

Adult Santal Males from Orissa and West Bengal: Comparison of Their Anthropometric Profile and Chronic Energy Deficiency

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ABSTRACT This study was undertaken among adult (aged > 18 years) male Santals of Orissa and West Bengal, to compare their anthropometric profile and the prevalence of chronic energy deficiency (CED), based on body mass index (BMI). Santals of Jhargram, Paschim Medinipur, West Bengal and Ananadapur, Keonjhar, Orissa were studied. Anthropometric measurements including height, weight and mid upper arm circumference (MUAC) were measured using standard protocol. The BMI was derived from height and weight. Internationally recommended BMI cut-off points were utilized to evaluate nutritional status. Results showed that there were significant differences between the means of some anthropometric characteristics of the two populations. The extent of CED (BMI < 18.5) was found to be high in both populations (Orissa = 26.2%; West Bengal = 31.5%). Using the World Health Organization criterion the prevalence of CED was high and the situation was serious in both populations. In conclusion, this study provided evidence that the nutritional status of adult Santals, in both Orissa as well as West Bengal, was not satisfactory. Immediate appropriate nutritional intervention programs are needed for implementation among Santals of both regions.

INTRODUCTION

About half of the world's autochthonous people, comprising 635 tribal communities live in India (Chhotray, 2003). Scheduled Tribes constitute about 8% of the total population in India, with varying proportions in different States (Rao et al., 2006). They live in unique physical, socio-economic and cultural environment, isolated from general population. In view of their habitat and food habits, they form a distinct group compared to other populations (Rao et al., 2006). Their food intake is influenced by vagaries of nature, with large seasonal variations, depending upon availability of agricultural and forest produce. Several studies have documented a close relationship between the tribal ecosystem and their nutritional status (Rao et al., 1994a, 1994b, 1996). Inadequate health care facilities and ecological degradation further aggravate the situation (Rao et al., 2006).

Santals are one such tribe whose mother tongue is Santali, an Austro-Asiatic language. They have their own script called Olchiki. They are inhabitants of five eastern and north-eastern provinces of India: Bihar, Jharkhand, Orissa,

Tripura and West Bengal (Mandal et al., 2002). They are the third largest tribal group of Orissa having a total population of 629,782 (Mandal et al., 2002) residing in the districts of Mayurbhanj, Baleswar and Keonjhar. Settled agriculture is their main occupation followed by gathering of forest produce since they traditionally prefer to live in hilly forest clearings.

They are the largest tribal group of West Bengal having a total population of 1,997,222 (Mandal et al., 2002). They constitute 52.4% of all tribal population of West Bengal. Although they reside in several districts of West Bengal, the majority of Santals are found in Paschim Medinipur District. Their traditional primary occupation was settled cultivation. They also practiced hunting, gathering and fishing. However, now their primary occupation is daily agricultural and manual labour. Many of them are bilingual and can speak Bengali or Hindi. It has been suggested that they migrated to West Bengal after the famine of 1770 AD from their traditional homeland of Chotanagpur plateau (Banerjee, 2005).

The use of anthropometry as an indicator of nutritional and health status of adults has now been well established (WHO, 1995). The body mass index (BMI) is an indicator of overall adiposity (Bose, 1996). Low BMI and high levels of undernutrition (based on BMI) is a major public

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health problem especially among rural underprivileged adults of developing countries (WHO, 1995). Although adult nutritional status can be evaluated in many ways, the BMI is most widely used because its use is inexpensive, non-invasive and suitable for large-scale surveys (Lohman et al., 1988; Ferro-Luzzi et al., 1992; James et al., 1994). Thus, BMI is the most established anthropometric indicator used for assessment of adult nutrition status (Lee and Nieman, 2003). BMI is generally considered a good indicator of not only the nutritional status but also the socio-economic condition of a population, especially adult populations of developing countries (Ferro-Luzzi et al., 1992; Shetty and James, 1994; Nube et al., 1998; Khongsdier, 2002; Mosha, 2003). A BMI < 18.5 kg/m² is widely used as a practical measure of chronic energy deficiency (CED), i.e., a 'steady' underweight in which an individual is in energy balance irrespective of a loss in body weight or body energy stores (Khongsdier, 2005). Such a 'steady' underweight is likely to be associated with morbidity or other physiological and functional impairments (James et al., 1988; Shetty and James, 1994; WHO, 1995). CED is caused by inadequate intake of energy accompanied by high level of physical activities and infections (Shetty and James, 1994; Shetty et al., 1994). CED has been associated with reduced work capacity (Pryer, 1993; Durnin, 1994), performance and productivity (Kennedy and Garcia, 1994), increased morbidity due to suppressed immune function (Garcia and Kennedy, 1994; Shetty and James, 1994; Strickland and Ulijaszek, 1994) and behavioural changes (Kusin et al., 1994).

In general, data are scanty on the anthropometric and nutritional status of various tribal populations of India (Bose and Chakraborty, 2005, Bose et al., 2006). It has been recently suggested (Bose and Chakraborty, 2005, Bose et al. 2006) that there is urgent need to evaluate the nutritional status of various tribes of India. In view of this, the objective of the present study was to report and compare the anthropometric characteristics and nutritional status of adult male Santals from two different States of India. We could not locate any published data from India that has compared the nutritional status of the same adult tribal population from two different States of the country.

MATERIALS AND METHODS

Subjects

Orissa: The data were collected from five villages, Gourshinga, Kashibera, Kumunia, Majhisahi and Sonatangri in Anandapur region of Keonjhar district of Orissa, India. These villages are located approximately 150 kms from Bhubaneswar, the provincial capital of Orissa. All adult (> 18 years) males in the five villages were contacted and the sample size was 332 subjects. The vast majority of the subjects were illiterate. They were predominantly settled cultivators or very low-wage earning manual labourers. Therefore, they belonged to the low socio-economic class.

West Bengal: The majority of Santals of West Bengal reside in West Medinipur District. The first author, as part of an ongoing research project, is currently evaluating the nutritional status of various tribal populations of West Medinipur District. In connection with this, the present study was conducted in six villages, namely Jharagaria, Jamiderdanga, Jamda, Jaynagar, Chapashol and Lukudahi near Jhargram town of Paschim Medinipur District, West Bengal, India. These villages are located within 15 kms (approximately) from Jhargram town and 150 kms from Kolkata, the provincial capital of West Bengal. Adult (> 18 years) residents of all houses in the five villages were contacted and a total of 197 men were included in the study. The vast majority of the subjects were illiterate. They were predominantly settled cultivators or very low-wage earning manual labourers. Thus, they belonged to the low socio-economic class.

Ethical approval and prior permission was obtained from relevant authorities as well as local community leaders, respectively, before commencement of the study. Informed consent was also obtained from each participant. Information on ethnicity, age, occupation and educational status were obtained from all subjects with the help of a questionnaire.

Anthropometry

All anthropometric measurements were made by trained investigators using the standard techniques of Lohman et al. (1988). Height, weight and MUAC were recorded to the nearest 0.1 cm, 0.5 kg and 0.1 cm, respectively. Technical errors

of measurements (TEM) were computed and they were found to be within acceptable limits (Ulijaszek and Kerr, 1999). BMI was computed using the following standard equation:

$$\text{BMI} = \text{Weight (kg)} / \text{height (m}^2\text{)}$$

Nutritional status was evaluated using internationally accepted World Health Organization (1995) BMI guidelines. The following cut-off points were used:

CED Grade III:	BMI < 16.0
CED Grade II:	BMI = 16.0 – 16.9
CED Grade I:	BMI < 17.0 – 18.4
Normal:	BMI = 18.5 – 24.9
Overweight:	BMI ≥ 25.0.

We followed the World Health Organization’s (WHO, 1995) classification of the public health problem of low BMI, based on adult populations worldwide. This classification categorises prevalence according to percentage of a population with BMI < 18.5.

- 1) Low (5–9%): warning sign, monitoring required.
- 2) Medium (10–19%): poor situation.
- 3) High (20–39%): serious situation.
- 4) Very high (≥ 40%): critical situation.

The distributions of anthropometric variables were not significantly skewed in both populations. Student’s t-tests were performed to test for population differences in mean anthropometric characteristics. Chi-square test was utilised to compute population differences in nutritional status. All statistical analyses were undertaken using the SPSS Statistical Package.

RESULTS AND DISCUSSION

The mean ages of subjects from both regions were similar (Orissa: mean = 34.7 years, sd = 13.1 years; West Bengal: 35.0, 13.4) were similar. The mean (sd) of the anthropometric characteristics of the adult Santal males of both regions are presented in Table 1. While Santals of Orissa had significantly ($p < 0.01$) greater mean height they had significantly ($p < 0.05$) less mean BMI compared with Santals of West Bengal. Both groups had identical mean weight.

Table 2 presents the frequency of undernutrition (BMI < 18.5) among the Santals. The frequency of undernutrition in Orissa and West Bengal was 26.2 % and 31.5%, respectively. There was no significant difference in the frequency of undernutrition between the two groups. According to the WHO (1995) classification of the public health problem of low BMI, based on adult populations worldwide, the prevalence in

both groups was high (20–39%), thereby indicating a serious situation.

Figure 1 presents the frequency of different grades of CED in the two groups. It was observed that rates of different grades of CED (Grade I, Grade II and Grade III) were similar among Santals of Orissa and West Bengal.

Several recent studies in India (Yadav et al., 1999; Gogoi and Sengupta, 2002; Khongsdier, 2002; 2005; Sahani, 2003; Dash Sharma, 2004, Bose and Chakraborty, 2005; Bose et al., 2006) have utilized BMI to study nutritional status of tribal populations. These studies have indicated that the utilization of BMI and WHO (1995) BMI-based cut-off points for the evaluation of CED are valid for use among tribal populations of India.

It is important to note that the anthropometric techniques used in studying both these groups were identical. Therefore, the comparisons are accurate, appropriate and valid. Comparing the anthropometric characteristics of adults of the two groups revealed significant differences in mean height and BMI. In general, Santals of Orissa had significantly greater mean values height and BMI. However, the nutritional status of both these populations was similar. The level of CED was high in both groups indicating a serious situation. These results clearly indicated

Table 1: Anthropometric characteristics of adult Santal males of Orissa and West Bengal.

Variable	Orissa (n = 332)	West Bengal (n = 197)	t
Height (cm)	162.5 (5.8)	160.5 (6.4)	3.69*
Weight (kg)	51.7 (5.6)	51.7 (8.6)	0.00
MUAC (cm)	23.7 (2.1)	23.8 (2.3)	0.51
BMI (kg/m ²)	19.6 (1.8)	20.0 (2.6)	2.09**

Standard deviations are presented in parentheses.

Significant differences: * $p < 0.01$

** $p < 0.05$.

Table 2: Nutritional status of adult Santal males.

State	CED (BMI < 18.5)	Normal (BMI = 18.5-24.9)
Orissa (n = 332)	87 (26.2)	244 (73.5)
West Bengal (n = 197)	62 (31.5)	123 (62.4)

Percentages are presented in parentheses.

Chi-square (1) = 3.02; $p = 0.08224$.

Overweight individuals excluded.

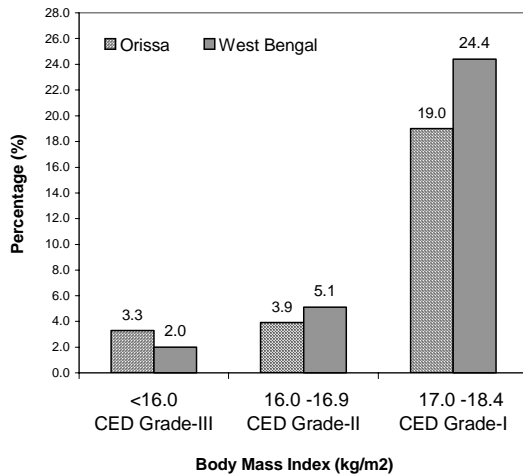


Fig. 1. Frequency of undernutrition among the two Santal populations: A comparison.

that there existed severe nutritional stress among Santals in Orissa as well as West Bengal. From the public health point of view, most importantly, immediate nutritional intervention programs need to be implemented among this ethnic group in both Orissa as well as West Bengal. It is mandatory that the recommendations include adequate dietary intake

The economic and health burden of high frequencies of adult undernutrition have been well documented (Ferro-Luzzi et al., 1992; Campbell and Ulijaszek, 1994; James et al., 1994; Naidu and Rao, 1994; Khongsdier, 2005). Endeavours should be made to study the consequences of the functional impairments commonly associated with low BMI in these ethnic groups. It is also imperative to ascertain the relationship of the high rate of undernutrition with morbidity and mortality. Moreover, since undernutrition has several underlying causes (Lee and Nieman, 2003; WHO, 1995), future investigations should aim at identifying the likely cause(s) of high rates of undernutrition among the Indian tribal populations. It must be pointed out that the present report did not deal with dietary intake of the subjects. It is therefore recommended that future investigations on tribals should study dietary intake, along with anthropometry, while evaluating their nutritional status.

In conclusion, it can be stated that the data will be useful in planning preventive healthcare and nutrition programs aimed at promoting the

health and nutritional status of adult Santal males in Orissa and West Bengal.

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