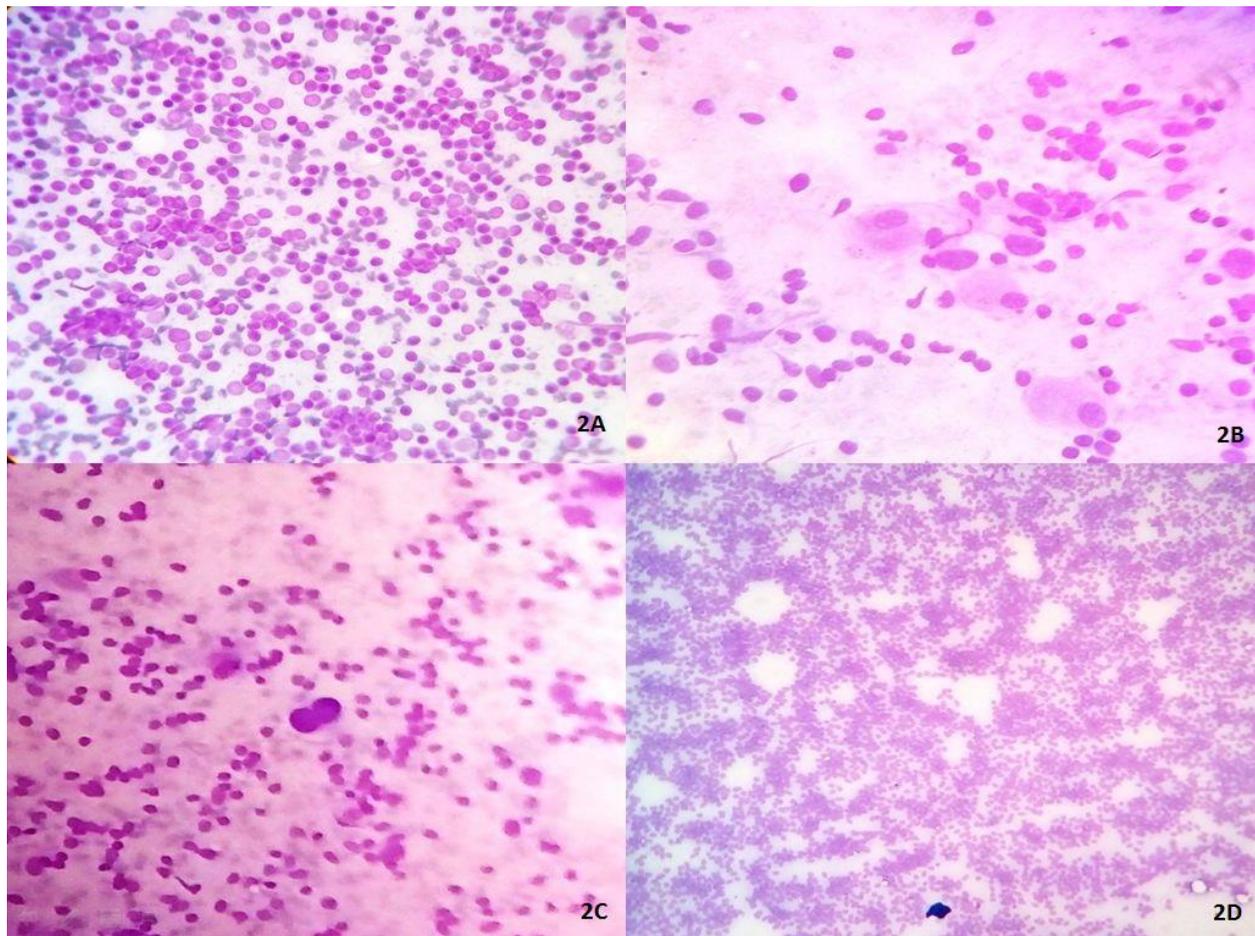
FNA Cytology		Histopathology	
Diagnosis	No. of aspirates	Histologic Diagnosis	No. of cases
TB lymphadenitis	12	TB lymph node	12
Reactive Lymph Node	17	Reactive Lymphadenitis	15
		TB Lymph node	1
		Non-Hodgkin Lymphoma	1
Cystic Lesions	06	Thyroglossal cyst	1
		Branchial Cyst	1
		Epidermal Cyst	3
		Cystic Hygroma	1
Fibroadenoma	13	Fibroadenoma	13
Benign spindle cell lesion	1	Neurofibroma	1
Inadequate aspirates	3	Haemangioma	1
		Osteomyelitis	1
		Colloid Goiter	1
Inflammatory lesions	2	Abscess	1
		Kimura's Disease	1
Lymphoma	3	NHL	3
RMS	1	RMS	1
Round Cell Neoplasm	1	Ewings	1
<b>Total</b>	<b>59</b>		<b>59</b>

**Table 8: Comparison of Various Studies in Pediatric Age Group**

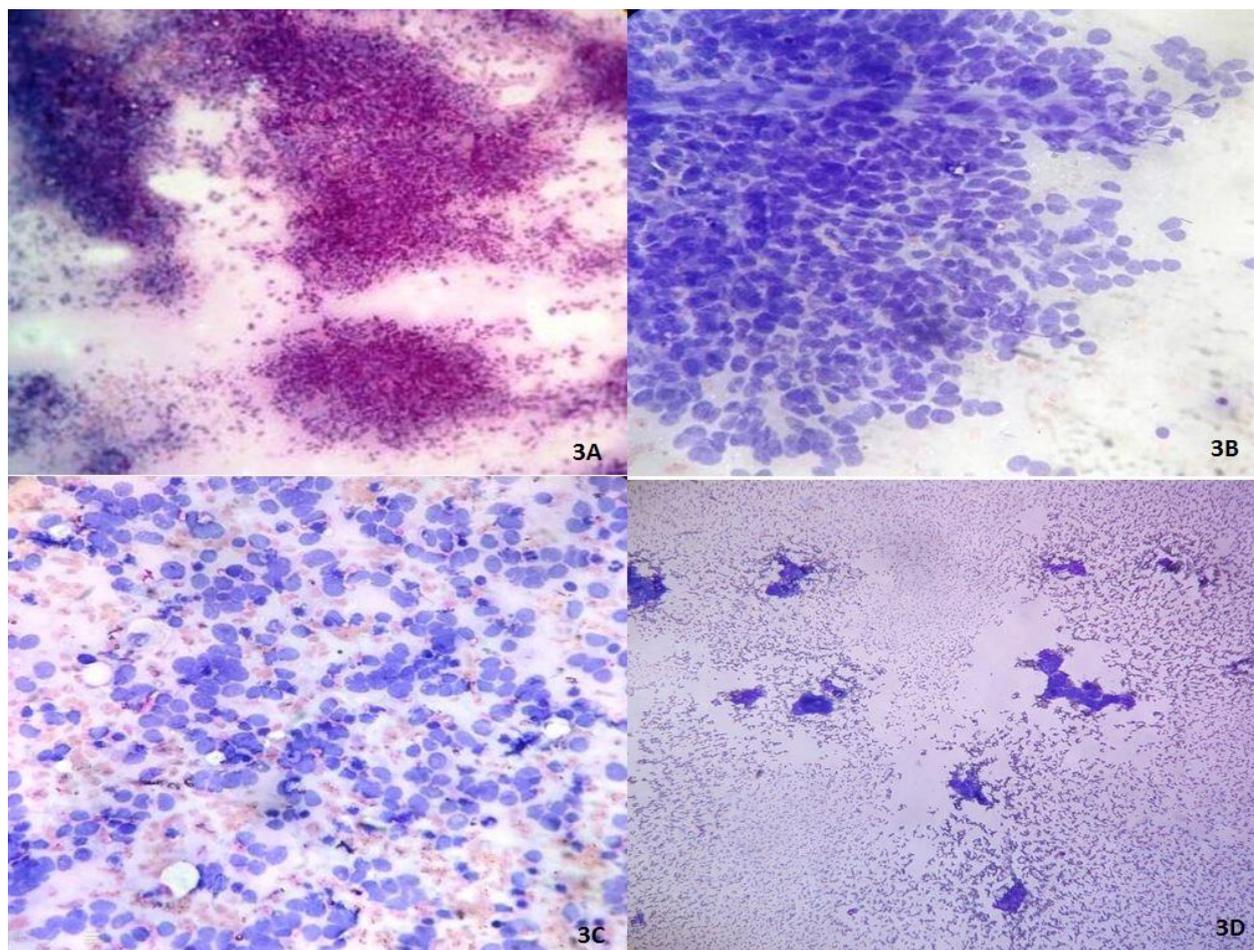
	Amy Rapackwiz <i>et al.</i> ; [4]	M Jain <i>et al.</i> ; [5]	Handa U <i>et al.</i> ; [7]	Mitra P <i>et al.</i> ; [8]	Present study
Total No.Of cases	85 cases	748 cases	692 cases	100	289
Age group	0-18 years	0-12 years	0-14 years	0-15	0-16
Adequacy of material		94%	93.4%	93%	92.8%
Age predominance			6-10 years	10-15 years	12-16
Sex predominance	Male [69.4%]		Male :female ratio 1.5: 1	Male 55%	Male 50.74%
Most common site of lesion	Lymph node cervical 69.4%	Lymph node cervical 81%	Lymph node cervical 84.3%	Lymph node cervical 87%	Lymph node cervical 54.10%
Nature of Lesion Benign	83%	98.5%	98.46%	88.17%	95.90%
Malignant	17%	1.5%	1.54%	11.83%	4.10%



**Fig 1: Reactive lymphadenitis showing polymorphous population of lymphoid cells (1A). Photomicrograph showing epithelioid cell granuloma (1B). Photomicrograph showing clusters of benign ductal epithelial cells, Fibroadenoma (1C). Photomicrograph showing biphasic population of epithelial and mesenchymal cells, Pleomorphic adenoma (1D)**



**Fig 2: Photomicrograph showing collection of lymphoid cells, Lymphoproliferative neoplasm (2A). Photomicrograph showing atypical lymphoid cells against a reactive background (2B). Photomicrograph showing a Reed Sternberg cell (RS CELL) (2C). Photomicrograph showing monomorphous round cells population, Round cell neoplasm (2D)**



**Fig 3: Photomicrograph showing low power view of malignant spindle cells in a case of malignant spindle cell neoplasm (3A). Photomicrograph showing cells with enlarged hyper chromatic nuclei and prominent nucleoli, Rhabdomyosarcoma (3B). Photomicrograph showing metastatic deposits of Rhabdomyosarcoma in a lymph node (3C). Photomicrograph showing papillary structures in a case of papillary thyroid carcinoma (3D)**

#### DISCUSSION:

FNAC is used as an initial diagnostic tool in evaluating different lesions in adult patients. However, FNAC was used in few pediatric cases possibly due to diagnostic technique of low morbidity and mortality but high accuracy and rapidity [6]. The FNAC specimen in present study is from various sites and includes a wide range of cytological diagnosis. FNAC studies done by various investigators in pediatric age group has rendered similar results as that of present study [Table VIII].

Adequacy of material in various studies is found to be in the range of 93-94%. While unsatisfactory aspirates is in the range of 6-8% [5,7,8]. In present study adequacy of material is found to be 92.8% and unsatisfactory/inadequate aspirate is found in 7.2% cases, which is within the range of other studies done.

In a study by Maheshwari, *et al.*; [9] majority of cases (40.82%) were in the age group of 11-14 years. While in Mitra *et al.*; [8] majority of cases were in the age group of 10-15 years. In present study maximum number of cases is in 12-16 age groups accounting for 39.17% hence correlating with these studies. In the present study, male preponderance was observed 50.74%. Male dominated the study population in all above studies [4, 7, 8]. The majority of aspirates were of a benign nature i.e. 257/268 (95.90%) and rest i.e. 11/268 (4.10%) were malignant. Correlating well with other studies [5, 7, 8].

A subdivision of FNA diagnosis according to anatomic site revealed a distinct preponderance of lymph nodes, over all other sites i.e. 157/268 (58.58%), this was followed by the head and neck region

(excluding lymph nodes) i.e. 62/268 (23.13%). Out of all lymph nodes aspirated 145/268 (54.10%) are cervical group of lymph nodes. Correlating well with all studies. However in all the studies cervical aspiration percentage was much higher as compared to present study.

In present study the commonest cytopathological finding among cervical lymph node lesions was reactive lymphadenitis in 44.39% (95/214), followed by tubercular lymphadenitis 6.07% (13/214), granulomatous lymphadenitis 5.60% (12/214), acute suppurative lymphadenitis 4.67% (10/214), and necrotizing lymphadenitis in 4.2% (09/214). The other major category included the benign cystic lesions i.e. 23/214 (10.74%) comprised mostly of epidermal cysts, thyroglossal cysts, branchial cysts, epidermoid cysts, cystic hygroma and dermoid cysts. Thyroid showing 17/214 out of which 12/214 colloid goiters and 05/214 cases of thyroiditis (1 case of lymphocytic thyroiditis and 4 cases of Hashimoto thyroiditis) [Figure 1A, 1B].

In a study by Pratima S *et al.*; [10] The most common site for FNAC was cervical lymph node swelling 48.3% (158/327) followed by thyroid swelling. Reactive lymphadenitis was the most common among non-neoplastic lesions 38.8% (103/265) followed by acute suppurative lesion 16.22% (43/265) and colloid goiter 7.2% (19/265). Among cervical lymph node lesions, maximum cases were of reactive lymphadenitis 65.2% (103/158), followed by acute suppurative lymphadenitis 12.6% (20/158), granulomatous lymphadenitis 10.7% (17/158), and tubercular lymphadenitis 10.1% (16/158). Annam, *et al.*; also noted that the most common cytopathological finding as reactive lymphadenitis in 58.08%, followed by granulomatous lymphadenitis and tubercular lymphadenitis in 30.55% and 29.01% respectively. [11] Colloid goiter was the main lesion in thyroid. M. Jain [5] got similar results. We got 4 cases of Hashimoto thyroiditis while P. Mittra [7] got one case of Hashimoto thyroiditis [1C, 1D].

Findings in salivary gland lesions were pleomorphic adenoma (3/43) and chronic/reactive sialadenitis (3/214). M. Jain [5] got similar findings. There were 43/268 (16.04%) aspirates which were showing benign neoplastic lesions. Fibroadenoma 58.13% (25/43) formed the majority among benign tumors in our study. Fibroadenoma 20.8% (10/49) formed the majority among benign tumors in study by Pratima S *et al.*; [10]. While Maheshwari *et al.*; noted soft tissue tumors (64%) were predominant among benign tumors [9].

The largest malignant group was formed by lymphomas (25.1%), followed by small round cell tumors (21.3%), and Wilms' tumor (12.6%) in a study by Maheshwari *et al.*; [9] Study by Pratima S. *et al.* [10] there were two cases each of non-Hodgkin's lymphoma and Hodgkin's lymphoma 15.3% (2/13) and one case of chondrosarcoma. In the present study, there were 5 cases of lymphoma 45.45% (5/11), followed by RMS 18.18% (2/11) and one case each of Follicular carcinoma of thyroid, round cell neoplasm, metastatic lesion in lymph node and one case reported as positive for malignancy [2A, 2B, 2C, 2D, 3A, 3B, 3C, 3D].

Correlation between cytologic and histologic diagnosis was available in only 59/289 cases, accounting for 22.01%. The cytological and histological findings were concordant in 53/59 cases. So accuracy was found to be 89.83%. One case of reactive lymphadenitis was diagnosed as tuberculous lymphadenitis on histopathology while another case as Non-Hodgkins lymphoma. Similarly 3 cases which were reported as inadequate on FNAC were diagnosed as haemangioma, osteomyelitis and colloid goiter. In the study done by Mohan A *et al.*; [12] comparison of cytomorphological and histopathological diagnosis was done in only 8.33% (18/215) cases. The cytological findings were concordant with histopathological findings in 88.89% cases (16/18) and 11.11% cases (2/18) were showing discrepancy between cytological and histopathological findings [12]. Also in a study by Prathima *et al.*; [10] cyto-histopathological correlation was done in 9.4% cases and got concordant results in 81.6% cases.

#### CONCLUSION:

FNAC is a safe, simple, cost-effective procedure with high diagnostic accuracy. It has got a good patient acceptance due to less side effects, no morbidity and can be carried out with ease in children. The necessity to perform excision biopsy is reduced in many cases, saving children from surgical complications. Hence it can be used as an initial screening tool in all the superficial lesions in pediatric age group.

The reactive lymphadenopathy is commonest clinical presentation in pediatric population, which resolves spontaneously and surgical excision is not at all indicated. FNAC has helped to avoid unnecessary excision biopsies, and its complications especially in benign inflammatory condition. Rational and proper planning of surgery/treatment can be done in cases of primary neoplasms as it is used to distinguish between benign and malignant lesions. However,

histopathological examination is mandatory in few suspicious cases. In resource limited settings, health care providers should realize the importance of FNAC as an initial screening tool in superficial lesions in pediatric population and refer patients for it appropriately.

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