

Body Mass Index and Chronic Energy Deficiency among Adult Male Lodhas and Kharias of Mayurbhanj, Odisha. Comparison with other tribal populations of Eastern India

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Abstract. *Odisha is one of the most backward states in India. Naturally its reflection will be felt in the tribal communities also. There exists scanty information of the prevalence of under-nutrition among the tribal population of Odisha. In view of this, the objective of the present study is to report the anthropometric characteristics and determine the nutritional status, based on BMI, of the adult male Lodhas and Kharias, two particularly vulnerable tribal groups (PTGs) of Mayurbhanj district of Odisha, India. A comparison is also made with other tribal males of Eastern India. A total of 204 Lodha (from three villages) and 157 Kharia (from five villages) adult (>18 years) men of Mayurbhanj district, Odisha were studied. Height and weight were recorded and the body mass index (BMI) was computed using the standard equation. Nutritional status was evaluated using internationally accepted BMI guidelines. Lodha males had significantly higher mean height ($p < 0.001$), weight ($p < 0.001$) and BMI ($p < 0.1$) compared with the Kharias. Both the Lodha (48.5%) as well as the Kharia (50.3%) males had similar high rates of Chronic Energy Deficiency (CED). According to the WHO classification of public health problem of low BMI, the prevalence of CED was very high ($\geq 40\%$) in both these groups, indicating a critical situation. This paper also provides strong evidence that, in general, tribal population of Eastern India are experiencing serious or critical nutritional stress. Hence immediate appropriate nutritional intervention programs are needed for implementation among all these ethnic groups.*

Key words: Nutritional Status, Body Mass Index, Chronic Energy Deficiency, Lodha, Kharia, Odisha.

Introduction

More than half of the world's undernourished populations live in India (Krishnaswami 2000, 1268-1269). Improvements in the nutritional status of the population during the last two to three decades have not been impressive (Griffiths & Bentley 2001, 2692-2700). Moreover, the tribal populations of India are recognized as socially and economically vulnerable (Ghosh and Bharati 2006, 12-20). The Lodhas and Kharias are two such particularly vulnerable tribal groups (PTGs) of Mayurbhanj District of Northern Odisha, India.

The Lodhas are inhabiting the jungle-clad hilly terrains of the Chotanagpur plateau running across the Bengal-Odisha-Bihar border including the Mayurbhanj District in Odisha, Singhbhum District in Bihar and Midnapur District in West Bengal. The Lodhas are exclusively a jungle tribe thriving on hunting and food gathering and trace their descent from the Savaras. Lodhas are ex-criminal Scheduled tribes of Odisha. They are famous for their aggressiveness and criminal activities. A micro-project called Lodha Development Agency, founded in 1986, have implemented various welfare schemes for the socio-economic development of the Lodha in Mayurbhanj District. Morphologically the Lodhas are medium statured persons endowed with a strong physique, brown to dark brown complexion, scanty hair on face & body and the Mongolian eye fold is slightly traced among the elderly population.

The Kharias are widely spread over Odisha, Bihar, West Bengal and Madhya Pradesh. The Similipal hill ranges or the Mayurbhanj hills are the hearth and home of the Hill Kharia. The Hill Kharia are the primitive and backward section of the tribe and represent the hunting and food gathering stage of economic life along with the practice of rudimentary cultivation and primitive culture. Kharias are low medium statured people with a

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complexion which varies from brown to dark brown. They possess a medium built body, less hair growth on face and body. The Mongolian eye-fold is not marked. Originally the Kharias resembles the Mundas and tends to show that they are the elder branch of that tribe.

It is an established fact that body mass index (BMI) is a useful anthropometric indicator of measuring nutritional status of the population (FAO, 1996) and is specifically suitable for large scale surveys (Ulijaszek and Kerr 1999, 165-177; WHO 1995). The prevalence of chronic energy deficiency (CED) measured through BMI is generally considered a good indicator of not only the nutritional status but also the poor demographic, socio-economic and environmental conditions of the population, especially adult population of developing countries (Ferro-Luzzi et al 1992, 173-186; Shetty and James 1994; Nube et al 1998, 136-144; Khongsidier 2002, 484-489; Mosha 2003, 37-67; Pryer and Rogers 2006, 815-822; Subramaniam and Smith 2006, 633-640). A BMI < 18.5 kg/m² is widely used as a practical measure of chronic energy or hunger deficiency (CED), i.e. a “steady” underweight (Khongsidier 2005, 101-107). Such a “steady” underweight or chronic under-nutrition reduces physical capacity (James et al 1994, 883-894), increases mortality (Harris et al 1993, 1318-1327) and morbidity (Khongsidier 2002, 484-489). Several studies shows high chronic energy under-nutrition among tribals across India (Ferro-Luzzi et al 1992, 173-186; Khongsidier 1997, 299-305; Adak et al. 2006a, 201-208; 2006b, 23-31; Bose et al 2006a;b;c;d) and specifically in the state of Orissa (Bulliyya et al 2004; Bose and Chakraborty 2005; Bose et al 2006a, 353-356; 2006b, 3-7; Chakraborty et al 2008, 95-101; Goswami et al 2010, 55-70; Goswami 2011, Goswami 2012, 39-47) which has the largest number (62) of tribal communities (Ministry of Tribal Welfare 2001). But the degree of prevalence differs from one community to other. However, in general data are scarce on the nutritional status of various tribal populations of India (Yadav et al. 1991, 101-106; Khongsidier 2001, 374-383; 2002, 484-489; Gogoi and Sengupta 2002, 271-273; Goswami et al. 2010, 55-70). Thus, there is an urgent need to evaluate the nutritional status of various tribes of India. In view of this, the present study is an endeavour to investigate the prevalence of under-nutrition among the adult male Lodhas and Kharias, the two tribal communities of Mayurbhanj district of Odisha. This paper also reports the variation of the prevalence of chronic under-nutrition across the various tribal communities of Eastern India.

Materials and Methods

The present study was conducted during January-April 2010. The data on Lodhas were collected from three villages and the data on Kharias were obtained from five villages of Mayurbhanj District. Adult (>18 years) male residents of all houses in the study villages were contacted, and a total of 204 Lodha and 157 Kharia men were included in the study. The response rates were 84% and 88% in the two ethnic groups respectively. The vast majority of subjects were illiterate and very low-wage earning manual labourers. Thus they belong to the low socio-economic class.

Ethical approval was obtained from relevant authorities. Informed consent was also obtained from local community leaders and each participant. The anthropometric measurements were taken using 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 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 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; Kharias – 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 Kharias.

Table – I: Characteristics of Adult Lodha and Kharia Males of Mayurbhanj, Odisha

Variables	Lodha (n-204)	Kharia (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/m ²)	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 Kharias (n-157) are presented in Table-II. The high frequency of CED (BMI < 18.5 kg/m²) among the Lodhas (48.5%) and Kharias (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 ($\geq 40\%$) 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 Kharia Males of Mayurbhanj

Nutritional Status	BMI (Kg/m ²)	Lodha (n-204)	Kharia (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: $\chi^2(df=1) = 0.11$

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 Kharias of Mayurbhanj district of Odisha is lacking. In view of this the present paper presents unique data on BMI and CED rates among the male Lodhas and Kharias.

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 rates

were in the category high (20%-39.0%) to very high ($\geq 40\%$). 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/m ²) (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 of

under-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.

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