



A Comparative Study of Tuberculosis in Association with Anthropometric Measurements among Settled and Migrated Populations of Delhi

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Abstract

TB is infectious disease is associated with the anthropometric measurements. TB patients treated under the directly observed treatment short course (DOTS) programme. The objective to identify the effects of weight gain among the TB patients.

Methods *TB patients register under DOTs centre in Delhi. Statically t test used to determine variable for analysis.*

Results *Presents mean and SD value for anthropometry measurements according to age group in migrated population significant difference observed for body mass index in age group 36-40yrs. mean value for male (17.41±3.33) and female (20.25±4.43).significant difference also observed for waist hip ratio in age group 26-30 yrs. mean value for male (0.92±0.24) and female (0.83±0.07) and age group 36-40 yrs. mean value for male (0.91±0.07) and female (0.83±0.08).*

Conclusion: *The findings showed that there is association between weight gain in TB in Dots centre.*

Introduction

Tuberculosis (TB) is a global public health problem, responsible for more than 2 million deaths each year. The association between TB and anthropometric measurements is well recognized; TB is also associated with various socio-economic factors and often occurs in populations suffering from poverty, poor housing and economic deprivation and these are also major factors predisposing to poor nutritional status and impaired immune function. Vasantha (2009) found among 1557 smear-positive TB patients registered under DOTS programme, the changes in weight ranged from a loss of 4 kgs to a gain of 20 kgs at the end of TB treatment; the

average change in weight was 3.22 kgs. The gain in weight at the end of treatment was associated with age (<45 years), DOT at government centres, no problems in taking drugs as reported by patients and cure rate.

Materials and Methods

The present study has been carried out in urban slums of Delhi. The state Delhi is comprised of nine districts. Out of this nine district south Delhi, North and East Delhi were chosen for present study. Because of the main reasons, firstly there are abundance of cluster slums, secondly these district claims maximum number of TB Cases. Random sampling method was used to collect

data. A total of 569 households formed the part of the study and an equal number of respondents were interviewed using various interview schedule developed for the study.

Study Techniques Anthropometric measurements- In order to ascertain the nutritional status of the TB patients as compared to non-TB and TB subjects anthropometric measurements were taken such as stature in (inches) by using anthropometric rods, body weight in (kgs) by using weighing machine, waist circumferences and hips circumferences in (cms) by using measuring tapes. All measurements were taken from right side of the body and by making subject to stand on plain surface with the vertical wall for stature measurements. From stature and weight data body mass index (BMI) was estimated by dividing weight in (kg) by height square in (metre sq.) then index was compared with the standard references.

Anthropometric parameters-The physical assessment included height, weight and circumference of waist and hips as per the procedure specified by Lohman et.al (1988). The instruments are calibrated prior to take the measurements.

Ethical considerations-The approval of the academic ethics committee of Department has been obtained. The written informed consents of all cases-controlled was obtained prior to

enrolment from the subjects. Clinical and vaccines details was noted of general cases-controlled population purely used for the academic research purpose.

Data Processing-After completion of field data collection each proforma was be edited and entered in MS-Excel data sheet, each subject was given code or numbering in order to keep the identity confidential. House-hold data and laboratory data was merged for linking the variables and for obtaining results from raw data.

Results

Anthropometric profile:

Table 1. Presents settled population of males and females. Sex differences are observed for anthropometry except for waist circumference, Hips circumference. Mean height in females and mean body weight (Kg) both is lower in females. The result in body mass index significantly elevated in females (18.47 ± 4.49) than (17.11 ± 3.15) in males. No Sex differences have been observed with regards to waist circumference. While hip circumference in females possess slightly have higher hip circumference (79.24 ± 7.78) than in males (79.54 ± 9.20) in females. And in WHR significant differences at $p<0.01$ level mean value for male (0.90 ± 0.12) and female (0.84 ± 0.07).

Table 1: Mean value for Anthropometry measurements in Settled Population

Variables	Male	Female	t-value
	Mean \pm SD	Mean \pm SD	
Height (cms)	170.32 \pm 3.04	155.75 \pm 6.64	24.56***
Body weight (kg)	49.65 \pm 9.23	44.68 \pm 10.25	4.84**
BMI (kg/m ²)	17.11 \pm 3.15	18.47 \pm 4.49	3.42***
Waist circumference (cms)	71.30 \pm 9.68	67.11 \pm 9.31	4.13
Hips circumference (cms)	79.24 \pm 7.78	79.54 \pm 9.20	-0.33
Waist Hip Ratio (cms)	0.90 \pm 0.12	0.84 \pm 0.07	4.96**

** $p<0.01$, *** $p<0.001$

Table 2. presents Mean and SD value for anthropometric measurements in migrated population of males and females. Sex differences have been observed only for height and hips circumference. Mean of body weight of male is higher (50.38 ± 7.6) then female (48.04 ± 12.30).

Mean value of body mass Index of male is higher (26.76 ± 104.22) then females (19.57 ± 5.00) also waist circumference of male is (70.60 ± 7.97) is higher than females (68.87 ± 13.11). Waist Hip Ratio of male is (0.90 ± 0.06) whereas female (0.84 ± 0.07) is higher of male. Mean and SD value

for height in male (169.46±14.26) and female(156.69±6.12). Mean value for hip

circumference in male (78.49±7.49) and female (81.69±13.29).

Table 2: Mean value for Anthropometry in Migrated Population

Variables	Male	Female	t-value
	Mean±SD	Mean±SD	
Height in (cms)	169.46±14.26	156.69±6.12	7.47**
Body weight (kg)	50.38±7.61	48.04±12.35	1.65
BMI(kg/m ²)	26.76±104.22	19.57±5.00	0.60
Waist circumference (cms)	70.60±7.97	68.87±13.11	1.04
Hips circumference (cms)	78.49±7.49	81.69±13.29	2.16**
Waist Hip Ratio(cms)	0.90±0.06	0.84±0.07	0.21

*p<0.01.

Table 3. Presents mean and SD value for settled and migrated males. No significant differences observed here. Mean value of height in settled (170.32±3.42) and migrated (169.46±14.26) mean of male is slightly higher in compare to migrate. Body weight mean in settled (49.65±9.23) and migrated (50.38±7.61) in this mean is slightly higher in migrated males. Mean value for body mass index in settled (17.11±3.15) and migrated

(26.76±104.22) in this mean value of migrated males are much higher when compare to settled males. Mean value for waist circumferences in settled (71.30±9.68) and migrated (71.30±9.68). mean value for hip circumference in settled (79.24±7.78) and migrated (78.49±7.49), mean value for waist hip ratio in settled (0.90±0.12) and migrated (0.90±0.06).

Table 3: Mean value for Anthropometric measurements and indices in Settled and Migrated Males

Variables	Settled	Migrated	t-value
	Mean±SD	Mean±SD	
Height (cms)	170.32±3.42	169.46±14.26	0.85
Body weight (kg)	49.65±9.23	50.38±7.61	-0.74
BMI(kg/m ²)	17.11±3.15	26.76±104.22	-1.38
Waist circumference (cms)	71.30±9.68	70.60±7.97	0.68
Hips circumference (cms)	79.24±7.78	78.49±7.49	0.86
Waist Hip Ratio (cms)	0.90±0.12	0.90±0.06	0.21

Table 4. Presents the mean and SD value of age adjusted anthropometry in settled and migrated females. Only significant difference observed here for body weight at p<0.05 level mean value for settled (44.68±10.25) and migrated i.e.(48.04±12.35). Mean value for height in settled (155.72±6.64) and migrated (156.69±6.12).Mean

value for body mass index in settled (18.47±4.49) and migrated(19.57±5.00). Mean value for waist circumference in settled (67.11±9.31) and migrated (68.87±13.11). Mean value for hip circumference is slighter higher in migrated females i.e. (81.69±13.29) and settled (79.54±9.20).

Table 4: Mean value for Anthropometric measurements and indices in Settled and Migrated Females

Variables	Settled	Migrated	t-value
	Mean±SD	Mean±SD	
Height (cms)	155.72±6.64	156.69±6.12	-1.07
Body weight(kg)	44.68±10.25	48.04±12.35	2.17*
BMI(kg/m ²)	18.47±4.49	19.57±5.00	1.68
Waist circumference (cms)	67.11±9.31	68.87±13.11	-1.16
Hips circumference (cms)	79.54±9.20	81.69±13.29	-1.42
Waist Hip Ratio (cms)	0.84±0.07	0.84±0.07	0.13

*p<0.05.

Table 5 presents mean and SD value for anthropometry measurements according to age group in settled population. Here significant difference observed at $p < 0.01$ level in age group 18 yrs. mean value is in male (1.43 ± 0.51) and female (2.25 ± 0.70). Significant difference also observed for age group 36-40 yrs. i.e. in male (1.23 ± 0.49) and female (1.83 ± 0.57). Significant differences also observed for body mass index in

age group 36-40 yrs. mean value i.e. for male (17.41 ± 3.33) and female (20.25 ± 4.43). Significant difference also seen for waist hip ratio at age 26-30 yrs. Mean value for it in male (0.92 ± 0.24) and female (0.83 ± 0.07). And significant difference for waist hip ratio also observed for age group 36-40 yrs. i.e. mean value for male (0.91 ± 0.07) and female (0.83 ± 0.08).

Table 5: Mean Value for Anthropometry Measurements According to Age Group in Settled Population

Settled			
Variables	Male	Female	
Age Groups	Mean \pm SD	Mean \pm SD	t-value
17 yrs.	1.45 \pm 0.60	1.67 \pm 0.84	-0.91
18 yrs.	1.43 \pm 0.51	2.25 \pm 0.70	2.80**
19 yrs.	1.14 \pm 0.37	1.80 \pm 0.44	-1.72
20 yrs.	1.56 \pm 0.52	1.44 \pm 0.52	0.44
21-25 yrs.	1.31 \pm 0.54	1.55 \pm 0.61	-1.58
26-30 yrs.	1.41 \pm 0.59	1.71 \pm 0.73	-1.66
31-35 yrs.	1.50 \pm 0.61	1.90 \pm 0.87	-1.41
36-40 yrs.	1.23 \pm 0.49	1.83 \pm 0.57	3.43***
41-45 yrs.	1.52 \pm 0.68	1.89 \pm 0.78	-1.29
46-50 yrs.	1.33 \pm 0.63	2.67 \pm 0.57	3.72*
51-55 yrs.	1.58 \pm 0.90	1.78 \pm 0.97	-0.47
BMI (kg/m ²)			
17 yrs.	16.64 \pm 2.11	15.90 \pm 2.12	1.07
18 yrs.	16.22 \pm 2.20	17.34 \pm 3.11	-0.98
19 yrs.	15.00 \pm 2.44	15.52 \pm 2.11	0.37
20 yrs.	15.18 \pm 2.33	16.55 \pm 2.63	-1.16
21-25 yrs.	15.85 \pm 3.02	17.62 \pm 4.39	-1.82
26-30 yrs.	17.23 \pm 3.03	19.07 \pm 4.83	-1.91
31-35 yrs.	17.60 \pm 4.67	21.46 \pm 4.26	2.15
36-40 yrs.	17.41 \pm 3.33	20.25 \pm 4.43	2.27*
41-45 yrs.	18.24 \pm 1.58	19.27 \pm 2.99	1.23
46-50 yrs.	17.85 \pm 3.16	17.53 \pm 1.44	0.17
51-55 yrs.	19.30 \pm 3.90	23.07 \pm 6.97	-1.57
Waist Hip Ratio (cms)			
17 yrs.	0.87 \pm 0.07	0.84 \pm 0.08	1.31
18 yrs.	0.89 \pm 0.05	0.84 \pm 0.07	1.56
19 yrs.	0.84 \pm 0.05	0.79 \pm 0.08	1.06
20 yrs.	0.86 \pm 0.09	0.81 \pm 0.04	1.13
21-25 yrs.	0.87 \pm 0.08	0.83 \pm 0.07	1.85
26-30 yrs.	0.92 \pm 0.24	0.83 \pm 0.07	1.81*
31-35 yrs.	0.88 \pm 0.08	0.88 \pm 0.05	0.11

36-40 yrs.	0.91±0.07	0.83±0.08	2.87**
41-45 yrs.	0.93±0.05	0.85±0.07	-0.98
46-50 yrs.	0.92±0.10	0.88±0.08	0.54
51-55 yrs.	0.94±0.13	0.91±0.05	0.75

*p<0.05, **p<0.01, ***p<0.001.

Table 6. Presents mean and SD value for anthropometry measurements according to age group in migrated population. The significant differences observed in age group 18 yrs. Mean value for male(1.43±.514) and female (2.25±.70). For 36-40 yrs. age group also significant difference observed mean value for male (1.23±0.49) and female (1.83±0.57). again

significant difference observed for body mass index in age group 36-40yrs. mean value for male (17.41±3.33) and female (20.25±4.43).significant difference also observed for waist hip ratio in age group 26-30 yrs. mean value for male (0.92±0.24) and female (0.83±0.07) and age group 36-40 yrs. mean value for male (0.91±0.07) and female(0.83±0.08).

Table 6: Mean Value for Anthropometry Measurements According To Age in Migrated Population

Migrated			
Variables	Male	Female	
Age Group(s)	Mean±SD	Mean±SD	t-value
17 yrs.	1.45±.605	1.67±.84	-0.91
18 yrs.	1.43±.514	2.25±.70	2.88**
19 yrs.	1.14±0.37	1.80±0.44	-1.72
20 yrs.	1.56±.52	1.44±.52	0.44
21-25 yrs.	1.31±0.54	1.55±0.61	-1.58
26-30 yrs.	1.41±0.59	1.71±0.73	-1.66
31-35 yrs.	1.50±0.61	1.90±0.87	-1.41
36-40 yrs.	1.23±0.49	1.83±0.57	3.43***
41-45 yrs.	1.52±0.68	1.89±0.78	-1.29
46-50 yrs.	1.33±0.63	2.67±0.57	3.72*
51-55 yrs.	1.58±0.90	1.78±0.97	-0.47
BMI (kg/m ²)			
17 yrs.	16.64±2.11	15.90±2.12	1.07
18 yrs.	16.22±2.20	17.34±3.11	-0.98
19 yrs.	15.00±2.44	15.52±2.11	0.37
20 yrs.	15.18±2.33	16.55±2.63	-1.16
21-25 yrs.	15.85±3.02	17.62±4.39	-1.82
26-30 yrs.	17.23±3.03	19.07±4.83	-1.91
31-35 yrs.	17.60±4.67	21.46±4.26	2.15
36-40 yrs.	17.41±3.33	20.25±4.43	2.27*
41-45 yrs.	18.24±1.58	19.27±2.99	1.23
46-50 yrs.	17.85±3.16	17.53±1.44	0.17
51-55 yrs.	19.30±3.90	23.07±6.97	-1.57
Waist Hip Ratio (cms)			
17 yrs.	0.87±0.07	0.84±0.08	1.31
18 yrs.	0.89±0.05	0.84±0.07	1.56
19 yrs.	0.84±0.05	0.79±0.08	1.06

20 yrs.	0.86±0.09	0.81±0.04	1.13
21-25 yrs.	0.87±0.08	0.83±0.07	1.85
26-30 yrs.	0.92±0.24	0.83±0.07	1.81*
31-35 yrs.	0.88±0.08	0.88±0.05	0.11
36-40 yrs.	0.91±0.07	0.83±0.08	2.87**
41-45 yrs.	0.93±0.05	0.85±0.07	-0.98
46-50 yrs.	0.92±0.10	0.88±0.08	0.54
51-55 yrs.	0.94±0.13	0.91±0.05	0.75

*p<0.05, **p<0.01, ***p<0.001

Discussion

Although subjects to criticism as an index of adipose tissue distribution waist hip circumference ratio (WHR) are an important because of its relationship to cardiovascular disease (Muller et.al 1991) for men, WHR were still larger in Mexican American (Heffner et. Al, 1986: Slatterly et.al 1992: Kaye et.al 1993). However reported rather larger values for black men. In women, waist hip ratio values were slightly larger in blacks than in whites until 30 years (Slatterly et.al; Key et.al., 1993).Dodor (2008) in his intervention study used questionnaire and anthropometric measurements on 570 adults on newly diagnosed pulmonary tuberculosis The mean BMI at registration was 18.7 kg/m²; 51% were malnourished; 24%, 12% and 15% respectively had mild, moderate and severe malnutrition. Two months after starting treatment, the mean BMI was 19.5 kg/m²; 40% were malnourished; 21%, 11% and 8% respectively had mild, moderate and severe malnutrition. Using univariate regression analysis, nutritional status was significantly associated with marital status, income per month, educational level, believe in avoiding certain food types and immediate family size at the time starting TB treatment. Two months after starting treatment, change in BMI was significantly associated with age group, marital status, employment status, educational level and belief in avoiding certain food types. Lonroth (2010) found there is a strong and consistent log-linear relationship between TB incidence and BMI across a variety of settings with different levels of TB burden. Present study has supported For 36-40 yrs. age group also significant difference observed mean value for male (1.23±0.49) and female

(1.83±0.57). again significant difference observed for body mass index in age group 36-40yrs. mean value for male (17.41±3.33) and female (20.25±4.43).significant difference also observed for waist hip ratio in age group 26-30 yrs. mean value for male (0.92±0.24) and female (0.83±0.07) and age group 36-40 yrs. mean value for male (0.91±0.07) and female(0.83±0.08).Dye et al., (2011) studied on nutrition and TB. They investigated association BMI had stronger adverse effects on TB in high-incidence India than in lower-incidence Korea.

Conclusion

More research is required to test the relationship at very low and very high BMI levels, to establish the biological mechanism linking BMI with risk of TB and to establish the potential impact on the global TB epidemic of changing nutritional status of populations.

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