Epidemiology of Childhood Tuberculosis in a Hospital Setting

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Abstract

A study of two hundred cases of tuberculosis over a span of two years was carried out at the pediatric department of a hospital in Islamabad. The diagnosis was based upon history, clinical examination, chest and other relevant radiography, Mantoux test, erythrocyte sedimentation rate (ESR) and where necessary cerebrospinal, pleural and ascitic fluid examinations and lymph gland histopathology were done. An equal number of male and female children upto 12 years of age were enrolled. The children usually presented with fever, cough, weight loss or failure to thrive and pallor. The most commonly affected age group was between 2-5 years and pulmonary tuberculosis was the most frequent diagnosis followed by tuberculosis adenitis. (JPMA 48:164, 1998).

Introduction

Tuebrculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis. Itpriniarily affects the lungs but can also affect the central nervous system, intestine, bone and joints, lymph glands, skin and other body tissues resulting in extra pulmonaiy tuberculosis. The disease is usually chronic with varying clinical manifestations. It is transmitted by droplet infection generated by sputum positive patients with pulmonaiy tuberculosis. The incubation period may be weeks, months oryears[1].

TB has become an important public health problem[2]. in today's world whereas previously it was considered a nuisance associated usually with the developing countries[3]. But various factors during the 1990's have made tuberculosis a global issue[4]. With the out- break of the human immune deficiency virus (HIV) epidemic, western world saw re-emergence of tuberculosis[5], which according to World Health Organization (WHO) is the principal killer of HIV positive people today[4]. Along with this and due to inadequate treatment, several outbreaks of multi-drug resistance tuberculosis have been reported from around the world[6]. Tuberculosis is a major cause of morbidity and mortality in all age groups. According to an estimate, approximately 170,000 children die from tuberculosis annually, world wide[7]. In developing countries most affected individuals are below 50 years of age, which is indirectly having a large negative impact on the economies of such nations[8].

In Pakistan only limited data is available however, the prevalence of tuberculosis is estimated to be as high as 250,000 cases annually[9]. According to the official estimates, the rate of open bacillaiy cases among adult population (15 years and above) was 17% and among children 5 to 9 year of age 13% were infected with tuberculosis[9]. It is thought to be the fourth major cause of all deaths in Pakistan[9]. There is a renewed interest in tuberculosis, as it is re-emerging as a very important public health problem worldwide. There is a little published data on childhood tuberculosis in Pakistan. We present hospital based epidemiological data from a group of children suffering from tuberculosis.

Patients and Methods

Prospective data regarding tuberculosis was collected in children upto 12 years of age presenting to the pediatric department of Federal Government Services Hospital, Islamabad. Two hundred consecutive

children were identified from outpatient and inpatient departments who suffered from various forms oftuerculosis. A detailed history of contact with a case of tuberculosis, history of measles or recurrent respiratory infections was obtained. Assessment of nutritional status on the basis of weight for age (Gomez Classification) was done. Each child had a blood complete picture, eiythrocyte sedimentation rate (ESR), chest radiograph and Mantoux test with five tuberculin unit (TU). When necessary cezebrospinal (CSF), pleural and ascitic fluids were sent for biochemical examination, microscopy, gram staining and Ziehi Neelson staining for acid fast tuberculous bacilli (AFB). Where lymph glands and bones were suspected to be involved, biopsies were also performed. Specific culture were not done due to non-availability. Children were diagnosed as having tuberculosis in the light of suggestive clinical features, history of contact, positive Mantoux test ESR >30 mm and evidence of tuberculosis in chest radiograph for pulmonary tuberculosis. Mantoux test was considered positive if? l0 mm induration without BCG scar or >15 with BCG scar For TB meningitis in presence of above. CSF examination showing >100 leukocytes predominantly lymphocytes, protein >100 mg/dl and sugar <50% of blood sugar was considered suggestive. Ascitic and pleural fluids were exudates (predominantly lymphocytic leukocytes and >3.0 g/dI proteins). TB lymphadenitis was diagnosed by histopathology. In severely malnourished and children with recent history of measles ,a negative Mantoux did not exclude the diagnosis of TB.

Results

Among the 200 children enrolled, most belonged to large families with low socioeconomic background. Commonly affected age group was of 2-5 years (Table I).

Table I. Age and sex distribution of children with tuberculosis (n=200).

Age (months)	Male		Female		Total	
	n	%	n	%	n	%
0-23	26	13	12	6	38	19
24-59	32	16	33	16.5	65	32.5
60-83	16	8	12	6	28	14
84-144	26	13	43	21.5	69	34.5
Total	100	50	100	50	200	

History of contact with a TB case was present in 129 cases (64.5%), 38(19.0%) children had recent histor of measles, whereas 3 (1.5%) had history of whooping cough. Duration of illness in the children varied. Symptoms for upto 2 months were present in 38.5% children, for 2-6 months in 31% and another 30.5% had symptoms for more than six months. Fever was the most common presenting complaint (80.5%) followed by weight loss or failure to thrive (69.5%) (Table II).

Table II. Presenting complaints and clinical signs of children with tuberculosis. (n=200)

	Number of cases	Percentage**
Symptoms*		
Fever	161	80.5
Weight loss/failure to thrive	139	69.5
Cough	130	69.7
Glandular swelling	33	16.5
Tiredness	31	15.5
Breathlessness	28	14.0
Sweating	27	13.5
Convulsions	12	6
Drowsiness/confusion	12	6
Vomiting	10	5
Anorexia	10	5
Signs***		
Pallor	153	76.5
Malnutrition	120	60
Adventitious sounds on auscultation	48	24
Visceromegaly	48	24
Lymphadenopathy	38	19
Neurological signs#	35	17.5
Meningeal irritation	17	8.5
Hepatomegaly	37	18.5
Splenomegaly	11	5.5

* 9 children had irritability, 5 physical deformity, 4 oedema, 3 haemophtysis, 8 limb weakness, 5 headache, 8 diarrhoea, 3 constipation and 2 had abdominal distension.

** Total percentages may be more then 100, because children had more than one symptom or sign.

*** 6 children had bone involvement, 2 had ascites and 2 had hydrocephalus.

12 children had varying degree of paresis, 8 had papilloedema, 7 had cranial nerve involvement and 6 had optic atrophy.

Pallor (76.5%) and malnutrition (60%) were common findings. Thirty-eight children had matted non-tender lymphadenopathy, of which 31 were in cervical region. Meningeal irritation was present in 17 children on initial examination, 11 (5.5%) of which were diagnosed on investigations as tuberculosis meningitis. All 11 cases had vazyingdegrees of paralysis of limbs. Six children had vitamin D

deficiency rickets.
Pulmonary tuberculosis was the most common diagnosis (79%) followed by tuberculous lymphadenitis (19%) (Table III).

Table III. Types of tuberculoses in children upto 12 years of age (n=200)*

Diagnosis	Number of patients
Pulmonary TB	158
Tuberculous adenitis	38
Tuberculous meningitis	11
Bone TB	6
Miliary TB	5
Abdominal TB	2
Phylactanular conjuunctivitis	1

*Some patients had more than one type of tuberculosis, so the total is more than 200.

Six children with spinal tuberculosis presented with bony deformities. In this group of children with bone involvement, one had paraplegia and another had swelling of fingers of both hands and feet, later diagnosed as tuberculous dactylitis on radiology and bone biopsy. Fifteen (7.5%) children were asymptomatic and were detected during course of contact tracing (Data not shown).
Sixty percent (120/200) of all children were below third percentile of weight forage, 33% were female and 27% male. Among 103 less than five year old group of children, 68 were malnourished and 27 had signs of clincal severe malnutrition (Data not shown).
Tuberculin reaction was positive in 166 (83%) cases, 59% showed an inducation of atleast 20 mm and a few developed ulceration and necrosis. There was no relationship between the severity of the disease and intensity of tuberculin reaction. Ninety four percent of children above 7 years showed a positive tuerculin reaction. Of the 34 non-reactors to tuberculin, 16 children had severe malnutrition, six had a recent attack of measles, two had miliary tuberculosis and one had history of repeated respiratory infections. Of remaining nine, seven had valying degree of malnutrition but no definite cause of non-reactivity to tuberculin could be established. ESR was raised in 162 (81%) children and in 119 (59.5%) it was more than 30 mm. Hemoglobin was less than 11 gfdl in 153 (76.5%) children and was less than 9 g'dl in 76 (38%) children.

Discussion

In traditional societies like ours there is a stigma attached to tuberculosis[6]. People are afraid to disclose the diagnosis due to fear of discrimination by the community. There has been little effort by the health professionals to educate the communities about preventive measures, symptoms of tuberculosis, reduction of prejudice, and encouraging patients to seek treatment and comply with therapy. Adults are the main source of TB in the community[6]. If they are infected and don't seek treatment they may pass it onto their children. It is estimated thatan active case ofTB will infect 27 to 28 people before he/she recovers or dies from the disease[8]. Children under two years of age are most vulnerable. Tuberculosis

affects children directly and indirectly. This disease probably creates more orphans than any other disease even though it is preventable and curable.

In our study the highest prevalence of cases (32.5%) was in 2-5 years age group, similar to that reported from United Kingdom and India[10]. Two other studies from India reported higher prevalence in over five year age group[11,12]. The most frequent symptoms in Our group of children were fever, weight loss/failure to thrive and cough. These were similar to two studies from India, Magotraet al reported dry cough, failure to thrive, low grade fever and weight loss , whereas Ramachandran reported repeated respiratory infections, failure to thrive and chronic diarrhoea as commonest presentations[10]. History of contract was present in 129 (64.5%) of our patients. Indian workers have quoted lower figures of 10%[10] and 19.5%[11]. Children suffering from miliary tuberculosis, tubexculous pneumonia and tuberculous meningitis in our study had strong history of contact with one or two family members suffering from tuberculosis.

A total of 60% children in our study were malnourished to some degree and a quarter of under five years of age were severely malnourished. Many children presenting with severe malnutrition to health facilities may be suffering from tuberculosis and nutrition rehabilitation efforts alone may fail. Llyod reported that 12.5% (51 out oC402) of her patients having severn malnutrition suffered from tuberculosis[13]. Okeahialam also reported that 38% of severely malnourished children in his study had tuberculosis[14]. Nutrition survey data from Pakistan showed that 42% were stunted among under five year old children, 35.8% were underweight and 9.3 were waste[15]. Many of these children might in fact have tuberculosis but remain undiagnosed.

The data we collected had its limitations. First, it was hospital based and cannot provide a community picture of disease epidemiology. Second, cases were a consecutive group of patients and not randomly selected so, it does not fulfil the criteria for a controlled study. Third, there may be some cirticism about establishing the diagnosis of tuberculosis inourpatients. As it is, diagnosing tuberculosis in children is difficult. Many a times they present with a non-specific symptom like failure to thrive. In malnourished children diagnosis becomes more difficult. Children with tuberculosis are not usually infective to others, and rarely produce sputum which can be checked forTh bacillus. So they remain unidentified and untreated. It is reasonable to assume that a child with appropriate clinical picture, a positive tuberculin test and history of contact with an infected untreated adult has tuberculosis[6,7]. Thirty-four of our study children had a negative Mantoux test. Mantoux test in one of the most important diagnostic tools for tuberculosis in children. A positive test below three years of age in children withoutBCGvaccination is diagnostic for tuberculosis[16,17]. A negative test can be present in severe malnutntion, measles, occasionally after measles vaccination, very recent infections, chicken pox and in advanced, tenninal or miliaiy tuberculosis[17,18]. A negative Mantoux test has also been documented inbacteriologically proved cases of tuberculosis.

With intensive therapy, TB spread can be prevented by proper treatment and good compliance even for three weeks when patients become AFB negative[7]. To improve tuberculosis cure rates and minimze development of multi-drug resistant (MDR) strain, WHO is promoting directly observed therapy, short course (DOTS)[6]. Good results have been reported from China[20] and other countries like Tanzania, Bangladesh, Guinea, Peru, and Kenya[6,7]. DOTS provides a strategy through which supervised effective medicines are provided to the patients regularly until cured[6]. It is recommended that every country affected by tuberculosis including Pakistan should implement DOTS as their tuberculosis treatment policy as effectively as possible.

Pakistan has had a National TB control Programme (NTP) since 1965 which has not been given high prioritiy by the government[20]. In 1996 this programme has been revised and DOTS adopted as a strategy. The Planning Commission document for NTP states that in collaboration with other primary

health care programmes i.e., EPI, Leprosy , AIDS control programme, and Prime Minister's Family Planning and Primary Health Programme. the NTP will try to prevent tuberculosis and will try to expand and provide full treatment coverage by 2000-2001[9]. There is a dire need for all health professionals tojoin hands with the national TB programme to control the menace of tuberculosis.

References

1. Smith MHD, Starke JR. Marquis JR. Tuberculosis. In Feigin. RD. and Cherry. J.D. (eds). Text book of pediatric infectious diseases. Philadelphia. WB Saunders Company, 1987. PP. 1321-1329.
2. Porter i. Epidemiological interaction of TB and HIV in the developing world News on health care in developing countries. N.U., 1995;9: 10-13.
3. Gebre-Medhin M, Proos AS. Introduction, NU News on health care in developing countries NU. 1995;9:3.
4. World Health Organization press release WHO/22. TB deaths reach historic levels. Geneva, WHO, March 21, 1996.
5. Chaulet, P. The new tuberculosis people. Editorial. TB and HIV newsletter Geneva, WHO. (4) June-Aug. 1996.
6. Singer C. The threat of tuberculosis, Groups at risk, WHO report on tuberculosis epidemic, Geneva. WHO, 19%, pp.2-23.
7. Tuberculosis and children: The missing diagnosis. A special supplement to child health dialogue. London, AHRTAG, 1996, pp. 1-5.
8. The global challenge of tuberculosis (Editorial). Lancet, 1994;344 :277.
9. Ministiy of Health,Govemment of Pakistan. PC-I Form National Tuberculosis Control Porgramme for 1996.97 to 2001. Islamabad, Ministry ofHcalth, 1996, pp. 2-6.
10. Ramachandran RS. Tuberculosis in children: experience with 1284 cases. Indian Pediatr., 1968;5:564-571.
11. Magotra ML, Andushar GP, Katira OP. Primary pulmonary tuberculosis in children. Indian Pediatr., 1974,9.529.533.
12. BhakooON, Gupta SP. Tuerculosis nchildrcn Indian J. Pediatr., 1969;36:65-70.
13. Lloyd AVC. Tuerculosis test in children with malnutrition. Br. Med,J., 1968;3 :529-531.
14. Okeahialam TC. Diagnostic criteria oftuberculosis in malnourished children. E. Afr. Med. i., 1974;5 1:79-89.
15. de.Onis M. Monteiro C, Akre J et al. The world wide magnitude of protein energy malnutrition. An overview from the WHO global database on child growth. Bull. WHO., 1993;71 :703-712.
16. Gocmen A, Kipen N, Ertan V et al. Is the BCG test of diagnostic value in TB? Tubercle. Lung Dis., 1994;75:54-57.
17. Udani PM. Tuberculosis in childhood. Pediatr. Clin. India., 1968 ;3: 163-164.
18. Speck WT. Tuberculosis. In Behrman, R.C.. Kleigman, R.M., Nelson, WE. et al. eds. Nelson textbook of Pediatrics. 14th Edition, Philadelphia. W.B. Saunders, 1992, pp. 763-772.
19. China tuberculosis control collaboration. Results of directly observed short course chemothrapy in 112842 Chinese patients with smear positive tuberculosis. Lancet, 1996;347:3 58-362.
20. Jafri SMA. Tuberculosis control. An uphill task in Pakistan. Int. J. Epidemiol., 198 1;10:381-382.