

Anthropometric Characteristics and Chronic Energy Deficiency of the Mankidias - A PTG of Northern Odisha, India

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ABSTRACT The present paper is an endeavor to focus on the socio-economic profile and anthropometric characteristics of the Mankidias, a semi-nomadic, particularly vulnerable tribe of Mayurbhanj District of Northern Odisha. The study includes 136 married women (≥ 15 years) and 124 adult men aged above 20 years. The subjects were also interviewed to collect data on their socio-economic profile. Anthropometric measurements including height and weight were measured using standard protocol. Body Mass Index (BMI) was calculated and used as a measure of nutritional status. The study depicts the low socio-economic status of the tribe in terms of low literacy and household income. Further the extent of under-nutrition ($\text{BMI} < 18.5 \text{ kg/m}^2$) was also found to be very high among both the males and the females. However, the frequency of under-nutrition or higher rate of chronic energy deficiency (CED), that is $\text{BMI} < 18.5 \text{ kg/m}^2$ is marked among the females. According to the WHO classification of public health problem of low BMI, the prevalence of CED was found to be very high ($\geq 40\%$) in both the males (48.4%) and females (59.5%) of this tribe indicating a critical situation. Since the socio-economic characteristics and nutritional status of the Mankidia tribe is indigent, it is indispensable that the nutritional status of the tribe should be improved by enhancing the socio-economic status through improved education and employment opportunities and appropriate nutritional interventional programs to reduce the prevalence of CED.

INTRODUCTION

Assessment of the nutritional status of a community is one of the first steps in the formulation of any public health strategy to combat malnutrition. The key consensus of such an assessment is to identify the groups "at risk" and to determine the contributory factors. In India the most underprivileged group is the scheduled tribal communities both in terms of their socio-economic condition as well as nutritional status (Basu 1994; Sharma 2004). Improvements in the nutritional status of the population during the last two to three decades have not been impressive (Griffiths and Bentley 2001). The manifestation of such poor living conditions leads to a high prevalence of chronic energy deficiencies (CED) among tribal communities of Odisha specifically among Dongria Khonds (Bulliyya et al 2004), Bathudis (Bose and Chakrabarty 2005), Savar (Bose et al. 2006a) and Santal (Bose et al. 2006b).

It is an established fact that anthropometry is best suited to assess the nutritional and health status of the populations (WHO 1995). The body mass index (BMI) is a useful anthropometric indicator of measuring nutritional status or adiposity (Khosla and Lowe 1967; Keys et al. 1972; Garrow and Webster 1985; Smalley et al. 1990; Deunenberget al. 1991; Strain and Zummof 1991; Bose 1996). A low BMI and high level of under-nutrition (based on BMI) is a major public health problem especially among rural underprivileged adults of developing countries (WHO 1995). A $\text{BMI} < 18.5 \text{ kg/m}^2$ is widely used as a practical measure of CED, that is, a "steady" underweight in which an individual is in energy balance irrespective of a loss in body weight or body energy stores (Khongsdier 2005).

The prevalence of CED measured through BMI can be used for assessing the differences in the standard of living between population groups of developing countries (James et al. 1988; Ferro-Luzzi et al. 1992; Shetty and James 1994; Nube et al. 1998; Khongsdier 2002; Mosha 2003). The expropriation of using $\text{BMI} < 18.5 \text{ kg/m}^2$ as chronic under nutrition is corroborated by many researchers to predict poor demographic, economic, social and environmental conditions of the population (Pryer and Rogers 2006; Subramanian and Smith 2006).

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Concurrently, it was perceived that data is scanty on the nutritional status of various tribal populations of Odisha and India (Arlappa et al. 2005; Bose and Chakraborty 2005; Ghosh and Bala 2006; Chakraborty et al. 2008; Bisai and Bose 2008). Moreover, recently Bose and Chakraborty (2005) suggested that further research from the public health perspective need, to be accomplished, to evaluate the current nutritional status of the various unexplored tribes of India.

Mankidias, inhabiting the remote areas of Similipal bio-reserve of Northern Odisha is a specific particularly vulnerable tribal group. Originally they belonged to the "Birhor" community. The reason for calling the Birhors "Mankidia" is that they are skilled in catching monkeys. They use nets made of *siali* creepers (*Mimosa rubicaulis*) for catching monkeys. The Mankidias fall into the category of hunting and gathering groups and pursue a semi-nomadic way of life. They are socially retarded and have a stringent economic situation. The primary occupation of the Mankidias is making ropes out of the bark of the *siali* creepers. During their trips to the forest for collection of barks, they dig out roots, fibers and also collect honey, which supplements their diet. However, rice is their staple food. The Mankidia family is invariably of nuclear type and they are basically polytheists (Dash 2010). The few number of Mankidias (1180 as per 2001 census) residing in the hilly terrain of Odisha is probably condoned. Therefore any published data representing the nutritional status of the Mankidias could not be located.

Thus the present study is an endeavor to focus on the socio-economic background, anthropometric characteristics and the prevalence of chronic under-nutrition among the Mankidia tribe of Northern Odisha. Further the result of the present study is compared with the findings available on other tribal populations of Eastern India.

MATERIAL AND METHODS

This cross-sectional study was conducted during the year 2009-2010. The data on the Mankidias was collected from seven villages within five blocks of the Mayurbhanj district of Northern Odisha. Since nutritional status is intricately linked with fertility, married women of reproductive age (15-49) years were contacted and data was also collected from their corresponding

husbands or adult males (20-54) years depending upon their availability. Thus adult males (≥ 20 years) and adult females (≥ 15 years) residents of all the houses in the study villages were contacted. Out of a total of 156 households covered, 124 males and 136 females were included in the study. The response rate was eighty-three percent for males and eighty-seven percent for females. Ethical permission was obtained from relevant authorities. Prior consent was sought before taking the anthropometric measurements. The respondents were also interviewed to collect data on their background characteristics, socio-economic status and dietary pattern. The anthropometric data was collected using the standard techniques of Lohman et al. (1988). Height and weight were recorded to the nearest 0.1cm and 0.5 kg respectively. Technical errors of measurement (TEM) were computed and they were found to be within acceptable limits (Ulijaszek and Kerr 1999).

BMI was computed as, weight (kg)/height (m^2)

Nutritional status was evaluated using internationally accepted BMI guidelines (WHO 1995).

- 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 $\geq$ 25.0

The subjects were classified on the basis of WHO classifications (1995) of the public health problem of low BMI and CED grades. This categorizes a prevalence of under-nutrition 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 ($\geq$ 40%): critical situation

RESULTS

The socio-economic characteristics of the Mankidia tribe are presented in Table 1. Majority of the subjects (80.1%) have a monthly family income of less than INR 1000. The average family income per month is only INR 1099. The 73.7 percent of the Mankidia male depend upon minor forest collection and women are generally unemployed while a few are engaged in rope making. The data reveals that a vast majority of

males (94.9%) and females (98.1%) are illiterate. Thus, all the above characteristics contemplate the low socio-economic status of the tribe. Several studies (Bulliyya et al. 2004; Bose and Chakraborty 2005; Bose et al. 2006a,b) on various tribal populations affirm the association between low socio-economic status and the prevalence of chronic energy deficiency.

Table 1: Socio-economic characteristics of the Mankidia tribe of Northern Odisha

Variable	Number	Percentage
<i>Possession of Electronic Item</i>		
Yes	21	13.5
No	135	86.5
<i>Monthly Family Income (Rs)</i>		
<1000	125	80.1
1001-2000	31	19.9
2001-3000	-	-
>3000	-	-
Above Rs 1099/-	-	-
<i>Main Earning Source</i>		
<i>Male</i>		
Cultivator	3	1.9
Annual labor	5	3.2
Daily labor	23	15.4
Forest products	8	5.8
Minor forest collection	110	73.7
<i>Female</i>		
Unemployed	59	37.8
Daily labor	48	30.8
Rope making	23	14.7
Minor forest collection	26	16.7
<i>Educational Status</i>		
<i>Male</i>		
Illiterate	141	94.9
Primary (1-5)	7	4.5
Secondary (6-10)	1	0.6
10+	-	-
<i>Female</i>		
Illiterate	153	98.1
Primary (1-5)	2	1.3
Secondary (6-10)	-	-
10+	1	0.6

Table 2 illustrates the anthropometric profile of the Mankidia males and females. The males have a higher mean height, weight and BMI than the females. A similar finding is also highlighted in Table 3, which represents the nutritional status of the tribe (males and females) based on their BMI. It is to be noted that though the mean BMI of the Mankidia males and females are in the normal range, maximum percentages of the males (48.4%) and females (59.5%) are in the category of CED (BMI<18.5 kg/m²) grades I, II, III indicating the prevalence of under-nutrition or a

critical nutritional condition. Moreover, higher rate of CED (BMI<18.5 kg/m²) is manifested among the Mankidia females. According to the WHO classification of public health problem of low BMI, the prevalence of CED was very high (≥40%) in both the males and the females, indicating a critical situation.

Table 2: Mean (SD) Anthropometric profile of the Mankidia tribe of Northern Odisha

Variable	Male (n-124)	Female (n-136)
Height (cm)	158.4 (5.84)	148.1 (6.04)
Weight (kg)	48.5 (3.87)	40.8 (4.63)
BMI (kg/m ²)	19.3 (2.15)	18.6 (2.81)

Table 3: Nutritional status of the Mankidia tribe of Northern Odisha

Nutritional status	BMI (kg/m ²)	Males Frequency (%)	Females Frequency (%)
CED Grade III	<16.0	8 (6.5)	14 (10.3)
CED Grade II	16.0-16.9	20 (16.1)	32 (23.5)
CED Grade I	17.0-18.4	32 (25.8)	35 (25.7)
Normal	18.5-24.9	61 (49.2)	53 (38.9)
Overweight	≥25.0	3 (2.4)	2 (1.5)
Total under-nutrition (BMI<18.5)		60 (48.4)	81(59.5)

DISCUSSION

Under-nutrition remains to be an everlasting problem in the Asian countries (Wickramasinghe et al. 2004). It is firmly associated with the morbidity and mortality patterns among the tribal residing in the remote hilly terrains. Studies worldwide (Strickland and Ulijaszek 1993, 1994) and from India have utilized BMI to show the prevalence of CED or nutritional status of various tribal populations (Gogoi and Sengupta 2002; Sahani 2003; Bose and Charkaborty 2005; Bose et al. 2006a, b; Chakraborty et al. 2008). Therefore, the BMI based cut-off points (WHO 1995) for the evaluation of normal and CED group are expropriate for use among the tribal populations. Several studies (Goswami et al. 2010; Ghosh and Bharati 2006; Ghosh and Malik 2007; Bisai et al. 2008; Mittal and Srivastava 2006) have highlighted the anthropometric characteristics and levels of under-nutrition among the various tribal populations (Bhumija, Koramudi, Munda, Oraon, Santal) of Eastern India (Table 4). But

Table 4: Mean BMI and prevalence of CED (Based on BMI) among various tribes of Eastern India

<i>Tribe</i>	<i>Sex</i>	<i>Sample size (n)</i>	<i>Mean BMI</i>	<i>CED (%)</i>	<i>Nutritional condition</i>	<i>Study area</i>	<i>Reference</i>
<i>Bhumija</i>	Male	66	18.9	48.5	Critical	Balasore	Goswami et al. (2010)
	Female	73	18.4	54.8	Critical		
<i>Koramudi</i>	Male	87	18.6	51.7	Critical	Paschim Medinipur	Bisai et al. (2008)
	Female	123	18.3	55.3	Critical		
<i>Mankidia</i>	Male	124	19.3	52.4	Critical	Mayurbhanj	Present study (2011)
	Female	136	18.6	63.2	Critical		
<i>Munda</i>	Male	153	18.7	49.0	Critical	Kolkata	Ghosh and Bharati (2006)
	Female	234	17.7	67.9	Critical		
<i>Oraon</i>	Male	200	18.8	47.0	Critical	Jalpaiguri	Mittal and Srivastava (2006)
	Female	150	19.7	31.7	Serious		
<i>Santal</i>	Male	400	18.5	55.0	Critical	Bankura	Ghosh and Malik (2007)
	Female	400	18.7	52.5	Critical		

pragmatic information on the socio-economic and nutritional status of the Mankidias is lacking. Therefore this paper makes an attempt to envisage the various socio-economic characteristics and anthropometric profile of this primitive tribe.

From this comparative table (Table 4), it can be deduced that the mean BMI of the males is in the range of 18.5-19.3 kg/m² and the females is in between 17.7-19.7 kg/m². It is also apparent that in the various tribal populations of Eastern India, the females possess a low mean BMI than the males. Moreover the rates of CED of both the sexes among the various tribal populations of Eastern India varied between thirty-one percent and sixty-eight percent. These rates are in the category high (20-39%) to very high (e"40%) indicating the nutritional stress of both the sexes of the individual tribes. The result of the present study (Mankidia) reveals that both the males and the females are under critical nutritional stress.

CONCLUSION

The present study contemplates the low literacy level, poor socio-economic status and high incidence of under-nutrition of the Mankidia tribe of Northern Odisha. A notable finding of this study is that both the males and the females are reasonably undernourished (BMI<18.5 kg/m²), indicating a critical nutritional stress situation. Beside other factors, illiteracy and poverty are the main contributing factors for their poor nutritional status, which is a current object of concern. Thus, it is incumbent that the nutritional status of the tribal should be improved by enhancing the socio-economic status through im-

proved education and employment opportunities. It is obvious that better educational attainment will lead to more scope for employment, which in turn will fortify their nutritional status.

RECOMMENDATIONS

In this context it is of primary importance from the public health perspective that immediate appropriate nutritional intervention programs are needed for implementation among all these ethnic groups. Nutrition and education are basic accessories needed for the upliftment of a community. Therefore, closely-knit government administered strategies have to be developed covering every interior pocket of the tribal areas. Optimal attention and developmental activities is required for tribes residing in the remote hilly terrains like the Mankidias, whose main earning source is minor forest collection and rope making. The government should come forward with realistic procurement prices and arrange for timely procurement as well as redistribution of their forest products. This will in turn enhance their economic status, which is intricately linked with the nutritional status. Thus, it is concluded that nutritional status of all the primitive and non-primitive tribes is to be monitored regularly emphasizing on the tribal groups having the highest rates of under-nutrition.

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REFERENCES

- Arlappa N, Balakrishna N, Brahman GN, Vijayaraghavan K 2005. Nutritional status of the tribal elderly in India. *Journal of Nutrition for the Elderly*, 25: 23-39.
- Basu SK 1994. The state of the art of tribal health in India. In: S Basu (Ed.): *Tribal Health in India*. New Delhi: Mamak Publications Private Limited, pp. 312-349.
- Bisai S, Bose K 2008. Body mass index and chronic energy deficiency among adult tribal populations of West Bengal: A review. *Tribes and Tribals*, Special Volume, 2: 87-94.
- Bose K 1996. Generalised obesity and regional adiposity in adult white and migrant Muslim males from Pakistan in Peterborough. *Journal of Royal Society for the Promotion of Health*, 116: 161-167.
- Bose K, Charrabarty F 2005. Anthropometric characteristics and nutritional status based on body mass index of adult Bathudis: A tribal population of Keonjhar district, Odisha, India. *Asia Pacific Journal of Clinical Nutrition*, 14: 80-82.
- Bose K, Chakraborty F, Bisai S, Khatun A, Bauri H 2006a. Body mass index and nutritional status of adult Savar tribals of Keonjhar District, Odisha, India. *Asia Pac J Public Health*, 18: 3-7.
- Bose K, Banerjee S, Bisai S, Mukhopadhyay A, Bhadra M 2006b. Anthropometric profile and chronic energy deficiency among adult Santal tribals of Jhargram, West Bengal, India: Comparison with other tribal populations of Eastern India. *Ecol Food Nutr*, 45: 1-11.
- Bulliyya G, Dwivedi B, Mallick G, Jangid PK 2004. Study on Nutritional Status of Dongria Kondh Primitive Tribes and Domb Scheduled Caste Populations of Odisha. *Studies on Nutrition- Annual Report 2003-04*. Regional Medical Research Centre, Bhubaneswar, pp. 49-54.
- Chakraborty S, Pal M, Bharati S, Bharati P 2008. Chronic energy deficiency among tribal communities of Odisha, India. *Tribes and Tribals*, Special Volume, 2: 95-101.
- Dash NC 2010. Reproductive Health, Nutritional Status and Demographic Profile of the Primitive Tribes of Odisha. *Report on the University Grants Commission - Major Research Project*, Department of Population Studies, Fakir Mohan University, Balasore, Odisha.
- Deurenberg P, Weststrate JA, Seidell JC 1991. Body mass index as a measure of body fatness: Age and sex specific prediction formulas. *British Journal of Nutrition*, 65: 105-114.
- Ferro-Luzzi A, Sette S, Franklin M, James WPT 1992. A simplified approach of assessing adult chronic deficiency. *European Journal of Clinical Nutrition*, 46: 173-186.
- Garrow JS, Webster JD 1995. Quetelet's index (W/H^2) as a measure of fatness. *International Journal of Obesity*, 9: 147-153.
- Ghosh A, Bala SK 2006. Anthropometric characteristics and nutritional status of Kondh: A tribal population of Kandhmal District, Odisha, India. *Annals of Human Biology*, 33: 641-647.
- Ghosh R, Bharati P 2006. Nutritional status of adults among Munda and Pod populations in peri urban area of Kolkata city, India. *Asia Pacific Journal of Public Health*, 18(2): 12-20.
- Ghosh S, Malik SL 2007. Sex differences in body size and shape among Santals of West Bengal. *Anthropologist*, 9(2): 143-149.
- Gogoi G, Sengupta S 2002. Body mass index among the Deoris of Assam, India. *Journal of Human Ecology*, 13: 271-273.
- Goswami M, Dash B, Dash NC 2010. Nutritional status of the Bhumija of Baleswar, Odisha. *Indian Anthropologist*, 40(1): 55-70.
- Griffiths PL, Bentley ME 2001. The nutrition is underway in India. *Journal of Nutr*, 131: 2692-2700.
- James WPT, Ferro-Luzzi A, Waterlow JC 1988. Definition of chronic energy deficiency in adults- Report of a working party of the International Dietary Energy Consultative Group. *European Journal of Clinical Nutrition*, 42: 969-981.
- Keys A, Fidanza F, Karvonen MJ 1972. Indices of relative weight and obesity. *Journal of Chronic Disease*, 25: 329-343.
- Khongsdier R 2002. Body mass index and morbidity in adult males of the War Khasi in Northeast India. *European Journal of Clinical Nutrition*, 56: 484-489.
- Khongsdier R 2005. BMI and morbidity in relation to body composition: A cross-sectional study of a rural community in North East India. *British Journal of Nutrition*, 93(1): 101-107.
- Khosla T, Lowe R 1967. Indices of obesity derived from body weight and height. *British Journal of Preventive and Social Medicine*, 21: 122-128.
- Lohman TG, Roche AF, Martorell R 1988. *Anthropometric Standardization Reference Manual*. Chicago: Human Kinetics Books.
- Ministry of Tribal Welfare (MTW) 2001. *Annual Report 2000/01 Government of India*, New Delhi.
- Mittal PC, Srivastava S 2006. Diet, nutritional status and food related traditions of Oraon tribes of New Mal (West Bengal), India. *Rural Remote Health*, 6(1): 385.
- Mosha TCE 2003. Prevalence of obesity and chronic energy deficiency (CED) among female in Morogoro District, Tanzania. *Ecology of Food and Nutrition*, 42: 37-67.
- Nube M, Asenso-Okyere WK, Van den Bloom GJM 1998. Body mass index as an indicator of standard of living in developing countries. *European Journal of Clinical Nutrition*, 77: 1186-1191.
- Pryer JA, Rogers S 2006. Epidemiology of undernutrition in adults in Dhaka slum households, Bangladesh. *European Journal of Clinical Nutrition*, 60: 815-822.
- Sahani R 2003. Nutrition and health status of the Jara-was: A preliminary report. *Journal of the Anthropological Survey of India*, 52: 47-65.
- Sharma PD 2004. *Nutrition and Health among the Tribes of India*. In: AK Kalla, PC Joshi (Ed.): *Tribal Health and Medicines*. New Delhi: Concept Publishing Company.
- Shetty PS, James WPT 1994. Body Mass Index: A Measure of Chronic Energy Deficiency in Adults.

- Food and Nutrition, Report of the Food and Agricultural Organization, *Paper No. 56*, Rome.
- Smalley KJ, Knerr AN, Kendrick ZV 1990. Reassessment of body mass indices. *American Journal of Clinical Nutrition*, 52: 405-408.
- Strain GW, Zumoff B 1991. The relation of weight-height indices of obesity to body fat content. *Journal of American College of Nutrition*, 11: 715-718.
- Strickland SS, Ulijaszek ST 1994. Body mass index and illness in Sarawak. *European Journal of Clinical Nutrition*, 48(Suppl-3): S98-S109.
- Subramanian SV, Smith GD 2006. Patterns, distribution and determinants of under and over-nutrition: A population based study of women in India. *American Journal of Clinical Nutrition*, 84: 633-640.
- Topal YS, Samal PK 2001. Causes for variation in social and economic condition among tribes of Indian Central Himalaya: A comparative study. *Man in India*, 81: 87-88.
- Ulijaszek SJ, Kerr DA 1999. Anthropometric measurement error and the assessment of nutritional status. *British Journal of Nutrition*, 82: 165-177.
- World Health Organization 1995. Physical Status: The Use and Interpretation of Anthropometry, *Technical Report Series No. 856*. Geneva: World Health Organization.