©*Genus Homo* (ISSN 2457-0028)
Dept of Anthropology
West Bengal State University

Genus *Homo*, Vol. 6, 2022
Parvin et al pp. 23-34
Accepted on 30th December 2022
Published on 31st December 2022

Original article

ASSESSMENT OF NUTRITIONAL STATUS BASED ON ANTHROPOMETRIC MEASUREMENTS AMONG THE BIRHOR FEMALES OF PURULIA DISTRICT, WEST BENGAL, INDIA

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ABSTRACT

Background: In India a blend of people living in urban, rural & tribal areas. According to NFHS-3data 46.6% tribal females had Body Mass Index (BMI) below 18.5 kg/m^2 indicating chronic energy deficiency. Birhor tribe is one of the PVTGs of West Bengal. So based on this background this study intends to evaluate the nutritional status of the Birhor females of Purulia district, West Bengal. **Methods:** The present study is a cross-sectional study conducted in 3 blocks, viz. Baghmundi, Jhalda and Balarampur of Purulia district among randomly selected 80 Birhor female participants of above 18 years age group. Birhor population was selected through their higher concentration of a residential area. A pre-tested semi structured schedule was used tocollect the information. Various anthropometric measurements were collected and nutritional status was calculated by Body mass index, Waist – hip ratio, Broca index and Wirth's standard index. **Results:** In the present study mean BMI obtained as 19.20 (±2.67) kg/m^2. The BMI shows that total 22.5% among them come under Chronic Energy Deficiency grade III, II, I and 38.1% are under Low weight normal grade. According to Wirth Standard value, 45% female are under nourished and 47.5% are normal. Whereas, Broca Index values shows that 45% of females are normal and 10 % of them fall under the obese category. As Waist-Hip ratio mainly indicates central obesity so it has been noticed that only 23.8% are under obese category and rest 76.2 % are normal. **Conclusion:** The present study has noticed that the nutritional status of adult Birhor female was not satisfactory. A well-planned and coordinated effort is needed to improve the scenario of malnutrition among them.

Key words: Birhor, Anthropometric Indices, Nutritional Status, Chronic Energy Deficiency.

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INTRODUCTION

Malnutrition is defined as "a state in which the physical function of an individual is impaired to the point where he or she can no longer maintain adequate bodily performance process such as growth, pregnancy, lactation, physical work and resisting and recovering from disease (WFP, 2000). The world is now bearing dual burden of malnutrition that is both over nutrition and under nutrition. This can be called as Nutrition transition phase, that means overweight and obesity predominate as diet related health problems in industrialized countries and under nutrition among large segments of world's population especially vulnerable sections such as tribal communities (Kue, 2005).

India is a diverse country where all kind of people living in urban, rural and tribal areas. According to National Family Health Survey -3 (2005-06) data on health & nutritional indicators and provides a clear picture of the status of tribal females. According to NFHS-3, 46.6% of tribal females had Body Mass Index (BMI) below 18.5, indicating chronic energy deficiency (MWCD, 2011).

Several research studies on tribal population of India reported that prevalence of chronic energy deficiency was high among tribal population. As females are the vulnerable section of the society the impact on their health are much higher. Health and Nutritional status of tribal population clearly indicates that, the goal of Health for all can't be fully achieved unless due care is paid to the susceptible sections of the society i.e., tribal's and especially tribal females.

Many studies have been undertaken on different aspect of Birhor tribe but available literatures indicated very few intensive studies using anthropometric parameters, standard values (Wirth's and Broca index). Specially at present health and nutrition problems exist all over the world and are particularly noticeable among the Birhor (PVTG) in West Bengal. The objective of the present study was to evaluate the nutritional status of the adult Birhor females of Purulia, West Bengal, through anthropometric indicators like Body Mass Index (BMR), Waist Hip Ratio (WHR) Wirth's standard value and Broca standard value,

MATERIALS AND METHODS

Study area and people

India consists of only 17,241 the Birhor tribal populations, now Particularly Vulnerable Tribal Group this community has pointed out as the most endangered tribal group as they hold only 0.01% of the total Tribal population in India (Census of India, 2011) They are mainly distributed in different states of India, such as Bihar, Madhya Pradesh, Chhattisgarh, Jharkhand, Odisha and West Bengal. They were migrated in Purulia from Ranchi, Gumla and Hazaribagh area of the Chotanagpur plateau. In West Bengal, they are mainly residing in the Purulia district. Approximately 78 Birhor families are present in Purulia district. The present study was tried to cover total number of families. Birhors are identified as one of the smallest Particularly Vulnerable Tribal Groups (PVTG) of India. Their mother tongue is belonging to "Austro-Asiatic" language group).

The present study is a cross-sectional study and data was collected during March 2018. In West Bengal, Birhor community mainly build up colony at Baghmundi, Balarampur, and Jhalda-1 block under Purulia district. The villages are Bhupatipally, Barrherria, Baredi under Baghmundi Block, Bersa under Balarampur Block and Chhotobakat under Jhalda-1 Block. The Birhors in West Bengal are given the surname, *Sikari*. The name Birhor means *Jungle Man.* In previous time Birhors are nomadic and hunting gathering tribal group, but now most of them are settled down. In Purulia district they speak in *Sandri* and *Bengali* language for their inter group communication (Mukherji, 1991)

Sampling and data collection

In the present study, two stage simple random sampling method have been adopted. At the first stage, one large residential area of Birhor tribe of Purulia district was selected through clustered sampling method. At the second stage, to collect anthropometric data among 80 adult female individuals were selected and measurements were recorded.

Information on age, sex, height and weight were collected through pretested schedule followed by interview and examination. Anthropometric measurements (i.e., height and weight) were performed in all selected participants according to the standard procedures (Lohman et.al, 1988.).

Anthropometric measurements include: Height, weight to obtain BMI as well as waist circumference and hip circumference were collected from adult Birhor females of 18 to 49 years to obtain Waist – hip ratio and classified them according WHO standard. From these measurements Wirth standard value index and Broca index were used for classification.

The weight was measured by using digital scale to the nearest 0.1 kg and height was measured using anthropometric rod to the nearest of 0.1 cm, respectively. BMI was computed using the following WHO standard of 1995, equation BMI=weight (kg)/ height (m^2).

Data analysis

Qualitative data was assessed as per researcher's impression, in case of quantitative data; descriptive statistics were applied such as Simple percentage, mean, median, standard deviation. For statistical analysis MS Excel and SPSS trail version-21 software were used.

Human subject ethical considerations

Verbal informed consent was obtained prior to each interview and measurement, in the presence of the traditional village headman, because most of the subjects were non-literate as well as relevant authorities and local community leaders were informed about the objective of the field work. Ethical approval was obtained from the appropriate ethical committees of the West Bengal State University.

RESULTS AND DISCUSSION

Here in the present study **table 1** stated about the descriptive statistics of anthropometric variables which indicates the nutritional status of adult Birhor females. In this table it was found that Mean height and weight of adult Birhor females are respectively 146.74(±5.32) cm and 41.35 (±6.10) kg respectively and Mean BMI obtained as 19.20 (±2.67) Kg/m^2. Their mean waist circumference obtained as 64.89(±6.35) and hip circumference is 78.77 (±5.23). Mean Waist Hip ratio is 0.82352(±0.052787) and mean Waist Height ratio obtain as 0.44276 (±0.045801).

Table: 1- Descriptive statistics of Anthropometric variables and nutritional parameters of Birhor females

Anthropometric variables	Mean	Std. Deviation	Minimum	Maximum
Body Stature (cm)	146.74	5.32982	135	158
Body Mass (Kg)	41.3538	6.10507	30	62.5
Waist Circumference (cm)	64.8956	6.35804	55.3	85.5
Hip Circumference (cm)	78.7744	5.23772	69.7	95.5
Body Mass Index (Kg/m^2)	19.2008	2.67180	15.23	31.24
Waist Hip Ratio	0.82352	0.052787	0.706	1.036
Waist Height Ratio	0.44276	0.045801	0.359	0.612

Body mass index (BMI) was calculated as weight (kg)/ height (m^2), it is an age-independent index i.e. normally used for assessment of nutritional status in above 18 year age groups. In table-2 the BMI of the Birhor females was calculated it was found that 22.5% of female are in Chronic Energy Deficiency (CED) grades (Table 2).

Table: 2- Body Mass Index of Birhor females (N=80)

Nutritional Grades		Birhor Females	
Grades	*BMI Value (Kg/m^2)*	No.	%
Chronic Energy Deficiency (CED) III	<16	3	3.8
Chronic Energy Deficiency (CED) II	16 – 17	5	6.2
Chronic Energy Deficiency (CED) I	17 – 18.5	10	12.5

Low Weight Normal	18.5 – 20	31	38.8
Normal	20 – 25	27	33.7
Obesity grade I	25 – 30	3	3.7
Obesity grade II	>30	1	1.3

Table 3 depicts nutritional status of adult Birhor female on the basis of waist hip ratio. In this table it was observed that according to WHR category, 76.2%. Birhor adult female shows normal condition and 23.8 % female shows obese health condition.

Table-3: Nutritional status of Birhor female based on WHR category (N=80).

Waist-Hip Ratio classification		Female	
Grades	*Value*	No.	%
Normal	Level 1 >80cm	61	76.2
Obese	Level 2 >88cm	19	23.8

Table 4 described about a good predictive indicator of malnutrition that is Weight for height calculation which is also an age-independent index. Ideal weight for height was estimated according to Wirth's Standard after this the percentage of weight for height was classified as per the Waterlow's classification. According to the following classification of nutritional grade, females have been seen under the three types of undernourished division i.e. 2.5% and 7.5% and 35 % respectively. Whereas, among them very few percentages were found under Obesity category, that is 6.3% and 1.2 % respectively.

Table: 4- Nutritional status based on Wirth's Standard value of Birhor females (N=80).

Nutritional Grades		**Females**	
Grades	***Value***	No.	%
Severely under nutrition	<=75%	2	2.5
Moderate under nutrition	>75 - <=84%	6	7.5
Marginal under nutrition	> 84 - <=90%	28	35.0
Normal	>90 - <=105%	38	47.5
Obesity grade I	>105 - <=115%	5	6.3
Obesity grade II	>115%	1	1.2

**Wirth's standard: weight for height: ideal weight in kg= ht. in cm X 0.4*

**Water low's classification: percentage of weight for height = Actual weight / ideal weight X 100*

Broca index is an index to measure the prevalence rate of malnutrition. In this index standard weight for height was estimated according to Broca Standard and then the percentage of weight for height was classified as per the Waterlow's classification. In table 5 as per this classification among Birhor females 2.5%, 6.3% and 36.2% respectively have been seen under the three types of undernourished category. On the other hand, total 10% of them found in Obesity grades.

Table: 5- Prevalence rate of malnutrition according to Broca Standard value among Birhor females (N=80).

Nutritional Grades		Females	
Grades	*Value*	**No.**	**%**
Severely under nutrition	<=75%	2	2.5
Moderate under nutrition	>75 - <=84%	5	6.3

Marginal under nutrition	> 84 - <=90%	29	36.2
Normal	>90 - <=105%	36	45.0
Obesity grade I	>105 - <=115%	6	7.5
Obesity grade II	>115%	2	2.5

**Broca Index = Standard weight = height in cm – 100*

**(Waterlow's classification) percentage of weight for height= actual weight / standard weight X 100*

India has a large and diverse tribal population. There are wide variations among the tribal communities in case of nutritional status and access to utilization of nutritional and health services. In the present study a comparison is made on the basis of mean BMI among females of Birhor and females of other tribal population in West Bengal. From the table 6 it is clearly found that Mukhopadhyay in 2009 reported that in Birbhum among the Santal females the mean BMI is 19.5 Kg/m^2 and Ghosh and Bharati in 2006 studied among the Munda that their mean BMI is 17.7 Kg/m^2 which is low. Mondal in 2007 studied one of the PVTGs in West Bengal that is Lodha and reported that the Mean BMI among Lodha females is 19.3 Kg/m^2. Das *et al.*, in 2013 studied and revealed that among Birhor females mean BMI is found to be as 20.2 Kg/m^2, in this present study it has been found that mean BMI among the Birhor females is 19.2 Kg/m^2. It was also observed during the present study that poverty, lack of awareness and poor communication still remains constraint for improved nutritional health services among Birhor. It has been observed there is lack of health awareness among maximum number of Birhor females.

Table 6: Comparison of mean BMI (kg/m^2) and prevalence of CED among females tribal population in West Bengal.

Reference	**Community**	**BMI (Mean value) Kg/m^2**
Ghosh, 2007	Bhumij	18.4

Dutta Banik et. al, 2007	Dhimal	19.1
Bose et. al, 2006b	KoraMudi	18.3
Bisai et. al, 2008	KoraMudi	18.3
Mondal, 2007	Lodha	19.3
Ghosh &Bharati, 2006	Munda	17.7
Mittal & Srivastava, 2006	Oraon	19.7
Bose et. al, 2006a	Santal	19.3
Ghosh &Mallik, 2007	Santal	18.7
Mukhopadhyay, 2009	Santal	19.5
Das & Bose, 2010	Santal	18.1
Das et al, 2013	Birhor	20.2
Present study	**Birhor**	19.2

CONCLUSION

We know generally the tribal communities are comparatively more vulnerable to food and nutrition insecurity problem. Thus, the prevalence of under-nutrition among tribal was relatively higher than others. Birhor is one of the PVTG out of 75 PVTGs in India and out of 3 PVTGs in West Bengal. The present study emphasizes general nutritional health of the Birhor females as one of the vital constituents of tribal life and it has been going through transition because of changes in health practices, life style, diet, nutrition and in many other aspects of life.

Nowadays in India, medical science is moving towards an advanced stage with the help of improved skills for monitoring all of these problems. The issues which are directly or indirectly

responsible for so called poor health care may be lack of awareness due to low literacy rate, poverty, insufficient nutrition, heavy workload etc. Again, in many areas of this location transport gap, communication break also prevails and such difficulties are mainly accountable for non-availability of proper medical facilities in proper time. Due to the short time period study and small sample size, in this study adequate amount of socio-economic variables and their dietary habits are not included. In the present study an attempt has been made to examine the nutritional status the Birhor females. It is well known fact that the utilization of health care services is still low in those villages of Purulia district. In case of general health condition, it was also found that among adult Birhor females mean BMI obtained as 19.20 (±2.67), according to Wirth as well as Broca standard 45% female fall under below normal categories.

In present study it has been seen that status of health and nutrition of Birhor females inaccessible to interior regions of Purulia district is very poor due to lack of nutrition awareness and non-availability of health services**.** Among the Birhor tribe the adult females were having more nutritional deficiency than adult male.

RECOMMENDATIONS:

Due to extreme poverty and financially vulnerable condition of this tribe nothing can be done more than maintenance. As these people are merely get their daily basic requirements. It is therefore, understood that an appropriate way of communication as well as location specific nutrition intervention program planning should be organized through government as well as other non-government organizations. To bring changes in the tribal health seeking behavior, initiatives of improved health services and its proper way of executions will be necessary.

ACKNOWLEDGEMENTS

The authors would like to pay regards to Department of Anthropology, West Bengal State University and also grateful to all the research participants for their kind cooperation during the whole study.

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