

Frequency of Extrapulmonary Tuberculosis in Patients With Cervical Lymphadenopathy

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ABSTRACT

Objective: To determine the frequency of extra-pulmonary tuberculosis in patient who are having cervical lymph node enlargement.

Patients and methods: This descriptive cross-sectional study was conducted at the Department of Ear, Nose, Throat, Head and Neck surgery, Post Graduate Medical Institute Lady reading Hospital Peshawar between March 2010 to March 2011. The study includes one hundred and one patients with enlarged cervical lymph nodes fulfilling the inclusion criteria.

Results: Our study included 101 cases with cervical lymphadenopathy fulfilling inclusion and exclusion criteria. There were 63 female and 38 male patients, with female: male ratio of 1.65:1. The age of the patients ranged from 3-67 years with mean age of 32.56 ± 13.49 years. These patients belonged to various group of life and most of them were from lower socioeconomic stratum of life. Majority of the patients (76.23%) having low body mass index. The main complaint of these patients was cervical lymphadenopathy (100%) with duration from 1 month to 12 months with average of 4.5 months duration. The size of the lymph node ranged from 2-7.2 cm with mean 4.40 ± 1.93 cm. In this study tuberculosis in cervical lymph nodes was diagnosed in 87 cases (86.13%) by fine needle aspiration cytology (FNAC), in 8 cases (7.92%) incisional biopsy and in 6 cases (5.94%) excisional biopsy was performed to get final diagnosis. The extrapulmonary tuberculosis was the commonest diagnosis in cervical lymphadenopathy accounting 75.24%. The next common finding was reactive hyperplastic lymphadenopathy in 11 cases (10.89%). In 6 cases (5.94%) there were metastatic lymph nodes. Some rare diseases diagnosed in cervical lymph nodes were Hodgkin's disease (2.97%).

Conclusion: Extrapulmonary TB is the commonest cause of cervical lymph node enlargement.

Keywords: Tuberculosis, extrapulmonary, fine needle aspiration cytology, histopathology,

INTRODUCTION

Tuberculosis is diseases caused by mycobacterium tuberculosis and is one of the most common infectious diseases in the world¹. Approximately one third of the whole world population is infected with tubercle bacilli, about nine million new cases of tuberculosis develop each year and about two million people die of this disease². Developing countries especially those in south Asian region are having a major burden of tuberculosis³. In Pakistan the incidence of tuberculosis is estimated to be 181 per 100000 populations (0.18%) and each year at least 286000 new cases of tuberculosis are added to the existing population of 1.8 million⁴. In Khyber Pakhtoon Khawa (KPK) alone 36000 new cases of tuberculosis develop annually⁵. World Health Organization has declared tuberculosis as a global emergency in year 1993⁶. Tuberculosis can involve any organ system in the body. While pulmonary tuberculosis is the most common presentation, extra-pulmonary tuberculosis (EPTB) is also an important clinical problem⁷. Extrapulmonary tuberculosis constitute about 15 to 20%

of all cases of tuberculosis and almost 50 percent of concurrent AIDS and tuberculosis⁸. Cervical lymph node tuberculosis being the most common manifestation account for almost 50% of the cases of extra-pulmonary tuberculosis⁹⁻¹¹. Tuberculous lymphadenitis is very high in Asian countries and Pakistan is ranked 8th among the 22 highest incidence countries and 1st in the eastern Mediterranean region by WHO¹².

Cervical glands are the commonest site of involvement. Despite the decline of pulmonary tuberculosis in the western world; the incidence of cervical mycobacterial infections has remained relatively unaffected¹³. In most instances of cervical lymphadenopathy the tubercle bacilli gain entrance through the ipsilateral tonsil¹⁴. Infection entry through the carious teeth, tonsils or adenoid usually involves the upper deep cervical nodes, where as involvement of lower cervical nodes indicates infection commonly from the apex of the corresponding lungs¹⁵.

Tuberculous lymphadenitis presents as an enlarging, painless mass in a lymphatic area. Occasionally, there may be fluctuance and even formation of an abscess or sinus. Systemic complaints are infrequent. Differential diagnoses include lymphoma, metastatic carcinoma, fungal diseases, cat scratch disease, sarcoidosis, toxoplasmosis, and bacterial

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adenitis as well as reactive adenitis¹⁶. The frequency of extra pulmonary tuberculosis in patients with cervical lymphadenopathy is 78.63% in a study¹⁷.

Over the last several years, reported extrapulmonary tuberculosis was increasing in absolute numbers and proportion of all reported tuberculosis cases¹⁸. Although this trend may be related to several factors including better health services and reporting, the mere proportion of all tuberculosis cases that have extrapulmonary involvement is significant. The associated delay in diagnosis of extrapulmonary tuberculosis results in increased morbidities and mortalities¹⁹. The manifestations of extrapulmonary tuberculosis are so protean that diagnosis and identification is often delayed. Tuberculosis stands high on the list of differential diagnoses when a person has enlarged lymph nodes. Examination with fine needle aspiration is the diagnostic procedure of choice. If the result is inconclusive, excision biopsy is recommended. Physicians should always endeavour to obtain bacteriological evidence of infection.¹⁹ This means that fine needle aspiration and excision biopsy specimens must be sent for auramine/Ziehl Neelsen staining and mycobacterial culture. Cytological and histological examination may contribute to making the diagnosis. Granuloma with caseation and necrosis is considered to be evidence of tuberculosis, even when the culture is negative. The value of the polymerase chain reaction (PCR) for demonstrating Mycobacterium tuberculosis complex DNA in extra pulmonary material has not yet been fully validated²⁰. The rationale of my study is that tuberculosis being the commonest cause of cervical lymphadenopathy. It is usually underestimated and as the facility of histopathology is available only in few cities of KPK, most of the patient in the periphery are either left as such being told to be having cancer or are given multiple antibiotics which causes them to present in late stages with advance disease and complications.

PATIENTS AND METHODS

This descriptive cross-sectional study was conducted at the Department of Ear, Nose, Throat, Head and Neck surgery, Post Graduate Medical Institute Lady reading Hospital Peshawar from March 2010 to March 2011. All patient regardless of age and gender, coming to ENT, head and neck surgery department lady reading hospital Peshawar with suspected enlarged cervical lymph node of more than three weeks duration were included in the study except those patient in which the cause of cervical lymphadenopathy was already known and those who were having history of bleeding disorders.. The study was approved by hospital ethical committee. The diagnostic criteria for cervical lymphadenopathy were triple assessment which was clinical, radiological and histological. After written informed consent for

recruitment into the study a detailed history of cervical lymph node was taken which included site, mode of onset, duration, progress, loss of weight, any other such swelling in other parts of the body. The lymph node was examined for site size, number, mobility and consistency. These patients were investigated for Hb% BT, CT, HBsAg Anti-HCV antibodies, ESR, plain X-ray neck, neck ultrasound. After confirming the neck swelling as cervical lymph node, it was aspirated with 21 Gauge needle attached to 20cc disposable syringes under local anesthesia. All FNACs were performed by the same person and specimens were analyzed by the same cytopathologist. Those patients whose FNAC results were inconclusive were reassessed with open biopsy. Open biopsy was taken under local or general anesthesia and specimen was sent to the same histopathologist for examination. The statistical analysis was performed using SPSS version 11.

RESULTS

Our study included 101 cases with cervical lymphadenopathy fulfilling inclusion and diagnostic criteria. There were 63 female and 38 male patients, with female: male ratio of 1.65:1. The age of the patients ranged from 3-67 years with mean age of 32.56±13.49 years. Most of the patients presented in 2nd and 3rd decade followed by 4th decade. These patients belonged to various group of life and most of them were from lower socioeconomic stratum of life (Table 1). Majority of the patients (76.23%) having low body mass index (Table 2). The main complaint of these patients was cervical lymphadenopathy (100%) with duration from 1 month to 12 months with average of 4.5 months duration. The size of the lymph node ranged from 2-7.2cm with mean 4.40±1.93cm. These lymph nodes presented as 38.61% on right side, 10.89% on left side, 41.58% on both sides and 8.91% of the lymph nodes were situated at midline of the neck (Table 3). The lymph nodes were found as unilateral single lymph nodes 66.33%, unilateral multiple 18.81% and bilateral single lymph nodes 5% (Table 4). The clinical characteristics of these lymph nodes were that shape of the lymph node was rounded in 58.41%, elongated in 14.85%, multilobed in 26.73%. Edges of lymph nodes were regular in 85.14% cases and irregular in 14.85% cases. Lymph node was mobile in 86.13% patients but mobility was absent in 13.86% cases (Table 5). On palpation of the lymph node, 7 cases (6.93%) were soft, 71 cases (70.29%) were firm and 23 cases (22.77%) were hard. In only 9.90% cases the lymph nodes were fixed. These lymph nodes were non-fluctuant in 97 cases (96.03%) and only 4 cases there was fluctuation (Table 6). In this study tuberculosis in cervical lymph nodes was diagnosed

in 87 cases (86.13%) by fine needle aspiration cytology (FNAC), while in 14 cases the reports of FNAC were inconclusive. These patients were subjected to tissue biopsy. In 8 cases (7.92%) incisional biopsy was performed and in 6 cases (5.94%) excisional biopsy was performed to get final diagnosis (Table 7). In our study extrapulmonary tuberculosis was the commonest diagnosis in cervical lymphadenopathy accounting 75.24%. The next common finding was reactive hyperplastic lymphadenopathy in 11 cases (10.89%). In 6 cases (5.94%) there were metastatic lymph nodes. Among these patients 3 cases (2.97%) had primary tumour in the larynx, in 2 cases (1.98%) there were carcinoma hypopharynx as primary disease while one case thyroid malignancy presented as metastatic cervical lymphadenopathy (Table 8).

Table 1: Frequency & %age of age, socioeconomic status of the patients (n=101)

Variable	No.	%
Age (years)		
1-30	63	62.4
31 – 60	31	30.7
61 – 80	7	6.9
Socioeconomic status		
Upper class	54	53.4
Middle class	33	32.7
Lower class	14	13.9

Table 2: Distribution of body mass index (BMI) (n=101)

Body mass index (%)	No.	%
< 18	77	76.3
18 – 25	18	17.8
> 25	6	5.9

Table 3: Frequency of symptoms among total patients

Symptom	No.	%
Cervical lymphadenopathy	101	100.0
Fever	35	34.6
Weight loss	25	24.7
Axillary lymphadenopathy	19	18.8
Inguial lymphadenopathy	8	7.9

Table 4: Frequency of involvement of the side of neck by lymph nodes (n=101)

Side of the neck	No.	%
Both sides	42	41.6
Right side	39	38.7
Left side	11	10.8
Midline	9	8.9

Table 5: Frequency of lymph nodes

Site of lymph node	No.	%
Unilateral single lymph node	67	66.4
Unilateral multiple lymph node	19	18.9
Bilateral single lymph node	11	10.8
Bilateral multiple lymph node	4	3.9

Table 6: Frequency of characteristics of lymph nodes

Characteristics of lymph node	No.	%
Shape		
Rounded	59	58.5
Multilobed	27	26.7
Elongated	15	14.8
Mobility		
Positive	87	86.2
Negative	14	13.8
Edges		
Regular	86	85.2
Irregular	15	14.8
Consistency		
Firm	71	70.3
Hard	23	22.8
Soft	7	6.9
Fixity		
Negative	91	90.1
Positive	10	9.9
Surface		
Smooth	89	88.2
Rough	12	11.8
Fluctuation		
Negative	97	96.2
Positive	4	3.8

Table 7: Diagnostic tool used for diagnosis of tuberculosis in cervical lymph nodes (n=101)

Tool	No.	%
FNAC	87	86.2
Incisional biopsy	8	7.9
Excisional biopsy	6	5.9

Table 8: Distribution of diseases in cervical lymph nodes

Disease	No.	%
Tuberculosis	76	75.5
Reactive hyperplastic lymph node	11	10.9
Metastatic lymph node	6	5.9
Hodgkin's disease	3	2.9
Non-Hodgkin's lymphoma	3	2.9
Kikuchi's disease	2	1.9

DISCUSSION

Tuberculosis is primarily considered a pulmonary disease; it has the potential to infect almost every organ system via lymphohematogenous dissemination during the initial pulmonary infection. Since 1984 the incidence of ex-trapulmonary tuberculosis has increased at an even faster rate than that of pulmonary tuberculosis. The diagnosis was based upon the presence of lymphocytes, macrophages, histiocytes of epithelioid type forming cohesive clusters and multinucleated giant cells of Langhan's giant cell with central caseation. So caseative necrosis and Langhan's giant cells were diagnostic for TB in smear. In the present study tuberculosis was common in female having 63 female and 38 male patients; which is in accordance to

results of Mutiullah²¹ reported female to male ratio of 1.4:1; Tatar²² reported female to male ratio of 1.7:1 but in some of the studies male are more affected by extrapulmonary tuberculosis as revealed by the study of Nissapatorn²³ where subjects were predominantly males 158 (60%) and females 105 (40%) with male: female ratio of 1.5:1. The reason for female predominance is joint family system in our society and females are neglected regarding health care.

In the present study the age of the patients ranged from 03-67 years with mean age of 32.56±13.49 years. Most of the patients presented in 2nd and 3rd decade followed by 4th decade which is comparable to the study of Mutiullah²¹ where the patients were in age range 3-54 years. Similarly in study of Shaikh²⁴ age of the patients ranged between 10–70 years and mean age was 35.16±16.56 years. According to the study of Asghar²⁵ tuberculosis was more common in patients who were in the group aged 15 to 44 years and less often in both the group aged younger than 15 years and older than 44 years. The commonly infecting patients in 2nd and 3rd decade could be due to more exposure of this age group to the mycobacterium tuberculosis.

In this study the patients belonged to various group of life and most of them were from lower socioeconomic group of community, and majority of the patients (76.23%) had low body mass index. In Mohapatra²⁶ study most of the patients with extrapulmonary tuberculosis belonged to racial and ethnic minorities with poor socioeconomic level. In most of the studies extrapulmonary tuberculosis was associated with immunodeficient condition like HIV having low body mass index as reported by Ilgazli²⁷.

In my study the complaints of the patients with extrapulmonary tuberculosis were cervical lymphadenopathy (100%), fever (34.65%) and weight loss (24.75%). Similarly Bukhary²⁸ reported that cervical lymphadenopathy was the most frequent site involvement of extrapulmonary tuberculosis noted in 246 out of 601 involvements (41%). Like wise in Jha²⁹ study symptoms of the patients were neck swelling 53(94.6%), malaise 10(17.8%), weight loss 8(14.3%), fever 6(10.7%), cough 6(10.7%), discharging sinus 3(5.3%) and haemoptysis 1(1.8%).

In this study cervical lymphadenopathy persisted from 1 month to 12 months with average of 4.5 months which is keeping with study of Jha²⁹ where the time interval between onset of symptoms and time of presentation varied from 15 days to 36 months (mean three months) while in Bukhary²⁸ study mean duration of symptoms before diagnosis of extrapulmonary tuberculosis was 7 months.

In this study tuberculosis in cervical lymph nodes was diagnosed in 87 cases (86.13%) by fine needle aspiration cytology (FNAC), while in 14 cases the

reports of FNAC were inconclusive which were followed by incisional or excisional biopsy to get final diagnosis. Similarly in Shaikh²⁴ study FNAC was performed in all cases but was inconclusive in 150. So these patients were subjected to incisional and excisional biopsy. In El-Tayeb³⁰ study FNAC in 58 cases with lymph nodes revealed caseating granuloma in 22 cases (90%). The remaining 6(10%) cases were diagnosed by excision biopsy. However in some of the studies the diagnostic tools were laboratory tests like ESR, Tuberculin test, PCR and radiological tool in form of CXR and CT scan as reported by national and international study of Nordin³¹.

By enlarge pulmonary tuberculosis is global disease but extrapulmonary tuberculosis is also not uncommon in human history and especially tuberculosis in cervical lymphadenopathy predominates. Tuberculosis is the commonest cause of cervical lymphadenopathy in young age people and in the developing countries and should be considered in every case of granulomatous lymphadenopathy unless proved otherwise. In our study extrapulmonary tuberculosis was the commonest diagnosis in cervical lymphadenopathy accounting 75.24%. Similar results are available in literature. Shafiullah³² and colleagues reported that extrapulmonary tuberculosis was the commonest observation in cervical lymphadenopathy i.e. 66.4%. While in Rajasekaran³³ and colleagues study tuberculosis was found in 77.3% people in cervical lymph nodes. Iqbal³⁴ worked on 220 patients with enlarged neck lymph nodes and found that tuberculosis was the commonest (n 155 - 70.45%) finding. Dogru³⁵ revealed a bit large no of tuberculosis in cervical region i.e. (84.8%). Gadre³⁶ studied that a total of 60 out of 100 cases clinically diagnosed as tubercular lymphadenitis were found to be of tubercular etiology by FNAC, microscopy and culture together. In my study tuberculosis was on top in cervical lymph nodes but some other disease were also diagnosed like reactive hyperplastic lymphadenopathy in 11 cases (10.89%), metastatic lymph nodes (5.94%), Hodgkin's disease (2.97%), Non-Hodgkin's lymphoma (2.97%). The rare diseases found in this study was Kikuchi's disease (1.98%) which in accordance to a national study conducted by Shaikh²⁴ who reported that the most common cause of cervical lymphadenopathy was tuberculosis in 99(49.5%) patients out of 200. Second most common cause was reactive change which accounts about 36 cases (18%), Non Hodgkins lymphoma 16 cases (8%), metastatic carcinoma 14 cases (7%), Hodgkins lymphoma 10 cases (5%) and Kikuchi's lymphadenopathy in 1 case (0.5%). My study results are also comparable to study of Jha

BC30 study where other causes of cervical lymphadenopathy were metastatic 18(19.14%), hyperplastic lymph-adenopathy 13(13.82%) and lymphoma 3(3.19%).

CONCLUSION

It is important that a high index of suspicion for tubercular lymphadenopathy is required. FNAC is investigation of choice though excision biopsy of lymph nodes is required occasionally. It requires special clinical alertness to recognize the condition. The delay in identification and treatment results in significant morbidity and mortality. As clinicians have to be aware of the potential of extrapulmonary involvement, health care facilities have to be prepared with the required expertise and resources for confirmation.

REFERENCES

- Elzinga G, Raviglione MC. Scaleup: meeting targets in global tuberculosis control. *Lancet* 2004; 363: 814-9.
- Afridi SP, Memon A, Rehman S. Spectrum of breast tuberculosis. *J Coll Physician Surg* 2009; 19: 159-61.
- Corbett EL, Maston B, churchyard Cj, Decock KM. Tuberculosis in sub Saharan Africa: opportunities, challenges and change in the era of antiretroviral treatment. *Lancet* 2006; 367:926-37.
- Afzal S, Qayum I, Ahmad I, Kundi S. Clinical diagnostic criteria for suspected ileocecal tuberculosis. *J Ayub Med Coll* 2006; 18: 42-6.
- Javid AK, Saha A, Rab A, Basit A, Ziaullah. Primary drug resistance to anti tuberculosis drugs in KPK Pakistan. *J PMA* 2008; 12: 437-40.
- Chhetri AK, Saha A, Verma SC, Palaian S, Mishra P. A study of adverse drug reactions caused by first line anti tuberculosis drugs used in directly observed treatment, short course therapy in western Nepal, Pokhara. *J PMA* 2008; 19: 531-5.
- Sharma SK, Mohan A. Extra pulmonary tuberculosis. *Indian J Med Res* 2004; 9:316-53.
- Golden PM, Vikram RH. Extrapulmonary tuberculosis overview. *Am Fam Phys* 2005; 176:1-8.
- Sreeramareddy CT, Panduru KV, Verma SC, Joshi HS, Bates MN. Comparison of Pulmonary and extra pulmonary tuberculosis in Nepal. A hospital based retrospective study. *BMC Infect Dis* 2008; 8: 1-7.
- Marais BJ, Wright CA, Schaaf HS, Gie RP, Hesseling AC. Tuberculous lymphadenitis as a cause of persistent cervical lymphadenopathy in children. *Pediatr Infect Dis J* 2006; 25(2):142-6.
- Ojo BA, Buhari MO, Malami SA. Surgica lymph node biopsies in university of Ilorin teaching hospital, Ilorin, Nigeria. *Niger Postgrad Med J* 2005;12 (4): 299-304.
- Ahmad P, Anwar M, Khan B, Altaf C, Khalilullah. Role of isoniazid prophylaxis for tuberculosis in hemopoietic stem cell transplant recipients. *J PMA* 2005; 378-81.
- Nomani K, Kazi Bm, Ahmad K, Karamat KA. *J Coll Physicians Surg Pak*. 2007;17(7):410-2.
- Bajwa M. Cervical lymphadenopathy: PIMS experience. *J Rawal Med Coll* 2004; 8: 78-82.
- Patra SP, Bhattacharya N, Mangal S. FNAC, imprint cytology and Histopathology for diagnosing disease of lymph node. *J Cytol* 2003; 20: 124-8.
- Screaton NJ, Berman LH, Grant JW. Head and neck lymphadenopathy. Evaluation with US-guided cutting needle biopsy. *Radiology* 2002; 224: 75-81.
- Khan JS, Latif Z, Hussain H, Khan JA, Ahmad B. Tuberculous Lymphadenitis as a cause of cervical lymphadenopathy. *J Rawal Med Coll* 2003; 7: 36-8.
- Farooq A, Ameen I. Comparison of FNAC vs excision biopsy for suspected tuberculous cervical lymphadenopathy. *Ann King Edward Med Coll* 2003; 9: 216 -8.
- Aljafari AS, Khalil EA, Elsididg KE, El Hag IA, Ibrahim ME et al. Diagnosis of tuberculous lymphadenitis by FNAC, microbiological methods and PCR: a comparative study. *Cytopathology* 2004; 15: 44-8.
- Saeed MS, Choudhry MK. Fine needle aspiration in the diagnosis of tuberculous lymph adenitis in a developing country. *Pak J Chest Med* 2002; 8: 15-8.
- Mutiullah S, Ahmed Z, Yunus M and Marfani MS. Evaluation of tuberculosis cervical lymphadenopathy. *Pak J Surg* 2009; 25: 176-9.
- Tatar D, Senol G, Alptekin S and Ebru Gunes E. Assessment of Lymph Node Tuberculosis in Two Provinces in Turkey. *Jpn J Infect Dis* 2011; 64:316-21.
- Nissapatorn V, Kuppusamy I, Wan-Yusoff WS, Anuar AK. Clinical analysis of foreign-born patients with tuberculosis found in Malaysia. *Southeast Asian J Trop Med Public Health* 2005; 36:713-721.
- Shaikh SM, Baloch I, Bhatti Y, Shah AA, Shaikh GS, Deenari RA. An audit of 200 cases of cervical lymphadenopathy. *Med Channel* 2010; 16: 85-87.
- Asghar RJ, Pratt RH, Kammerer JS, Navin TR. Tuberculosis in South Asians Living in the United States, 1993-2004. *Arch Intern Med* 2008; 168(9): 936.
- Mohapatra PR, Janmeja AK. Tuberculous lymphadenitis. *JAPI* 2009; 57: 585-90.
- Ilgazli A, Boyaci H, Basyigit I, Yildiz F. Extrapulmonary tuberculosis: clinical and epidemiologic spectrum of 636 cases. *Arch Med Res* 2004; 35: 435-41.
- Bukhary ZA. Extrapulmonary tuberculosis, clinical presentation & outcome. *Saudi Med J* 2004;25(7): 881
- Jha BC, Dass A, Nagarkar NM, Gupta R, Singhal S. Cervical tuberculous lymphadenopathy: changing clinical pattern and concepts in management. *Postgrad Med J* 2001;77:185-7.
- El-Tayeb A, ElTayeb A, Ibrahim N. Extrapulmonary childhood tuberculosis. *Egyptian J Surg* 2008; 27:185.
- Nordin AJ, Saini SM, Razak HRA, Rahim NA. Multimodality Diagnostic Imaging in Tuberculous Lymphadenitis: a case review. *Pertanika J Sci Technol* 2011; 19(1): 141-6.
- Shafi Ullah, Shah SH, Rehman A, Kamal A, Begum N, Khan G. Extrapulmonary tuberculosis in Lady Reading Hospital Peshawar, NWFP, Pakistan: survey of biopsy results. *J Ayub Med Coll Abbottabad* 2008; 9: 15-9.
- Rajasekaran S, Gunasekaran M, Jayakumar DD. Tuberculous cervical lymphadenitis in HIV positive and negative patients. *Ind J Tub* 2001; 48: 201-4.
- Iqbal M, Subhan A. Frequency of tuberculosis in cervical lymphadenopathy. *J Surg Pak* 2010;15(2):107
- Dogru T, Karakas A, Karadurmus N, Turhan V, Saglam K. Lymph node tuberculosis in non-hiv positive young male patients: retrospective analysis of 33 cases. *TAF Prev Med Bull* 2010; 9(4):271-6.
- Gadre DV, Singh UR, Saxena K, Bhatia A, Talwar V. Diagnosis of tubercular cervical lymphadenitis by fnac, microscopy and culture. *Ind J Tub* 1991; 38: 25-7.

