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Original Research Article

Body Mass Index and Chronic Energy Deficiency among Adults of Tharu Population, Uttarakhand, India

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Abstract

Objectives: A cross-sectional study was conducted to evaluate the nutritional profile and nutritional status based on BMI of adult Tharu, a tribal population of Uttarakhand, India.
Methods: A total of 176 adult (aged > 18 years) Tharus of four villages of Udham Singh Nagar District, Uttarakhand, India, were studied. Height, weight has been taken as anthropometric measurements and BMI was calculated to ascertain nutritional status.
Results: Overall, the extent of under-nutrition (BMI < 18.5) was found to be moderately high (22.2%) especially among old aged individuals. Moreover, there was a significant difference in the prevalence of under-nutrition between males (26.2%) and females (18.9%).
Conclusion: It is suggested that some immediate nutritional intervention programmes are needed for implementation among Tharu community of Uttarakhand, especially among old age individuals.
Keywords: Anthropometry, Body Mass Index, chronic energy deficiency, Nutritional Status, Tharu.

1.Introduction

India, one of the biggest democratic countries of the world, has its commitment to the creation of a society free from poverty, ignorance and diseases, so that equality, freedom and justice can be made accessible to all the citizens of the country in general and tribes in particular.[1] The tribes of India comprise about 8% of the total population of the country having probably the largest number of tribal communities in the world.[2] Several research studies on tribal population living in different parts of India have found them to be socially and economically vulnerable because of their geographical isolation, socio-economic disadvantage and inadequate health facilities.[3,4]

The tribal scenario of Uttarakhand presents a composite picture in which every tribal group has its own identity, peculiarity and life style.[1] Percentage of Schedule Tribes in Uttarakhand is 3% i.e. 2.56 lakhs ST out of a total population of 84.89 lakhs.[5] Out of these, Tharu comprises highest population i.e. 82,390. Tharu people are living in the Terai plains on the border of India and Nepal. In India, Tharu are inhibiting mostly in Chaparan District of Bihar; Udham Singh Nagar District of Uttarakhand; Kheeri, Pilibhit, Gonda, Balrampur, Gorakpur, Bahirayach district of Uttar Pradesh.[6]

Although, adult nutritional status can be evaluated in many ways, [7] it is established fact that Body Mass Index (BMI) is useful anthropometric indicator of measuring nutritional status of the population.[8] 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.[9-15] Hitherto, majority of studies on body composition from India have been restricted to non-tribal populations.[16] There is urgent need to evaluate the nutritional status of various tribes of India.[17] In the view of this, the present study has attempted to evaluate prevalence of under-nutrition among adult Tharu. It is the first report on anthropometric and nutritional profile on adults of Tharu population.

2. Material & Methods

The data were collected from four villages, *viz*. Bhigra Bagh, Chanda, Nadana and Umarukhurd of Udham Singh Nagar District, Khatima Subdivision of Uttarakhand, India under the national project "Community Genetics and Health". Ethical approval was obtained from Institutional Ethical Committee of Anthropological Survey of India. Total number of 176 adult (>18yrs) individuals (87 males and 89 females) were included in the present study. All male and female individuals were selected at random from the above mentioned villages for the present study. All the participants were apparently healthy individuals. The vast majority of participants were illiterate; all of them were cultivators and engaged in agricultural labour. Maximum number of female participants was housewives and few of them were low-wage earning labourers. Prior permission was obtained from local community leaders as well as relevant authorities before commencement of the study. Informed written consent was obtained from each participant. Information on ethnicity and socio-demographic profile were obtained from all participants with the help of pretested schedule.

All the anthropometric measurements have been taken by trained investigators using standard techniques.[7] Height and weight were recorded to the nearest 0.1cm and 0.5kg respectively. Errors of measurement were computed and they were found to be within acceptable limits.[18] Body Mass Index (BMI) was calculated using the following standard equation:-

BMI (Kg/m^2) = Weight (kg)/Height (m^2)

Nutritional status was evaluated by using internationally accepted BMI guidelines given by World Health Organisation (WHO, 1995). The following cut off points were used –

Undernutrition: BMI <18.5

Normal: 18.5 ≤ BMI<25.0

Overweight: BMI ≥ 25.0

Obese: BMI ≥30

Chronic Energy Deficiency (CED) grades III, II, I were identified by BMI values as follows-

CED III: 16.0

CED II: 16.0 – 16.9

CED I: 17.0-18.4

2.1 Statistical Methods

Means and Standard Deviations of all anthropometric variables and BMI were computed for each sex separately. Contingency Coefficient test (Crosstab) was used to compare male and female difference in nutritional status. All statistical analysis was undertaken by using the Statistical Package for Social Science (SPSS 16.0) programme.

3. Results

The mean ages of both sexes were 50.62±17.09 and 46.10±15.67 respectively. The anthropometric characteristics are demonstrated in table 1. Table 2, has shown that males had significantly greater mean height (161.72± 7.06) and weight (55.46± 11.25) in comparison to female participants ($p<0.001$). Both sexes exhibited almost similar BMI (Male: 21.18±4.00 & Female: 21.52±3.57). Table 3, represented the nutritional Status of the Tharu adults. Overall, the extent of under-nutrition (N-39, 22.2%) was found to be moderately high. Moreover, there was a non significant difference in the prevalence of under-nutrition between males (26.2%) and females (18.9%) by Contingency Coefficient (CC) test (CC= 0.123; P=0.443). Overall, 58.6% of males and 68.5% of females have shown BMI within normal range. Table 4, has demonstrated the prevalence of Chronic Energy Deficiency (CED) among adult male and females of Tharu community. Total 39 individuals (both male and female) have reported for CED. Here, males shown more frequency (15.2%) of CED I than females (8.2%). In addition to that, both males and females were revealed almost equal number of CED II and CED III. Distribution of CED (%) among different age groups of adult Tharu population was presented in table 5. In this context, maximum number of individuals has shown CED I (51.3%) followed by CED II (33.3%) and CED I (15.4%). Interestingly, 12 individuals above 60 years of age have revealed more prevalence of CED out of 39 individuals.

Table 1: Anthropometric Characteristics of Adult Tharu

Variable	Mean	SD
Age (yrs)	48.13	16.42
Height (cm)	157.09	7.82
Weight (kg)	52.75	10.36
BMI (kg/m^2)	21.35	3.78

Table 2: Anthropometric Characteristics among Males and Females of Adult Tharu

Variable	Gender	No.	Mean	SD	t	P
Age (yrs)	Male	87	50.39	16.64	1.816	0.071
	Female	89	45.92	16.00		
Height (cm)	Male	87	161.72	7.06	9.552	0.000
	Female	89	152.57	5.56		
Weight (kg)	Male	87	55.46	11.25	3.541	0.001
	Female	89	50.10	8.68		
BMI (kg/m^2)	Male	87	21.18	4.00	0.595	0.553
	Female	89	21.52	3.57		

Table 3: Prevalence of under- nutrition based on BMI among adult Tharu

Nutritional Status		Gender		Total	CC	P
		Male	Female			
Under weight	F	23	16	39	0.123	0.443
	%	26.4%	18.0%	22.2%		
Normal	F	51	61	112		
	%	58.6%	68.5%	63.6%		
Overweight	F	8	9	17		
	%	9.2%	10.1%	9.7%		
Obese	F	5	3	8		
	%	5.7%	3.4%	4.5%		
Total	F	87	89	176		
	%	100.0%	100.0%	100.0%		

Table 4: Prevalence of CED (%) among adult Tharu Population

Nutritional Status		Gender		Total	CC	P
		Male	Female			
CED III	F	3	3	6	0.225	0.352
	%	13.0%	18.8%	15.4%		
CED II	F	6	7	13		
	%	26.1%	43.8%	33.3%		
CED I	F	14	6	20		
	%	60.9%	37.5%	51.3%		
Total	F	23	16	39		
	%	100.0%	100.0%	100.0%		

Table 5: Distribution of CED (%) among Different Age groups of adult Tharu Population

Nutritional Status	Age Group					Total	CC	P
	18-30	31-40	41-50	51-60	>60			
Chronic Energy Deficient Grade III	0	1	1	0	4	6	0.445	0.292
	0%	25.0%	12.5%	.0%	33.3%	15.4%		
Chronic Energy Deficient Grade II	2	0	3	3	5	13		
	28.6%	0%	37.5%	37.5%	41.7%	33.3%		
Chronic Energy Deficient Grade I	5	3	4	5	3	20		
	71.4%	75.0%	50.0%	62.5%	25.0%	51.3%		
Total	7	4	8	8	12	39		
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		

4. Discussion

The results of the present study indicated the prevalence of under-nutrition among adult Tharu was moderately high especially among old aged individuals. Total 30.76% of old aged individuals (above 60 yrs) have shown under-nutrition which may indicate a combination of physical changes viz. reduction in lean body mass, reduced appetite, loss of interest in food consumption as well as reduced availability and social context of food can lead to low levels of nutrition.[19] Furthermore, at the age groups 41-50yrs and 51-60yrs, equal number of individuals (20.51%) has demonstrated under-nutrition indicated nutritional deficiency associated with increasing age among Tharu tribal population.

Number of studies has shown that elderly people are more vulnerable for nutritional inadequacy as compared to adults and increasing in the prevalence of under-nutrition among elderly people over the world. [20-22] Malnutrition in elderly is a common problem albeit under diagnosed and when diagnosed is often untreated. The cornerstone to proper management of malnutrition in elderly is early detection by nutritional assessment and prompt treatment.[21] In view of the public health, it is suggested that some immediate nutritional intervention programmes are needed for implementation among Tharu community of Uttarakhand, especially among old age individuals. Furthermore, there is an urgent need for future studies to ascertain the relationship of this moderately high rate of under-nutrition among elderly people with morbidity and mortality among this ethnic group, not only that the future study needs to address

the effect of societal attitudes towards food among old aged people of Tharu community.

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