

Spectrum of Lymph Node Lesions by Fine Needle Aspiration Cytology in Worker Population of Eastern Zone of India

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ABSTRACT

Evaluation of lymphadenopathy is of clinical significance as the underlying disease may range from a treatable infectious etiology to malignant neoplasm. The aim and objective of the present study was to evaluate palpable lymph nodes of population working in small to medium scale industries represented as Group A by Fine Needle Aspiration Cytology (FNAC) and to compare the results with the general population designated as Group B comprising dependent non-working family members of Group A population. The results were categorized into two main headings of benign and malignant diseases with sub categorization. The prevalence of benign diagnoses in Group A and Group B was 81% and 79% respectively while that of malignant diagnoses in Group A & Group B was 19% and 21% respectively. The predominant cause of lymphadenopathy in Group A & Group B was reactive lymphadenitis, followed by tubercular lymphadenitis respectively. Metastatic carcinoma was the commonest malignant neoplasm (Group A- 16.31% & Group B- 17.33%) followed by Non Hodgkins lymphoma (Group A- 2.63% & Group B- 2.89%). Squamous cell carcinoma was the commonest cytological type in metastatic carcinoma. Surprisingly, the Group A had a decade earlier incidence of metastasis compared to the general population represented by Group B. Early and continuous exposure to the carcinogens among the workers may be the cause of early occurrence of malignancy. FNAC being an easy and reliable procedure is recommended for screening of lymph node lesion of the worker population for early diagnosis and management.

KEYWORDS: *Lymph node, Fine needle aspiration cytology (FNAC), Small to medium scale industries*

INTRODUCTION

Communicable diseases, malnutrition, poor environmental sanitation and insufficient medical care are presently the major public health problems in India. Apart from these, occupational diseases also play a major role especially in the industrial areas. Silicosis, musculoskeletal injuries, coal workers' pneumoconiosis, chronic obstructive lung diseases, asbestosis, byssinosis, pesticide poisoning and noise induced hearing loss bear the maximum burden of occupational diseases in India [1].

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The ESIC Medical College & Post Graduate Institute of Medical Sciences & Research and its attached Hospital & Occupational Disease Centre (Eastern Zone), Joka, Kolkata is under administrative control of Employees' State Insurance Corporation. Employees' State Insurance Scheme of India, India is a multidimensional social security system tailored to provide socio-economic protection to worker population and their dependents covered under the scheme. Full medical care for self and dependents that is admissible is provided from day one of insurable employment till

the age of their retirement or resignation from the job.

“In India, globalization and rapid industrial growth in the last few years has resulted in emergence of occupational health related issues” [1]. According to Leigh et al., the annual incidence of occupational disease is between 924,700 and 1,902,300, leading to over 121,000 deaths in India [3]. Since ESIC caters to small to medium scale industries comprising more than 10 workers working in a factory with monthly income more than 15000 per month, ESIC, Joka has been designated as referral centre for Occupational diseases of eastern zone of India. Hence, many workers and their dependent family members visit this institute for health related problems, amongst which enlarged lymph nodes is a common complaint.

Evaluation of lymphadenopathy gives valuable information of the several underlying diseases including benign and malignant neoplasms or acute and chronic infections. Early investigation of the lymphadenopathy thereby helps in early management of the patient. In fact, it is also essential to establish that the swelling in question is a lymph node [4]. Several studies have established the importance of evaluation of lymph node as a diagnostic tool in occupational disease [5-6]. Evaluation of lymph nodes can be done by Fine needle aspiration cytology (FNAC), which is a very simple and cost effective diagnostic tool [7]. The overall sensitivity, specificity, positive predictive value and negative predictive value while evaluating lymph nodes with FNAC is 92.7%, 98.5%, 97.3% and 94.8% respectively, making it an important first line diagnostic tool for the evaluation of enlarged lymph nodes [8].

The aim & objectives of the present study was to evaluate palpable lymph nodes by FNAC in worker population and their dependents in the department of Pathology, ESIC medical college and hospital, Joka, Kolkata. And also, to compare the results with the general population represented by the dependent family members not working in small to medium scale industries.

MATERIALS AND METHODS

An observational retrospective as well as prospective study was conducted in the department of Pathology, ESIC-PGIMSR, ESIC Medical College and Hospital & ODC (EZ), Joka, Kolkata from December, 2011-November, 2014. All outdoor and indoor insured patients and their dependent family members of 20-60 years of age attending the hospital with palpable lymph nodes anywhere in the body were included in the study. A detailed performa including age, sex, and nature of work along with chief complaints were noted down for each patient. Only those dependent family members were included in the study who were not

working and thus are not exposed to any occupational health hazard and if any such history was found they were excluded from the study.

The dependent family members above 60 years with palpable lymph nodes were excluded from the study.

Patients with palpable lymph nodes, after obtaining informed consent were subjected to Fine Needle Aspiration Cytology (FNAC) taking all aseptic precautions. FNAC was done using 10 cc ml syringe, 23 G needle and Franzen handle in the FNAC room of the department of Pathology. As the needle enters the lymph node, the needle was moved back and forth within the lesion with the negative pressure maintained. The negative pressure is released before the needle is withdrawn. Then the aspirate is blown out on the slides to prepare the smears. The smears prepared were both wet and dry fixed and were subsequently stained with May Grunwald Giemsa (MGG) as well as Haematoxylin & Eosin (H& E) stain. Special stains like Zeihl Neelson stain, Gram stain were done wherever applicable.

The stained smears were observed under microscope by at least two expert cytopathologists correlating the cytomorphological features and clinical features. Orell was followed for categorizing different lymph node lesions [9].

The patients were divided into two groups- Group A comprising worker population and Group B comprising their dependent family members representing the general population. The results were tabulated comparing the cytomorphological diagnosis between the two groups and also analysed statistically wherever applicable.

RESULTS

A total of 293 patients over a period of three years were subjected to FNAC from lymph nodes palpable at variable sites. Out of 293 cases, 64.16% cases comprised Group A (n=188) and 35.84% cases comprised Group B (n=105).

Table 1. Distribution of lymphadenopathy in Group A & B

Site of lymphadenopathy	Group A (%)	Group B (%)
Cervical	36	42
Axillary	23	19
Inguinal	25	27
Supraclavicular	16	12

No significant difference is noted for male and female ratio amongst the two groups.

Group A comprises of workers working mainly in the small to medium scale industries like paint, jute, electrical, rubber, oil gas companies and are exposed to occupational hazards. Group B included the family members of the workers comprising mother, father, daughter, son etc., who are dependent on the worker. Dependents included

in the study were not exposed to any occupational exposure and if any such history was found, were excluded from the study.

Cytomorphological diagnosis showed varied disease entities in both the groups and was broadly divided into benign and malignant. Diagnoses of benign diseases include

granulomatous lymphadenitis (Acid Fast Bacilli - negative), tubercular lymphadenitis (Acid Fast Bacilli-positive), reactive lymphadenitis, acute suppurative lymphadenitis and non-specific lymphadenitis (Fig.1). Malignant entities were Hodgkin's lymphoma, Non-Hodgkin lymphoma and metastatic deposits in the lymph node.

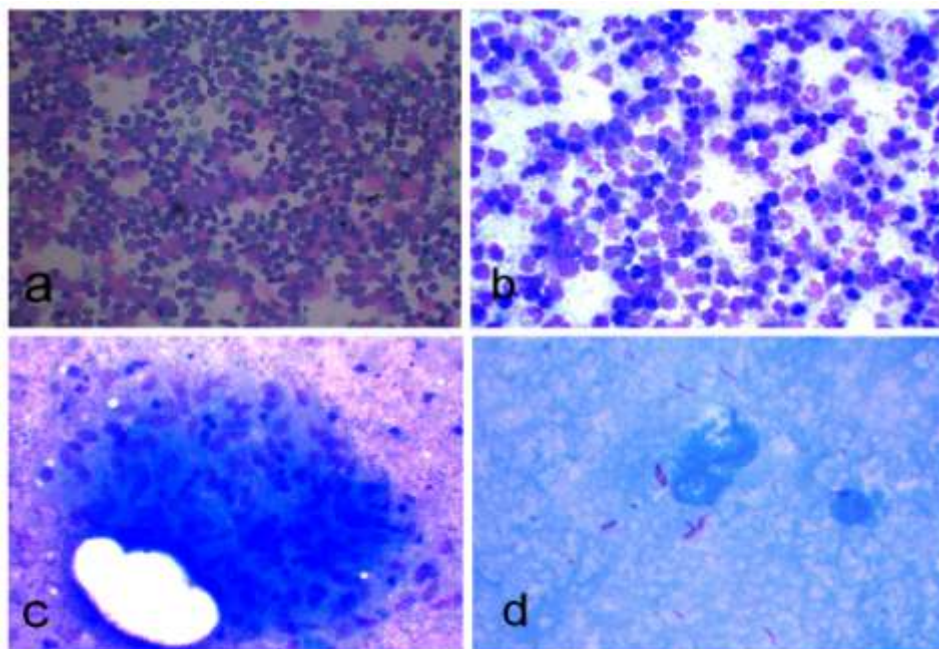


Fig 1. a) Polymorphous population of lymphoid cells in reactive lymphadenitis b) Predominantly neutrophilic infiltration in Acute suppurative lymphadenitis c) Granulomatous lymphadenitis showing Epithelioid cell granuloma (400X, MGG) d) Numerous Acid Fast Bacilli positive (1000X, ZeihlNeelson)

The prevalence of benign diagnoses in Group A and Group B was 81.38% and 85.71% respectively while that of malignant diagnoses in Group A and Group B was 18.62% and 14.29% respectively.

In Group A, among the benign entities highest prevalence was of reactive lymphadenitis (22.34%) followed by tubercular lymphadenitis (20.21%). Metastatic lymph node was the major

malignant disease entity comprising 16.49% of the Group A worker population followed by Non-Hodgkin lymphoma (2.13%).

In Group B, highest prevalence was of both tubercular and granulomatous lymphadenitis (25.71%) each. Metastatic lymph node was the only malignant entity found in Group B (14.29%) (Table 2).

Table 2. Incidence of disease entities in worker (Group A) and dependent population (Group B)

FNAC Diagnosis	Group A		Group B		<i>t</i> test results <i>P</i> value (95% Confidence Interval)
	Cases	Percentage	Cases	Percentage	
	Benign (81.38%)		Benign (85.71%)		
Reactive lymphadenitis	42	22.34	22	20.95	0.02578
Tuberculous lymphadenitis	38	20.21	27	25.71	0.3942
Granulomatous lymphadenitis	23	12.23	27	25.71	0.6525
Acute Suppurative lymphadenitis	18	9.57	6	5.71	0.0104
Non specific lymphadenitis	32	17.02	8	7.62	0.0240
	Malignant (18.62%)		Malignant (14.29%)		
Metastatic lymph node	31	16.49	15	14.29	0.3796
Non Hodgkin lymphoma	4	2.13	0	0	0.1340
Total	188	100	105	100	

When the malignant diagnoses was compared between the two groups, it was found that metastatic lymph node occurred a decade earlier in Group A in the age range of 31-40 years as compared to age range of 41-50 years in Group B. In Group A, amongst the metastatic lymph nodes, squamous cell carcinoma n=19 cases (61.3%) was the most prevalent malignancy, followed by poorly differentiated carcinoma n=10 cases (32.2%) and adenocarcinoma n=2 cases (6.5%). In group B also, squamous cell carcinoma

was predominant among the metastatic lymph nodes n=7cases (46.66%) followed by poorly differentiated carcinoma n=3cases (20%), adenocarcinoma n=2 cases (13.33%), small cell carcinoma of lung n=1 cases (6.67%), metastatic deposit of melanoma n=1 cases (6.67%) and metastatic deposit of papillary carcinoma thyroid n=1case (6.67%). Here also, surprisingly, though the malignancies are detected a decade earlier in Group A than Group B, diverse morphological types of malignancies are found only in Group B (Fig.2).

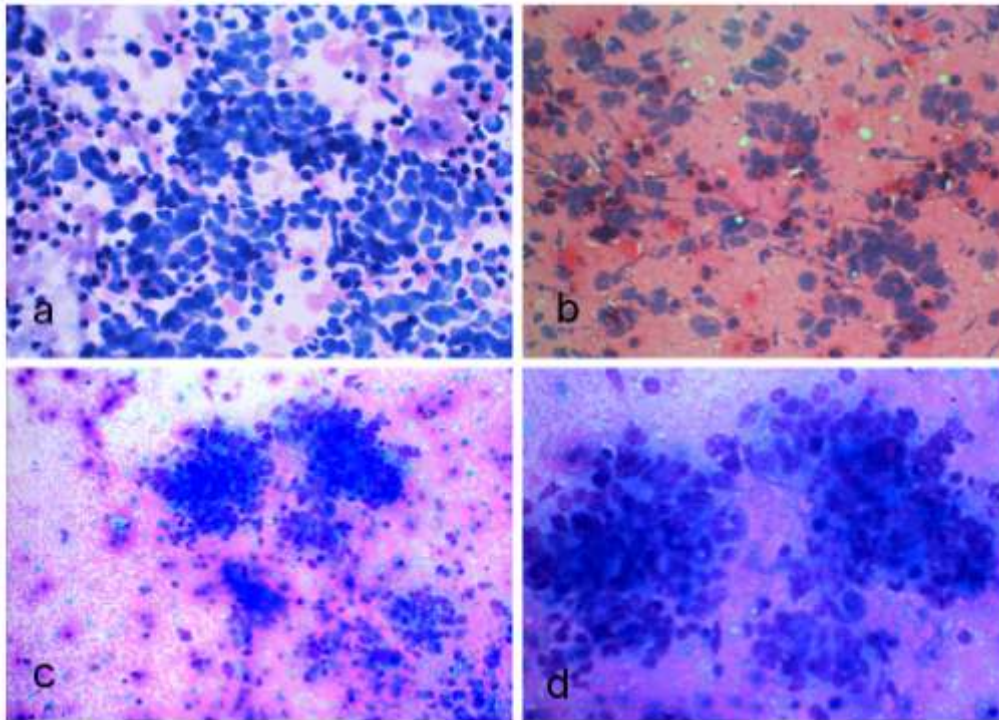


Fig 2. a&b) Metastatic deposit of poorly differentiated adenocarcinoma (400X, MGG &Papanicolaou); c&d) Metastatic deposit of squamous cell carcinoma (100X & 400X , MGG)

DISCUSSION

Many asymptomatic patients incidentally observe lymph node enlargement and seek for medical advice. On several occasion, evaluation of lymphadenopathy may reveal presence of some unknown malignancy [4,10]. In developing countries like India, FNAC plays a significant role in the evaluation of an enlarged lymph node, as it is a cheap procedure, simple to perform and has almost no complications. Histopathological examination plays a superior role than FNAC in diagnosing and sub categorizing lymphomas. For metastatic malignancies FNAC undoubtedly plays a pivotal role as far as diagnosis and patient management is concerned [11-13].

In the present study, Group A representing worker population of Eastern India, had reactive lymphadenitis as the commonest finding amongst benign lesions followed by Tubercular lymphadenitis. Many of the authors have reported

highest incidence of tubercular lymphadenitis amongst benign lesion in northern and southern part of India except Chawla et al. whose study group was in Northern India and whose findings corroborated well with present study [14-17]. This discordance may be due to the higher level of awareness amongst the population who avail the medical benefits of ESI scheme and visit hospital even for a non-significant palpable lymphadenopathy.

Worker population represented by Group A had reactive lymphadenitis the commonest cause of lymphadenopathy while in Group B granulomatous and tubercular lymphadenitis were common amongst the benign lesions. Poor hygienic, low socio economic and environmental condition of the dependent family members could have attributed to this fact. Previous studies also found higher prevalence of tubercular lymphadenitis compared to reactive lymphadenitis similar to the Group B of

the present study [14-16].

Similarly, amongst benign lesions, both the groups in the present study have maximum number of cases comprised of reactive hyperplasia and tubercular lymphadenitis until fourth decade of life after which the prevalence in both the groups has decreased. Reactive hyperplasia was seen most often in first two decades of life, followed by tuberculous lymphadenitis in the second and third decades [14]. Population in both the groups has similar socio-economic background as only those workers who are drawing a salary of 15000/month can become an insured person in the ESIC scheme and hence have similar nutritional status. This may be the reason that almost comparable results were seen in both the groups for benign lesion.

Amongst benign lesions, prevalence of acute suppurative lymphadenitis showed higher statistical significance in Group A (9.57%) than Group B (5.71%). The workers exposed to various infections in their working environment and spending most of their time in outdoors could have attributed to higher prevalence of acute suppurative lymphadenitis among the worker population compared to their dependents who remain in a closed environment in indoors, thereby having decreased exposure to infectious agents. The study of Kochchar et al. (9.89%) and Chawla et al. (5.3%) also showed varying prevalence of acute suppurative lymphadenitis [14,17]. The lymph nodes diagnosed as acute suppurative lymphadenitis showed predominantly neutrophils, lymphoid cells and necrotic debris materials.

Table 3. Comparison of cytological diagnosis of lymphadenopathy

SI No.	Diagnosis/ Author	Present Study					
		Chawla et al.	Kochchar et al.	Biswas et al.	Singh et al.	Group A	Group B
1.	Reactive lymphadenitis	125 (41.7%)	57 (31.31%)	84 (19.9%)	149 (33.38%)	42 (22.10%)	74 (26.72%)
2.	Tuberculous lymphadenitis	95 (31.7%)	65 (35.71%)	192 (45.4%)	177 (39.77%)	38 (20%)	51 (18.41%)
3.	Granulomatous lymphadenitis	-	-	15 (3.5%)	32 (7.1%)	23 (12.10%)	38 (13.72%)
4.	AuteSuppurative lymphadenitis	16 (5.3%)	18 (9.89%)	-	-	18 (9.47%)	15 (5.41%)
5.	Non specific lymphadenitis	-	30	12 (2.8%)	-	33 (17.37%)	40 (14.44%)
6.	Metastatic lymph node	32 (10.7%)	37 (20.33%)	90 (21.2%)	40 (8.9%)	38 (17.33%)	38 (17.33%)
7.	Non Hodgkin lymphoma	9 (3.0%)	3 (1.64%)	15 (3.5%)	18 (4.0%)	5 (2.63%)	8 (2.89%)
8.	Hodgkin lymphoma	10 (3.3%)	2 (1.09%)	12 (2.8%)	7 (1.5%)	0	3 (1.08%)

Malignancies in lymph nodes in our country are predominantly metastatic in nature with an incidence varying from 65.7% to 80.4% and lymphomas range from 2% to 15.3% among lymph nodes aspirated from all sites. The diagnostic accuracy of FNAC in metastatic disease varies from 87% to 97.9% and for lymphomas is 82% [11-13]. In the present study, prevalence of metastatic lymph nodes is comparable in both the group comprising 16.49% and 14.29% in Group A and Group B respectively and the most common malignancy was squamous cell carcinoma.

Surprisingly, a few cases of metastatic lymph nodes were found in the age group of 31-40 years in Group A while no cases were detected in Group B. Naeimi Mohammad et al. [18] found that the male were predominantly (67%) involved in metastatic lymph node with mean age of 47.07 year. Singh et al. and Khajuria et al. have also reported only one case in 31-40 years age group and the number of cases showed an upward trend as the age group increased [13,16]. However, these studies by different authors represent the general

population, the results are not related to the occupation of the patient, and hence it is in more accordance with the result of Group B in the present study.

The prevalence of metastatic lymph node in Group A population was found to be a decade earlier in Group A population indicating occurrence of primary carcinoma a decade earlier than in the general population. This may be because of the fact that the population in Group A is represented by population working in small to medium scale industries like paint, rubber, oil, gas companies where they may be facing early and continuous exposure to various carcinogens, which are part of the occupational hazards. In comparison, Group B, which comprised the dependents of the workers, was not exposed to any occupational hazards that may be the reason for the late appearance of metastatic lymph nodes.

Among the metastatic lymph nodes majority was squamous cell carcinoma comprising 61.3% and 46.66% in Groups A & B respectively. Kochchar et al. [10], Chawla et al. [9], Singh et al.

[19] also found squamous cell carcinoma the predominant cause of metastatic lymph node with prevalence of 83.78%, 31.3% and 75% respectively, almost comparable with the results of present study [14, 16-17]. However Biswas et al. reported only 8.5% squamous cell carcinoma metastasis in cervical lymph nodes [15]. The discordance of the results could be because the study of Biswas et al. was restricted only to the cervical lymph nodes. In contrast, the reason for higher prevalence in the present study as well as other studies may be attributed to the fact that all peripheral palpable lymph nodes of various sites were included in the study.

Group B had more miscellaneous malignancies including small cell carcinoma of lung, papillary carcinoma thyroid, melanoma apart from the common one i.e. squamous cell carcinoma, poorly differentiated carcinoma and adenocarcinoma. Absence of exposure to specific carcinogen for long duration in the dependent family members in Group B could be the probable cause of this behaviour.

Amongst the primary malignancies of the lymph node, prevalence of Non Hodgkins lymphoma was 2.63% in Group A and 0% in Group B in present study. The result is comparable with studies of Chawla et al., Biswas et al, Kochhar et al. and Singh et al. who reported the prevalence of 3%, 3.5%, 1.64% and 4% respectively [14-17]. The results were comparable between the two groups in the present study as well as with other studies indicating no difference in the occurrence of disease in relation to the occupation of the population.

CONCLUSION

In the present study, FNAC was performed in worker population and their dependents and data analysis revealed the occurrence of metastasis in the worker population a decade earlier than the dependents.

The worker population had statistically significant higher prevalence of acute suppurative lymphadenitis compared to the dependents.

This may be due to workers facing early and continuous exposure to various carcinogens, which are part of the occupational hazards. However, larger studies are recommended in this regard to establish the fact.

FNAC being an easy and reliable procedure may be considered for screening of lymph node lesions of the worker population for early management.

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The authors declare that there is no conflict of interest.

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