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ANTHROPOMETRIC ASSESSMENT OF NUTRITIONAL STATUS AMONG COLLEGE WOMEN OF MIDNAPORE, WEST BENGAL, INDIA

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ABSTRACT

A woman's nutritional status has important implications for her health as well as the health of her children. The present cross-sectional study was undertaken to determine the overall prevalence of undernutrition among young adult women of Raja N. L. Khan Women's College, Midnapore, West Bengal, India. Our study measured data on height and weight of adults aged 18-20 years. A total of 491 females were measured. One commonly used indicator i.e., body mass index (BMI; kg/m^2), was used to evaluate the nutritional status of the subjects. Based on BMI, chronic energy deficiency (CED) was used as a measure of undernutrition. The mean (SD) BMI of the subjects was 20.05 kg/m^2 (SD = 2.63). Results revealed that there was a significant ($F = 4.085^{***}$, $p < 0.001$) increasing age trend in mean BMI. The overall age combined prevalence of CED was 28.3 %. Overall, only 4.5 % belonged to the overweight category. A significant (chi-square = 31.439; $p < 0.001$) age relationship existed in the prevalence of CED. According to the WHO classification of low BMI, it is clear that studied college girls of Midnapore, India are in serious situation for all ages and the youngest (18 years) among them are experiencing the most serious situation (32.7 %) with respect to their health and nutritional status. Overall prevalence of CED was (28.3 %). Conditions of the young women's were more severe and this severity decreases with increasing age of these women's. Results have been compared with recent reports from 18 states of India.

Keywords : Women, body mass index, chronic energy deficiency, undernutrition.

INTRODUCTION

Malnutrition in women and men can result in reduced productivity, slow recovery from illnesses, increased susceptibility to infections, and a heightened risk of adverse pregnancy outcomes. A woman's nutritional status has important implications for her health as well as the health of her children. A woman with poor nutritional status, as indicated by a low body mass index (BMI), short stature, anaemia, or other micronutrient deficiencies, has a greater risk of obstructed labour, having a baby with a low birth weight, having adverse pregnancy outcomes, producing lower quality breast milk, death due to postpartum haemorrhage, and illness for herself and her baby. Women's height can be used to identify women at risk of having a difficult delivery, since small stature is often related to small pelvic size. The risk of having a baby with a low birth weight is also higher for mothers who are short (NFHS-III, 2007). Malnutrition is one of the most devastating

problems worldwide and is inextricably linked with poverty. The scale of under nutrition has also been studied among other populations and age groups, such as pregnant and lactating women (Rouse DJ, 2003). The problems arise from cultural, political and economic realities that must be addressed in tandem. Malnutrition among women has long been recognized as a serious problem in India, but national-level data on levels and causes of malnutrition have been scarce. This paper mainly focuses on malnutrition in college women of Raja N. L Khan women's college.

India is one of the few countries in the world where women and men have nearly the same life expectancy at birth. The fact that the typical female advantage in life expectancy is not seen in India suggests there are systematic problems with women's health. Indian women have high mortality rates, particularly during childhood and in their reproductive years. The health of Indian women is intrinsically linked to their status in society. Research on women's status has found that the contributions made by Indian to families often are overlooked, and instead they are viewed as economic burdens. There is a strong son preference in India, as sons are expected to care for parents as they age. This son preference, along with high dowry costs for daughters, sometimes results in the mistreatment of daughters. They typically have little autonomy, living under the control of first their fathers, then their husbands, and finally their sons (Chatterjee M, 1990; Desai S, 1994; Horowitz B and Kishwar K, 1985; The World Bank, 1996). All of these factors exert a negative impact on the health status of Indian women. Poor health has repercussions not only for women but also their families. Women in poor health are more likely to give birth to low weight infants. They also are less likely to be able to provide food and adequate care for their children. Finally, a woman's health affects the household economic well-being, as a woman in poor health will be less productive in the labour force. Due to the wide variation in cultures, religions, and levels of development among India's 28 states and 7 union territories, it is not surprising that women's health also varies greatly from state to state. Numerous studies indicate that malnutrition is another serious health concern that Indian women face (Chatterjee M, 1990; Desai S, 1994; The World Bank, 1996). It threatens their survival as well as that of their children. The negative effects of malnutrition among women are compounded by heavy work demands, by poverty, by childbearing and rearing, and by special nutritional needs of women, resulting in increased susceptibility to illness and consequent higher mortality. While malnutrition in India is prevalent among all segments of the population, poor nutrition among women begins in infancy and continues throughout their lifetimes (Chatterjee M, 1990; Desai S, 1994). Women and girls are typically the last to eat in a family; thus, if there is not enough food they are the ones to suffer most (Horowitz B and Kishwar K, 1985). Other studies have shown that many women never achieve full physical development (The World Bank, 1996). This incomplete physical development poses a considerable risk for women by increasing the danger of obstructed deliveries.

The present study was undertaken to investigate age differences in nutritional status among the young adult women's of bengalee ethnicity from Raja N. L. Khan Women's College, Midnapore, West Bengal, India.

MATERIALS AND METHODS

The present study was cross-sectional and conducted in Raja NL Khan Women's College, Midnapore West Bengal which is situated about 130 km from Kolkata city, the provincial capital of West Bengal. A total of 491 female adults aged between 18 to 20 years were measured. This study was carried out during March 2009. Data were collected after obtaining the necessary approval from the College authorities and students were informed about the objectives before the commencement of measurement. The institutional ethical committee approved the data schedule. All adult (> 18 years) womens of the college were requested to participate in the study. Ethical approval and prior permission was obtained from Vidyasagar University Ethics Committee and College authority respectively, before commencement of the study. Informed

consent was also obtained from each participant. Information on age, gender, weight and height were collected on a pre-tested questionnaire by class-to-class visit following interview and examination. Height and weight measurements were taken on each subject by the first author following the standard techniques. (Lohman TG et al. 1988). Height and weight measurements were recorded to the nearest 0.1 cm and 0.5 kg respectively.

The BMI was computed using the following standard equation:

BMI = Weight (kg) / height (m^2).

Nutritional status was evaluated using internationally accepted BMI guidelines World Health Organization (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: BMI = 18.5 – 24.9
Overweight: BMI ≥ 25.0.

We followed the WHO (1995) of the public health problem of low BMI, based on adult populations worldwide. This classification categorises prevalence according to percentage of a population with BMI< 18.5.

Low (5-9%): warning sign, monitoring required.
Medium (10-19%): poor situation.
High (20-39%): serious situation.
Very high (≥ 40%): critical situation.

Data was analyzed using SPSS 16.0. Descriptive statistics were used for all the variables studied. ANOVA test were undertaken to test for age differences in weight, height and BMI, Pearson Chi-square were used to test for the significant difference in the prevalence of CED. The significance level used was $p<0.05$.

RESULTS AND DISCUSSIONS

Age specific number, mean, standard deviation and ANOVA of weight, height and body mass index (BMI) of the subjects are presented in Tables 1. Mean (sd) weight, height and BMI were 48.96 kg (7.51 kg), 154.79 cm (5.03) and 20.05 kg/m^2 (2.63 kg/m^2), respectively. The mean BMI was highest (20.57 kg/m^2) at age for 20 years and lowest (19.72 kg/m^2) at age 19 years. There was a significant (F = 4.085***, df = 2) positive age trend in mean BMI.

Table 1. ***Mean and standard deviation of anthropometric variables of the studied subjects***

Age (Years)	N	Anthropometric Variables					
		Weight (Kg)		Height (Cm)		BMI (Kg/m^2)	
		Mean	SD	Mean	SD	Mean	SD
18	159	47.44	7.21	154.93	5.46	19.72	2.55
19	195	48.10	6.82	155.13	5.08	19.97	2.51
20	137	48.10	6.82	154.16	4.35	20.57	2.82
Total	491	48.96	7.51	154.79	5.03	20.05	2.63
F-TEST		1.661		1.611		4.085***	

***** Significant age difference; p < 0.001.**

The overall age combined prevalence (Table 2) of CED was 28.3 %. Out of these**,** 4.9 %, 6.9 % and 16.5 % belonged to CED III, CED II and CED I categories, respectively. Overall, only 4.5 % belonged to the overweight category. There was a significant (chi-square = 31.439; p < 0.001) negative age trend in the prevalence of CED. The highest rate was observed at age 18 years (32.7%) while the lowest rate (21.1%) was present at age 20 years.

Table 2. ***Prevalence CED and nutritional status among the college girls of Midnapore, West Bengal***

Nutritional status	BMI (kg/m^2)	Age (years)		
		18	19	20
CED III	< 16.00	6.9	4.6	2.9
CED II	16.00-16.99	10.7	5.6	4.4
CED I	17.00 - 18.49	15.1	19.5	13.9
Total CED	Upto 18.49	32.7	29.7	21.2
Normal	18.50 - 24.99	66.0	68.2	67.2
Over weight I	25.00 - 29.99	1.3	2.1	11.7

Pearson Chi-square = 31.439; p < 0.001 (based on BMI)

According to the WHO classification of low BMI, it is clear that studied college girls of Midnapore, India, are in critical to serious situation for all ages and the youngest (18 years) among them are experiencing the critical situation (32.7 %) with respect to their health and nutritional status.

Women are generally vulnerable to undernutrition especially during pregnancy and lactation where the food and nutrient requirements are more during that period. The demographic consequences of the lower status in women has formed expression in various forms such as female infanticide, higher death rate for women compared to men, lower sex ratio, lower literacy rate in female, lower level of employment of women in the nonagricultural sector as compared to men etc. (Srinivasan K and Tara K, 1989).

Recent study (NFHS-III, 2007) has reported the prevalence of chronic energy deficiency (CED) of different states of India. Comparative statement of the prevalence of CED and undernutrition based on body mass index (BMI, kg/m^2) of adult women of 18 states of 6 different zones of India along with the present study revealed considerable state wise differences (Table 3, Fig. 1). We compared the rates of CED among 18 states of India. A total of 11 states were found to have high (20-39 %) rates of undernutrition with serious condition and 5 states had very high (≥ 40 %) rates of undernutrition with critical condition. It is also clear from the table that Punjab & Kerala had medium (10-19 %) rates of undernutrition. Wide range of state wise differences in rate of undernutrition were observed highest CED was observed from Bihar (45.1 %) followed by Chattisgarh (43.4 %), Jharkhand (43.0 %), Madhya Pradesh (41.7 %), West Bengal (39.1 %), Rajasthan (36.7 %), Assam (36.5 %), Gujarat (36.3 %), Maharastra (36.2 %), Uttar Pradesh (36.0 %), Karnataka (35.5 %), Andhra Pradesh (33.5 %), Haryana (31.3 %), Uttarakhand (30.0 %), Tamil Nadu (28.4 %) and Punjab (18.9 %). Kerala (18.0 %) had the lowest prevalence of CED.

Table 3. Comparative prevalence of CED (%) of women's of different zones & states of India with the present study

Sl. No.	Eco-Zones of India	States	CED (%)	Overall CED (%)
1	Northern	Punjab	18.9	29.05
		Uttarakhand	30.0	
		Haryana	31.3	
		Uttar Pradesh	36.0	
2	North-Eastern	Assam	36.5	36.50
3	Central	Madhya Pradesh	41.7	42.55
		Chattisgarh	43.4	
4	Eastern	West Bengal	39.1	42.15
		Orissa	41.4	

		Jharkhand	43.0	
		Bihar	45.1	
5	Western	Maharastra	36.2	36.4
		Gujarat	36.3	
		Rajasthan	36.7	
6	Southern	Kerala	18.0	28.85
		Tamil Nadu	28.4	
		Andhra Pradesh	33.5	
		Karnataka	35.5	
7		India		35.6
8	Eastern (Present Study)	West Bengal (Midnapore)		28.3

It is clear from (Table 3 & Figure 1) that Central zone (42.55 %) had the highest prevalence of CED followed by Eastern zone (42.15 %), North-Eastern zone (36.51 %), Western zone (36.4 %), Northern zone (29.05 %), Southern zone (28.85 %). College women (28.3 %) of the present study had high (20-39 %) rate of CED prevalence but less than that from all zones and India combined (35.6 %).

Figure 2 shows that India (36.5%) had the highest prevalence of CED followed by present study (Midnapore) (28.3 %), Haiti (18.7 %), Central African Republic (15.2 %), Nigeria (13.5 %), Kenya (9.6 %), Ghana (9.1 %), Zimbabwe (7.9 %), Brazil (7.3 %), Uzbekistan (7.2 %), Kazakhstan (6.2 %), South Africa (5.0 %), Kyrgyz Republic (4.7 %), Morocco (3.6 %), Colombia (2.1 %), Turkey (1.8 %), Jordan (1.7 %) and Guatemala (1.6 %). Egypt (1.3 %) from North Africa had the lowest prevalence of CED. Thus from Figure 2 it is clear that college women of present study had much higher prevalence of undernutrition than studied rest of the countries but the overall prevalence of undernutrition of Indian women is much higher than the present study.

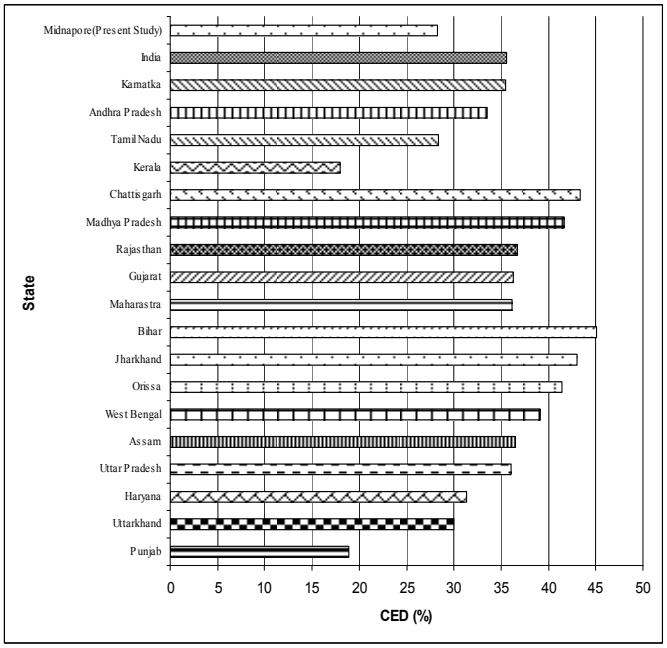

Figure 1. ***Comparative prevalence of CED (%) of women's of different states of India with the present study***

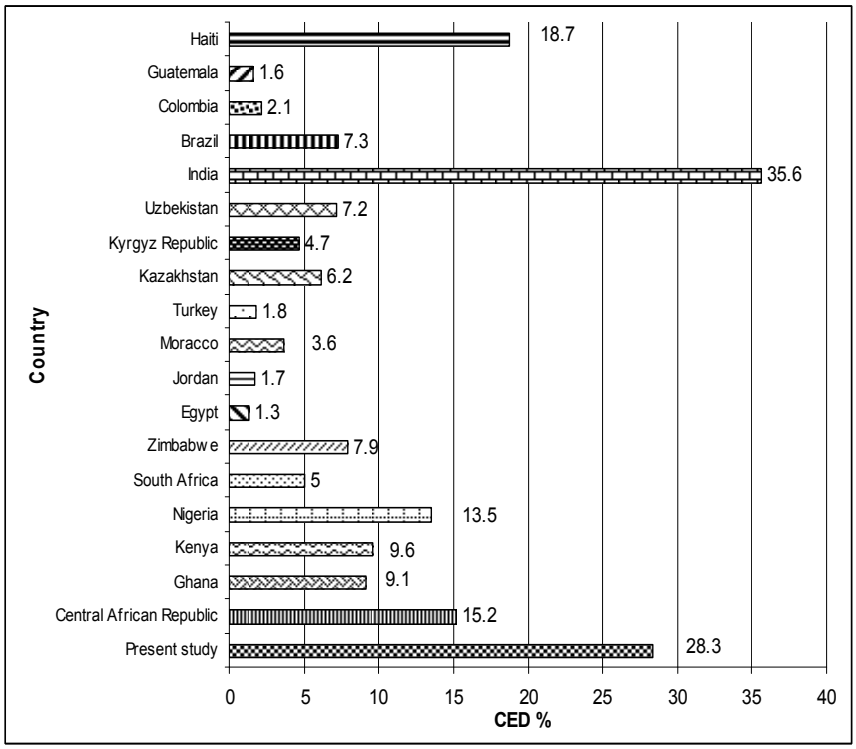

Figure 2. ***Comparative prevalence of CED (%) of women's of different countries with the present study. (Boerma JT and Sommerfelt AE, 1993)***

The present study is limited by its small sample size, being from one college of West Bengal, India. Though, what we suggest is that they provide additional information on the level of undernutrition in a particular college of Paschim Medinipur, West Bengal as well as an overall idea at a glance about the nutritional profile of the diversified community living in different zones of India. These results may therefore only be representative of a small sample size and not representative of the district, state or country. To obtain a broader representation, we suggest that more studies involving BMI among young women from different parts of India be undertaken. Valuable health and nutritional promotion programs for women's zone wise can be formulated based on the findings of these researches with the ultimate objective of decreasing undernutrition in women.

CONCLUSIONS

The present study found that nutritional status among the young adult women's is poor, with high (20-39 %) rate of nutritional risks, youngest among them were experiencing the highest (32.7 %) prevalence of nutritional stress respectively.

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REFERENCES

1. Boerma JT and Sommerfelt AE. Demographic and health survey (DHS): contributions and limitations. World Health Stat Q. 1993; 46:222-6.
2. Chatterjee M. Indian Women: Their Health and Economic Productivity, World Bank Discussion Papers 109, Washington, DC; 1990.
3. Desai S Gender Inequalities and Demographic Behavior, India, New York. 1994.
4. Horowitz B and Madhu K. "Family Life–The Unequal Deal," in Madhu Kishwar and Ruth Vanita, eds., In Search of Answers: Indian Women's Voices from Manushi, London. 1985.
5. IIPS and Macro International *National Family Health Survey-3, 2005-06, India: Volume-I*, International Institute for Population Sciences, Mumbai. 2007.
6. Lohman TG, Roche AF, Martorell R . *Anthropometric Standardization Reference Manual.* Chicago: Human Kinetics Books. 1988.
7. Rouse DJ. "Potential Cost-Effectiveness of Nutrition Interventions to Prevent Adverse Pregnancy Outcomes in the Developing World." *Journal of Nutrition.* 2003; 133: 1640S-44S.
8. Srinivasan K and Tara K. Demographic consequences of low Status of women in Indian Society. . In: C Gopalan, Suminder Kaur (Eds.): *Women and Nutrition in India.* New Delhi: Nutrition Foundation of India, and Spl. Pub. 1989; Series No. 5: 17-62.
9. The World Bank. Improving Women's Health in India, Washington, DC. 1996.
10. World Health Organization Physical status: the use and interpretation of anthropometry. Technical Report Series No. 854. Geneva: *World Health Organization*. 1995.