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Original Article

Nutritional Status of Pulmonary Tuberculosis Patients Admitted at Selected Treatment Facilities in Bangladesh

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Abstract

Background: Every year more than 13.7 million people became an active case of tuberculosis and more than 1.5million cases of TB patients will die. The association between TB and malnutrition is bi-directional. TB leads patient to malnutrition and malnutrition increases the risk of developing active TB by 6-10 times. Therefore, improving the nutrition of individual greatly reduces tuberculosis.

Objectives: This study aims to evaluate and follow-up of the nutritional status of pulmonary TB patients based on BMI, laboratory test (CRP), CXR and clinical examination in some selected treatment facilities in addition to age & gender distribution of the respondents.

Method: This prospective follow-up study was carried out during the period from 1st January to 31st December 2010, in the Department of Biochemistry, Sylhet M.A.G Osmani Medical College, and DOT centre, Sylhet M.A.G Osmani Medical College Hospital, Sylhet. A total of 76 subjects, both male & female having 15 and 60 years of age was included in the study. Out of them 46 were smear positive newly diagnosed pulmonary tuberculosis patient (cases) and 30 were age-matched healthy subjects (control).

Results: During the study, both patients were presented with weight loss followed by 95.7 percent had cough, fever had 84.8 percent cases, 34.8 percent had haemoptysis, 50 percent had chest pain. Mean (± SD) serum CRP amount (mg/l) is 79.59 (± 22.71) and 7.5 (± 1.68) in cases and controls respectively at the time of diagnosis. An unpaired t-test was performed to compare serum level of C-reactive protein between cases and controls. Serum CRP level was slightly higher in cases than controls ($p < 0.001$). 71.7 percent cases had unilateral opacities; 28.3 percent had bilateral opacities. 13 percent had cavity on chest radiograph. Lower levels of TC, TG, LDLC and HDLC were observed in this study.

Conclusion: In patients with pulmonary tuberculosis, the results of this research indicate lower nutritional profile values. This could be linked to high frequency radicals, oxidative stress and lipid peroxidation. Improved diet and dietary supplements will avoid oxidative stress and further risks in the treatment of pulmonary tuberculosis.

Keywords: Pulmonary Tuberculosis, mycobacterium tuberculosis, clinical status.

Introduction

Tuberculosis is one of the major prevailing diseases worldwide. The disorder is affected by economic and diet conditions while education, immunity and hormone status is associated with its prevalence.[1] The most frequent economic and nutritional forces in the developed world. The most common cause agent of Mycobacterium tuberculosis while Mycobacterium bovis, which affects animals, can also be seen in human beings.[2-3] It is normally a pulmonary disease (pulmonary tuberculosis) which causes a local infection after inhalation.[4-5]

The additional pulmonary area includes the lymph nodes, bone and joints, the subsurface area, the meninges, the scalp, the reindeer and even the gastrointestinal tract.[5] After getting Mycobacterium tuberculosis from an infected mother to an infected fetus, congenital tuberculosis could be present.[6] The Mycobacteria allow the invaded macrophages to free radical use.[7-8] The elevated levels of serum in these free radicals are characterized by the high lipid peroxidation products of the advanced tuberculosis patient.[9] In this study main goal is to evaluate the nutritional status of pulmonary tuberculosis patients in Bangladesh..

Objectives

- To evaluate and follow-up of the nutritional status of pulmonary TB patients

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- To estimate BMI, blood test for CRP, sputum for AFB and radiological CXR test
- To examine TB cases for clinical findings of study patients, and
- To determine age and gender distribution of the respondents as well

Material and Methods

This prospective follow-up study among tuberculosis patients was conducted during the period from 1st January to 31st December 2010, in the Department of Biochemistry, Sylhet M.A.G Osmani Medical College, and DOT centre, Sylhet M.A.G Osmani Medical College Hospital, Sylhet. A total of 76 subjects both male & female having age between 15 to 60 years were included in the study. Out of them 46 were smear positive newly diagnosed pulmonary tuberculosis patient (cases) and 30 were age-matched healthy subjects (control). However, the comparison of control was only for age distribution, blood test CRP, lipid profile & with CXR and CRP in particular. Cases were selected purposively from DOT center of Sylhet MAG Osmani Medical College Hospital after diagnosed as new smear positive pulmonary tuberculosis patients & controls were selected from healthy volunteers. Sputum smear negative pulmonary tuberculosis patient or patients having history of taking anti-TB drugs or patients of pulmonary TB with associated connective tissue disorders were excluded from the study.

Detailed history was taken through a pretested questionnaire, clinical examination and laboratory data were recorded with the help of a check list. Then blood sample was collected from all the subjects after informed written consent. Blood samples were tested for Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP). After two months of starting anti-tubercular therapy when patient came for follow up again laboratory data were recorded and blood sample was collected for ESR and C-reactive protein. CRP was also evaluated only once, in the group of healthy control. Serum C-reactive protein (CRP) concentration was measured by immunonephelometric method & Erythrocyte sedimentation rate (ESR) was determined in Westergren's method. As a comparative index of response to treatment sputum microscopy for AFB were tested on two occasions- before starting and after two months of treatment. Reporting of sputum smear:

- 1-9 AFB per 100 oil immersion fields: To mention the exact number (Scanty)
- 10 -100 AFB per 100 oil immersion fields: 1+
- 1-10 AFB per oil immersion fields: 2+
- >10 AFB per oil immersion fields: 3+

Then all data were analyzed with the help of SPSS for windows version 15, using the relevant tests of significance such as student 't'-test, Pearson correlation analysis was done to elucidate association between variables. P value < 0.05 was taken as level of significance.

Results

After analysis result was presented as follows:

Table 1: Distribution of the respondents according to age

Groups	Mean ±SD Age (years)	Age range (Years)	t-value	p-value
Case (n=46)	33.41±11.1	16-55	0.447	<0.657
Control (n=30)	34.57±10.92	18-55		

Table 1 shows age distribution of the patients where, mean ± SD age of the cases was 33.41 ± 11.1 years with a range of 16-55 years. Mean ± SD age of the controls was 34.57 ± 10.92 years with a range of 18-55 years.

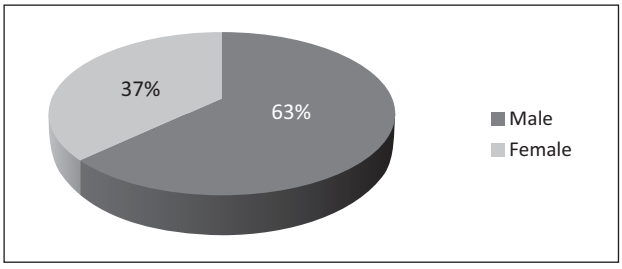

Figure 1: Distribution of the respondents according to sex (n= 76)

Figure 1 shows that majorities (63.0%) of the respondents were male and rest (37.0%) were female.

Table 2: Distribution of the respondents according to clinical presentation (n= 46 *)

Clinical presentation	Percentage
Weight loss	100
Cough	95.7
Fever	84.8
Haemoptysis	34.8
Chest Pain	50.0

* Multiple responses

Table-2 shows clinical presentation of the patients where all patients were presented with weight loss followed by 95.7% had cough, 84.8% had fever, 34.8% had haemoptysis, and 50.0% had chest pain.

Table 3: Distribution of the respondents according to serum C-reactive protein (CRP) level

Groups	Mmean(± SD) CRP level (mg/l)	t-value	p-value
Case (n=46)	79.6 ± 22.7	0.2144	<0.001
Control (n=30)	7.5 ± 1.7		

Table 3 shows that mean (±SD) serum CRP level (mg/l) were 79.6 (±22.7) and 7.5 (±1.7) in cases and controls respectively at the time of diagnosis. An unpaired t-test was conducted to compare serum level of C-reactive protein between cases and controls which shows significant difference between them ($p < 0.001$).

Table 4: Comparison of CRP in cases based on CXR findings

X-ray chest (CXR) findings	Percentage	Mean ± SD serum CRP level (mg/I)	t-value	p-value
Opacities				
Unilateral	71.7	72.54±20.46	3.8	<0.001
Bilateral	28.3	97.46±18.28		
Cavity				
Present	13.04	123±15.92	7.49	<0.001
Absent	86.96	73.07±15.13		

Table 4 shows comparison of CRP in cases based on CXR findings where 71.7% cases had unilateral opacities, 28.3% had bilateral opacities which were statistically significant ($p < 0.001$). On the other hand 13.04% had cavity on chest radiograph and 86.96% had no cavity which was also significant ($p<0.001$)

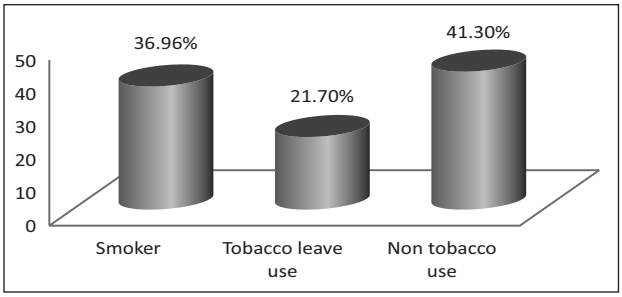

Figure 2: Distribution of the respondents according to Tobacco use status (n=76)

Figure 2 shows tobacco use status of the patients where 36.96% were smoker, 21.74% were tobacco leave user and 41.30% were non tobacco user.

Table 5: Comparison of weight and BMI of the cases at diagnosis and after two months of starting anti-TB treatment

Parameter	At diagnosis	At two months of starting anti-TB treatment	t-value	p-value
Weight (In Kg)	41.76(±5.53)	43.02(±5.48)	13.96	<0.001
BMI (Kg/m^2)	17.08(±1.87)	17.56(±1.88)	9.11	<0.001

Table 5 shows comparison of mean (±SD) body weight in Kg and BMI in Kg/m^2 of cases at diagnosis and at two months of anti-TB therapy were 41.76(±5.53) & 17.08(±1.87) and 43.02(±5.48) & 17.56(±1.88) respectively.

Table 6a: Paired samples t-test of different variables.

Pair	Variables	Paired Differences					t value	p value
		Mean	SD	SEM	95% CI			
					Lower	Upper		
Pair 1	Weight-Weight	-1.30	0.60	0.09	-1.49	-1.10	-13.53	<0.001
Pair 2	ESR at diagnosis- at 2 months	51.85	13.88	2.19	47.41	56.29	23.62	<0.001
Pair 3	CRP At diagnosis- at 2 months	68.00	21.08	3.33	61.25	74.74	20.39	<0.001
Pair 4	Total Protein at diagnosis- at 2 months	-1.06	0.82	0.13	-1.33	-0.80	-8.17	<0.001
Pair 5	Alb1-Alb2	-0.89	1.16	0.18	-1.27	-0.52	-4.85	<0.001
Pair 6	TG1-TG2	-24.05	23.84	3.76	-31.67	-16.42	-6.38	<0.001
Pair 7	Tc1 -Tc2	-38.70	24.79	3.92	-46.63	-30.77	-9.87	<0.001
Pair 8	HDL1-HDL2	-6.68	5.29	0.83	-8.37	-4.98	-7.98	<0.001
Pair 9	LDL1-LDL2	-27.20	20.01	3.16	-33.60	-20.80	-8.59	<0.001
SEM= Standard Error of Mean								

Table 6b: Paired samples correlations

Pair	Variables	N	Correlation	p value
Pair 1	Weight & Weight	40	0.99	<0.001
Pair 2	ESR at diagnosis & at 2 months	40	0.74	<0.001
Pair 3	CRP at diagnosis & at 2 months	40	0.50	<0.001
Pair 4	Total Protein at diagnosis & at 2 months	40	0.77	<0.001
Pair 5	Alb1 & Alb2	40	0.43	<0.001
Pair 6	TG1 & TG2	40	0.59	<0.001
Pair 7	TC1 & TC2	40	0.68	<0.001
Pair 8	HDL1 & HDL2	40	0.68	<0.001
Pair 9	LDL1 & LDL2	40	0.71	<0.001

Table 6c: Paired Samples Statistics

Pair	Variables	Mean	N	SD	SEM
Pair 1	Weight	41.08	40	5.60	0.88
	Weight	42.37	40	5.56	0.87
Pair 2	ESR at diagnosis &	100.6	40	20.06	3.17
	At 2 months	48.83	40	11.03	1.74
Pair 3	CRP at diagnosis	80.02	40	23.68	3.74
	At 2 months	12.02	40	6.76	1.06
Pair 4	Total Protein at diagnosis	6.41	40	1.15	0.18
	At 2 months	7.48	40	1.26	0.19
Pair 5	Alb1	3.72	40	1.08	0.17
	Alb2	4.61	40	1.11	0.17
Pair 6	TG1	125.4	40	22.17	3.50
	TG2	149.4	40	28.89	4.56
Pair 7	TC1	144.4	40	29.14	4.60
	TC2	183.1	40	32.66	5.16
Pair 8	HDL1	31.78	40	6.41	1.01
	HDL2	38.47	40	6.86	1.08
Pair 9	LDL1	87.61	40	23.17	3.66
	LDL2	114.82	40	28.27	4.47

Table 6a, 6b, 6c shows correlation between variables.

Discussion

In one study reported that, the patients presented with abdominal pain and distension were 22.5% and 17.5% respectively. These were the patients of abdominal tuberculosis, which was 35% in this study.[7] It is similar to data of Medical Research Council. Surveyed in 1983 for Indian subcontinent (ISC) ethnic group in which lymph node tuberculosis was 52% followed by abdominal tuberculosis (14%).[8] whereas in our study all patients were presented with weight loss followed by 95.7% had cough, fever had 84.8% cases, 34.8% had haemoptysis, 50% had chest pain. During the study, mean (± SD) serum CRP level (mg/l) were 79.59 (± 22.71) and 7.5(±1.68) in cases and controls respectively at the time of diagnosis. An unpaired t-test was conducted to compare serum level of C-reactive protein between cases and controls. Serum CRP level was significantly higher in cases than controls (p <0.001) which was supported by several study.[9-10] This study has found lower levels of TC, TG, LDLC and HDLC.In both of the patient's types of pulmonary tuberculosis, two studies found elevated levels of lipid peroxidation, independent of treatment circumstances, and this may have triggered a drop-in serum lipid concentration as seen in this studies.[11-12] Total cholesterol in tuberculosis patients was shown to be slightly lower in comparison to the pulmonary controls without tuberculosis. The chief constituent of the cell membranes are triglycerides and LDL cholesterol, while HDL cholesterol safeguards the arterial walls of the circulatory blood system. A factor in their predisposition to damage to the cell and tissue, cardiac complications or low cell immunity may be lower lipid levels seen in these cases. In this analysis, lower concentrations of total cholesterol, HDLC, LDLC and TG could be attributed to impaired development rates of lipid and an increased tuberculosis risk of lipid catabolic.

Conclusion

In patients with pulmonary tuberculosis, the results of this research indicate lower nutritional profile values. This could be linked to high frequency radicals, oxidative stress and lipid per oxidation. Improved diet and dietary supplements will avoid oxidative stress and further risks in the treatment of pulmonary tuberculosis.

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