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Research Article

CO-EXISTENCE OF INTESTINAL PARASITES AND PULMONARY TUBERCULOSIS FROM TERTIARY CARE REFERRAL CENTER

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The study was aimed to find out co-existence of parasitic and Mycobacterium tuberculosis amongst the Tuberculosis cases.

A B S T R A C T

Objectives: Parasitic infections are common in tuberculosis endemic areas. The co-infection of intestinal parasites indicates increase morbidity of tuberculosis patients, emphasizing on the importance of stool examination and treatment of parasitic infection in such cases. The study was aimed to find out co-existence of parasitic and Mycobacterium tuberculosis amongst the Tuberculosis cases.

Methods: All the patients were taken from NITRD indoor ,outdoor and casuality department during May 2016 April 2017 with diagnosis of Pulmonary tuberculosis and non tubercular patients. All the enrolled patients were examined clinically and were investigated for pulmonary tuberculosis and parasitic infections in laboratory. Laboratory investigation comprise of Ziehl Neelsen sputum smear examination and stool examination from freshly passed stool sample by direct normal saline preparation, iodine preparation and formal ether concentration.

Results: During the study 187 cases were in each group i.e pulmonary tuberculosis and non tubercular patients group. In smear positive TB patients out of 187 patients 53(28.34%) were positive for intestinal parasite with predominance of E. histolytica (19.79%) followed by Giardia (6.42%); while in non TB patients 40(21.39%) were positive for intestinal parasites, among them 30(16.04%) were Entamoeba. histolytica and 7(3.74%) Giardia lamblia. It suggests that intestinal infestations are more common in sputum positive pulmonary tuberculosis patients than in non TB patients which is statistically significant ($p<0.05$) also.

Conclusions: The study concluded that intestinal infections co-exist with tuberculosis and more common in sputum positive pulmonary tuberculosis patients than in non tuberculosis patients.

INTRODUCTION

Intestinal parasitic infections are ubiquitously distributed globally. Infection attributed to parasites varies mild asymptomatic infection to severe chronic debility. These are linked to divergent groups of patients, especially in poor economies. These infections are important cause of morbidity, affecting a large proportion of human populations living in tropical and subtropical regions (1).

It is known that tuberculosis is caused by single infectious agent and has been reported that Tuberculosis (TB) remains the leading cause of morbidity and mortality due to any one infectious agent worldwide.

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Simultaneously the host susceptibility to Mycobacterial tuberculosis organism and subsequently TB infection and the clinical course of the infection depend on a complex , interplay between host, bacterial as well as environmental factors, such as poverty, malnutrition ,overcrowding, and exposure to other pathogens(2). Tuberculosis (TB) remains the leading cause of morbidity and mortality due to any one infectious agent worldwide. It has also been estimated that approximately 1·2 billion people harbor at least one species of intestinal parasite worldwide. In fact, 50–100 million people are infected with Strongyloides stercoralis, with a high prevalence in tropical regions of Africa, Asia and South America, particularly in Brazil (3,4,5).

It has been suggested that parasitic infections in humans are associated with a significant hyperactive humoral immunity and a depressed cellular immune response. Ultimately, this

immunological dysregulation may facilitate concomitant infection or increase pathogenicity of other microbes; however, this is not fully understood. Co-infection with Mycobacterium tuberculosis (MTB) is common in the developing world; however, whether parasitic infection worsens immune responses to TB is unclear, as evidenced by recent studies (6,7,8,9).

Study showed that 20-- 30% of TB patients are linked with the intestinal parasitic infection. The burden of tuberculosis is very high in India. Parasitic infections are also common in TB infections endemic areas which add to high burden of TB. The high prevalence of intestinal parasites indicates increase in morbidity of TB patients, emphasizing on the importance of continued stool analysis and treatment (10,11,12,13). The type of intestinal parasitic infection in tuberculosis patients during active disease is not known. A study was planned to study pattern of intestinal infestation in smear positive TB cases.

MATERIALS AND METHODS

The study was undertaken at National Institute of Tuberculosis & Respiratory Diseases after obtaining approval from research committee and Ethical Review Board which is headed by civic society personal (NGO head), external Tb experts, advocate, social worker and institute Tb experts. Study population comprises of pulmonary tuberculosis cases(sputum AFB smear or sputum AFB culture positive patients) came to OPD and those admitted in institute. Also patients suffering from non tubercular pulmonary diseases such as COPD, asthma, bronchiectasis, lung cancer, interstitial lung disease etc. attended OPD or admitted in wards were included as non tubercular population and at least two sputum examinations done to rule out possibility of pulmonary tuberculosis. The study group consists of patients who fulfilled the following criteria; Age >14yrs, Sputum positive pulmonary tuberculosis, Non tubercular pulmonary cases (COPD, asthma, bronchiectasis, lung cancer and ILD (14). Patients who are not willing to participate in the study and patients with severe illness (e.g patients on mechanical ventilator were excluded from study. All the patients were taken from out patient department (OPD) or admitted patients from emergency and Wards of NITRD, with suspected or diagnosed Pulmonary Tuberculosis.

Thorough assessment of medical history (including any comorbidities if present, clinical examination (general and local Examination) were done by treating physician. Sputum and stool and blood samples were send to the laboratory for examination. Sputum samples were stained with Ziehl-Neelsen stain and dried slides examined by microbiologist. Stool samples were examined by standard procedure i.e normal saline preparation iodine preparation and by formal ether concentration technique. (15,16,17). Above all the enrolled subjects were also assessed for risk factors for co-infection of pulmonary tuberculosis and intestinal parasites. Demographic factor- age, sex, BMI, socioeconomic status, associated co-morbidity- diabetes, smoking and new Vs retreatment cases were recorded in pre formed patients Performa.

Data were analyzed by using simple statistical formulae mean and median data and p-value of , 0.05 was considered as statistically significant. Significance of test was done with Mann Whitney and Wilcoxon tests for continuous data and Fisher's exact test for discrete variables.

RESULTS

A total of 374 patients from 2 groups were enrolled during the study. In 1st group; patient's sputum smear were positive for acid fast bacilli i.e Tb patients and in 2nd group patient's sputum were negative for acid fast bacilli i.e non Tb lung diseases control group. In each group 187 patients were enrolled. All patients in both the groups were negative for HIV infection. Mean age of sputum positive patients was 37.11 % (SD= ± 14.84) years where as in sputum negative group it was 42.26 ((SD= ± 15.48) years. Sex distribution showed 144 (77.01%) were male and 43(22.99%) females in sputum positive and 147 (78.61%) were male and 40 (21.39%) were female in sputum negative group. Demographic profile of patients showed mean basal metabolic index (BMI) 16.81 (SD± 1.24) and 18.45 (SD± 2.39) in smear positive and smear negative groups of patients respectively. Out of 93 patients who were positive intestinal parasite 62 (66.67%) were undernourished and mostly they were from the smear positive group of patients and 31 (33.33%) were having normal BMI while in 281 patients negative for intestinal parasite 200 (67.17%) were undernourished and 81 (28.33%) had normal BMI ($P \leq 0.05$). According to Kuppuswamy scale of socioeconomic classification, 262(70.05%) patients belonged to Lower class (lower & Upper lower), 89 (23.80%) patients were belonged to middle class (lower middle), 17 (4.55%) to Upper middle class, 6(1.60%) belonged to upper class. In sputum positive patients 131(70.05%) belong to lower class and in sputum negative patients 131(70.05) belonged to lower class (table -1). Among 93 patients who were positive for intestinal infections 65(69.89%) belong to lower class while in patients negative for intestinal infections total 281 patients 197(70.11%) belong to lower class (Table-1).

Risk factors for co- infection observed were diabetes mellitus (10.16%), anemia (65.59%), past history of anti tuberculous treatment (48.3%), leucocytosis (27.93%) and absolute eosinophil count (22.53%; AEC >300 cells/mm) and diabetes mellitus (11.87%). (Table-2).

The number/percentage of intestinal parasite identified with risk factor was more in comparision to tuberculosis without risk factor. Among 93 patients who were positive for intestinal infection 82/93 (88.17%) were diabetic while in non diabetic patients it was 11/93 (11.83%) ($p \leq 0.05$). In sputum positive patients total 53/187 (28.34%) were positive for intestinal parasitic infection The intestinal parasites observed were cyst of Entamoeba histolytica; 37(19.79%) Giardia lambia; 12 (6.42%), Hymenolepis nana; 2 (1.07%) Iodoameoba. butshlii;(0.53%), only 1(0.53%) patient was positive for both Entamoeba. hystolytica and Giardia lambia. In non TB patients total 40 (21.39%) patients were positive for intestinal parasitic infestation. Among them E. histolytica; 30(16.04%), Giardia lamblia; 7(3.74%), H. nana in 2 (1.07%) patients, Iodoamoeba. butshlii in 1 (0.53%) (Table-3).. Risk factors for tuberculosis and parasitic co- infection were found to be, anemia (65.59%), past history of anti tuberculous treatment (48.3%), leucocytosis (27.93%) and absolute eosinophil count (22.53%;

AEC >300 cells/mm) and diabetes mellitus (11.87%) (Table-3).

Table 1 Demographic profile of study population:

S.No	Demographic profile		ZN smear	
			Positive (N=187)	Negative (N=187)
1.	Age	Mean ± St dev	42.26 ± 15.48	37.11 ± 14.84
2.	Sex			
		Female	40 (21.39%)	43 (22.99%)
		Male	147 (78.61%)	144 (77.01%)
3.	Body mass index	Mean ± St dev	18.45 ± 2.39	16.81 ± 1.24
4	Kuppuswamy scale			
	Upper	3 (1.60%)	3 (1.60%)	6 (1.60%)
	Upper middle	8 (4.28%)	9 (4.81%)	17 (4.55%)
	Middle/Lower	45 (24.06%)	44 (23.53%)	89 (23.80%)
	Lower/upper	131 (70.05%)	131 (70.05%)	262 (70.05%)

Table 2 Risk factors for development of co- infection ; TB and intestinal parasites

S.No	Risk factors	ZN smear		
		Positive (N=187)	Negative (N=187)	Total
1.	Diabetes mellitus			
	Diabetic	19 (10.16%)	20 (10.70%)	39 (10.43%)
	Non diabetic	168 (89.84%)	167 (89.30%)	335 (89.57%)
2	H/O of ATT			
	Absent	138 (73.80%)	66 (35.29%)	294 (54.55%)
	Present	49 (26.20%	121 (64.71%)	170 (45.45%)
3.	Anemia			
	Present	98 (52.41%)	39 (20.86%)	137 (36.63%)
	Absent	89 (47.59%)	148 (79.14%)	237 (63.37%)
4.	Total leukocyte count			
	>12000	53 (28.34%)	49 (26.20%)	102 (27.27%)
	0-4000	2 (1.07%)	5 (2.67%)	7 (1.87%)
	4000-12000	132(70.59%)	133(71.12%)	265(70.86%)
5.	Absolute eosinphil count			
	<300	161 (86.10%)	164 (87.70%)	325 (86.90%)
	>300	26 (13.90%)	23 (12.30%)	49 (13.10%)

Table 3 Association of risk factor and intestinal parasitic infection in TB patients and control group

S.No	Parasitic species	Groups		
		ZN Smear Positive (N=187)	ZN Smear Negative (N=187)	Total
1.	Protozoan Cysts			
2	E.hystolytica	37 (19.79%)	30 (16.04%)	67 (17.91%)
3	Giardia lamblia	12 (6.42%)	7 (3.74%)	19 (5.08%)
4	Hymenolopis nana	2 (1.07%)	2 (1.07%)	4 (1.07%)
5	Iodaoemba butchilli	1 (0.53%)	1 (0.53%)	2 (0.53%)
6	E.hystolytica + Giardia	1 (0.53%)	0 (0.00%)	1 (0.27%)
7	Negative	134 (71.66%)	147 (78.61%)	281 (75.13%)
	Total	187 (100.00%)	187 (100.00%)	374

DISCUSSION

Of the total 374 study participants integrated in the two groups, 25 % were positive for intestinal parasites. This study is in support of other studies high association of parasitic infection in TB patients were reported (18,19). In this study, equal number of cases were enrolled each group smear positive TB group (50%) and control groups(50%). Study conducted by Abate *et al* showed out of total of 295 study participants 112 (37.96%) were TB patients and 183 (62%) were control group. Abate *et al* in his study identified 29% intestinal parasites amongst the TB patients and 19% from the control group. Abate *et al* Ascaris lumbricoides (38%) was the most common intestinal parasite followed by ancyostoma duodenae (25%), Shistosoma mansoni (19%), Trichurs trichuira (25%) and Strongyloide stercoralis (9%%). Two species Hymenolopis nana and Taenia spps were identified in control group only. Were as in our study Entamoeba histolytica (20%) was identified as the commonest parasites in TB group of patients followed by Giardia lamblia (6%), Iodameoba butchilli (0.5%). This variation is evident as of different geographical location and the existence of prevalent parasite in the area. In our study protozoan cysts were identified possibly because of poor socioeconomic condition of TB patients and living in overcrowded area of suburb of the city where water supply is scarce and population are at risk of getting infection from contaminated water and food (20). Resende Co *et al* found 27 % TB patients enrolled for the study were co-infected with at least one intestinal helminth and in contrast to our study S. stercoralis (72.7%%) was the most common parasite identified during the study (21). Brown *et al* in his study study showed a total 54% of the smear positive TB patients were infested with parasitic infection. The parasites identified were, Strongyloides mansoni, Ankylostoma duodenale, Strongyloides. Stercoralis and Mansonella perstans being the principal species in his cohort (22). Parasites identified in these studies were different from our study and it is due to local dietary habits and geographical variation and health and hygiene practices.

Many studies have indicated that TB and parasitic co-infection are associated with reduction in circulating CD4 and CD8 T cells decrease in lymphocyte and increase eosiniphil count in blood. In contrast to this in our study increase number of lymphocyte and easinophil cells per millimeter were reported in TB parasitic co-infection (21,23) .

The study highlighting the urgent need for commitment and implementation of providing clean environment, potable drinking water facilities and providing preventive health packages and health check up facilities in suburb of big cities. The study also highlight that TB patients who are at risk of developing parasitic co-infection toilet facilities and councel for prohibiting in open defecation. Though the government of India under the swatch bharat abhiyan, constructing toilets at all the rural areas and remote villages but at the same time attention are also required poor populated area of big cities.

Currently there is no guidelines for routine screening for parasitic infection in the affected areas and TB patients are rarely been looked for parasitic infection. In this study TB patients were screened for parasitic infestation and were treated with anti parasitic medicines. Same observation has been noticed in the study from Ethopia, Brazil and Uganda where TB and parasitic co-infection were reported but routine screening of stool examination are not in place. The major

concern of this study is to provide preventive health packages including development of toilets and improving hygienic practice at family level which may have direct impact in reducing the occurrence of TB – parasitic coinfection.The study also highlighting the need of the hour for increasing awareness and improving hygienic practice which will help in an actual decrease in the magnitude of intestinal parasites in the area.

SUMMARY AND CONCLUSION

In this study a high burden of intestinal parasites was observed among TB patient and parasitic infection correlated to increased eosinophil count and serum IgE levels indicating an effect on host immunity. We have also observed that a rapid decline in the rate of worm infection when patient were put on anti-helminthic treatment, after 2 weeks of TB treatment. Timely diagnosis and treatment of intestinal helminths may be important for a successful response to anti-TB treatment. This may be critical to the success of the global effort to control TB.

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