

Original Research Article

A study of factors affecting weight gain among tuberculosis patients under DOTS in district Amritsar

Pooja Sadana^{1*}, Harpreet Kaur¹, Vishal Verma²

¹Department of Community Medicine, Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar, Punjab, India

²Department of Chest and TB, Government Medical College, Amritsar, Punjab, India

Received: 30 July 2018

Revised: 23 September 2018

Accepted: 26 September 2018

*Correspondence:

Dr. Pooja Sadana,

E-mail: sadanapooja@hotmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Wasting is a common feature in tuberculosis and treatment is aimed at achieving weight gain in pulmonary tuberculosis patients. The aims and objectives of the study were to study the extent of body weight gain during treatment and to identify the effect of different factors on weight gain among TB patients.

Methods: The study was conducted on a total of 326 patients residing in the area of PHC Verka and registered with District Tuberculosis Centre, Amritsar. Weight change was assessed by taking the difference of weight at initial diagnosis and after completion of continuation phase therapy.

Results: A total of 228 patients participated in the study. The mean ($\pm$ SD) body weights (in kg) for the patients were 44.92 ± 12.7 at diagnosis and 48.79 ± 12.9 at the end of treatment. The mean ($\pm$ SD) weight gain was 3.86 ± 4.55 kgs at the end of treatment. The gain in weight at the end of treatment was associated with supervision of treatment and outcome of the TB patient.

Conclusions: The findings showed that there is an association between gain in weight with supervision of treatment and outcome of the TB patient.

Keywords: Tuberculosis, Weight gain, Directly observed treatment short course

INTRODUCTION

Tuberculosis (TB) remains a major health burden and a leading cause of death worldwide.¹ Relationship between TB and under nutrition is known since ancient times. TB makes under nutrition worse and under nutrition weakens immunity, thereby increasing the risk of progression of latent TB infection into active disease.² Malnutrition lowers the cell-mediated immunity, which in turn leads to increased susceptibility to infection.³ Most of the patients experience weight loss and some show signs of micronutrient deficiency at diagnosis. Weight loss occurs due to loss of appetite, reduced food intake, nutrient losses from vomiting and diarrhoea and also due to

metabolic alterations caused by tuberculosis.² Severe weight loss, which is considered to be immunosuppressive and a major determinant of severity in outcome of disease.⁴

Weight gain is simple to measure, inexpensive to obtain, and easily accessible.⁵ The weight of the patient monitored at different times during treatment is an important component to assess the progress of patients.⁶ Risk of death and TB relapse increases if there no adequate weight gain during treatment. Failure to gain weight during TB treatment is an indicator of severe illness, unfavourable outcome, and the presence of other comorbid conditions. The objective of this paper is to

identify the effects of different factors such demographic characteristics, category of patients, treatment under supervision, side effects of drugs and treatment outcome on weight gain among the TB patients.

METHODS

The study was conducted in the area of Primary Health Centre (PHC) Verka which is the field practice area of department of Community Medicine, Government Medical College, Amritsar.

Study subjects

All the patients belonging to the area falling under PHC Verka and registered with District Tuberculosis Centre, Amritsar from 1st April 2010 to 31st March 2011 were included in the study keeping in view the time period of treatment of category I & II which is six and eight months respectively. Patients of category III were also included because at time of registration (2010) there were three categories.

Following information was collected from District Tuberculosis Officer:

- List of patients suffering from tuberculosis and their complete address who were residing in the area of PHC Verka.
- Treatment record of these patients of TB.

Data collected from the district tuberculosis center included demographic information, patient's address, treatment information including dates of tuberculosis registration, treatment initiation, treatment category, pre-treatment sputum result and record of follow up sputum examinations. Patients once started on treatment were included in the study. Houses of all the patients were located using information available from the tuberculosis register, DOT provider or staff who knew the patients. If the patient was not available in the first visit, then every effort was made to contact the patient by subsequent visits as per convenience and suitability to the patient. Maximum five visits were made to trace the patients. In the event a patient no longer lived at a specific address, help of local neighbours and guides was taken to trace the patients. Patients who had migrated to another district were excluded from the study. The patients who were below 14 years of age, the adult family member who accompanied the patient to the DOT centre were interviewed and the consent of the parent/guardian was taken. Informed consent was taken from each study subject in their own vernacular language.

Inclusion criteria

Patients on DOTS therapy were only included.

The information regarding name, age, sex was obtained personally by interviewing the patient. Information

regarding side effects of the drugs and whether the patient took treatment under supervision was also obtained. The information was recorded on a pretested and preformed questionnaire evolved for the study. Information regarding follow up sputum examination was obtained from the patient's treatment card. Criteria for sputum grading and for patient treatment outcome was done according to RNTCP guidelines.⁷ Treatment outcome of cases was stated as cured, treatment completed, failure, default, transferred out and died. Weight recorded at the initial stage of treatment was collected from the treatment cards of the patients and each patient was weighed at the end of anti-TB treatment by using the same scale. Weights were recorded to the nearest 0.1 kg. Weight changes were calculated as the differences between weights measured at diagnosis and the end of continuation phase.

Approval of college ethical committee was granted at the time of submission of the plan of the study.

Statistics

All the information so collected was compiled, analysed statistically with help multiple regression (SPSS version 13.0) was performed to identify the association of weight gain on different factors. The adjusted odds ratio and 95% confidence intervals (CI) were estimated for the factors. $P < 0.05$ was taken as statistical significant and valid conclusions were drawn.

RESULTS

The present study to assess the weight gain was carried out on a total of 326 patients registered with District Tuberculosis Centre, Amritsar, only 228 (69.94%) patients were interviewed. A total of 59 (18.10%) patients could not be traced as most of them had migrated to new place and some of them could not be traced due to their incomplete or wrong addresses. By the time of interview 36 (11.04%) had died and 3 (0.92%) patients did not give consent for interview.

Disease characteristics are summarized in Table 1 among the 228 patients studied, 132 (57.90%) were males and 96 (42.10%) were females. In the present study, 87.2% males and 82.3% females belonged to 15-59 years age group. Male to female ratio was 1.37:1 approximately.

Of the 228 patients, 161 (70.61%) were treated under Category I, 49 (21.49%) and 18 (7.90%) were treated under category II and III respectively. In 92 (40.40%) patients intensive phase was fully supervised and in 84 (36.80%) patients, treatment was partially supervised. In rest 52 (22.80%) patients not a single dose of anti tubercular drug was supervised. Of the total 228 interviewed patients 119 (52.2%) reported that there were no side effects of anti tubercular drugs. The treatment outcomes for these patients were as follows: 98 (43.00%)

were cured, 95 (41.70%) completed treatment, 29 (12.70%) defaulted, 6 (2.60%) failed treatment and none was transferred out.

Table 1: Characteristics of TB patients registered under DOTS.

Characteristics of TB patient	Frequency N (%)
Age (in years)	
<45	175 (76.75)
≥45	53 (23.24)
Sex	
Male	132 (57.89)
Female	96 (42.11)
Category of treatment	
I	161 (70.61)
II	49 (21.49)
III	18 (7.90)
In intensive phase medicine supervised	
All doses supervised	92 (40.35)
Partially supervised	84 (36.84)
Not supervised at all	52 (22.81)
Side effects	
Present	109 (47.80)
None	119 (52.20)
Outcome of patient	
Cured	98 (43.00)
Treatment completed	95 (41.70)
Defaulted	29 (12.70)
Failure	6 (2.60)
Transferred out	Nil

Table 2: Distribution of patients according to weight gain after taking anti tubercular treatment.

Weight gain	Frequency	Percentage (%)
No wt. gain	70	30.70
1-5 kg	97	42.54
6-10 kg	35	15.35
11-15 kg	22	9.64
16-20 kg	4	1.75

Table 2 shows that out of 228 patients, 97 (42.54%) patients had gained weight in the range of 1-5 kg, 35 (15.35%) patients gained 6-10 kg, 22 (9.64%) patients gained 11-15 kg, and 70 (30.70%) patients had no weight gain.

Table 3 summarizes the change in weight of the patients during treatment. The mean body weight (in kg) of the patient was 44.92 ± 12.7 at the initial stage of treatment and 48.79 ± 12.9 at the end of treatment. The mean weight gain was 3.86 ± 4.55 kgs at the end of treatment.

In Table 4, the proportion of category I patients who gained weight was higher (75.2%) as compared to category II patients (63.3%). Patients who took treatment under supervision were more likely to have gained body weight. There is significant difference in weight gain among patients whose treatment was either partially, completely supervised or unsupervised. Percentage of patients who gained weight among cured and treatment completed is 78.6% and 72.6% respectively which is more as compared to patients with unsuccessful outcome i.e. defaulted (41.4%) and failure group (33.3%). There is a significant association between weight gain and outcome of treatment. The association between weight gain and age, sex, and category of the patients was found to be statistically insignificant.

Table 3: Comparison of pre treatment and post treatment weight among TB patients.

Weight	Mean weight (kg)	Mean difference	Standard deviation	Standard error of mean	t value	P value
Pre-treatment	44.9254	-3.86623	12.77357	0.84595	-12.823	0.00
Post-treatment	48.7917		12.94411	0.85724		

*Significant for $p < 0.05$; ** highly significant for $p < 0.01$.

Table 4: Analysis of factors associated with weight gain among tuberculosis patients on directly observed treatment short-course.

	Weight gain (%)	No weight gain (%)	Total
Factors			
<45 years	124 (70.9)	51 (29.1)	Df=1 p=0.68
≥45 years	36 (67.9)	17 (32.1)	
Sex			
Male	86 (65.1)	46 (34.9)	Df=1 p=0.052
Female	74 (77.1)	22 (22.9)	
Category of treatment			
I	121 (75.2)	40 (24.8)	Df=2 p=0.13
II	31 (63.3)	18 (36.7)	
III	8 (44.4)	10 (55.6)	

Continued.

	Weight gain (%)	No weight gain (%)	Total
In intensive phase medicine supervised			
All doses supervised	69 (75.0)	23 (25.0)	Df=2 p=0.014
Partially supervised	63 (75.0)	21 (25.0)	
Not Supervised at all	28 (53.8)	24 (46.2)	
Side effects			
Present	90 (75.6)	29 (24.4)	Df=1 p=0.06
None	70 (64.2)	39 (35.8)	
Outcome of patient			
Cured	77 (78.6)	21 (21.4)	Df=3 p=0.00
Treatment completed	69 (72.6)	26 (27.4)	
Defaulted	12 (41.4)	17 (58.6)	
Failure	2 (33.3)	4 (66.7)	

*Significant for $p < 0.05$; **highly significant for $p < 0.01$.

DISCUSSION

In the present study 87.2% males and 82.3% females belonged to 15-59 years age group. According to TB India 2012 report, tuberculosis primarily affects people in their most productive years of life. Almost 70% of TB patients were between 15-54 yrs of age.⁸

Monitoring weight can be one of the pillars of the DOTS strategy. Our study shows (Table 2) out of 228 patients 70 (30.70%) patients did not gain weight. Most of the patients i.e. 49.24% patients had gained weight in the range of 1-5 kg. A study conducted by Vasantha et al showed that weight remained constant from initial stage to the end of treatment for 6.3% patients. 4.4% patients lost weight, where as 89.3% attained weight. 16.4% patients gained weight less than 2 kgs, 54.8% gained 2-4 kgs, 28.8% gained more than 4 kgs.⁶

In our study (Table 3) the mean weight of tuberculosis patients at the time of registration was found to be 44.92 ± 12.7 . Similar findings are seen in studies done in Malaysia, Vietnam and Peru which showed a mean weight of 41.7 kg, 46.3 kg and 54.7 kg respectively at the time of registration.⁹⁻¹¹

Our study (Table 3) shows that patients had a significant gain in weight the end of treatment ($p=0.00$). The mean weight gain was 3.86 ± 4.55 kgs at the end of treatment.

A study conducted by Vasantha et al in Tiruvallur district, Tamil Nadu, India, showed average weight gain of 3.33 kg among patients registered under DOTS.⁶ However, our finding is lower when compared with other similar study done in Indonesia where the average weight gain is 4.9 kg.¹² The reason for this could be the low socioeconomic status and lack of adequate nutritional care of the patients during treatment in India.

Weight gain is frequently used as part of the assessment of a patient's response to DOTS and it is a predictor of good clinical outcome.¹³ The present study (Table 4) has substantiated the association between weight gain and favourable outcome of the patients. Our study also shows

that the gain in weight at the end of treatment was associated with supervised treatment. Other parameters like age, sex, and category of the patient were not significantly associated with weight gain.

The results of Vasantha et al and Bernabe et al revealed that patients who gained weight during the treatment, had favourable outcome as compared those who had poor weight gain.^{6,11}

Khan et al reported that patients with weight gain of 5% or less after two months of treatment was associated with an increased risk of relapse.¹⁴

Weight loss is associated with impaired physical function as well as increased mortality in patients with TB. Our study highlights the need to improve the body weight during treatment for a successful treatment outcome.

This study showed that weight gain during the treatment was associated with supervision by the DOT provider and treatment outcome of the patients.

CONCLUSION

Weight increased among those who ended as cured and treatment completed and in those whose treatment was supervised. Our study highlights the need to improve the body weight during treatment for a successful treatment outcome. Despite the high burden of malnutrition, assessment of nutrition intake is often neglected in clinical practice and in national TB programs. There is a need of nutritional counselling and supplementation, which may improve TB treatment outcomes.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. World Health Organization. Global tuberculosis report 2015. Geneva: WHO; 2015.

2. WHO. Guideline: Nutritional care and support for patients with tuberculosis. Geneva: World Health Organization; 2013.
3. Phan MN, Guy ES, Nickson RN, Kao CC. Predictors and patterns of weight gain during treatment for tuberculosis in the United States of America. *Int J Infect Dis*. 2016;53:1–5.
4. Wassie MM, Shamil F, Worku AG. Weight Gain and Associated Factors among Adult Tuberculosis Patients on Treatment in Northwest Ethiopia: A Longitudinal Study. *J Nutr Disorders Ther*. 2014;4:143.
5. Gler MT, Guilatco R, Caoili JC, Ershova J, Cegielski P, Johnson JL. Weight Gain and Response to Treatment for Multidrug-Resistant Tuberculosis. *Am J Trop Med Hyg*. 2013;89(5):943-9.
6. Vasantha M, Gopi PG, Subramani R. Weight gain in patients with tuberculosis treated under DOTS. *Indian J Tuberc*. 2009;56:5–9.
7. Managing the Revised National Tuberculosis Control Programme in your area-A Training Course; Modules 1- 4: Central TB Division, Directorate General of Health Sciences, Ministry of Health and Family Welfare, New Delhi; 2005: 14.
8. TB India 2012. RNTCP Annual status report. Central TB Division. Directorate General Of Health Services, Ministry of Health and Family Welfare, New Delhi; 2012: 11.
9. Rohini K, Surekha B, Srikumar PS, Jyoti S, Kumar AM. Body Weight Gain in Pulmonary Tuberculosis during Chemotherapy. *Int J Collab ResIntern Med Public Health*. 2013;5(4):247-54.
10. Hoa NB, Lauritsen JM, Rieder HL. Changes in body weight and tuberculosis treatment outcome in Viet Nam. *Int J Tuberc Lung Dis*. 2013;17(1):61–6.
11. Bernabe-Ortiz A, Carcamo C P, Sanchez J F, Rios J. Weight variation over time and its association with tuberculosis treatment outcome: a longitudinal analysis. *PLoS ONE*. 2011;6:e18474.
12. Karyadi E, West CE, Schultink W, Nelwan RH, Gross R, et al. A double-blind, placebo-controlled study of vitamin A and zinc supplementation in persons with tuberculosis in Indonesia: effects on clinical response and nutritional status. *Am J Clin Nutr*. 2002;75:720-7.
13. WHO Geneva: Global tuberculosis Control, Surveillance, Planning, Financing. WHO/HTM/TB 2005: 49.
14. Khan A, Sterling TR, Reves R, Vernon A, Horsburgh CR. Lack of weight gain and relapse risk in a large tuberculosis treatment trial. *Am J Respir Crit Care Med*. 2006;174:344–8.

Cite this article as: Sadana P, Kaur H, Verma V. A study of factors affecting weight gain among tuberculosis patients under DOTS in district Amritsar. *Int J Community Med Public Health* 2018;5:4804-8.