thesiology without whose permission and support this study would not have been possible.

REFERENCES

1. Hannallah RS, Rosales JK. Experience with parents' presence during anesthesia induction in children. Can Anesth Soc J 1983; 30: 286-289.

2. Schulman JL, Foley JM, Vernon DTA, Allan D. A study of the effect of the mother's presence during anesthesia induction. Pediatrics 1967; 39:111-114.

3. Bevan JC, Johnston C, Haig MJ, *el al.* Preoperative parental anxiety predicts behavioral and emotional responses to induction of anesthesia in children. Can J Anaesth 1990; 37:177-182.

4. Parnass CM, Pittman SK, Moritz HA, McCarthy RJ. A survey of parental attitudes following pediatric anesthesia at a community hospital. Anesthesiology 1993;79:A1156.

Mycobacterial Lymphadenitis

R. Julka
M. Deb
A.K. Patwari*
M. Jain[+]

Tuberculosis is one of the commonest causes of lymphadenopathy in the pediatric age group in developing countries. This condition, like tuberculosis elsewhere, is associated with prolonged morbidity and requires prompt and energetic treatment^). Although *M. tuberculosis* remains the commonest cause, non-tuberculous mycobacteria (NTM) have been increasingly reported in the past few years from the developed countries(2). There is a paucity of data regarding the frequency of non-tuberculous mycobacterial disease among children in developing countries. Lack of information on this subject assumes even greater significance because it is important to identify children with NTM lymphadenopathy since antitubercular drugs (ATD) are often ineffective and the treatment of choice in these cases is total excision(2). The present study was, therefore, undertaken to assess the magnitude and clinical profile of NTM lymphadenopathy in the pediatric age group.

From the Departments of Microbiology, Pediatrics and Pathology*, Lady Hardinge Medical College and Associated Kalazvati Saran Children's Hospital, New Delhi 110 001.*

Reprint requests: Dr. A.K. Patwari, Professor of Pediatrics, Kalawati Saran Children's Hospital New Delhi 110 001.

Manuscript received: January 12,1996;
Initial review completed: March 25,1996;
Revision accepted: November 8,1996

Subjects and **Methods**

Seventy children aged-18 months to 12 years (median age 8 years) who attended the Outpatient Department of Kalawati Saran Children's Hospital with a clinical diagnosis of tubercular lymphadenopathy between August 1993 and December, 1994 constituted the study group. After a detailed history, thorough clinical examination, Mantoux test and chest X-ray, fine needle aspiration cytology (FNAC) was done(3). The aspirates were stained by Giemsa and Ziehl Neelsen (Z-N) stains. The

aspirated material was cultured on a pair of Lowenstein Jensen (LJ) medium, and incubated at 37° C for 8 weeks. The slopes were examined every week for evidence of growth. The growth once evident was examined by Z-N staining for acid-fast bacilli (AFB). The AFB positive cultures were screened for NTM by testing for PNB (Para nitrobenzoic acid) tolerance(4). Identification of cultures were carried out using biochemical tests with appropriate positive and negative controls as described(5). These included rate of growth; photochromogenicity; growth at 25°C, 37°C and 42°C; niacin production test; nitrate reduction test, aryl sulphatase test (3 days and 7 days); semiquantitative catalase test, 5% sodium chloride tolerance; urease test; tween hydrolysis (5 days and 7 days) and growth on MacConkeys's medium.

The histopathological criteria used for diagnosis of tuberculosis was presence of chronic granuloma consisting of epitheloid cells, and presence of necrotic material with or without epitheloid cells. The entire smear stained with Z-N stain was searched for AFB, under oil immersion.

Results

Out of 70 children, 26 (37.1%) were diagnosed as tubercular lymphadenopathy on cytomorphological characters at FNAC. Of these 26 cases, maximum number (52.5%) were in the 6-12 year age group. There was an overall preponderance of females (56.6%) as compared to males (43.4%). History of contact was obtained in 9 (34.6%) cases. Out of 26 cases, 8 (30.7%) had a BCG scar. Tuberculin reaction was positive in 16 (61.5%) and X-ray chest revealed active pulmonary disease in 4 (15.4%) children *(Table I).*

Giemsa stained smears were grouped into 3 categories depending on the cytological features *(Table II).* Smear for AFB was positive in 8/26 (30.7%). The total culture isolates were 15/26 (57.6%), of which 13 (86.6%) isolates were *M. tuberculosis* and the remaining 2 (13.3%) were NTM (one strain each of *M. szulgai* and *M. flavescens).*

TABLE *1—Summary of Clinical Profile (n=26)*

Features	Number	Percentage
Age (yrs)		
<3	4	15.4
3-6	8	30.7
>6	14	53.8
Site of lymphadenopathy		
Cervical	18	69.2
Axillary	6	23.0
Generalized	2	7.6
Associated symptoms		
Fever	16	61.5
Respiratory	8	30.7
Others	8	30.7
History of contact	9	34.6
BCG vaccinated	8	30.7
Positive tuberculin test	16	61.5
Positive X-ray chest	4	15.4

Discussion

Tubercular lymphadenopathy remains the commonest extrapulmonary manifestation in children. Based on cytological evidence, 37.1% of the total enrolled cases with lymphadenopathy were diagnosed to have mycobacterial infection. As has been described by others, majority (52.5%) of the cases belonged to 6-12 year age group. The reason could be related to immunological competence and relatively better defense mechanism of older children since more severe forms of tuberculosis occur at a younger age. Household contacts (41.4%)

TABLE II—*Correlation of Cytomorphological Features with AFB Smear and Culture Positivity (n=26)*

Cytological category	Number	Culture for Mycobacteria	
		Positive	Negative
Granuloma only (n=10)			
Smear positive	2	2	0
Smear negative	8	5	3
Granuloma & necrosis (n=14)			
Smear positive	5	3	2
Smear negative	9	4	5
Necrosis only (n=2)			
Smear positive	1	—	1
Smear negative	1	1	0

and unimmunized status of children (69.3%) seemed to be quite common as described earlier(l).

Cervical region was the commonest (69.2%) site, followed by axilla (23.0%), as observed by other workers(l). Fever is one of the commonest associated features followed by respiratory symptoms. A positive tuberculin test and skiagram supported the diagnosis of mycobacterial/tubercular lymphadenitis.

Diagnosis of childhood tuberculosis still poses a problem owing to paucity of specific symptoms and signs. A high degree of clinical suspicion, at times supported by investigations are helpful in arriving at a provisional diagnosis. Cytologic features, as has been found in the present study, irrespective of AFB smear positivity could provisionally diagnose 26 (37.1%) cases. Out of these 10 cases were culture positive, emphasizing its utility in confirming the diagnosis of tuberculosis in peripheral lymphadenopathy.

In developed countries most cases of mycobacterial lymphadenitis are caused by NTM(2) but in our patient population M. *tuberculosis* still continues to be the commonest agent. This observation is consistent with the results from other Indian studies(6,7). It is recognized that the distribution of NTM in environment varies from region to region(8,9). In many countries it has been noticed that as the number of cases of tuberculosis decline, diseases due to other mycobacterial species increase(6,8). The usual clinical presentation of NTM lymphadenitis in children includes affliction in young subjects with usually no systemic upset or evidence of hematological spread and common involvement of cervical lymphnodes followed by submandibular and pre-auriculur lymphnodes. In contrast to tubercular lymphadenitis, unilateral lymphnode enlargement is common. Tuberculin test may be negative or doubtful and routine hematology and skiagram of chest are generally normal, but the organisms are highly resistant to antitubercular drugs(2,9).

NTM most commonly encountered in local lymphadenitis in children are M. *scrofulaceum* and *M. avium* complex followed by *M. kansasi* and M. *fortuitum(7,9-*11). NTM isolated from 2 of our patients included *M. szulgai* and *M. flavescens* which are reported by other workers from various

sites. *M. sznlgai* and *M. flavescens* are known to cause lymphadenitis, disseminated disease and pulmonary disease (rare) in children(12). Our patient in whom M. *szulgai* was isolated had cervical lymphadenitis, negative tuberculin test and responded well to a combination therapy of isoniazid and rifampicin. *M. flavescence* has generally been regarded as a saprophyte. The child in whom M. *flavescence* was isolated also had cervical lymphadenitis, negative tuberculin test and responded very well to ATD. Eventhough both cases responded to ATD, it needs to be remembered that most of the NTM are resistant to ATD and may pose a therapeutic problem as surgical intervention is generally required in such cases(2,12).

REFERENCES

1. Sheikh MM, Ansari Z, Ahmed P, Tyagi SP. Tuberculous lymphadenopathy in Children. Indian Pediatr 1981; 18: 293-297.
2. White MP, Bangash H, Goel KM, Jenkins PA. Non tuberculpus mycobacterial lymphadenitis. Arch Dis Child 1986; 61: 368-371.
3. Kline TS. Lymphnode and superficial masses. *In:* Handbook of Fine Needle Aspiration Biopsy Cytology. St. Louis, CV Mosby, 1981; pp 23-64.
4. Roberts GD, Koneman EW, Kim YK. Mycobacterium. *In:* Manual of Clinical Microbiology, 5th edn. ED. Albert B. Wahington, American Society of Microbiology, 1991; pp 304-339.
5. Patricia TK, Cubica GP. Identification test techniques. *In:* Public Health Mycobacteriology: A Guide for the Level III Laboratory. U.S. Department of Health and Human Services, Centre for Disease Control, Atlanta, 1985; pp 71-146.
6. Das BK, Sharma VK, Rao Bhau LN, Saxena SN, Bhardwaj BK. Characterization of *Mycobacterial* strains from clinical specimens. Indian J Pathol Microbiol 1982; 25:19-27.
7. Gadre DV, Singh UR, Saxena K, Bhatia A, Talwar V. Diagnosis of tubercular cervical lymphadenitis by FNAC, microscopy and Culture. Indian J Tuberc 1991; 38: 25-27.
8. Aggarwal M, Jindal N, Arora R, Aggarwal NP, Arora S. Non-tuberculous mycobacteria: The changing scenario at Amritsar. Indian J Tuberc 1993; 40: 25-27.
9. Paramasivan CN, Herbert D, Prabhakar R. Non-tuberculous mycobacteria-An overview. Lung India 1986; 1: 7-12.
10. Paramasivan CN, Govindan D, Prabhakar R, Somasundaram PR, Subbamal S, Tripathy SP. Species level identification of non tuberculous mycobacteria from South Indian BCG trial area during 1981. Tuber cle 1985; 66: 9-15.
11. Rohtagi M, Shrinivas, Dewan M. Etiology of chronic cervical lymphadenopathy in infancy and childhood. Indian J Med Microbiol 1988; 6: 309-314.
12. Margileth AM. Nontuberculous (atypical) Mycobacterial disease. Sem Pediatr Infec Dis 1993; 4: 307-315.