Saudi Journal of Medical and Pharmaceutical Sciences
Scholars Middle East Publishers
Dubai, United Arab Emirates
Website: http://scholarsmepub.com/

ISSN 2413-4929 (Print)
ISSN 2413-4910 (Online)

Underweight among Tuberculosis Patient in Batticaloa District, Sri Lanka

Umakanth M
Senior lecturer in medicine, Faculty of Health Care Sciences, Eastern University, Sri Lanka

***Corresponding author**
Umakanth M

Article History
Received: 03.09.2017
Accepted: 09.09.2017
Published: 30.09.2017

DOI:
10.21276/sjmps.2017.3.9.6

Abstract: Tuberculosis (TB) is commonly associated with poverty and under-nutrition in both developed and developing countries. Being underweight has been associated with a higher risk of tuberculosis in several studies. A retrospective descriptive study was conducted to analyze TB surveillance data from the chest clinic teaching hospital Batticaloa, in SriLanka. Finally, 103 TB patient's records were analyzed and available data were extracted. The prevalence of underweight among TB patients is 39(37.9%). Obesity and overweight were associated with a significantly lower risk of both clinically active and culture-confirmed tuberculosis.
Keywords: Tuberculosis, underweight and Sri Lanka

INTRODUCTION

Tuberculosis (TB) is a disease caused by bacteria called Mycobacterium tuberculosis. The bacteria usually attack the lungs, but they can damage other parts of the body. It is a major global health problem. It is estimated that in 2015, there were 10.4 million new cases Worldwide[1]. Over 90% of TB cases occur in low and middle-income countries that have frail healthcare infrastructures and constrained resources available, and consequently, struggle to tackle one of the world's deadliest communicable diseases [1].

TB spreads through the air when a person with TB of the lungs or throat coughs, sneezes, or talks. Better TB control should address the risk factors such as diabetes mellitus (DM) [2], Human immunodeficiency, virus, smoking and other co-morbid conditions such as anemia [3], chronic kidney disease, and chronic obstructive airway disease. However, the number of TB deaths and incidence rate continuously fall globally [4]. Underweight has been shown to be associated with host susceptibility to several infections. However, the link between the underweight and the risk of tuberculosis infection has been studied in Worldwide[5]. Furthermore, underweight directly correlates with risk of TB complication and significantly increases the burden of disease.

Internationally, risk factors of TB infection prevalence have been found to be varied across areas. Low body mass index (BMI) has been shown to be associated with host vulnerability to active TB development. In addition, obesity and overweight were observed to be significantly associated with decreased risk of developing active TB as compared with normal-weight [6]. Additionally, type 2 diabetes mellitus has been suggested to be a re-emerging risk factor for TB.

Body mass index is a person's weight in kilograms divided by the square of height in meters. A high BMI can be a pointer of high body fatness. BMI can be used to screen for weight categories that may lead to health problems but it is not diagnostic of the body fatness or health of an individual. According to the BMI, we can divide following categories underweight (<18.4), normal (18.5-24.9), overweight (25-29.9), obesity (30-39.9) and extreme obesity (>40).

Underweight can suppress lymphocyte stimulation and reduce cytokine secretions. Obese (BMI ≥30) and overweight (BMI, 25 to <30) individuals were at significantly lower risks of developing active tuberculosis than normal-weight individuals (BMI, 18.5 to <25). Undernourishment is the main cause of immunodeficiency worldwide, and we are learning more and more about the pathogenesis of this interaction. Micronutrient deficiencies have effects such as poor growth, impaired intellect, and increased mortality and susceptibility to infection [7].

MATERIALS AND METHODS

A retrospective cohort study was conducted to analyze TB surveillance data from the chest clinic in Teaching Hospital Batticaloa, Sri Lanka. This chest clinic maintains almost all TB patients' medical details belong to Batticaloa district. All adult (age >12 years) with the diagnosis of TB during 2015to 2017 were included in the analysis. The socio-demographic factors

included age, sex, BMI, marital status, education level; smoking status, alcohol use, and employment status were collected by a standardized questionnaire administered by trained interviewers. We gathered details including height and weight from that calculated body mass index (BMI). We also grasped other pieces of information such as fasting blood sugar, types of TB cases, including new and re-treatment cases, sputum positive pulmonary TB, sputum-negative pulmonary TB and extra-pulmonary cases from those who are an age of more than 12 years old. We screened 102 patients for BMI using standard diagnostic criteria of BMI. The weight was taken with the standard weighing machine. The height was taken with head, occiput, and buttock against the wall. The Body mass index [BMI] was calculated by the formula, (weight in Kg)/ (height in met^2). Data were entered in the SPSS-19 statistical package. Continuous variables were summarized as mean with standard deviation. Categorical variables were expressed as counts and chi-square analysis was performed to compare proportions. The $P < 0.005$ was taken as statically significant.

RESULTS

The study population comprised 103 registered as tuberculosis within the last two years period. Male patients outnumbered female patients. Out of 103 patients, 67(65%) were males and 36(35%) were females. The mean age for males and females was 51.3($-^{+}$17.2) and 44.8($-^{+}$17.6) respectively. Among 103 TB patients, 22(21.4%) people had diabetes mellitus. When we consider BMI, the majority of the patient 54 (52.4%) were under the category of normal BMI (18.5-24.9), however, 39(37.9%) of the patient were underweight (BMI<18.4) and only 10 (9.7%) patient had BMI under category of overweight and obese (Table 1). Moreover, in this study more sputum positive TB patient 30(29.1%) patients were seen in the underweight population.

Table 1: Distribution of TB among Sex

BMI	Frequency	Percent	Sputum Positive	Sputum negative	Extra-pulmonary
underweight	**39**	**37.9**	30(29.1%)	4(0.9%)	5(4.8%)
normal	**54**	**52.4**	29(28.1%)	9(8.7%)	16(15.5%)
overweight	**7**	**6.8**	3(2.9%)	1(0.9%)	3(2.9%)
obesity	**3**	**2.9**	0(0%)	1(0.9%)	2(1.8%)
Total	**103**	**100**	62(60.1%)	15(14.5%)	26(25.2%)

DISCUSSION

Our study includes 103 TB patients. Of these 67 (65%) were males and 38(35%) were females, which suggests that the number of male patients is more as compared to female patients. A similar study conducted in India where nearly 80% of patients were male [8].

The connection between BMI and TB infection has not been widely understood, even though years of research on its links with active TB disease. Among the 103 patients, 39 patients (37.9%) had a low BMI (<18.5 kg/m2), 54 patients (52.4%) had normal BMI (18.5-24.9 kg/m2) and 10 patients (9.7%) had high BMI. The vicious cycle of malnutrition and infection increases the risk of infection and vice versa. Body mass index (BMI) is a popular and useful tool to evaluate nutrition status, and lower BMI is strongly associated with higher mortality [9, 5]. The correlation between body mass index (BMI, the ratio of mass per height squared) and TB was first recognized by Hippocrates and is strongly logarithmic [10]. Traditionally it has always been assumed that there is an obvious relationship between nutrition and TB [11]. However, a population-based study conducted in China which revealed that individuals with obesity might be one main target population for TB infection control in rural China [12]. Another study conducted in China which postulated that there is no link between BMI and TB, however, it stated that BMI strongly related with impaired glucose tolerance and diabetes [13]. It has been suggested that excess adiposity negatively impacts immune function and host defense in obese individuals. In addition to that, the excess of adipose tissue might attenuate host pulmonary defense through metabolic disturbances [14].

This study clearly indicated that prevalence of sputum positive pulmonary TB more common in low BMI (<18.5Kg/m^2) individuals than higher BMI (25-29.9Kg/m^2) (Table 4). Malnutrition together with socio-cultural and economic factors, poor sanitation, and lack of awareness makes people more susceptible to diseases. It is well understood that people show a decrease in their body fat content with increasing level of physical activity or a decrease in energy intake. The reduction in energy intake might be due to less food intake, poor eating habits or anorexia. There is no doubt that one of the symptoms of TB is anorexia or loss of appetite which would cause a loss in body weight with a concomitant decrease in body fat and muscle mass[5]. Under-nutrition increases the risk of TB which in turn, can lead to malnutrition. Under-nutrition not only is a risk factor for progression of latent TB infection to active disease but also increases the risk of drug toxicity, relapse and death once TB develops.

A systematic review of the literature revealed that across a range of settings with different levels of TB burden, a strong and consistent log-linear

relationship existed between BMI and TB incidence - for each unit reduction in BMI the risk of TB increased by about 14 per cent[15].

CONCLUSION

Studies report that patients with active TB are more likely to be wasted or have a lower body mass index (BMI = kg/m2) than healthy controls and that wasting is associated with increased mortality in TB patients. Obesity and overweight were associated with a significantly lower risk of both clinically active and culture-confirmed tuberculosis. Sputum positive pulmonary TB is more common among underweight patient.

REFERENCES

1. World Health Organization. (2015). *Global Tuberculosis*.
2. Umakanth, M. (2017). Prevalance of diabetes mellitus among tuberculosis patient in batticaloa district, sriLanka. *Int J Med Res*, *3*, 21-23.
3. Umakanth, M. (2017). Anemia among tuberculosis patient in teaching hospital Batticaloa, Sri Lanka. *Int J Med Heal Res*, *3*(5), 95-97.
4. Article, R. (2015). Mycobacterium tuberculosis, 2127-2135. doi:10.1056/NEJMra1405427.
5. Tungdim, M. G., & Kapoor, S. (2008). Tuberculosis treatment and nutritional status among the tribals of Northeast India, *52*(2), 323-327.
6. Falagas, M. E., & Kompoti, M. (2006). Obesity and infection. *Lancet Infect Dis*, *6*, 438–446.
7. Katona, P., Katona-apte, J. (2008). The Interaction between Nutrition and Infection, 90024. doi:10.1086/587658.
8. Raghuraman, S., Kavita, P., & Vasudevan, S. G. (2010). Prevalence of Diabetes Mellitus among Tuberculosis Patients in Urban Puducherry. *N Am J Med Sci*, *6*(1), 30–34.
9. Schaible, U. E. (2007). Malnutrition and infection: complex mechanisms and global im. *PLoS Med*, 4(5), 115.
10. Jr S, D. E. (1987). Tuberculosis and body build. *JAMA*, 3299.
11. Casha, A. R., & Scarci, M. (2017). The link between tuberculosis and body mass index, *9*(11), 301-303.
12. Zhang, H., Li, X., & Xin, H. (2017). Association of Body Mass Index with the Tuberculosis Infection : a Population-based Study among 17796 Adults in Rural China. *Nat Publ Gr*, 1-9.
13. Cai, J., Ma, A., & Wang, Q. (2017). Association between body mass index and diabetes mellitus in tuberculosis patients in China : a community based cross-sectional study, 1-7.
14. Mancuso, P. (2013). Obesity and respiratory infections: does excess adiposity weigh down host defense? *Pulm Pharmacol Ther*, *26*, 412–419.
15. Lonnroth, K., Williams, B. G., & Cegielski, P. (2010). A consistent log-linear relationship between tuberculosis incidence and body mass index. *Int J Epidemiol*, *39*, 149–5.