International Journal of Clinical and Diagnostic Pathology

ISSN (P): 2617-7226
ISSN (E): 2617-7234
www.patholjournal.com
2021; 4(4): 30-35
Received: 22-08-2021
Accepted: 24-09-2021

Dr. Pinal M Patel
MBBS, Third Year Resident, Department of Pathology, B. J. Medical College and Civil Hospital, Asarwa, Ahmedabad, Gujarat, India

Dr. Viral M Bhanvadia
MD Pathology, Assistant Professor, Department of Pathology, M&J Western Regional Institute of Ophthalmology, B. J. Medical College and Civil Hospital, Asarwa, Ahmedabad, Gujarat, India

Dr. Hansa M Goswami
MD Pathology, Professor & Head, Department of Pathology, B. J. Medical College and Civil Hospital, Asarwa, Ahmedabad, Gujarat, India

Corresponding Author:
Dr. Viral M Bhanvadia
MD Pathology, Assistant Professor, Department of Pathology, M&J Western Regional Institute of Ophthalmology, B. J. Medical College and Civil Hospital, Asarwa, Ahmedabad, Gujarat, India

Fine needle aspiration cytology as a diagnostic tool in superficial lyphadenopathy of pediatric age group

Dr. Pinal M Patel, Dr. Viral M Bhanvadia and Dr. Hansa M Goswami

DOI: https://doi.org/10.33545/pathol.2021.v4.i4a.420

Abstract
Background: Superficial Lymphadenopathy (LAP) is a common clinical presentation seen in pediatric patients attending the outpatient department. The etiology of Superficial LAP varies from a benign process to malignancy. Fine needle aspiration cytology (FNAC) is a very rapid and easy to perform diagnostic test. Majority of cases can be diagnosed and managed on FNAC without need of histopathology. The aim of this study was to evaluate the role of FNAC in diagnosis of superficial LAP in pediatric population.
Methods: This retrospective study was carried out over a period of two year from June 2019 to May 2021 in the department of Pathology, B.J. Medical college, Civil Hospital Ahmedabad, Gujarat, India. Aspirated material was stained with Giemsa, Papanicolaou and Ziehl- Neelsen stain (whenever required). Distribution of cases in different age groups and sex was analyzed. lesions were categorized into benign and malignant conditions. All cases of superficial LAP seen in pediatric population where FNAC was performed were included in the study.
Results: A total of 122 lymph nodes were aspirated in pediatric population during the study period. Majority of cases (94%) were benign. The results were categorized into two broad categories as benign-reactive lymphadenitis (67; 55%), Granulomatous lymphadenitis (47; 39%) and malignancy (08; 06%). The eight cases of malignancies identified in this population comprised of four cases, one of Hodgkin's Lymphoma (HL) and three of Non-Hodgkin's Lymphoma (NHL). In this study, maximum number of patients were in the age group of 10-14 years (46%) followed by <5 years age group (37%). Cervical lymphadenopathy is the main group of superficial lymphadenopathy in pediatric population constituting (96/122; 79%) of all superficial LAP followed by Axillary Lymphadenopathy.
Conclusion: FNAC should be considered as a first line investigation for evaluating the peripheral superficial LAP in pediatric population. Reactive Lymphadenitis is recognised as most common cytological finding of superficial LAP examination. Majority of these cases can be diagnosed and managed on FNAC alone.

Keywords: fine needle aspiration cytology (FNAC), Pediatric, superficial lymphadenopathy (LAP), reactive lymphadenitis, granulomatous lymphadenitis

Introduction
FNAC is a safe, minimally invasive rapid procedure with good patient acceptance and low morbidity [1]. In comparison, FNAC provides a simple and quick diagnostic procedure. This procedure is highly cost effective as it diagnoses majority of cases [3, 4, 5]
The ease of FNAC along with its high diagnostic accuracy makes it a desirable method for diagnosing lesions in children [2].
Superficial lymphadenopathy is the disease process of the lymph nodes that rendering them abnormal in size and consistency [6]. Superficial LAP is a common clinical presentation seen in pediatric population. The etiology for Superficial LAP varies from a benign reactive process to infections or malignancies [7]. In majority of the pediatric cases, the enlarged lymph nodes are due to reactive causes and are self-limiting. Hence, it is not possible or required to perform excision biopsy in all these cases [8].
Hence, this study was undertaken to review the cytomorphological spectrum of pediatric lymph node lesions with respect to age, sex, and site of involvement and to assess the diagnostic efficacy of FNAC.

Material and Method
This retrospective study was carried out over a period of two year from June 2019 to May

2021 in the department of Pathology, B.J. Medical College, Civil Hospital Ahmedabad, Gujarat, India. It is a tertiary care hospital. All pediatric cases (4 months to 14 years) with superficial LAP where FNAC was performed during the study period were included. In all these patients, a thorough work out was done, which included taking detailed clinical history and general, local and systemic examination, along with routine and special investigations which included X-ray chest (PA view), bone marrow aspiration, ultrasound and CT scan (if indicated).

Superficial lymphadenopathy was considered to be significant if the cervical group and axillary group was >1.0 cm and the inguinal group was >1.5 cm [9].

FNAC was done on the representative lymph nodes according to standard protocol and following strict aseptic precautions. An informed consent was taken from parents/guardians before performing the procedure.

All the cases fulfilling the following criteria were included in the study [9]:

- Age 4 months to 14 years.
- Lymph node enlargement with diameter exceeding 1cm for cervical & axillary nodes and 1.5cm for inguinal nodes.

Following exclusion criteria were applied

- Un-cooperative child.
- Overlying skin showing acute inflammatory changes.

FNAC procedure was done with 22-24 gauze needle. The aspiration and non-aspiration technique with minimum 3 -4 passes used to minimize haemorrhage. The sample was placed on a glass slide and smears were made by inverting second glass slide over the drop and a sit spreads, pulling the slides apart horizontally or vertically. Smears were either immediately fixed with ethyl alcohol or kept air dried. The fixed smears were subjected to Papanicolaou (PAP) stain while, the air dried smears were subjected to Giemsa stain, followed by microscopic examination.

Staining Procedure

May-Grunwald-Giemsa [14]: The air dried smears were stained in diluted MGG solution for 10 minutes, rinsed in pH 6.8 buffer, then stained in the diluted Giemsa solution for 30 minutes and washed and differentiated in pH 6.8 buffer for 15 minutes.

Papanicolaou method [14]: The wet smears were treated with 95% alcohol for one minute, 70% alcohol for two minutes, distilled water for three minutes, then stained with filtered Harri's haematoxylin solution for three minutes, rinsed in water and blued in running tap water for seven minutes, then rinsed in 90% alcohol for one minute, stained with orange G solution for two minutes, treated with 90% alcohol for one minute, stained with EA 50 solution for two minutes and rinsed in 95% alcohol. The stained slides were then cleared in xylene, mounted in DPX mountant and examined under the microscope.

Cytomorphological Patterns

On the basis of cytomorphology, Superficial lymphadenopathy was classified into one of the following categories - Non-neoplastic, Neoplastic and Inconclusive.

All those smears were considered inconclusive where lymphoglandular bodies could not be identified in the FNAC sample or cytologic material obtained was insufficient to give definitive diagnosis or smears contained only blood [10].

Result

Patient characteristics: A total of 122 cases of pediatric Superficial lymphadenopathy had cytological evaluation during this study period. The age of patients ranged from 4 months to 14 years. The male to female ratio was 1.5:1

Broad etiological classification in Superficial LAP

The results were classified into three broad categories: Reactive Lymphadenitis (67/122; 55%), Granulomatous Lymphadenitis (47/122; 39%) and Malignancy (08/122; 6%) as shown in Figure 1. Age-wise distribution of Superficial LAP cases is shown in Figure 2.

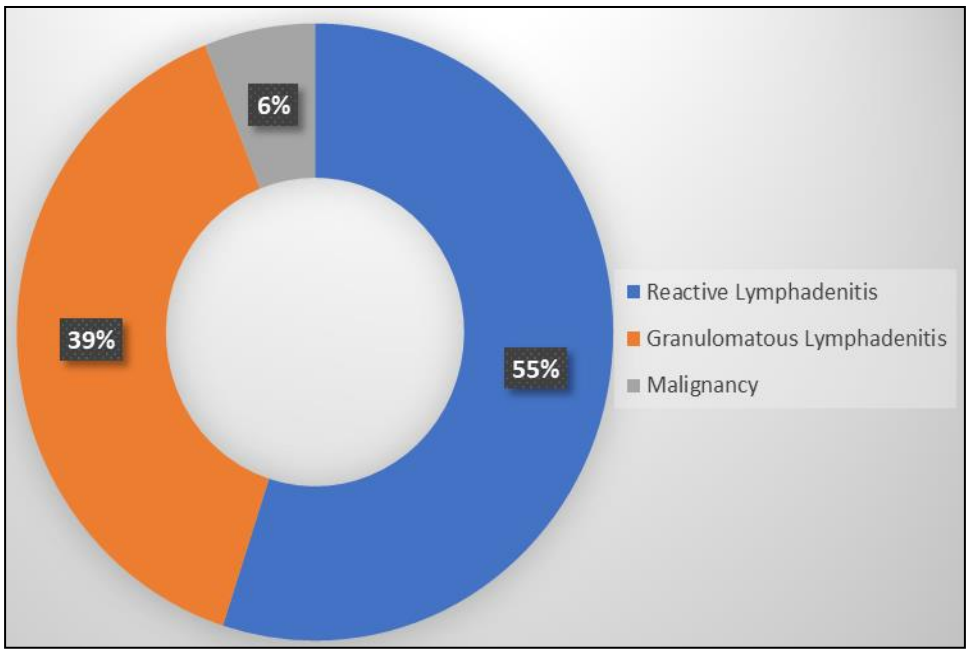

Fig 1: Distribution of Superficial Lymphadenopathy Cases

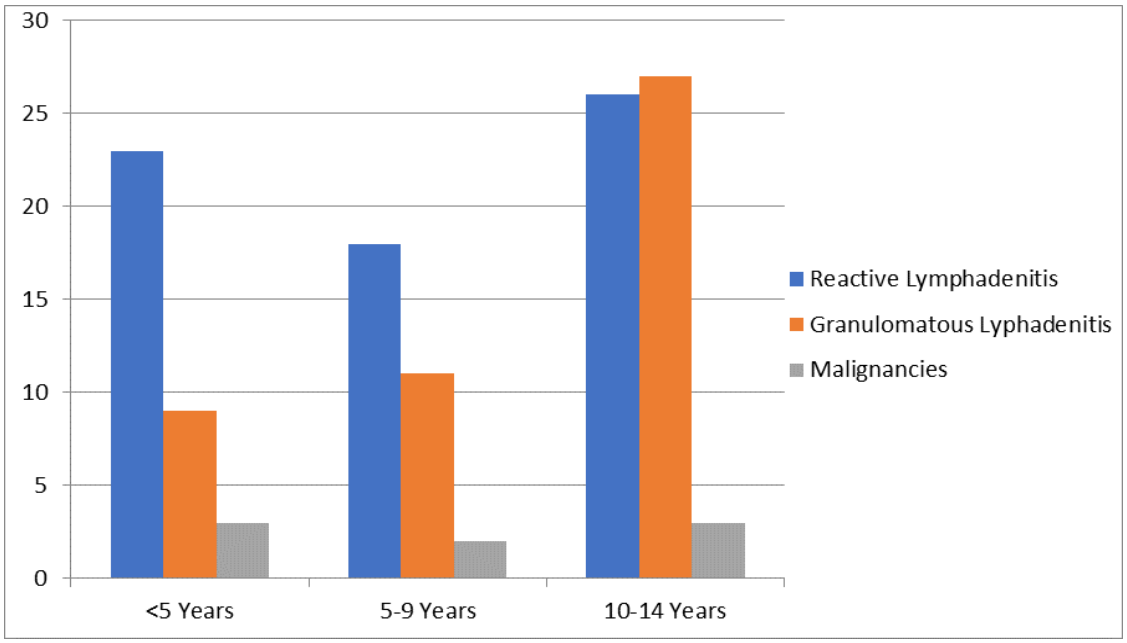

Fig 2: Age Wise Distribution of Superficial Lymphadenopathy Cases

Table 1: Frequency of Various Lesions: Age Wise.

lesion	<5 years	5-9 years	10-14 years
Reactive Lymphadenitis	23	18	26
Granulomatous lymphadenitis	09	11	27
Lymphoproliferative disorder	02	01	01
Hodgkin's lymphoma	00	01	00
Nonhodgkin's lymphoma	01	00	02

Etiology based A total of 74 lymph nodes were sampled among males in pediatric population. Majority of these cases were Benign it is (68/74; 92%) and malignancies (6/74; 08%).

Among pediatric female population, a total of 48 lymph nodes were aspirated. Majority of these cases were Benign (46/48; 96%) and malignancies (02/48; 04%).

Table 2: Frequency of Cytomorphology Pattern: Sex Wise.

Lesion	Male	Female
Non Neoplastic	68	46
Neoplastic	2	6

Etiology Based on Site

Cervical lymph node was the main group of lymph nodes enlarged in pediatric population constituting (96/122; 79%) of all Superficial LAP. Majority of the cases of cervical LAP were identified as reactive lymphadenitis (54/96; 56%), followed by Granulomatous lymphadenitis (34/96; 36%) and malignancies (08/96; 8%).

Axillary lymph nodes were the next group of lymph nodes aspirated during our study (17/122; 14%). The main etiology of Superficial LAP in these cases was Granulomatous lymphadenitis (9/17; 53%), followed by reactive lymphadenitis (8/17; 47%).

A total of 6 supraclavicular lymph nodes were aspirated in pediatric population in this study. 2 cases were identified as Reactive lymphadenitis and 4 cases of Granulomatous lymphadenitis.

A total of 3 inguinal lymph nodes were aspirated during this period and all these lymph nodes revealed Reactive lymphadenitis.

Table 3: Distribution of cases according to Aspirated lymph node

Site of Aspirated lymph node	No. of cases
Cervical lymph node	96
Axillary lymph node	17
supraclavicular lymph node	6
inguinal lymph node	3

Cytological Diagnosis

Reactive Lymphadenitis

A total of 67/122 (55%) cases of reactive lymphadenitis were identified in our study. The cytological features which helped to clinch the diagnosis were cellular smears, polymorphous lymphoid cell population and presence of lympho-histiocytic tangles.

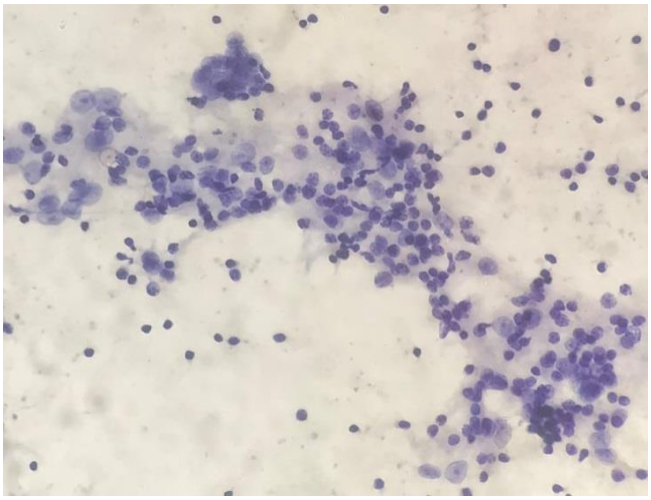

Fig 3: Reactive Lymphadenitis showing polymorphous population of reactive lymphoid cells. (MGG stain, 40X)

Granulomatous lymphadenitis

Granulomatous lymphadenitis cases were identified based on the presence of collection of epithelioid cells with or without necrosis (Figure 4). A total of 47 cases of Granulomatous lymphadenitis were identified in this age group. Necrosis was seen in 12 cases. These cases were identified as necrotizing tuberculous lymphadenitis. ZN

staining was advised in all 47 cases of granulomatous lymphadenitis. nine cases (19%) were positive for acid fast bacilli (AFB) and were reported as tubercular lymphadenitis. Rest cases which lacked necrosis and were negative for AFB, were reported as granulomatous lymphadenitis and further clinical work up was advised.

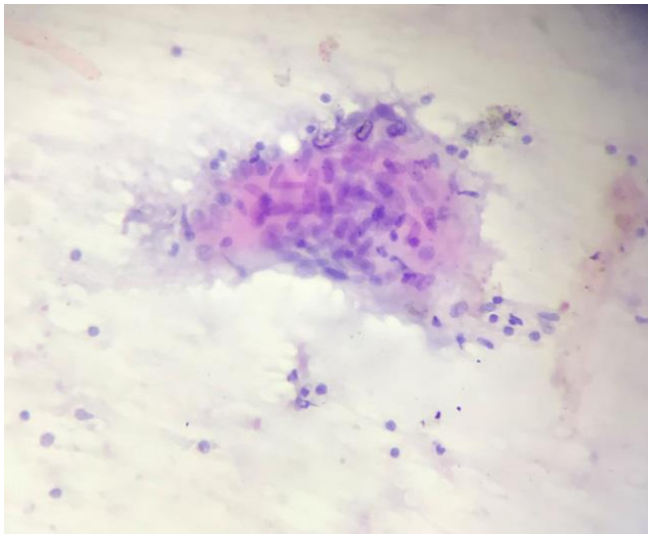

Fig 4: Granulomatous lymphadenitis: Shows well-formed granuloma with reactive lymphoid cells in background. (MGG stain, 40X)

Malignancies

A total of 8 malignancies were identified during this study period. These cases were classified as: Hodgkin's Lymphoma (HL), Non- Hodgkin's lymphoma (NHL) and Lymphoproliferative disorder. One case of HL was identified in 7 years of age. The cytological features of HL consisted of scattered typical Reed-Sternberg cells, atypical mononuclear cells in a background of reactive lymphocytes, eosinophils, plasma cells and histiocytes (Figure 5).

Three cases of NHL were identified in 12 years, 5 months and 12 years of age. All cases revealed monotonous population of scattered lymphoid cells and background showing lymphoglandular bodies. All cases of lymphomas diagnosed on cytology were advised excision biopsy of the lymph nodes for histopathological confirmation of diagnosis. Three cases of NHL and one case of HL was confirmed on histopathology. These cases were further advised immune-histochemistry (IHC) for characterization of lymphomas.

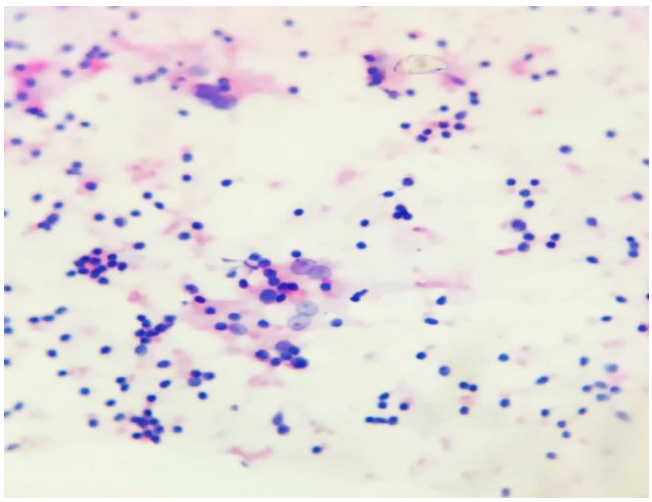

Fig 5: HL: Smear shows many mononuclear atypical cells and typical Reed Sternberg cells in a background of lymphocytes, eosinophils and plasma cells. (MGG stain, 40X)

Discussion

Superficial LAP is a common clinical presentation encountered in pediatric population. The etiology in these cases may vary from a benign etiology to a malignant condition. FNAC plays a very important role in evaluating superficial lymph nodes as these are easily accessible for the procedure. Further, FNAC is also advocated due to the ease of the procedure, a relatively non-invasive procedure, quick diagnosis and cost effectiveness [5].

Being the most cost-effective procedure with rapid diagnosis, FNAC is the most frequently used procedure for palpable lesions worldwide.

In this study, a total of 122 cases of superficial lymph nodes were sampled during the study period. In this study, 55% cases of Superficial LAP were due to reactive lymphadenitis and were managed accordingly.

Age and gender correlation: In this study, maximum number of patients were in the age group of 10-14 years (46%) followed by <5 years age group (37%). Similar results were seen in a study done by Ponder TB, Smith D and Ramzy I [11].

In our study, incidence in males (60.6%) was more than that in females (39.34%) with male to female ratio 1.5:1. Male predominance was more evident in age group of 10-14 years. Similar results were obtained in studies of Bezabih M, Mariam DW and Selassie SG (1.3:1) [12] and Mitra S, Ray S and Mitra PK (1.3:1) [13].

Table 4: Comparison of Cytodiagnosis of Current study with Singh, *et al*. study and Hussain Gadelkarim Ahmed *et al*. study.

Cytodiagnosis	Singh, *et al*. study [9]		Hussain Gadelkarim Ahmed *et al*. study [14]		Current Study	
	Cases	%	Cases	%	Cases	%
Non-Neoplastic						
Reactive Lymphadenitis	324	71	64	71	67	59
Granulomatous Lymphadenitis	116	25	26	29	47	41
Acute Suppurative Lesion	16	4	-	-	-	-
Total	456	100	90	100	114	100
Neoplastic						
Hodgkin's Lymphoma (Hl)	5	62	3	30	1	12
Non- Hodgkin's Lymphoma (Nhl)	2	25	7	70	3	38
Lymphoproliferative Lesion	-	-	-	-	4	50
Metastatic Lesion	1	13	-	-	-	-
Total	8	100	10	100	8	100

Table 5: Comparison distribution of sites of aspiration with Hussain Gadelkarim Ahmed *et al*. study [14]

Site of Aspirated lymph node	Hussain Gadelkarim Ahmed *et al*. study [14]	Current Study
Cervical lymph node	61	96
Axillary lymph node	16	17
supraclavicular lymph node	1	6
inguinal lymph node	3	3
Sub-mandibular lymph node	12	0
Parotid Lymph node	4	0
Generalized Lymph node	3	0

Table 6: Comparison of Granulomatous lymphadenitis & Tuberculous lymphadenitis with Dhingra V, Misra V, *et al*., study [19]

Cytodiagnosis	Dhingra V, Misra V, *et al*., study	Current study
Granulomatous lymphadenitis	28%	41%
Tuberculous Lymphadenitis	7%	19%

Majority of cases can be diagnosed and managed on FNAC diagnosis alone. However, it is important to clinically correlate the cytological findings. If in any case the cytological diagnosis differs from the clinical diagnosis, excision biopsy and histopathological confirmation of the disease must be considered. Furthermore, excisional biopsy should also be done if the lymph node swelling persists or there is any increase in size of node.

Role of cytology- Benign**:** Similar to available data, majority of cases were benign (114/122; 94%) in our study. Only 6% malignancies were identified in this age group. Among benign cases, 55% cases were of reactive lymphadenitis and 39% cases of granulomatous lymphadenitis. Characteristic cytological features consisted of polymorphous lymphoid cell population and many tingible body macrophages.

Cytology smears of granulomatous lymphadenitis revealed granulomas, giant cells with or without necrosis. Out of 47 cases Granulomatous lymphadenitis necrosis was seen in 12 cases and were identified as necrotizing tuberculous lymphadenitis. All granulomatous lymphadenitis cases were worked up for AFB (Ziehl-Neelson (ZN) staining). AFB positivity was seen in 19% cases of granulomatous lymphadenitis. Numerous studies have reported AFB positivity ranging from 10% to 70% [15, 16, 17].

In countries where TB is endemic, all cases must be worked up for TB until proved otherwise. Presence of Langhan giant cells and caseous necrosis are hallmark of tubercular lymphadenitis [18].

These findings must prompt a pathologist for a detailed work up of the patient for TB. If AFB is not found on ZN staining, culture studies must be advised on aspirate material.

Role of cytology- malignancies**:** Though only 6% malignancies were identified in pediatric population in our study, it is important to keep these in the differential diagnosis for causes of Superficial LAP. All cases identified as malignancies on FNAC, must be confirmed on histopathology.

Conclusion

FNAC should be considered as a first line investigation for evaluating the peripheral superficial LAP in pediatric population. As a safe, minimally invasive and rapid procedure, clinicians can reliably utilize FNAC in the management of lymphadenopathy in children. Reactive Lymphadenitis is recognised as most common cytological finding of superficial LAP examination.

References

1. Rapkiewicz A, Thuy Le B, Simsir A, Cangiarella J, Levine P. Spectrum of head and neck lesions diagnosed by fine-needle aspiration cytology in the pediatric population. Cancer 2007;111:242-51. [PubMed] [Google Scholar]
2. Prathima S, Suresh TN, Krishnappa J. Annals of Medical and Health Sciences Research | Jan-Feb 2014; 4(1):47.
3. Hirachand S, Lakhey M, Akhter J, Thapa B. Evaluation of fine needle aspiration cytology of lymph nodes in Kathmandu Medical College, Teaching hospital. Kathmandu Univ Med J 2009;7:139-142.
4. Ahmed HG, Elmubasher MB, Salih RA, Elhussein GE, Ashankyty IM. Fine needle aspiration cytopathology of pediatric lymphadenopathy among Sudanese children. Asian Pac J Cancer Prev 2013;14:4359-4363.
5. Hafez NH, Tahoun NS. Reliability of fine needle aspiration cytology (FNAC) as a diagnostic tool in cases of cervical lymphadenopathy. J Egypt Natl Canc Inst 2011;23:105-114.
6. Nield LS, Kamat D. Lymphadenopathy in Children: When and How to Evaluate. Clin Pediatr 2004;43:25-33. [PubMed] [Google Scholar]
7. Twist CJ, Link MP. Assessment of lymphadenopathy in children. Pediatr Clin North Am 2002;49:1009-1025.
8. Bilal JA, Elshibly EM. Etiology and clinical pattern of cervical lymphadenopathy in Sudanese children. Sudan J Paediatr 2012;12:97-103.
9. Neha Singh, Abhishek Singh, Rashmi Chauhan, Preeti Singh, Nidhi Verma. Fine needle aspiration cytology in evaluation of lymphadenopathy in pediatric age group: our experience at tertiary care centre. International Journal of Contemporary Medical Research 2016;3(5):1347-1351.
10. Kardos TF, Maygarden SJ, Blumberg AK, Wakely PE Jr, Frable WJ. Fine needle aspiration biopsy in the management of children and young adults with peripheral lymphadenopathy. Cancer 1989;63:703-7.
11. Ponder TB, Smith D, Ramzy I. Lymphadenopathy in children and adolescents: role of fine-needle aspiration in management. Cancer Detect Prev 2000;24:228-33.
12. Bezabih M, Mariam DW, Selassie SG.Fine needle aspiration cytology of suspected tuberculous lymphadenitis. Cytopathology 2002;13:284-90.
13. Mitra S, Ray S, Mitra PK. Fine needle aspiration cytology of supraclavicular lymph nodes: Our experience over a three-year period. J Cytol 2011;28:108-10.
14. Hussain Gadelkarim Ahmed *et al.* Fine Needle Aspiration Cytopathology of Pediatric Lymphadenopathy among Sudanese Children Asian Pacific Journal of Cancer Prevention, 2013, 14.
15. Lau SK, Wei WU, Hsu C, Engzella UC. Efficacy of fine needle aspiration cytology in the diagnosis of tuberculous cervical lymphadenopathy. J Laryngol Otol 1990;104:24-27.
16. Dua T, Ahmad P, Vasenwala S, Beg F, Malik A. Correlation of cytomorphology with AFB positivity by smear and culture in tuberculous lymphadenitis. Indian J Tuberc 1996;43:81-84.

17. Vignesh R, Balakrishnan P, Shankar EM, Murugavel KG, Hanas S *et al.* Value of single acid fast bacilli sputum smears in the diagnosis of tuberculosis in HIV positive subjects. J Med Microbiol 2007;56:1709-1710.
18. Somu N, Vijayasekaran D, Ravikumar T, Balachandran A, Subramanyam L *et al*. TB disease in pediatrics referral centre. Ind Pediatr 1994;31:1245-1249.
19. Dhingra V, Misra V, Mishra R, Bhatia R, Singhal M. Fine Needle Aspiration Cytology (FNAC) As A Diagnostic Tool In Pediatric Lymphadenopathy. J Clin of Diagn Res 2010;4(3):2452-2457.