Original article

Effect of anti-tuberculosis treatment on weight of tuberculous patients following up in Gulab Devi Hospital, Lahore

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ABSTRACT

Background: Tuberculosis is the most prevalent disease in Pakistan. Multiple studies have been conducted on disease pattern and anti-tuberculosis therapy however; there is sparse literature of anti-tuberculosis therapy on weight gain of patients. The objective of this study was to measure the effect of anti-tuberculosis treatment on weight of the patient.

Subjects and methods: It was a cross sectional study conducted for a period of 1 year at Pulmonology and Surgical OPD of Gulab Devi Chest Hospital Lahore. Interview of 400 patients were recorded and there record of weight and height was collected at start of the treatment, at 02 months and at 6 months of treatment.

Results: Mean weight change in 400 patients were 3.06 ± 3.97 Kg. Out of 400 patients 310 had weight gain, 50 patients had weight loss and in 40 patients weight remain unchanged. Mean weight gain in 310 patients was 4.53 ± 2.95 kg with maximum weight gain of 16 Kg. Mean weight loss in 50 patients was 3.67 ± 2.63 Kg with maximum weight loss of 14 Kg.

Conclusion: A significant weight gain was seen in patients undergoing anti tuberculosis treatment. Younger age group, treatment completion and drug compliance had positive association with weight gain of the patient. Diabetes mellitus was the only co morbidity found to have negative association with weight gain of the patient.

Keywords:

Tuberculosis, weight change, body mass index

INTRODUCTION

Tuberculosis is a chronic granulomatous infection of any body part caused by mycobacterium tuberculosis.[1] Around 0.5 million people suffer from tuberculosis every year. Around 70000 deaths were reported in Pakistan in 2016 due to tuberculosis.[2] Mycobacterium tuberculosis infection is divided into pulmonary and extra pulmonary (lymph nodes, pleura, cutaneous tissue, abdomen, gastrointestinal system and bones) infections. Pulmonary tuberculosis usually presents with productive cough, evening rise in temperature, weight loss, fatigue and anorexia.[4] Extra pulmonary tuberculosis usually presents according to the organ involved.

Different modalities are used for the diagnosis of pulmonary and extra pulmonary tuberculosis. In most instances PCR of tuberculous bacillus sequence and culture are investigations of choice.[5] Treatment of tuberculosis is long and challenging. In pulmonary tuberculosis treatment is given for six months.[6] There are two phases of this treatment. One is intensive phase which last for first two months and other is continuous phase which last for four months. In intensive phase four drugs are given which are isoniazid, rifampicin, pyrazinamide and ethambutol. In continuous phase isoniazid and rifampicin is given. Continuous phase last for four months in majority of cases.[7]

Nutritional status is one of the most important factors in occurrence and treatment success of tuberculosis. Malnutrition results in more chances of getting this disease as compared to healthy individuals.[8] Body mass index is the most commonly used method for the nutritional assessment of the person. In normal individuals body mass index is between 18.5 kg/m^2 and 22.9 kg/m^2. According to Body mass index scale around 36%-85% of the tuberculosis patients are malnourished.[9-11] There is 12 times more risk of developing tuberculosis in patients with body mass index lower than 18.5 kg/m^2 as compared to normal.[12] Also there are marked differences of weight around 20% between tuberculosis and control group.[9] This not only results in treatment failure and relapse but also results in increased mortality of these patients. Tuberculosis results in loss of appetite and malabsorption, which will lead to wasting and poor nutritional status and weight loss.[13]

Conflict of interest: The authors declared no conflict of interest exists.

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Table 1. Comparison of means of weight gain at onset of treatment and at completion of 2 months and 6 months of treatment using paired sample t-test

Pair	Weight at onset (Mean+ SD)	Weight at 2 months (Mean+ SD)	Weight at 6 months (Mean+ SD)	t-test value	p-value
1	50.58 + 11.58	51.3 + 11.33	-	-10.645	0.000
2	50.58 + 11.58	-	53.8 + 11.45	-15.41	0.000
3	-	51.3 ± 11.33	53.8 ± 11.45	-14.64	0.000

Table 2. Comparison of means of weight gain at onset of treatment and at completion of 2 months and 6 months of treatment according to age group using paired sample t-test

Pair	Weight at onset (Mean+ SD)	Weight at 2 months (Mean+ SD)	Weight at 6 months (Mean+ SD)	p-value
10 – 20 years				
1	43.1 + 9.31	44.2 + 9.32	-	0.000
2	43.1 + 9.31	-	47.1 + 10.07	0.000
3	-	44.2 + 9.32	47.1 + 10.07	0.000
Above 20 years				
1	53.5 + 11.05	54.1 + 10.8		0.000
2	53.5 + 11.05		56.4 + 10.9	0.000
3		54.1 + 10.8	56.4 + 10.9	0.000

Documented weight gain after tuberculosis treatment is seen 62.4% of patients only in international study.[14] No such data is available for our population. The objective of this study is to measure the effect of anti-tuberculosis treatment on weight of the patient, 2 months after initiation and on completion of tuberculosis treatment. Results of this study can help develop weight gain as a positive predictor of treatment success in our local setting.

METHODOLOGY

It was a cross sectional study conducted in Pulmonology and Surgical department, Gulab Devi Hospital Lahore for duration of one year. Non-probability purposive sampling was done and data of 400 patients with diagnosis of tuberculosis was collected who visited Pulmonology and Surgery outdoor department at Gulab Devi Hospital Lahore. They were followed up for 06 months. Patients having any abdominal surgery thereby restricting proper oral intake contributing to weight loss or restricted weight gain were excluded. After approval by the institutional ethical review committee of the hospital, patients fulfilling the inclusion criteria were recruited from outpatients department. Informed consent was taken. Weight of all patients was calculated at start of treatment, 02 months after treatment and at completion of treatment 06 months. Demographic information of patient (name, age, sex, address) was obtained and frequency of weight change was recorded. All the data was entered on a predesigned questionnaire. Data was entered, cleaned and analyzed using SPSS version 23.0. Frequency tables were generated for all possible variables. Means and other parameters of central tendency were calculated for continuous data. Chi Square was applied to find out association between categorical variables. Means were compared using student's t test.

RESULTS

In this study 400 patients were included with mean age of 34.58 ± 17.1 years (range 10 to 85 years). Two hundred and fourteen (214) (53.5%) were males while 186 (46.5%) were females. Two hundred and fifty two (252) (63%) were married while 146 (37%) were unmarried. Mean weight change in all 400 patients was 3.06 ± 3.97 kg. Mean weight gain was recorded in 310 (77.5%) patients which was 4.53 ± 2.95 kg (range 1.0 to 16.0 kg) while 40 (10%) patients had no change in weight. Mean weight loss was seen in 50 (12.5%) patients was 3.67 ± 2.63 kg (range 1.0 to 14.0 kg). As far as a weight gain of more than 5% of the weight at the time of start of treatment was concerned, only 43 (10.8%) had a weight gain of >5% at 2 months, while 211 (52.8%) had weight gain >5% at the end of 6 months. Mean height of patients included in this study was 5.31 ± 0.41 feet (range 3.4 to 6.2 feet). Mean BMI of patients at the start of treatment was 19.79 ± 5.48 Kg/m^2. Mean BMI of patients at the end of 06 month of treatment was 21.1 ± 5.68 Kg/m^2. An overall average increase in BMI of 1.21± 1.70 Kg/m^2 was seen in this study. Pulmonary tuberculosis was diagnosed in 318 (79.5%) while extra pulmonary tuberculosis was found in 82 (20.5%). Out of these extra pulmonary tuberculosis tuberculous lymphadenitis was most common 41 (49.4%) followed by pleural 26 (31.32%). Other sites include abdominal, bones, pericardium and cold abscess. Clinical suspicion of tuberculosis was present in 321 (80.3%) patients. Cavitary lesion was

Table 3. Repeated Measure Analysis of weight gain comparing the weight at onset with weight at 2 months and then 6 months after treatment

Weight	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	50.584	.584	49.436	51.731
2	51.376	.571	50.253	52.499
3	53.728	.573	52.602	54.855

Pairwise Comparisons						
(I) weight	(J) weight	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-.792*	.074	.000	-.938	-.646
	3	-3.145*	.198	.000	-3.535	-2.755
2	1	.792*	.074	.000	.646	.938
	3	-2.353*	.161	.000	-2.669	-2.037
3	1	3.145*	.198	.000	2.755	3.535
	2	2.353*	.161	.000	2.037	2.669

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

present in 262 (65.5%) patients. AFB smear was positive in 275 (68.8%) patients. GeneXpert was positive in 166 (41.5%) patients. Tuberculosis was cured in 372 (93%) patients while 24 (6%) had treatment failure and 4 (1%) was transferred to MDR program. Drug compliance was seen in 392 (98%) patients while 8 (2%) patients had no drug compliance. Associated factors that were statistically significant with weight gains were married patients (p-value =0.04), cure patients (p =0.00), patients with drug compliance (p =0.00) and diabetes mellitus (p-value =0.05). It was observed that mean age of patients having weight gain was 33.4±17.04 years as compared to 38.4±17.21 years of the no weight gain patients. This difference was statistically significant (p-value =0.015). The comparison of means of weight gain at onset of treatment and at completion of 2 months and 6 months of treatment using paired sample t test was done which was also significant (Table 1). The comparison of means of weight gain at onset of treatment and at completion of 2 months and 6 months of treatment of different age groups using paired sample t test was done which was also significant (Table 2). Repeated Measure Analysis was applied to compare the weight change between initiation of treatment followed by readings at 2 months and then 6 months. The mean difference between all the 3 groups was found to be statistically significant (p-value=0.000) (Table 3). A very weak correlation of age with weight gain at the end of 6 months of treatment was found in our study (r=-0.210). This shows that with increase in age there is less weight gain. A comparison of mean weight gain over time between those who gained less than 5% and those who gained more than 5% weight was done in this study. This shows that mean weight in patients having weight gain less than 5% already had better mean weight at start of treatment as compared to patients having weight gain more than 5%. They had less mean weight at the start of treatment.

DISCUSSION

This study was performed to measure the effect of anti-tuberculosis treatment on weight of the patients, 2 months and 6 months after initiation of tuberculosis treatment and to identify factors associated with the effect of anti-tuberculosis treatment on weight of patients presenting and following up in OPD of Gulab Devi Hospital, Lahore.

In this study weight gain was seen in 77.5% patients. Phan et.al conducted their study on 144 tuberculous individuals in United States of America and published in 2016 documented 5% weight gain at 6 months in 62.4% patients.[14] Overall weight gain in tuberculous patients in our study was more than this study. However as far as 5% weight gain at 6 months was concerned, only 52.8% patients achieved it. The number was even lower at the end of 2 months which was just 10.8%. A possible explanation could have been that patients in our study belonged to lower socioeconomic status as compared to this study. 12.5% patients had weight loss during this study while 10% had no effect in their weight during this study.

Age of the patient was one of the most influencing factors in determining the weight gain in these patients. It was observed that more weight gain was seen in younger patients as compared to older patients. We found that 4 kg weight gain was seen in patients between 10 to 20 years of age group while only 2.7 kg weight gain was seen in patients above 20 years of age group. The more weight gain among the adolescents could also be secondary to the growth spurt that occurs during this age.

Other factors including sex, education, smoking, alcohol, family income and family history of tuberculosis had no statistically significant association with weight gain in our patients.

Among co morbidities we found that more weight gain was seen in patients having no diabetes mellitus. Other comorbidities like hypertension, gastritis and psychiatric illness had no association with weight gain of the patient in our study.

A significant association was found between weight gain and treatment outcome. Patients who were cured at the end of six month of treatment had more weight gain. Similarly significant association was present statistically between weight gain and drug compliance. Weight gain at 2 months of intensive phase and at completion of 6 months of treatment in tuberculosis patient can be used as a good predictor of treatment success. It is documented that bacterial endotoxins in tuberculosis result in profound weight loss. It is mostly due to muscle wasting. Wasting is secondary to anabolic block or impaired anabolic response to feeding. Weight gain after effective chemotherapy for tuberculosis has been reported by studies conducted by Rohini et al and Wassie et al.[15-16] No significant association was found in pulmonary and extra-pulmonary tuberculosis. Similarly other factors including cavitary lesions on x-ray, positive AFB smear and category (I or II) of patient for treatment had no significant association with weight gain. However significant association was seen between these variables in other studies.[9] According to Phan et al significant association was found between weight gain of patients and factors like cavitary lesions on x-ray (p=0.01) and positive AFB smear (p= 0.02). According to them the burden of disease and extensive disease affects the weight gain of patients. No significant association was found between weight gain and these factors in our study. There were limitations in this study. In extra pulmonary tuberculosis patients the treatment may continue for 9 to 12 months. In our study we only followed patients for 6 months. More weight gain could have been documented in these patients had they been followed for the full length of treatment duration.

CONCLUSION

A significant weight gain was seen in patients undergoing anti tuberculosis treatment. Younger age group, treatment completion and drug compliance had a positive association with weight gain of the patient. Diabetes mellitus was the only co morbidity found to have negative association with weight gain of the patient.

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