Original Research Article

A study of influence of malnutrition in development of tuberculosis in BCG vaccinated children

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Abstract

Background: Tuberculosis is global Burdon with India contributing major patients. Childhood tuberculosis is major concern as it affects the future productive days and economy of the country. **Aim and objective:** To study the influence of malnutrition in development of tuberculosis in BCG vaccinated children in age group of 2 months to 12 years. **Material And Methods:** Present study was a prospective study carried out on children in the age group of 2 months to 12 years with symptoms suggestive of tuberculosis. Data was collected with pre tested questionnaire. Data included sociodemographic data, clinical history and through clinical examination. Nutritional assessment was done according to IAP classification. All confirmed cases were treated according to IAP consensus for childhood TB. Data was analysed with appropriate statistical tests. **Results And Discussion:** In our study, 58(55.76%) had protein energy malnutrition (PEM), of which 17(21.25%) had Grade I, 13(16.25%) had Grade II PEM, 11(13.75%) had Grade III PEM and 04(5%) had Grade IV PEM according to IAP Classification of Malnutrition. 35 (43.75%) cases had normal nutritional status. 4 cases from Grade IV malnutrition had associated HIV infection.

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INTRODUCTION

In Sanskrit tuberculosis is known as King's evil, "Rajyakshma". Tuberculosis is disease that continues to plague mankind in spite of the fact that its etiology has been known for more than a century and effective means of treatment have been available for more than half century. It is the most frequent cause of death from a single agent in the world being second only to AIDS are equivalent to the crash a jumbo jet every hour of everyday. Globally it has been estimated that 1.9 billion people (1/3 of world's population) are infected and 5000 people die of TB Globally each day.[1] Out of which 95% are in the developing world. About 3 million cases die every year with an addition of 4-5 million new cases every year.[2] The majority of infected individuals live in South East Asian region.More than 90% of deaths are reported to occur in low-income countries. In India 1.8 million new cases annually accounting for one fifth of new cases two of every 5 persons (>400 million) in general population have latent tuberculosis.[3] Tuberculosis long known to be a major cause of morbidity and mortality through out the world has for the several decades been a neglected disease in both industrialized and developing countries specially in children because of the difficulty of confirming the diagnosis. The Global burden of childhood Tuberculosis in the world is unclear. Another important reason is that children do not make a significant contribution to the spread of tuberculosis.[4] The actual global disease burden of childhood TB is not known, but it has been assumed that 10% of the actual total TB caseload is found amongst

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children. Global estimate of 1.5 million new cases and 130,000 deaths due to TB per year amongst children is reported. However these figures appear to be an underestimate of the size of the problem. Children can present with TB at any age, but the majority of cases present between 1 and 4 years. Disease usually develops within one year of infection. In younger individuals the progression to disease is earlier and is more disseminated. Pulmonary tuberculosis (PTB) is usually smear negative. PTB to extra-pulmonary TB (EPTB) ratio is usually around 3:14. In infants, the time span between infection and disease can be as little as 6-8 weeks. Untreated adults pass the disease on to 43% of children under one and to 16% of children from 11-15 years old. Only 5-10% of adults in similar contact would contract the disease. Scientific data on the burden of all forms of TB amongst children in India are not available. Most surveys conducted have focused on pulmonary TB and no significant population based studies on extrapulmonary TB are available. Pulmonary TB is primarily and adult disease and it has been estimated that in 0-19 year old population PTB is only 7%.[5] After the implementation of expanded and universal immunization programmes in India, there is substantial improvement in BCG vaccination coverage reaching up to 90% in urban areas. [6] In spite of this improved vaccination coverage and timely revised treatment protocols the disease is still rampant, and multidrug resistant strains tuberculosis (MDRTB) have under debate.[7,8] HIV positivity amongst patients with tuberculosis attending tuberculosis centers is considerably higher than in the general populations.[9] Tuberculosis is now attracting renewed interest due to Increased incidence of tuberculosis in many HIV endemic countries,[10] Proven effectiveness of short– course chemotherapy and as Tuberculosis control is one of the most cost effective health intervention in developing countries[11] The highlighted fact is that tuberculosis is less a disease of the individual and more strikingly a disease of the family and of the community. This is even more the case with tuberculosis in children. However, the ultimate goal is to protect children form infection, allow the emergence of a whole generation free form infection and, thus, to eradicate tuberculosis. Evidence from high- burden communities suggests that this is possible. Tuberculosis, theoretically, is a disease that should be able to be eradicated but this well require new tools to accomplish. Inspite of the large coverage of BCG, the disease in the BCG immunized population is still a big quantum. Hence it is decided to study the disease pattern and its progression and complications in BCG immunized children aged between 2 months-12 years.

Aim and objective: To study the influence of malnutrition in development of tuberculosis in BCG vaccinated children in age group of 2 months to 12 years.

MATERIAL AND METHODS

Present study was a prospective study carried out at tertiary health care centre. Study population was children in the age group of 2 months to 12 years with symptoms suggestive of tuberculosis.

Inclusion criteria: 1. Children vaccinated with BCG (presence of BCG scar) and admitted in paediatric ward or PICU with symptoms of tuberculosis 2. Children in age group of 2 months to 12 years of either sex 3. Children with Recurrent or prolonged fever, Recurrent respiratory infections and Recurrent wheezing 4. Children with Poor weight gain 5. Children with any of the symptoms /signs like Lymphadenopathy, Hepato splenomegaly, M Meningitis, Convulsions and Serous effusions 6. Babies not thriving well

Exclusion criteria: 1. Asymptomatic Mantoux positive children with no evidence of disease 2. Babies less than 2 months of age 3. Children with BCG adenitis 4. Children those without BCG vaccination or Scar 5. children on empirical anti-tubercular drugs were excluded from the study.

Study was approved by ethical committee of the institute. A valid written consent was taken from parents of children after explaining study to them. Data was collected with pre tested questionnaire. Data included sociodemographic data, clinical history and through clinical examination. Nutritional assessment was done according to IAP classification.[12] All patients underwent Mantoux test, chest X-ray, Complete blood countand urine routine examination. Mantoux test was done with 0.1 ml of PPD (5TU PPD-S) injected on volar surface of forearm for all patients and induration exceeding 10mm after 48-72 hours was considered as positive reaction. In relevant cases gastric aspirate for AFB smear examination for three consecutive days. Lymph node biopsy, cerebrospinal, pleural and peritoneal fluid studies including adenosine deaminase test were done. Positive Mantoux test, positive X-ray findings, AFB positive in gastric aspirate, lymph node biopsy suggestive of tubercular pathology, CSF positive for tubercular meningitis and CT appearance of tuberculoma brain were used as diagnostic criteria in our study. All confirmed cases were treated according to IAP consensus for childhood TB. Data was entered in Excel sheet and analysed with SPSS version 22.0.

RESULTS

In our study, we studied 80 patients. Table 1 shows distribution of patients according to age group. Majority of the patients belong to 1 to 5 years (40%) followed by 6 to

10 years (26.25%). Patients less than 1 year were 16.25%. In our study, positive history was shown by 20% population and 80% showed negative history for tuberculosis (table 2). Table III shows predominant symptoms of presentation are Fever 52(65%) and cough 47 (58.75%). 30(37.5%) had initial presentation as seizures. One third had weight loss or poor weight gain, significant lymphadenopathy was observed in 20 (25%) cases and 17(13.46%) had wheezing. Three patients were investigated because of positive contact history and had primary pulmonary complex. Table IV shows 58(55.76%) had protein energy malnutrition (PEM), of which 17(21.25%) had Grade I, 13(16.25%) had Grade II PEM, 11(13.75%) had Grade III PEM and 04(5%) had Grade IV PEM according to IAP Classification of Malnutrition. 35 (43.75%) cases had normal nutritional status. 4 cases from Grade IV malnutrition had associated HIV infection. Table V shows 25 cases of PPC had normal nutrition and 04 cases had Grade II malnutrition. -5 cases with normal nutritional status were diagnosed with Tuberculoma. Disseminated and Milliary TB were more in children with Grade III and Grade IV malnutrition (2 cases each in Grade IV). 4 cases of TBM had normal nutrition whereas 3 cases each had grade I and grade III malnutrition. 1 case of abdominal tuberculosis had normal nutrition and 1 case had grade I malnutrition. 2cases of lymphnode tuberculosis with PPC had grade III malnutrition and 3 had normal nutrition.

Table 1: Distribution of patients according to age group.

Age group	No of cases	Percentage
< 1year	13	16.25%
1 to 5 year	32	40%
6 to 10 year	21	26.25%
11 to 12 year	14	17.5%
Total	**80**	**100.00**

Table 2: Distribution of patients according to positive history.

History of contact	No of cases	Percentage
Positive history	16	20%
Negative history	64	80%
Total cases	80	100%

Table 3: Distribution of patients according to clinical presentation.

Clinical Presentation	No of Cases	Percentage
Fever	52	65%
Cough	47	58.75%
Wt.Loss/Poor wt gain	28	35%
Seizures	30	37.5%
Lymphadenopathy	20	25%
Wheeze	17	13.46%
Total	**194***	**100.00**

Table 4: Distribution of patients according to nutritional status.

Nutritional Status	No of cases	Percentage
Normal	35	43.75%
Grade I	17	21.25%
Grade II	13	16.25%
Grade III	11	13.75%
Grade IV	04	5%
Total	**80**	**100.00**

Table 5: Distribution of patients according to nutritional status and type of tuberculosis.

Types of TB	Normal	Grade I	Grade II	Grade III	Grade IV
PPC	25	04	04	01	01
LN	01	01	01	01	00
Diss.TB	-	-	00	00	02
Mill.TB	-	1	1	1	02
TBM	4	3	2	3	01
Tuberculoma	5	4	1	1	-
Abd.TB	01	1	-	-	-
PPC+LN	3	1	1	2	-
Cong.TB	1	-	-	-	-

DISCUSSION

In our study, we studied 80 patients. Table 1 shows distribution of patients according to age group. Majority of the patients belong to 1 to 5 years (40%) followed by 6 to 10 years (26.25%). Patients less than 1 year were 16.25%. Ramachandran *et al.*[13] reported 89.8% below 6 years and 9.12% between 6 – 12 years. Bhakku *et al.*[14] reported 71% under 5 years of age and 22.9% in 5–12 years. Our incidence correlates well with various studies. Udani in his study on 2000 BCG vaccinated children with tuberculosis has observed that 91% has intrathoracic lesions with majority having mediastinal lymph node tuberculosis.[15] Mathur *et al.* in a comparative study between BCG vaccinated and non-vaccinated groups of patients could not find any significant difference in clinical pattern or mortality rate.[8] In our study, positive history was shown by 20% population and 80% showed negative history for tuberculosis (table 2). Table III shows predominant symptoms of presentation are Fever 52(65%) and cough 47 (58.75%). 30(37.5%) had initial presentation as seizures. One third had weight loss or poor weight gain, significant lymphadenopathy was observed in 20 (25%) cases and 17(13.46%) had wheezing. Three patients were investigated because of positive contact history and had primary pulmonary complex. Table IV shows 58(55.76%) had protein energy malnutrition (PEM), of which 17(21.25%) had Grade I, 13(16.25%) had Grade II PEM, 11(13.75%) had Grade III PEM and 04(5%) had Grade IV PEM according to IAP Classification of Malnutrition. 35 (43.75%) cases had normal nutritional status. 4 cases from Grade IV malnutrition had associated HIV infection. Table V shows 25 cases of PPC had normal nutrition and 04 cases

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CONCLUSION

Protective benefit of BCG vaccine against the dissemination of tuberculosis in children in possible only if they have normal nutrition

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