Original article:

Role of Serum Albumin in Monitoring Nutritional status in Patients with Pulmonary Tuberculosis and its Association with Sputum Conversion

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ABSTRACT:

Background: India has the highest number of TB cases in the world and it is second leading cause of death among all diseases. Study of Serum Albumin in patient with pulmonary tuberculosis will provide the information required to develop interventional strategies.

Objectives: To determine the role of serum albumin as biochemical marker for monitoring the nutritional status in newly diagnosed smear positivepulmonary tuberculosis patients during treatment

Method: Data were collected prospectively from 185 adults of >18 yrs aged, indoor patients of active Pulmonary tuberculosis in PBM Hospital, Bikaner, Rajasthan from Jan. 2019 to Dec 2019. All enrolled cases of active pulmonary tuberculosis were screened by Consecutive sampling after obtaining informed written consent.

Results: After 6 month of treatment, patients had gained weight though it was statistically significant. On Day 1, patient mean weight was 44.09±7.42 kgs and after 6 months of treatment 51.21± 6.87 kgs.

Conclusion: Majority of active pulmonary tuberculosis cases were associated with progressive nutritional recovery of BMI status and serum albumin. Their early and right intervention at right time will lessen the impact of tuberculosis.

Key Words: Serum Albumin, Active Pulmonary Tuberculosis, BMI

INTRODUCTION

India has the highest number of TB cases in the world and it is second leading cause of death among all diseases. Malnutrition may predispose people to development of disease and tuberculosis can contribute to malnutrition. Protein calorie malnutrition has been identified as an essential risk factor for the predisposition to intracellular infection and leading to death. The most efficient and economical measurements to describe nutritional status are the Serum Albumin, Body weight & Body Mass Index (BMI). Weight, Body Mass Index (BMI) and serum albumin are very reliable markers of nutritional status in patients with newly diagnosed smear positive pulmonary tuberculosis. Of these three parameters, serum albumin is the most sensitive. Since serum albumin is free from some of the short comings of weight and Body Mass Index (BMI) like drug induced vomiting and diarrhoea. In most of the underdeveloped and developing countries of the world both tuberculosis and malnutrition are still problems of

considerable magnitude.[1] It is important to consider, how these two problems tend to interact with each other. Study of Serum Albumin in patient with pulmonary tuberculosis will provide the information required to develop interventional strategies. As in our region, we have paucity of data pertaining to role of serum albumin as biochemical marker for monitoring the nutritional status in newly diagnosed smear positive pulmonary tuberculosis patients during treatment, present study is an effort in this direction.

METHODOLOGY

The study was designed as a hospital based prospective study conducted at Department of Respiratory Medicine of S. P. Medical College, Bikaner from Jan 2019 to Dec 2019 among 185 eligible [adult (>18 yrs), at least one SS+ve] indoor patients. A pretested questionnaire was used for data collection regarding their clinical profile, change in outcome parameters with respect to treatment. Data analysis was done with the help of Epi Info software considering level of significance as $p<0.05$.

RESULTS

Table:1 Distribution of Pulmonary TB cases according to their Clinico-Demographic Profile

Age	Frequency	Percent
18-30 years	32	17.30 %
31-40 years	39	21.08 %
41-50 years	29	15.68 %
51-60 years	34	18.38 %
>60 years	51	27.57 %
Gender		
Female	66	35.68 %
Male	119	64.32 %
Area		
Rural	110	59.46 %
Urban	75	40.54 %
Complaints		
Cough, fever, weight loss	145	78.38 %
Cough, Haemoptysis	20	10.81 %
Cough, chest pain	20	10.81 %
Chest X-Ray		
B/L Upper Lobe	49	26.49 %
Right Upper Lobe	67	36.22 %
Left Upper Lobe	10	5.41 %
Right Upper Lobe & Left Lower Lobe	25	13.51 %
Right Lower Lobe & Left Upper Lobe	10	5.41 %

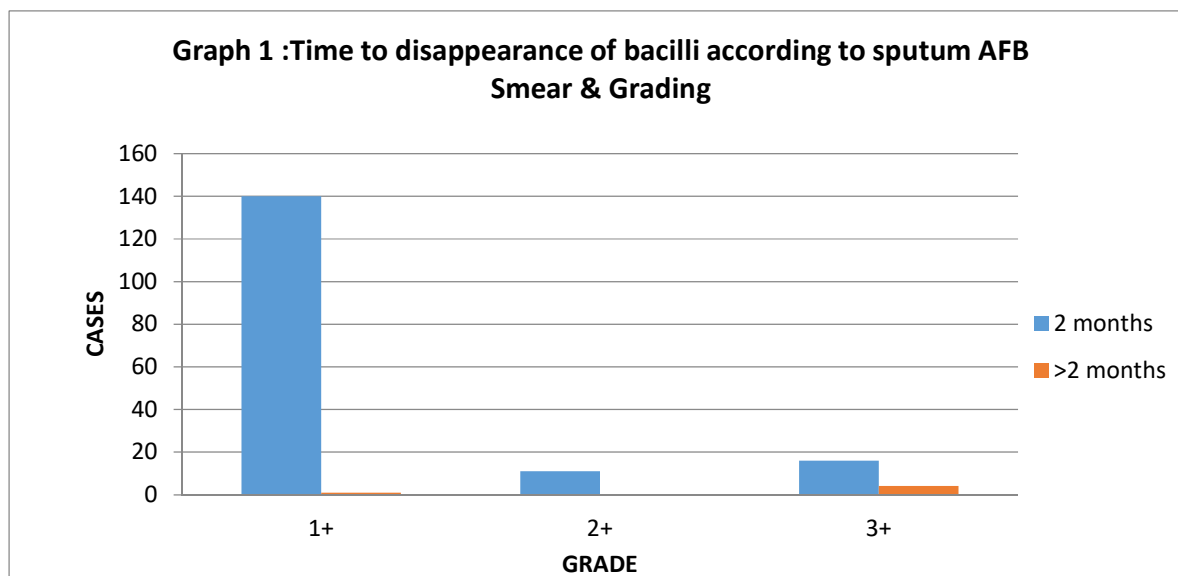|		
Right Upper Lobe & Right Middle Lobe	16	8.65 %
Right Middle Lobe	8	4.32 %
Sputum AFB Smear & Grading		
1+	149	80.54 %
2+	13	7.03 %
3+	23	12.43 %
TOTAL	**185**	**100.00 %**

In our study sample, maximum 27.57% were in >60 yr followed by 21.08% in 31-40 yrs. Majority 64.32% were male. Majority 78.38% presented with cough fever and weight loss. Maximum 36.22% had TB involving Right upper lobe followed by 26.49% both upper lobe.
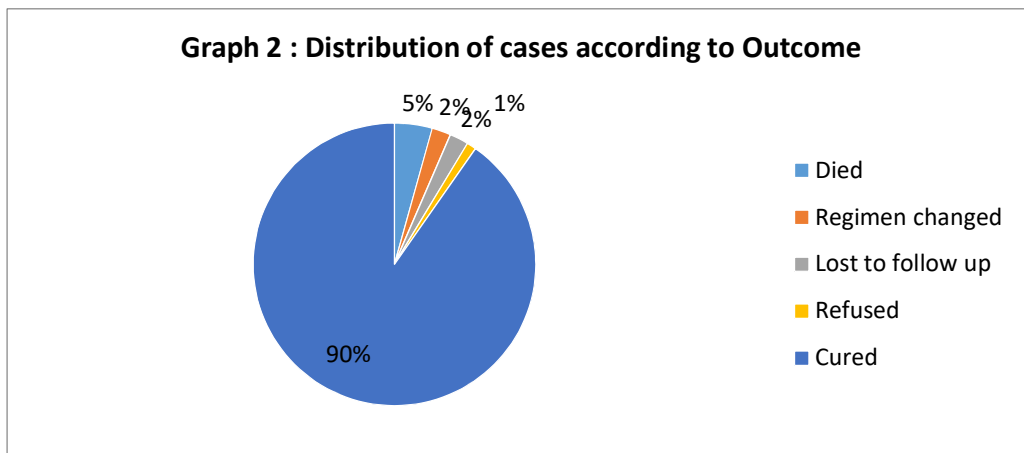
Maximum 80.54% had 1+ grading followed by 3+ (12.43%) whereas minimum 7.03% had grade 2+.

Table:2 Distribution of cases according to Serum Albumin at different follow up

Grading	DAY1	2 month	6 month	P value
1+(N_1=149,N_2=142,N_3=140)	3.49±0.284	3.71±0.264	4.00±0.235	0.0001*
2+ (N_1=13,N_2=11,N_3=11)	3.3±0.290	3.55±0.271	3.86±0.238	0.0001*
3+ (N_1=23,N_2=19,N_3=17)	3.14±0.288	3.41±0.267	3.77±0.237	0.0001*
P value	0.0001	0.0062	0.0022	

Table 2 shows distribution of cases according to Serum Albumin at different follow up time that Serum Albumin in all the grades can be proven an important indicator for assessing response to treatment as well as disease progression. (p = 0.0001)

Graph 1 :Time to disappearance of bacilli according to sputum AFB Smear & Grading

Graph 2 : Distribution of cases according to Outcome

DISCUSSION

This study was a hospital based prospective study conducted at Department of Respiratory Medicine of S. P. Medical College, Bikaner from January 2019 to Dec 2019, 185 patients as per inclusion criteria and reporting within study duration with the aim to determine the role of serum albumin as biochemical marker for monitoring the nutritional status and association between sputum conversion and serum albumin levels in newly diagnosed smear positive pulmonary tuberculosis patients during treatment.

In present study Maximum ≈45.00% were in >40 yr followed by 21.08% in 31-40 yrs. Majority 64.32% were male and 59.46% had rural residence. The findings were such because prevalence of TB in INDIA is much higher in rural settings. 24.32% labour and house wife (20.54 %) were mainly affected and minimum 3.24% were teacher and student (≈5%) were affected from tuberculosis.

In our study majority 78.38% patient presented with the classical features of tuberculosis that were cough, fever and weight loss. On Chest X Ray maximum 36.22% had TB in Right upper lobe which is the most common site for primary pulmonary TB and minimum 4.32% in Rt middle lobe. 42.16% were nonsmoker had personal history of Tuberculosis.80.54% cases had 1+ Sputum AFB Grading 7.03% had grade 2+ and 3+ (12.43%). In our study mean weight on Day 1 of treatment was 44.09±7.42 kg. Also Bhargava A et al (2013)[2] observed in their study that at the time of diagnosis, mean body weights were 42.1 kg in men and 34.1 kg in women.

In our study on follow up the weight was 51.21± 6.87 at completion of DOTS so the patient gained 7.12±1.05kg and the difference between weight was statistically significant (p = 0.040). Similarly Nalabothu et al (2014)[3] found that the pre treatment mean weight was 46.78kg and at the end of six month of treatment was 52.86kg showed significant improvement with treatment. Also Schwenk et al (2004)[4] found that the patients had gained 9.5 ± 8.9% body weight and the weight gain was statistically significant. Whereas Paton et al (2006)[5] found that the difference was no longer statistically significant by 6 months.

In our study mean S alb at day 1was on lower side which was 3.49±0.284 in 1+, in 2+ was 3.3 ± 0.29 and in 3+ cases it was 3.14±0.288. The difference was statistically significant. Also in Malawi, researchers found that serum albumin was low in newly diagnosed TB (p<0.001). Also Nalabothu et al (2014)[3] found that pre treatment mean Serum albumin was low 25.68g/L.

In present study found that mean Serum albumin were increasing at completion of 2 months in 1+ was 3.71± 0.264 and 3.55 ± 0.271 in 2+ whereas in 3+ was 3.41± 0.267. The difference was statistically significant. Also in Malawi, researchers found that after two months of anti-TB treatment, mean serum albumin increased significantly to the level of the healthy controls at 39.6 ± 5.8(p<0.0001).

In present study at completion of treatment mean of Serum albumin was more in 1+ (4.00± 0.235) and minimum in 3+ (3.77±0.237) and 2+ had 3.86±0.238. Also higher S. alb was observed by Nalabothu et al (2014)[3] was 40.14g/L.

In our study we observed that Serum albumin continuously increased in all the grades on follow up as 1+ had 3.49±0.284 on day 1 and 4.00±0.235 at 6 month. (p = 0.0001). Also Nalabothu et al (2014)[3] found that pre treatment mean Serum albumin was 25.68g/L and at completion of treatment was 40.14g/L showed significant improvement.

In our study at diagnosis mean BMI (BMI<17.0 kg/m^2) of 1+ cases were 16.75± 2.03 whereas less in 2+ (16.03±2.06) and 3+ (15.64±2.04). Similarly Bhargava A et al (2013)[2] observed that at the time of diagnosis 80% of women and 67% of men had moderate to severe under-nutrition (BMI<17.0 kg/m^2). On contrary Nalabothu et al (2014)[3] found that The pre treatment Body Mass Index (BMI) was 17.22 Kg/m2. Also Das S et al study (2018)[6] was found that 264 (66%) patients who were diagnosed with sputum positive pulmonary tuberculosis had the mean BMI of the patients is 17.9Kg/m2.

In our study at completion of treatment mean BMI was maximum 19.40±2.17 in 1+ whereas minimum in 3+ (18.36±1.46) and in 2+ (18.83±1.54) was statistically significant. Similarly Nalabothu et al (2014)[3] found that at the end of six month of treatment Body Mass Index (BMI) was 19.09 Kg/m2 was statistically significant improvement.

In our study 169 out of 185 patients were converted to negative within 2 months. Whereas Ootsu Y, Akiyama I, et al study (2014)[7] was found that 76 out of 92 patient (83.6%), sputum cultures for TB bacilli tested negative within 30 days after the start of treatment.

In our study 4.32% were died during treatment. Similarly Bhargava A et al (2013)[2] observed 60 deaths in 1179 patients (5%) in whom treatment was initiated.

CONCLUSION

This study suggests that Body Mass Index (BMI) and serum albumin are very reliable markers of nutritional status in patients with newly diagnosed smear positive pulmonary tuberculosis. Of these parameters, serum albumin is the most sensitive, a relatively easily available biochemical marker can be used in addition to Body Mass Index (BMI) in monitoring the nutritional status of patients with pulmonary tuberculosis.

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