Original Article

Tuberculosis as a Predicator of Childhood Malnutrition in Sindh, Pakistan

TB in Malnurished Children

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ABSTRACT

Objective: To assess the prevalence and identify risk factors associated with Mycobacterium tuberculosis infection in Sindh, Pakistan.

Study Design: Quantitative and cross-sectional study.

Place and Duration of Study: This study was conducted at the Department of Pulmonology, and Department of Biochemistry Ghulam Muhammad Mahar Medical College, Sukkur from January 2016 to May, 2019.

Materials and Methods: Diagnosis of TB was performed by AFB smear and X-ray chest. For the screening of malnutrition, blood sample were collected and Total Protein, Albumin and A/G ratio were analyzed. Body Mass Index (BMI) were estimated by analyzing data from questioners.

Results: Overall 170 children were recruited in this studu, 81 were male and 89 were female. It was estimated that 13% children were infected eithTuberculosis every each year. Malnutrition was highly prevalent in TB infected children.

Conclusion: This seems to be a relationship between malnutrition and an increased risk of TB in children belong to remote areas of Sindh, Pakistan.

Key Words: Mycobacterium Tuberculosis, Malnutrition, Childhood Malnutrition.

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INTRODUCTION

TB is one of the leading infection cause mortality as weigh against to other infections disease of humankind particularly in rustic areas of developing countries[1]. TB is most spreading and has high mortality rate. It is reported that the rate of deaths due to TB is very high in developing countries[2]. As for as Pakistan is concern, it is not probable to present precise data of TB and TB related deaths due to the dearth of disease surveillance[3]. Tuberculosis (TB) remains a significant source of morbidity and mortality amid children in resource-Limited areas. It was estimated in a study that 11% children are infected with TB among new TB infections each year. Malnutrition is also highly prevalent in children belong to tuberculosis endemic countries and contributes to 2.2 million deaths in children under 5 years of age words wide[4]. There is multiple reasons contributed both malnutrition and poor TB control like poverty, overcrowding, food insecurity and human in immunodeficiency[5].

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Although the World Health Organization (WHO) states that malnutrition is a significant risk factor for childhood tuberculosis, there are limited studies to explain the mechanisms underlying this association[6]. This may be due to the challenges in diagnosing pediatric tuberculosis, difficulty in establishing a causal role of malnutrition on tuberculosis, and an overall low research priority because of the limited infectivity of children[7]. We will review 4 lines of support that serve as the foundation of our understanding of the interaction between pediatric tuberculosis and nutritional status, namely, (1) gene polymorphisms involving vitamin metabolism to danger of tuberculosis, (2) studies investigating immune development amid malnourished children, (3) links between malnutrition and respiratory tract infections in children, and (4) associations among nutritional status and tuberculosis in both animal model and children[8,9]. Taken jointly, the proof suggests that malnutrition affects genetic expression and immune function that predisposes children to tuberculosis progression, and the resulting disease and inflammatory response further worsens the nutritional state[10]. Because of this devastating cycle, understanding the mechanisms that contribute to this precise interaction in children is necessary to addressing both epidemics and ascertaining whether nutritional interventions. Eventually, we want to recognize if nutritional supplementation can recover immune function and clinical outcomes in tuberculosis[11]. Early ecological studies found that during times of food restriction, such as war, tuberculosis morbidity rose significantly and then sharply declined after food supplies returned[12].

However, clinical trials face large challenges, because tuberculosis therapy will cause a rapid drop in bacillary load and improve nutritional status. Consequently, this can overshadow any modest change after supplementation[13]. One promising randomized trial among adults with tuberculosis in Indonesia found that supplementation of zinc and vitamin A resulted in faster sputum conversion time and resolution of lung lesions on chest X-ray[13,14]. However, more recently, the same group was unable to repeat the results in a more malnourished population with a combined or individual addition of vitamin A and zinc. The few trials on nutritional supplementation for pediatric tuberculosis do not suggest a significant benefit[15]. A study in Brazil showed that zinc supplementation at the time of purified protein derivative (PPD) placement in malnourished children increased the size of induration, suggesting an improvement in cell-mediated immunity[16]. However, an in-vitro study found that in HIV-positive patients, zinc was unable to improve IFN-γ response or increase lymphocyte levels after PPD stimulation[16,17]. Clinical trials have shown mixed results. Hanekom et al evaluated the response to vitamin A supplementation in 85 South African children at baseline, 6 weeks, and 3 months after initiation of tuberculosis therapy. Supplementation was not associated with a significant improvement in outcomes, including weight change or improvement in respiratory symptoms[18]. Morcos et al conducted a small trial on vitamin D supplementation among children ages 1.5–13 years old and noted clinical and radiographic improvement in the supplementation group but did not demonstrate differences in vitamin D levels or weight gain at the end of therapy[19]. The most comprehensive trial was conducted recently by Mehta et al among 255 children from Tanzania 6 weeks to 5 years of age with active tuberculosis. The children were randomized to receive a daily multivitamin or placebo for 8 weeks after initiation of therapy. Overall, there was no difference in weight after 8 weeks, and there was also no effect in terms of CD4, CD8, and CD3 T-cell subsets[20,21].

MATERIALS AND METHODS

This study was conducted at department of Pulmonology, department of Biochemistry Ghulam Muhammad Mahar Medical College, Sukkur and department of Biochemistry, CMC Larkana covering the period from January, 2016 to May, 2019.The patients were included in present study after gave their consent for the analysis of TB and Malnutrition. All children were recruited from OPD of pulmonary diseases of GMMMC teaching hospital, Sukkur. All individual data, such as age, sex, socioeconomic surroundings, schooling Level, occupation, and history of any surgery or blood transfusion were collected. The TB has been diagnosed by using AFB Sputum smear and by FNAC/biopsy in patient expected with extra pulmonary tuberculosis (EPTB). For screening of malnutrition, blood sample were collected and Total Protein, Albumin and A/G ratio were analyzed. Body Mass Index (BMI) was estimated by analyzing data from questioners..

RESULTS

Total 170 patients with Tuberculosis infection were recruited in present study, of the 170 patients 81 were males and 89 were females.. The most commonly affected age group was 3 - 8 years..

Table No.1: Tuberculosis detected in children (n = 170)

Male	89 (52.3%)
Female	81(47.7%)
Total TB positive	70

n = Total number of TB patien

Table No.2: Clinical presentation of the TB infected patients

Clinical presentation of the co-infected patients	
Symptoms	Percentage
Cough	90
Fever	78
Loss of appetite	76
Weight los	76
Dyspnea	44
Hemoptysis	14
Chest pain	10

Table No.3: Comparison of risk factor of Malnutrition in children with TB infection.

Risk factors of Malnutrition	**Degree**	**Percentage%**	**p-value**
BMI	High	13%	< 0.04
	Low	69%	< 0.01
Hb%	High	06%	< 0.05
	Low	79%	< 0.01
Total Protein	High	09%	< 0.02
	Low	71%	< 0.03
Albumin	High	11%	< 0.04
	Low	74%	< 0.04
A/G ratio	High	10%	< 0.04
	Low	71%	< 0.02

DISCUSSION

In present study, we observed that 13% children were infected with TB with low BMI and with low nutrition markers in Sindh, Pakistan which was significantly alarming. TB remains a significant source of morbidity and mortality among children in resource-limited settings. It is reported that of the 9 million new TB infections each year, 11% are in children[12]. Other similar study in Bangladesh reported that malnutrition is also highly prevalent in children living in tuberculosis endemic countries and contributes to 2.0 million deaths in children fewer than 5 years of age. In

this study, we analyzed that 70% children were malnourished shown infected with TB[12, 13].

A similar study was conducted in India in 2000 shown low prevalence than presented HIV-TB co-infection study[17]. It had shown 10.91% prevalence which is lower than this study[18]. Another study of India from 1996 to 2001 shown the prevalence in Alighar a states of India has 0.8% to 2.8% prevalence. In this study it was observed that in Sindh[14, 15], Pakistan there is a higher HIV-TB co-infection in Males than Females. HIV-TB co-Infection ratio has also reported in other part of the world[16]. Apart from for a few countries in Africa, the occurrence of co-infection has been reported to be elevated among males than females. But almost all other countries, there is title dissimilarity in the sexual category proportion[17]. In many studies that gave been conducted in different parts of Hindustan have indicated considerably elevated HIV-TB co-infection in Males than in Females patients[18]. The findings of the present study align with that pattern of India and of few countries in Africa. Moreover, in this present study, we observed that the age group which more frequently infected with HIV- TB co-infection is between 33-48 year in both males and females[19, 20]. It is also align with other studies of world and in particularly to India. Almost all the patient was infected with HIV- TB co-infection were belonging to low socio-economic background[21, 22]. The present study indicates that there is need to imperceptible change in society to improve the Health of people, particularly remote area of the countries. There are needs in public awareness and better treatment regimes[23, 24].

CONCLUSION

The prevalence of HIV-TB co-infection was 13.9%. Consequently, all TB patients should be assessed for HIV risk factors and counseled to undergo HIV testing. Males patients are more often infected with HIV-TB co-infection than females. Ages from 33 years to 48 years are more often infected with TB and also have co-infection with HIV. Results of this study are alarming and needs betterment in public awareness and treatment regimes..

Author's Contribution:

Concept & Design of Study:	Shafi MuhammaKhuwar
Drafting:	Arshad Hussain Laghari
Data Analysis:	Ghulam Sarwar Shaikh
Revisiting Critically:	Shafi Muhmmad Khuwar Arshad Hussain Laghari
Final Approval of version:	Shafi Muhammad Khuwar

Conflict of Interest: The study has no conflict of interest to declare by any author.

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