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A COMPARATIVE STUDY ON BODY MASS INDEX AND PREVALENCE OF CHRONIC ENERGY DEFICIENCY AMONG ADULT MALE LODHAS AND MUNDA OF BANKURA DISTRICT OF WEST BENGAL, EASTERN INDIA

Physiology

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ABSTRACT

BACKGROUND:The Health and nutritional status of an individual depends on the food he eats. Man needs a wide range of nutrients to lead a healthy and active life and these are derived through the diet they consume daily. Good nutrition is a basic component of health. Aim to report the anthropometric characteristics and nutritional status of adult male Lodha and Munda, two tribes of the *Bankura District, West Bengal,India*. A total of 157 Lodha and 161 Munda adult (>18 years) men from four villages located near Bishnupur town in *Bankura District, West Bengal,India* was investigated. Height and weight were recorded and the body mass index (BMI) computed using the standard equation. Nutritional status was evaluated using internationally accepted BMI guidelines. The public health problem of low BMI in these populations was classified according to the World Health Organization criteria Results Lodha males had significantly higher mean height ($p<0.01$), weight ($p<0.001$) and BMI ($p<0.01$) compared with Munda. Both Lodha (45.2%) as well as Munda (48.4%) males had similar high rates of chronic energy deficiency CED. According to the WHO classification of the public health problem of low BMI, the prevalence of CED was very high (_40%) in both these groups, indicating a serious situation. Conclusion Since the nutritional status of these two populations was unsatisfactory, immediate public health programs should be initiated to reduce the prevalence of CED.

KEYWORDS

India Tribes Lodha Munda Body mass index Nutritional status

INTRODUCTION

According to census reports that India has more than 84 million tribals who constitute 8.2% of the total population (Mittal and Srivastava 2006). India probably has the largest number of tribal communities in the world (Topal and Samal 2001). The vast majority of the tribal populations reside in rural areas of the country. The tribal populations of India are recognized as socially and economically vulnerable (Ghosh and Bharati2006). Lodha and Munda are two such tribes resident in Bankura District of West Bengal, India. Originally, Lodhas inhabited hilly rugged terrains covered with jungle. Their mother tongue is Lodha, which is close to Savara, an Austro-Asiatic language. Traditionally, they were forest dwellers, but now they have started cultivation either as owner or as agricultural laborer and are also engaged in hunting and fishing. More than 80%of them follow Hinduism with their traditional belief in sprits and nature (Mandal et al. 2002). The Munda are the third largest tribal group in West Bengal. The term "Munda" means owner of the soil. They inhabit rugged forested terrains and speak Bhumij, an Austro- Asiatic language. They are divided into several exogenous clans and are basically agriculturists. As supplementary occupation, they practice hunting and trapping of birds and animals in the jungles. Some of them work as laborers in agricultural and other sectors. More than 95% of the Munda Bhumij follow some traits of Hinduism. They take part in all the religious festivals of the Hindus in West Bengal (Mandal et al. 2002). Although there are several techniques available to study nutritional status (Lee and Nieman 2003), it has now been well established that anthropometry is best suited to assess the nutritional and health status of adults, especially in field surveys (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 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, noninvasive and suitable for large-scale surveys (Lohman et al1988; Ferro-Luzzi et al. 1992; James et al. 1994; Lee and Nieman 2003). 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 socioeconomic 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 an inadequate intake of energy accompanied by a 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 behavioral changes (Kusin et al. 1994). Hitherto, data have been scanty on the anthropometric and nutritional status of various tribal populations of India (Arlappa et al. 2005; Bose and Chakraborty 2005; Bose et al. 2006a, b, c, d; Ghosh and Bala 2006). It has been recently suggested (Bose and Chakraborty 2005) 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 the anthropometric characteristics and nutritional status of adult male Lodha and Munda, two tribes of *Bishnupur, West Bengal,India*. These results were also compared with findings from other tribal populations of West Bengal.We could not locate any published This cross-sectional study was conducted during January- April, 2007. The data on Munda were collected from four villages, Sarenga, Chatna,Bishnupur,Gorbeta. The data on Lodhas were obtained from Susunia. These villages are located within 25 km from Bishnupur town in Bankura District,West Bengal. Bishnupur is an important railway station and is located approximately140 km from Kolkata (the state capital ofWest Bengal). Adult (>18 years) male residents of all houses in the study villages were contacted, and a total 157 Lodha and 161 Munda men were included in the study. The response rates were 82% and 86% in the two ethnic groups, respectively. The vast majority of the subjects were illiterate and very low-wage earning manual laborers. Thus, they belonged to the low socioeconomic class. Ethical permission was obtained from relevant authorities. Informed consent was also obtained from all subjects. Trained investigators (PSM and MG) made the anthropometric measurements following the standard techniques of Lohman et al. (1988). Height and weight were recorded to the nearest 0.1 cm and 0.5 kg, respectively. Technical errors of

measurements (TEM) were computed, and they were found to be within acceptable limits (Ulijaszek and Kerr1999). BMI was computed using the following standard equation:

BMI= weight (Kg)/height (m2)

Nutritional status was evaluated using internationally accepted BMI guidelines (WHO 1995). 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 Range	BMI= 18.5-24.9
Overweight	BMI≥25.0

Student's t-test was performed to test for sex differences in the mean anthropometric characteristics between the two tribes. Ethnic differences in CED/non CED were determined by Chi-square test.

RESULTS

The anthropometric characteristics of the two tribes are presented in Table I. Both the groups have similar mean ages (Lodhas – 38.81±16.64 years; Munda – 36.23±17.10 years). Lodha males had significantly higher mean height (L-161.43, K-158.80; p<0.001), weight (L-50.98, K-48.31; p<0.001) and BMI (L-19.56, K-19.11; p<0.1) compared with Munda.

Table – I: Characteristics Of Adult Lodha And Munda Males Of Bankura District, West Bengal,india

Variables	Lodha (n-204)	Munda (n-157)	t
	Mean (SD)	Mean (SD)	
Age	38.81 (16.64)	36.23 (17.10)	1.438
Height (cm)	161.43 (5.8)	158.80 (6.2)	4.109*
Weight (Kg)	50.98 (6.6)	48.31 (7.3)	3.591*
BMI (Kg/m2)	19.56 (2.4)	19.11 (2.6)	1.66**

***p<0.001**
****p<0.1**

Prevalence of Chronic Energy Deficiency (CED) and nutritional status of the adult male Lodhas (n-204) and Munda (n-157) are presented in Table-II. The high frequency of CED (BMI<18.5 kg/m2) among the Lodhas (48.5%) and Munda (50.3%) indicates that the adult male populations of these tribes are suffering from severe under-nutrition. According to the WHO classification of the public health problem of low BMI, the prevalence of CED was very high (≥40%) in both these groups, indicating a critical situation. But ethnic differences in under-nutrition between the two tribes were not found to be significant.

Table – II: Nutritional status of Adult Lodha and* Munda *Males of Bankura District, West Bengal,India

Nutritional Status	BMI (Kg/m2)	Lodha (n-204)	Munda (n-157)
		Frequency (%)	Frequency (%)
CED G-III	<16.0	8 (3.9)	10 (6.4)
CED G-II	16.0-16.9	39 (19.1)	32 (20.4)
CED G-I	17.0-18.4	52 (25.5)	37 (23.6)
Normal	18.5-24.9	98 (48.0)	75 (47.8)
Overweight	≥25.0	7 (3.4)	3 (1.9)
Total Under-nutrition (BMI<18.5)		99 (48.5)	79 (50.3)

Proportion test: chi-square(df=1) =0.11

DISCUSSIONS

Under-nutrition remains to be a significant problem in the Asian countries (Wickramasinghe et al 2004, 114-118). Several recent studies from India (Yadav et al 1999, 101-106; Khongsdier 2001, 374-383; Gogoi and Sengupta 2002, 271-273; Sahani 2003, 47-65; Adak et al 2006a, 201-218; b, 23-31) have utilized BMI to study nutritional status of tribal populations of India. Moreover, recent investigations (Bose and Chakraborty 2005, 80-82; Bose et al 2006c, 65-68; d, 1-11; Datta Banik et al 2007, 348-352; Datta Banik 2008, 91-98; Ghosh and Bharati 2006, 12-20; Chakraborty et al 2008, 95-101; Ghosh 2007; Mondal 2007; Ghosh and Malik 2007, 143-149; Mittal and Shrivastava 2006, 385; Bisai and Bose 2008, 87-94; Goswami et al 2010, 55-70; Goswami 2011; Goswami 2012, 39-47) have studied the anthropometric characteristics and levels of under-nutrition (CED) among various tribal populations of Eastern India. These studies have dealt with various primitive and non-primitive tribes (Bathudi, Bhumij, Bhuyan, Dhimal, Gond, Juang, Khond, Koramudi, Lodha, Mankidia, Munda, Oraon, Paroja, Santal, Savara) of Eastern India. However information of the Lodhas and Mundas of Bankura district of West Bengal is lacking. In view of this the present paper presents unique data on BMI and CED rates among the male Lodhas and Mundas.

Table-III compares the mean BMI and the levels of CED (among males) of the various tribal populations of Eastern India. From this Table it can be inferred that, in general, the mean BMI of the tribes of Eastern India was in the range of 17.3-20.0 Kg/m2. Moreover the rates of CED varied between 27.0% and 80.0%. These rateswere in the category high (20%-39.0%) to very high (≥40%). These results clearly indicate that males of these tribes are under serious or critical nutritional stress.

Table – III: Mean BMI and prevalence of CED among various tribes of Eastern India

Tribe	Sample Size (n)	Mean BMI (Kg/m2) (SD)	CED (%)	Study Area	Reference
Bathudi	226	18.4 (1.9)	52.7	Keonjhar	Bose & Chakraborty (2005)
Bhumij	66	18.7 (2.41)	48.5	Balasore	Goswami et al (2010)
Bhumij	161	18.7 (2.4)	48.4	Paschim Medinipore	Ghosh (2007)
Bhuyan*	303	18.2 (2.71)	58.7	Keonjhar & Anugul	Goswami (2012)
Bhuyan*	50	19.41 (1.84)	30.0	Keonjhar	Chakraborty et al (2008)
Dhimal	159	19.5 (2.0)	27.0	Darjeeling	Datta Banik et al (2007)
Gond	99	18.11 (1.51)	64.64	Kalahandi	Chakraborty et al (2008)
Kharia*	157	19.1 (2.6)	50.3	Mayurbhanj	Present Study (2012)
Khond*	100	19.17 (1.95)	35.0	Kondhmal	Charraborty et al (2008)
Koramudi	250	18.7	48.0	Bankura	Bose et al (2006c)
Koramudi	87	18.6 (1.9)	51.7	Paschim Medinipur	Bisai & Bose (2008)
Lodha*	157	19.5 (2.7)	45.2	Paschim Medinipur	Mondal (2007)
Lodha*	414	19.3 (2.3)	48.5	Mayurbhanj	Present Study (2012)
Mankirdia*	124	19.3 (2.15)	52.4	Mayurbhanj	Goswami (2011)
Munda	153	18.7 (1.8)	49.0	Kolkata	Ghosh & Bharati (2006)
Munda	50	19.11 (1.68)	34.0	Mayurbhanj	Chakraborty et al (2008)
Oraon	200	18.8 (2.0)	47.0	Jalpaiguri	Mittal & Srivastava (2006)
Oraon	290	18.48	53.1	Ranchi	Datta Banik (2008)
Paraja*	50	17.31 (1.84)	80	Koraput	Chakraborty et al (2008)
Santal	197	20.0 (2.6)	31.5	Paschim Medinipur	Bose et al (2006d)
Santal	400	18.5	55.0	Bankura	Ghosh & Malik (2007)
Santal	106	18.28 (1.47)	63.2	Mayurbhanj	Chakraborty et al (2008)
Savara	200	18.46 (1.59)	53.0	Gajapati & Ganjam	Chakraborty et al (2008)

**- PTGs (Particularly Vulnerable Tribal Groups)*

In this situation, most importantly, immediate nutritional interventional programs are needed for implementation among all these ethnic groups. Although priority must be given to tribal groups having the highest rates of under-nutrition, all groups must be incorporated in these food supplementation programs. It is imperative that these recommendations should include not only adequate dietary intake but also various ways in which they can enhance their socio-economic status through improved education and employment opportunities. Better educational attainment will lead to more scope for employment and healthier dietary practices. Thus relevant Government authorities should play a pro-active role in reducing the rates of under-nutrition among tribals.

The rate of under-nutrition more or less varies among the different tribes of Eastern India. This distinct inter-tribal difference is due to their socio-economic conditions and also in the environment in which they reside, i.e. the ecology of the population. Each tribal population has its unique food habits (Mondal et al 2002) and variations also exist in social and economic conditions among the tribals of India (Topal and Samal 2001, 87-88). Keeping this in mind various tribal specific intervention programs should be formulated & initiated.

Furthermore, there is an urgent need for further studies to ascertain the relationship of this high rate ofunder-nutrition with morbidity and mortality among this ethnic group. Similar studies should also be undertaken among other tribal population in India since they constitute a sizeable portion of India's population. Moreover, since under-nutrition has several underlying causes (WHO 1995), future investigations should aim at identifying the likely cause(s) of high rates of under-nutrition among Indian tribal populations.

CONCLUSION

Since the nutritional status of these two populations was unsatisfactory, immediate public health programs should be initiated to reduce the prevalence of CED.

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