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COMPARISON OF NUTRITIONAL STATUS BETWEEN SANTAL TRIBAL WOMEN AND BENGALI WOMEN OF PURBA MEDINIPUR, WEST BENGAL

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ABSTRACT ■ The study was aimed to evaluate the nutritional status of rural tribal women and to compare them with that of urban non-tribal women. Tribal Santal women were selected from the villages of Ramnagar Block II of Purba Medinipur district and Bengali housewives were selected as non-tribal women from Contai urban areas. The average height for the Santal women was 151.8 ±2.2 cm whereas that of the Bengali women was 155.8 ±3.4 cm. The average body weight for the Santal women was 47.6 ±4.6 kg whereas that of Bengali women was 54.8 ±4.2 kg. The Santal had low socioeconomic status and they were belonged to lower and upper lower category according to the Kupaswami scale. Most of selected Bengali women were belonging to upper and upper middle socioeconomic status. The Santal women consumed significantly lesser amount ($p < 0.05$) of Protein and fat than that of their Bengali counterpart. The energy and carbohydrate intake was also lower in Santal women than that of Bengali women but the difference was not significant. It was observed that about 70% of the total Santal women had normal nourishment while 30 % of them were malnourished. On the other hand all Bengali women were belonging to normal nourishment category. Thus, malnourished status of santal women was due to low socioeconomic status compare to Bengali women.

Key Words: Tribal, women, nutritional status, Energy intake, BMI

INTRODUCTION

India is country of diversity with a blend of distinct Tribal and Non-Tribal people who live in urban, semi-urban, rural areas. Santal is the largest Adivasi ethnic group who is the native of Indian subcontinent and lives in Jharkhand, West Bengal, Bihar, Odisha, Assam, Bangladesh and Nepal. Most of the Santals live in villages but some of them also live in urban areas. Agriculture and hunting is the main occupation of the Santals in the villages. Most of the Santal women are involved in domestic works either at home or out of home as maid. On the other hand most of the Bengali women in urban areas are involved in income generating activities besides domestic activities at home in urban areas (Lahiri and Sil 2004)

Tribal women, who are more vulnerable section of the tribal society, are effected more in terms of chronic energy deficiency (Basu

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1985, Roy Burman 1988 , Chatterjee 1989, Antony et al 2001, Bose et al 2006, Bose et al 2008, Das and Bose 2015). On the other hand, Bengali women in urban areas are not affected that much as the tribal women does (Budhwar et al 2005). The aim of the present study was designed (i) to compare the nutritional status of Tribal women from village with the Bengali women from urban areas of West Bengal, (ii) to find out whether socioeconomic status had any impact on nutritional status of two different races from two different habitation of same province.

METHODOS:

Subjects: Forty five Santal women were selected randomly from the villages of Ramnagar Block II of Purba Medinipur district of West Bengal. Similarly, 53 Bengali women were selected randomly form the urban areas of Conati, Purba Medinipur district. Both Santal and Bengali populations had the same profession like house wife. The age range for all groups was 20-30 year. Both Santal and Bengali women were measured for their height, weight, and questioned for their dietary survey and other information. Prior permission and ethical approval was obtained from Institutional Ethics Committee before commencement of the study and the experiment was performed in accordance with the ethical standards of the committee and with the Helsinki Declaration

Anthropometrical measurements: Height and body weight was measured with a Anthropometric Rod and portable weighing scale. Measurements were done according to the standard method (Ermakova et al., 1985; Weiner et al., 1981). Weight was measured to the nearest 0.1 kg using portable weighing scale (Omron) and height was measured to the nearest 0.1 cm using an Anthropometric Rod.

Dietary assessment: For Dietary assessment, a diet history questionnaire with defined questions on frequency and portion size was used. Food intake for consecutive seven days were noted by a standard questionnaire method and mean intake was recorded (Hebert et al, 1998).

Body Mass Index: Body Mass Index (BMI) was calculated using the equation where

BMI = Weight (kg) / Height $(m)^2$.

Nutritional status was determined using WHO guideline based on BMI (WHO 2016). The Following WHO guideline and classification was followed for Nutritional Status based on BMI.

BMI	Nutritional status
< 16.0	Grade III Malnourished
16.0 – 16.99	Grade II Malnourished
17.0 – 18.49	Grade I Malnourished
18.5 – 24.99	Normal
25.0 – 29.99	Grade I overweight
30.0 – 39.99	Grade II overweight (Grade I obese)
> 40	Grade II obese

Statistical analysis: Statistical analysis was done using MS Excel program.

Socioeconomic Status: Socioeconomic status was assessed by Kuppuswamy scale (1981) revised by Shaikh and Pathak (2016). Kuppuswami scale was a widely used method to measure the socio-economic status of an individual in a society. It was based on three variables namely education, occupation and income. Kuppuswami scale was modified later on, where the education, occupation of the head of the family and income per capita per month was used

This scale consists of composite scores of education and occupation of the head of the family along with monthly income from all the sources of the family. It yields a score of 3 – 29 and it classifies the study population into high, middle and low socio economic status (SES). Of the three variables, education

and occupation of the head of the household do not change frequently with time. However, the steady inflation and the resultant devaluation of the rupee necessitate periodic revisions of the income variable. The changes in the income scale are proportional to the change in AICPI. The AICPI values are interpreted with reference to a particular base year. The previous base years were 1960, 1982 and at present 2016 year was considered as base year. Following tables showed the scoring method for SES estimation.

SCORING FOR MODIFIED KUPPUSWAMY'S SOCIO-ECONOMIC STATUS SCALE, REVISED FOR 2016

EDUCATION	SCORE
Professional or honors	7
Graduate or postgraduate	6
Intermediate or post-high school diploma	5
High School Certificate	4
Middle School certificate	3
Primary School certificate	2
Illiterate	1
OCCUPATION	SCORE
Professional	10
Semi-Professional	6
Clerical, Shop Owner, Farmer 5 Skilled Worker 4 Semi-Skilled Worker	3
Unskilled Worker	2
Unemployed	1
FAMILY INCOME PER MONTH IN RUPEES (August 2016 current price index for industrial workers)	SCORE
? 42,876	12
21,438-42,875	10
16,078-21,437	6
10719-16,077	4
6,431-10,718	3
2,165-6,430 2	2
? 2164 1	1

KUPPUSWAMY'S CLASSIFICATION OF SOCIO-ECONOMIC CLASSES ACCORDING TO SCORE

CLASS	TOTAL SCORE
Upper class (I)	26-29
Upper middle class (II)	16-25
Lower middle class (III)	11-15
Upper lower class (IV)	5-10
Lower class (V)	<5

RESULTS:

The Kuppuswami scale was a widely used method to measure the socioeconomic status (SES). It was noted that 95 % of Santal women were belonging to upper- lower class (IV),whereas 5 % of them were from lower class (V). The socioeconomic status for Santal women was graphically represented in Fig 1. The results indicated that the Santal women had very poor socioeconomic status. Fig 2 represented the socioeconomic status of Bengali women where it was found that 55 % of the Bengali women were belonging to Upper socioeconomic class (I), 25% of them were from Upper middle class (II) , and remaining 20 % were from Lower middle class (III) .

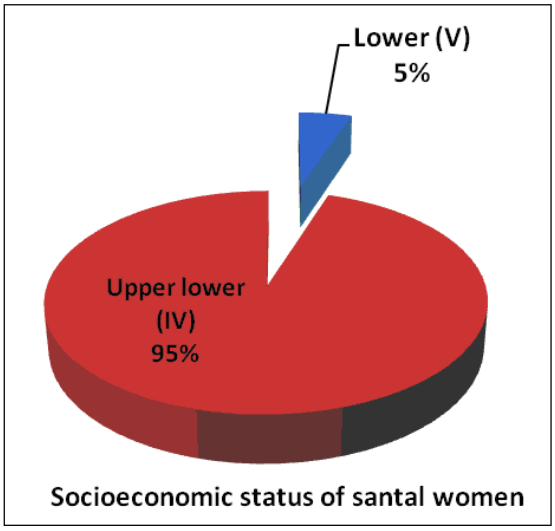

Fig 1 : Socioeconomic status of tribal Santal women.

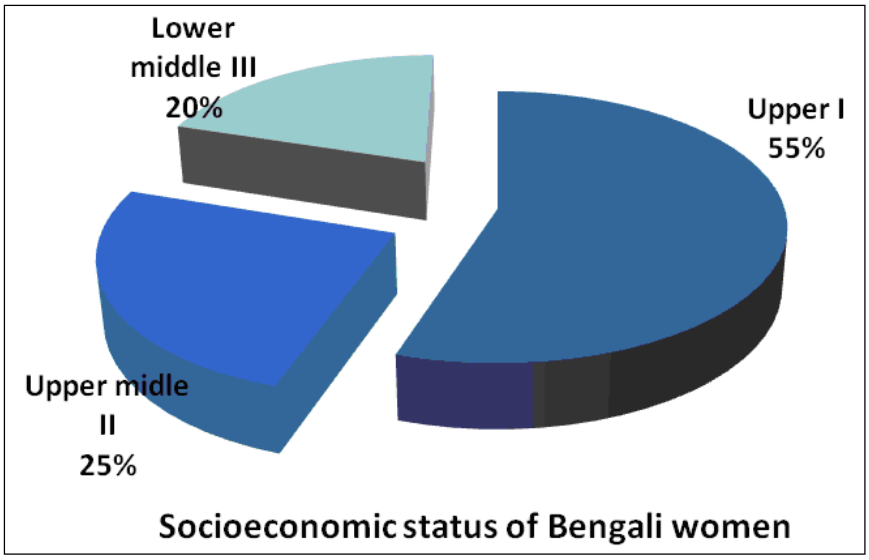

Fig 2 : Socioeconomic status of urban Bengali women.

A large section of Tribal Santal women were either did not attend school or unable to complete primary level education due to less family support , proverty and awarness. Awarness was an important factor for most of the Santal families where parents did not like to send their children to school which they thought wastage of time. Proverty was also another factor which barred the children to go to the school. Hence 25 % of Tribal women were illeterate and 70 % were educated upto primary level. Whereas , urban women were literate and a large section of them attended college and university. This was due to awraness and welathy financial condition of the Bengali urban women. Educational status of both Bengali urban women and Tribal santal women were presented graphically in Fig 3 and Fig 4.

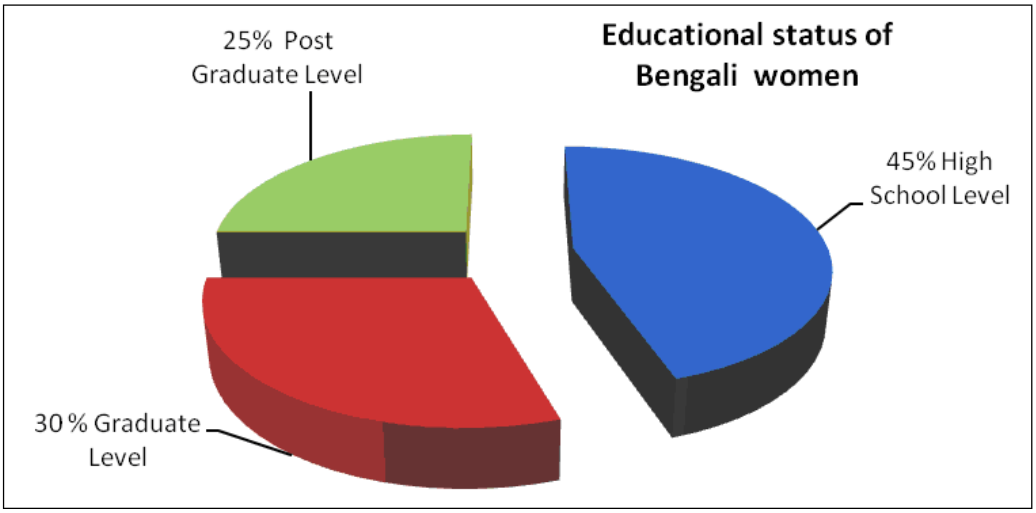

Fig 3: Educational qualifications of urban Bengali women on percentile basis.

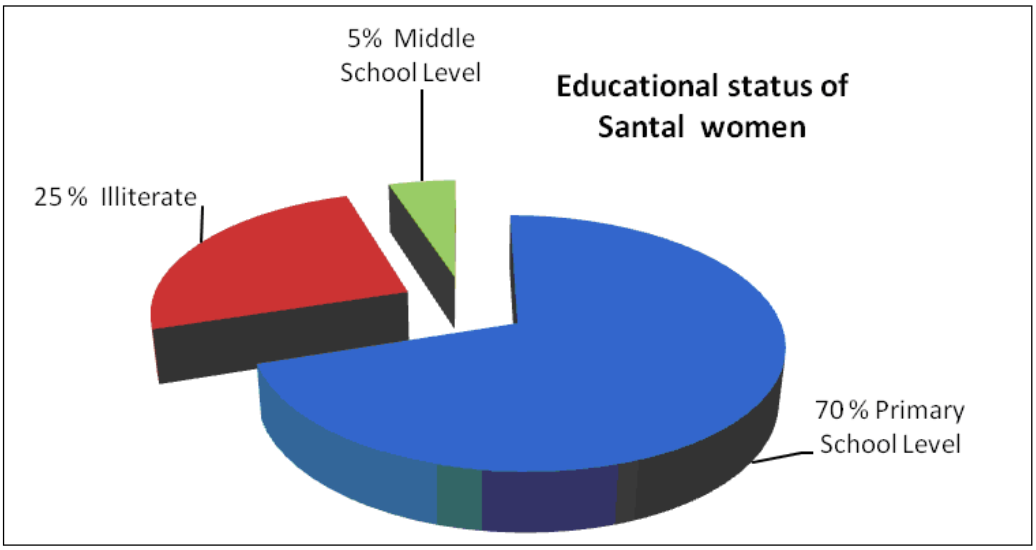

Fig 4: Educational qualifications of Santal women on percentage basis.

The Santal women were shorter than the Bengali women , but the Bengali women were heavier than the Santal women which were shown in Table 1.The results also showed the average BMI of the both populations.

Table 1: Anthropometrical characteristics of Tribal and Bengali urban women

Parameters	Santal women (mean ± SD)	Bengali women (mean ±SD)	t-value
Body Mass (kg)	47.6 ±4.6	54.8±4.2	8.09*
Height (cm)	151.8±2.2	155.8±3.4	6.78*
BMI (kg/m^2)	20.7 ±1.6	22.6±1.8	4.34*

(SD = Standard deviation, BMI = Body mass Index)
*$p<0.001$

The nutrient intake of the tribal women and urban Bengali women were compared in Table 2. The energy intake were lesser in tribal women than that of Bengali women but not significantly different. The Bengali women consumed higher amount of energy yielding nutrients, that is, carbohydrate, protein and fat than that of Santal women. Significant differences ($p<0.05$) were observed in protein and fat intake but not in carbohydrate intake.

Table 2: Energy intake of Tribal women and Urban Bengali women.

	Energy and nutrient intake of tribal women (Mean ± SD)	Energy and nutrient intake of urban women (Mean ± SD)	t-value
Energy (kcal/24hr)	2180 ± 473	2241±402	0.69
Carbohydrate (g/24 hr)	388±92	362±82	1.48
Protein (g /24 hr)	18 ±2	30.0 ±3	22.86*
Fat (g/24 hr)	10±3	22 ± 3	19.7*

*$p<0.05$

Table 3: Nutritional status of Tribal women according to BMI

Nutritional health status based on BMI	No. of cases	Percentage on total sample
Normal	30	66 %
Grade I Malnourished	10	22%
Grade II Malnourished	4	9%
Grade III Malnourished	1	3 %

Table 4: Nutritional status of urban Bengali women based on BMI weight category

Nutritional health status	No. of cases	Percentage on total sample
Normal	53	100 %

The nutritional status of the women of Santal and Bengali population was determined in terms of BMI and the results have been presented in Table 3 and Table 4 respectively. It was noted that a large portion (34%) of the studied Santal women were undernourished whereas all Bengali women were under normal category.

4. DISCUSSION

In the present study the nutritional status of Tribal women was compared with the Bengali women from urban areas of West Bengal and efforts were made to find out whether socioeconomic status had any influence on nutritional status of two different races from two different habitation of the same district. The studied populations were from two different races and cultures belonged to two different economic strata with different profession and habitation. As the Bengali women were belonged to urban community, there might be a chance of influencing rural urban differences on the nutritional status of the subjects. But different socio-cultures

should not have any influence on physical characteristics like height of the population. The height is governed genetically but the stunted growth (low height for age) is a common feature in malnutrition (Ganong, 2008; WHO 2017). In the present study the average height of the Santal tribal women was 151.8 ± 2.2 cm whereas that of Bengali women was 155.8 ±3.4 cm (Table 1). There was a significant difference in stature where Bengali women were taller than the Santal tribal women in average. Ghosh and Malik (2007) reported an average value of 148.94 cm for height for the Santal women of Bribhum district of West Bengal. Das and Bose (2010) also observed similar average value of 147.51±5.7cm for Santal women of Purulia district of West Bengal. But the Santal women of the present who lived in Ramnagar block II near Contai town were taller than the previous studies (Ghosh and Malik 2007, Das and Bose 2010). In the present study average body weight of the Santal women was 47.6±4.6 kg and that of Bengali women was 54.8±4.2 kg (Table 1). The Bengali women were heavier with significant differences. But the average body weight of the Santal women of the present study was more than the other reported values of 41.38 kg and 39.45 kg for the santal women of Bankura and Purulia district (Ghosh and Malik 2007, Das and Bose 2010). According to Indian Council of Medical Research (ICMR), the reference Indian women, aged between 20-39 year, should have 50 kg body weight (ICMR 2000).

The Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. However, BMI may not correspond to the same degree of fatness in different populations due, in part, to different body proportions. But BMI is the best way to express malnutrition till date (ICMR, 2000; Ganong, 2008; WHO 2017). The observed average BMI of the Tribal Santal women of the present study was 20.7 ±1.6 kg/m^2 and that of Bengali women was 22.6 ±1.8 kg/m^2 with a significant difference (Table 1). Ghosh and Malik (2007) observed an average BMI of 18.7 kg/m^2 for the Santal women of Bankura district whereas very similar value (18.1 kg/m^2) was observed by Das and Bose (2010) which was lower than the present observed value for the Santal women from East Medinipur District. Bose et al (2007) also reported low average BMI for the Santal women of Jhargram of West Medinipur district of West Bengal. The average BMI of Bengali women of the present study was 22.4 kg/m^2, which was less than that of the Bengali women of Calcutta and nearby areas of West Bengal. In the present study, 66% of the total Santal women were in normal category while 22 % were under Grade I malnourished, 9 % were under Garde II malnourished, and 3% were in grade III malnourished (Table 3) whereas the Bengali women were all in normal category (Table 4). Thus 66 % of Tribal Santal tribal women were in underweight whereas all Bengali urban women are in normal weight category. This might be due to different socioeconomic status of tribal as well as Bengali women. Socioeconomic status (SES) is a measure of an individual's or family's economic and social position in relation to others (Kuppuswamy 1981, Chatterjee 1989, Chatterjee 1990). The socioeconomic status of a person has an immense impact on health and nutritional status (ICMR 2000). The socioeconomic status of 95 % Santal women of the present study was in Upper lower IV class and the rest was in lower V class (Fig 1). But socioeconomic status of 55 % Bengali women were from Upper I class , 25 % upper middle II and 20 % from lower middle III class (Fig 2). Thus lower body weight of 30 % Santal

women might be due to low socioeconomic status.

Presence of proper and balanced nutrients has a great impact on growth and development of human body. Sufficient amount of calorie intake are important for maintaining the daily activities. Similarly presence of required protein is also important for repairing and maintenance of muscles as well as muscle growth. According to ICMR, energy requirement for an Indian reference women involved in moderate activities is 2100 Kcal (ICMR 2000). The reported energy requirement for adult Indian women with 45.0 kg body weight is 2090 Kcal for 24 hr (ICMR 2000). In the present study, average calorie intake of the Santal women was 2180 ±473 Kcal/24 hrs , whereas that of the Bengali women was 2241 ±402 Kcal/24 hr (Table 2).There was no significant differences in calorie intake in between Santal tribal women and Bengali women.

The distribution of the calories among carbohydrate, protein, and fat is determined partly by physiologic factors and partly by taste and economic considerations (Ganong 2008, ICMR 2000, WHO 2016). A daily protein intake of 1 g/kg body weight to supply the nutritionally essential amino acids and other amino acids is desirable (Ganong 2008). Average daily requirement of first class protein like animal protein for Indian adult women is estimated to be 0.5 g/kg body weight which is less than international standard of 1 g per kg body weight (ICMR 2000, Ganong 2008). The required estimated protein for the Santal women of the present study with average body weight of 47.6 kg , should be 23.8 g per day and that for Bengali women should be 27.4 g per day. In both cases intake of protein was less than the required amount. But the Bengali women consumed more protein than Santal Tribal women (Table 2).

Fat is the most compact form of food, since it supplies 9.3 Kcal /g. Fat not only the major source of energy, but it also required for absorption of beta-carotene and other fat soluble vitamins (Ganong 2008). The recommended minimum dietary requirement of fat for adult Indian women is 12 g per day which may go to a higher level of 20 g per day depending on the requirement. In the present study, the average dietary intake of fat was less than the required amount daily fat intake (Table 2). But the Bengali women consume more fat than Santal tribal women (Table 2).

Inadequate protein and fat intake of tribal women and carbohydrate intake of urban women was seen in this study. This could be because of consumption of bulky food with low energy and/or nutrient density. The protein and fat intake of the tribal women was generally lower than daily requirement. Most of their protein intake were from plant foods but there were some nutritionally good food combinations they make in the area that can help in improving the quality of their protein intake. For example, plant foods like beans were being prepared with animal foods like crayfish and/or dried fish and/or meat. At times, legumes and cereals were normally mixed together in their meals and this combination gives protein of very high quality.

In the present study, all the Santal women were from lower socioeconomic status whereas the urban Bengali women were from either upper or middle class socioeconomic status. None of the Bengali women were from lower socioeconomic status. When literacy was considered it was noted that a large number of Santal women were illiterate and the rest were literate but educated either primary or school level whereas, all the Bengali women were literate and educated

either university or college level. This economic and educational level had an immense effect on nutritional status as well as consumption and selection of proper diet among the tribal women. Though the average energy intake for both Santal and Bengali women were more or less the same, but Protein and fat intake were significantly lower in Tribal Santal women. Poor economic condition barred them to have first class protein from animal source either from meat or egg in their daily food intake. The tribal women had their own poultry for egg production but they sold them to earn money to meet up their financial demand instead of consuming them as a source of protein in their food. On the other hand, Bengali women took sufficient first class protein from meat and egg as their good and middle class economical status allowed them to have those items from the market. Not only that nutritional education or choice of food was also an important factor for less consumption of protein and fat. Due to the less literacy on nutritional facts, tribal women took less protein and fat in their daily food intake, where they consume more rice or fermented rice to balance their energy source. They did not have any nutritional education on balanced diet and importance of first class protein and fat. So, socioeconomic status was the main reason to have lees protein and fat intake in Santal Tribal women compare to that of urban Bengali women.

Thus , improve the standard of living of the tribal women, proper legislative measures should be taken by the appropriate authority. Health care services should be improved and awareness of taking proper diet for proper physical growth and development should be improved by nutritional education, training and campaign along with changing the socioeconomic status.

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