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Nutritional Status of Adult Tribal Ho Women of Paschim Medinipur district, West Bengal, India: A Comparative Study

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Abstract

Introduction: The health and nutritional status of tribal women are important factors that not only contribute to maintaining a healthy family and healthy children but also influence economic growth globally. Tribal women health is affected by various important factors such as poverty, early marriage, domestic violence, lack of nutrition, education, health care facilities, and insufficient knowledge or awareness. The present result aims to understand the health and nutritional status of tribal women of two blocks of Paschim Medinipur district of West Bengal. **Methods:** The present cross-sectional study was conducted in twelve villages (Duan, Baguan, Chak Sujal, Bankakul, Amra Gerya, Kismat Duan Roypukur, Srirampur, Sridharpur, Sirni, Keshrambha, Sahania and Nandakuria) under Debra and Dantan-II blocks of Paschim Medinipur district, West Bengal, India. **Results:** From the present study we found that mean values of anthropometric variables like WT, MUAC, BSF, TSF, SISF and SSSF were higher among the women in Debra block than those in Dantan-II and these values are statistically significant ($p<0.001$). The derived measurements of BMI, FM, FFM, FMI, and FFMI were higher among Debra block women than Dantan-II and and all these values are statistically significant ($p<0.001$; in the case of FFM, the value is $p<0.01$). Overall, undernutrition based on BMI of the study population was 31.2%. Among them, women of Dantan-II block were more undernourished (46.3%) than Debra block (18.5%) (χ^2 =33.85, df=2, $p<0.001$). Similar to BMI, the nutritional status of the study population based on MUAC showed that overall undernutrion was 55.4%, among them in Dantan-II block women were more undernourished (65.0%) than Debra women (47.3%) (χ^2 =8.54, df=1, $p<0.01$). Women in the Debra block were more obese (30.31%) than Dantan-II (10.6%) (χ^2= 15.30, df=1, $p<0.001$). **Conclusions:** From various studies, we found that the nutritional status of Scheduled Tribe women varies widely depending on factors such as rural housing, illiteracy and poor economic status. In the present study we found that the prevalence of undernutrition was higher among the Dantan-II block women than the Debra block. Almost one third of the study participants were undernourished, which is why a well-planned and coordinated effort is needed to address the scenario of malnutrition among the tribal population.

Keywords: Ho, BMI, Undernutrition, Women

Resumen

Introducción: El estado de salud y nutricional de las mujeres tribales son factores importantes que no solo contribuyen a mantener una familia sana y niños sanos, sino que también influyen en el crecimiento económico a nivel mundial. La salud de las mujeres tribales se ve afectada por varios factores importantes como la pobreza, el matrimonio precoz, la violencia doméstica, la falta de nutrición, educación, instalaciones de atención médica y el conocimiento o la concienciación insuficientes. El presente resultado tiene como objetivo comprender el estado de salud y nutricional de las mujeres tribales de dos bloques del distrito de Paschim Medinipur de Bengala Occidental. **Métodos:** El presente estudio transversal se llevó a cabo en doce aldeas (Duan, Baguan, Chak Sujal, Bankakul, Amra Gerya, Kismat Duan Roypukur, Srirampur, Sridharpur, Sirni, Keshrambha, Sahania y Nandakuria) bajo los bloques Debra y Dantan-II del distrito de Paschim Medinipur, Bengala Occidental, India. **Resultados:** Del presente

estudio encontramos que los valores medios de las variables antropométricas como WT, MUAC, BSF, TSF, SISF y SSSF fueron mayores entre las mujeres del bloque Debra que entre las del Dantan-II y estos valores son estadísticamente significativos (p<0,001). Las mediciones derivadas de IMC, FM, FFM, FMI y FFMI fueron mayores entre las mujeres del bloque Debra que entre las del Dantan-II y todos estos valores son estadísticamente significativos (p<0,001; en el caso de FFM, el valor es p<0,01). En general, la desnutrición basada en el IMC de la población del estudio fue del 31,2%. Entre ellas, las mujeres del bloque Dantan-II estaban más desnutridas (46,3%) que las del bloque Debra (18,5%) (χ2 =33,85, df=2, p<0,001). De manera similar al IMC, el estado nutricional de la población del estudio basado en MUAC mostró que la desnutrición general fue del 55,4%, entre ellas, en el bloque Dantan-II, las mujeres estaban más desnutridas (65,0%) que las mujeres Debra (47,3%) (χ2 = 8,54, gl = 1, p < 0,01). Las mujeres en el bloque Debra eran más obesas (30, 31%) que Dantan-II (10,6%) (χ2 = 15,30, gl = 1, p < 0,001). **Conclusiones:** A partir de varios estudios, encontramos que el estado nutricional de las mujeres de las tribus programadas varía ampliamente dependiendo de factores como la vivienda rural, el analfabetismo y el bajo nivel económico. En el presente estudio, encontramos que la prevalencia de la desnutrición fue mayor entre las mujeres del bloque Dantan-II que en el bloque Debra. Casi un tercio de los participantes del estudio estaban desnutridos, por lo que se necesita un esfuerzo bien planificado y coordinado para abordar el escenario de la desnutrición entre la población tribal.

Palabras Clave: Ho, IMC, Desnutrición, Mujeres

Introduction

One-third of the world's tribal and indigenous population, that is, over 104 million tribal people live in India (8.6%). Spread across 705 communities, they represent unique cultural diversity. Out of the total Scheduled Tribal population, approximately 2.6 million (2.5%) belong to “Particularly Vulnerable Tribal Groups” (PVTGs) known as the “Primitive Tribes” (NHSRC-Executive Summary, 2018). According to the 2001 census, there are 5296963 Scheduled Tribe (ST) population in West Bengal which constitutes 5.8% of the total population. West Bengal has 40 Scheduled Tribes, and 5.08% of the total ST population of India lives in the state.

The Ho is one of the major tribes of Jharkhand and Odisha. The Calhan area of Jharkhand is the original place of their habitation. In due course of time, they spread towards its neighbouring areas of Jharkhand, Orissa and West Bengal and even a few to Assam. According to the 2011 census, Ho population is 23,483 in West Bengal. In the Ho language, the word 'Ho' means man. These Hos belong to the Proto-Australoid group. They are of short stature, dark complexion with broad and flat noses. The Ho people belong to the Munda branch of Austro-Asiatic languages.

A major public health problem in developing countries like India is malnutrition. Poor health among Indian women is a significant concern both nationally and individually. In recent years, there has been a remarkable rise in interest in the health, nutrition, and fertility behavior of women in India. Post-independence, there have been notable gains with respect to women’s health (India- Life expectancy at birth. https://countryeconomy.com/2015). However, a large number of nutritional surveys have highlighted a high rate of insufficient nutritional status among females compared to males in India. One important determinant of the nutritional status of women is their status in a society. Women in India generally have a ‘lower status’ than men in society (Haddad, 1999).

In India, overnutrition and undernutrition run parallel. Obesity is now becoming an epidemic among people in high-income groups due to overnutrition, whereas a large section of India, especially vulnerable sections such as tribal communities, suffers from undernutrition. This is an asymmetric nutritional disparity of overnutrition and undernutrition in India. Different studies on Indian tribes have supported the existence of chronic energy deficiency, reflected in poor nutritional status in terms of underweight and malnutrition. Tribal women, who are a more vulnerable section of the tribal society, are more affected by chronic energy deficiency (Dash & Adhikari, 2018).

The aim of the present study was to assess the nutritional status of adult tribal Ho women of Debra and Dantan II blocks of Paschim Medinipur district, West Bengal, India.

Materials and Methods

Study Area and Participants

The present cross-sectional study was conducted in twelve villages (Duan, Baguan, Chak Sujal, Bankakul, Amra Gerya, Kismat Duan Roypukur, Srirampur, Sridharpur, Sirni, Keshrambha, Sahania and Nandakuria) under Debra and Dantan II blocks of Paschim Medinipur district, West Bengal, India. The study was carried out from August 2019 to March 2021. A total of 269 adult Ho tribal females, aged above 18 years from above mentioned villages,

were included in this study. The vast majority of the subjects were illiterate and very low-waged manual laborers belonging to a low socio-economic status.

Ethical considerations were guided by the declaration of Helsinki (Goodyear et al., 2007). Appropriate ethical clearance was obtained from authorities of Vidyasagar University and the district level authorities. Relevant local administrative authorities and community leaders were informed about the objective of the present study. Informed verbal consent was obtained from each participant in their own language prior to each interview and measurement procedure.

Anthropometric Measurements and Assessment of Nutritional Status

All anthropometric measurements were taken using standard techniques (Lohman et al., 1988). ***Height*****:** The participants stood on a flat surface in bare feet, keeping the subject on an erect posture the measurement was taken standing at his back. The anthropometer was placed at the back and between the participant's heels, kept as close to the subject as possible, and the measurement was taken from the floor to the vertex. ***Body Weight:*** Weight is essential in the calculation of BMI and body fat content. It was measured in kilograms while participants wore minimal clothing and no shoes, using a conventional weighing machine. Body weight was recorded to nearest 0.5 kg on the weighing scale. Technical errors of measurements (TEM) were computed and found to be within acceptable limits (Ulijaszek & Kerr, 1999). ***Mid Upper Arm Circumference (MUAC):*** The participant's arm hangs relaxed, just away from her side. The Measurement was taken at the mid-point between the tip of the shoulder and the tip of the elbow (Acromium to Olecranon process) of the left upper arm, MUAC was recorded to the nearest 0.1 cm. Skinfold thickness can provide a useful technique for evaluating body fat. It was measured using a Holtain skinfold caliper (Holtain Ltd., UK). ***Biceps Skinfold (BSF):*** The biceps skin folds a measure of subcutaneous adipose tissue and skin thickness on the anterior aspect of the arm. In combination with other skin fold measurements, it is a useful predictor of total body fat. ***Triceps Skinfold (TSF):*** The triceps skinfold was measured in the midline of the posterior aspect of the arm, over the triceps muscle. The triceps skinfold is correlated with the percentage of body fat and with total body fat. ***Sub-scapular Skinfold (SSSF):*** The subject stands comfortably erect, with the upper extremities relaxed at the sides of the body. The subscapular skinfold is picked up on a diagonal, inclined infero-laterally approximately 45^0 to the horizontal plane in the natural cleavage lines of the skin. The site is just inferior-to-inferior angle of the scapula. ***Supra-iliac Skinfold (SISF):*** Supra-iliac skinfold thickness is commonly used as an index of body fatness together with other skinfold thickness. The subject stands in an erect position. The suprailiac skinfold was measured in the midaxillary line immediately superior to the iliac crest. ***Body mass index (BMI)*** was computed using the following standard equation: BMI = weight (kg)/height (m^2). Nutritional status was determined following World Health Organization (WHO) guidelines (WHO, 1995) to facilitate international comparison. The following BMI (kg/m^2) 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:	BMI = 18.5 – 24.9
Overweight:	BMI $\geq$ 25.0
Obese :	BMI $\geq$ 30.0

Nutritional status was also determined using Mid-upper arm circumference (MUAC) values. The following internationally accepted cuts off values were used (James et al., 1994):

Nutritional Category	Cut off Value
Under nutrition	MUAC< 22 cm
Normal	MUAC≥ 22 cm

By using Percentage of Body Fat (PBF) values, nutritional status was also determined. PBF was calculated using four skin folds with the following standard equations (Durnin & Womersely, 1974).

Nutritional Category	Cut Off Value
Normal	PBF ≤35%
Obese	PBF> 35%

Statistical Analysis

After data collection, data analysis was done using Statistical Package for Social Science (SPSS 16.00) program. Student's t-test was performed to determine sex wise differences in mean and SD value of height, weight, MUAC, BSF, TSF, SISF, SSSF, BMI PBF, FM, FFM, FMI & FFMI. Chi-square test was performing to determine the association between the discrete variables. Level of significance was set at $p < 0.05$.

Results

Table 1. Comparative study of anthropometric characteristics of the study population

Variables	Debra (N=146)	Dantan II (N=123)	't' value
	Mean (±SD)	Mean (±SD)	
HT (cm)	149.0 (5.4)	149.48 (5.3)	-.718
WT (kg)	47.54 (8.2)	42.4 (6.0)	5.88***
MUAC (cm)	22.46 (2.8)	21.22 (2.2)	3.93***
BSF (mm)	5.78 (2.31)	4.22 (1.7)	6.13***
TSF (mm)	9.94 (3.9)	8.16 (3.61)	3.84***
SISF (mm)	9.93 (4.8)	7.08 (3.2)	5.75***
SSSF (mm)	12.22 (4.6)	7.87 (3.21)	8.98***

***=p<0.001

Table 1 shows that mean and SD value of anthropometrics variables like WT, MUAC, BSF, TSF, SISF and SSSF were higher among women of Debra block than Dantan II and those values are statistically significant ($p<0.001$) also.

Table 2. Comparative study of derived measurements of the study population

Variables	Debra (N=146)	Dantan-II (N=123)	't' value
	Mean (±SD)	Mean (±SD)	
BMI (kg/m^2)	21.37 (3.2)	18.96 (2.3)	7.07***
PBF	32.0 (5.2)	27.33 (5.2)	7.25***
FM (kg)	15.50 (4.9)	11.80 (3.6)	7.04***
FFM (kg)	32.03 (4.1)	30.60 (3.1)	3.23**
FMI (kg/m^2)	6.96 (2.0)	5.27 (1.57)	7.57***
FFMI (kg/m^2)	14.40 (1.4)	13.69 (1.1)	4.47***

**=p<0.01, ***=p<0.001

Table 2 reveals that mean and SD value of derived measurements (BMI, FM, FFM, FMI, FFMI) were higher among Debra women than Dantan II women and these all values are statistically significant ($p<0.001$, in case of FFM the value is $p<0.01$)

Table 3 demonstrated about the nutritional status of the study population, based on BMI. Overall undernutrition of the study population was 31.2%, women of Dantan II were more undernourished (46.3%) than Debra women (18.5%). This result portrays that health condition was better in case of Debra women than Dantan II, this is statistically significant ($\chi^2 = 33.85$, df=2, $p<0.001$).

Table 3. Nutritional status of study population based on BMI

Block	BMI Category			x^2
	Undernutrition	Normal	Overweight	
Debra	27 (18.5%)	98 (67.1%)	21 (14.4%)	33.85***
Dantan-II	57 (46.3%)	65 (52.8%)	1 (0.8%)	
Total	84 (31.2%)	163 (60.6%)	22 (8.2%)	

df=2, ***=p<0.001

Table 4. Nutritional status of study population based on MUAC

Block	MUAC category		x^2
	Undernutrition	Normal	
Debra	69 (47.3%)	77 (52.7%)	8.54**
Dantan-II	80 (65.0%)	43 (35.0%)	
Total	149 (55.4%)	120 (44.6%)	

Table 4 shows that nutritional status of the study population based on MUAC. Dantan II women are more undernourished (65.0%) than Debra women (47.3%) and the overall undernutrition was 55.4%. These values are statistically significant (x^2 =8.54, df=1, **=p<0.01).

Table 5. Percentage of body fat (PBF) of study population

Block	PBF category		x^2
	Normal	Obese	
Debra	102 (69.9%)	44 (30.1%)	15.30***
Dantan-II	110 (89.4%)	13 (10.6%)	
Total	212 (78.8%)	57 (21.2%)	

df=1, ***=p<0.001

Table 5 reveals the PBF value of study population. Here also PBF were higher among Debra women (30.31%) than Dantan II women (10.6%), overall, 21.2% participants were belonging to this category. These values are also statistically significant (x^2= 15.30, df=1, p<0.001).

Discussion

Scheduled Tribe people are among the most vulnerable groups in India. As a result, this population is at high risk in practically every health parameter. They continue to depend heavily on subsistence farming for income and survival. Furthermore, their awareness about a healthy lifestyle is limited. Similarly, traditional norms, belief systems and illiteracy, all of which contribute to various health and social problems, make it challenging to access the health services required.

The anthropometric measurements of the tribal women in this study reveal that there is a deficit in both weight and height as compared to the standards. The Indian Council of Medical Research (ICMR) has set a standard of 151 cm as the average height for Indian women and 55 kg as average body weight for Indian reference women. However, the mean height among the study population was found to be 147.95 cm and the mean weight was 45.01 kg which indicates that the tribal women were shorter by 2% and have a deficit of 18.16% in their weight as compared to the average Indian women. The women of Scheduled Tribes are linked to inadequate intake of nutrients such as vegetables, which can lead to increased risk of iron deficiency in women and poor eating habits and knowledge (Bharati et.al. 2008, Singh et. al., 2020, Nayak & Srelgiri, 2016, Shrinivasa et. al., 2014).

In terms of place of residence, tribal and rural women are more underweight than urban tribal women, while the reverse trend is observed for overweight and obesity. In the urban and rural context, scheduled tribal women in rural areas are more likely to be underweight, while overweight and obesity are more prevalent in urban areas. A study found a similar result in urban India that most of the overweight and obese women are found in urban India, specifically in metropolitan cities. Moreover, Scheduled tribes are found to have a lower percentage of the overweight and obese population as compared to other populations. On the other hand, non-poor higher educated women were more likely to be overweight and obese (Gouda & Prusty, 2014).

Underweight is most prevalent among tribal women with no education (19.29%) and least prevalent among the tribal women with higher education (11.48%). Conversely, the prevalence of overweight and obesity are lowest among tribal women with no education at 12.02% and 2.36%, respectively, and highest among women with higher education at 16.74% and 4.01%, respectively. The educational status also shows a positive relationship with BMI. With increasing educational levels, overweight and obesity are also rising. A study conducted in Northeast India supports the result of our study (Rengma et al., 2015). The nutritional status of Scheduled Tribe women varies widely depending on factors such as rural housing, illiteracy and poor economic status. These factors can be detrimental to Scheduled Tribe women, as 75% of health infrastructure focuses on urban areas, while most tribals live in rural areas. A study conducted in the Darjeeling district of West Bengal, India, supports our findings (Sarkar, 2016).

Research has found that Scheduled Tribe people are mainly engaged in agricultural and day labour occupations, which is the main reason for economic backwardness. As a result, there is instability in food supply, which contributes to the health of Scheduled Tribe people, especially women. The tribal population in India is oppressed, discriminated against in terms of social and economic equality, and suffers from poverty (Jungari & Chauhan, 2017).

Limitations

Nutritional status of only adult women was assessed for the concerned tribes. Specifically, socio-demographic factors influencing the nutritional conditions of adult women and gender dynamics within the households of these tribal communities were not included in this study

Conclusion

The anthropometric parameters of tribal women were lower than the ICMR standards. The tribal population in India is highly vulnerable in terms of social, political, health, and educational development. Both the central and state governments need to focus on a regional and community-based development approach for overall health improvement among the tribal women in West Bengal. This study may help policymakers in preparing developmental plans or strategies to enhance overall health among the tribal women.

Recommendations

Among tribal women, raising awareness about health and nutritional issues is the first step towards improving health outcomes. In order to increase health awareness in tribal areas especially among mothers or women, more IEC materials should be distributed frequently. Information, Education and Communication (IEC) campaigns - such as stressing the importance of hand washing, regular ante-natal check-ups, institutional deliveries, immunization, food value, etc. have had little impact. In tribal areas, to ensure women's health, there is a need to raise awareness about appropriate marriage age.

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Data availability

Full access to data on request.

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Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Informed Consent Statement

All the athletes included in the study provided written informed consent.

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