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A STUDY ON NUTRITIONAL STATUS AMONG THE ADULT GAROS' OF WEST GARO HILLS, NORTH-EAST INDIA (MEGHALAYA)

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Abstract. Health Status is the basic indicator of human wellbeing and nutritional status. Deficiencies or imbalance in nutrient intake leads to malnutrition which is associated with a number of short- and long-term health consequences that alleviate the ability of an individual to sustain economically productive work and ultimately hinder the development of the whole nation. Thus, study on nutritional status requires urgent attention in order to prevent malnutrition related complications. In this background, the present study examines nutritional status of the Garos of West Garo Hills, Meghalaya. To achieve this purpose, cross-sectional study was conducted among 43 females and 57 males of 'Garos' from Asananggre village, West Garo Hills, North-east India (Meghalaya). The study divulge taller and heavier males compared to females. Body Mass Index status of male and female did not differ significantly ($p<0.05$). Majority of females belong to normal (52.6%) followed by overweight category(35.1%) while males were more incline to overweight category (48.8%). According to MUAC, the nutritional status of both the males and females are normal. Significant ($p<0.05$) difference was seen between males and females in terms of Hemoglobin level where, majority were mild anemic or normal.1.8% females were found to be severely anemic. From the study it can be envisaged that most adult males and females are well-nourished and only few females were severely anemic i.e., undernourished.

Key words: health, malnutrition, hemoglobin level, BMI, MUAC, anemia

Introduction

Health status is central to human happiness, well-being and resource quality (Odonkor et al., 2019) while nutritional status is an important determinant for maintaining optimum health (Jumrakh et al., 2001; Muslim et al., 2021) being the prime indicator of health status. Human body require proper nutrition through well balanced diet to fulfill body needs and to maintain basic physiological functions of the body. Therefore any deficiencies or imbalance in nutrient intake leads to malnutrition which can be either 'overnutrition', consumption of excess calorie or 'undernutrition', insufficient supply of one or more essential nutrients (Bhattacharya et al., 2019).

Both undernutrition and overnutrition is consequently the most important risk factor for the burden of disease throughout the world, particularly in developing countries (Paruchuri et al., 2012; Muller et al., 2005; Nemer et al., 2001), affecting 792 million people worldwide, of which 20% are from developing countries (World Bank Report, 2011). Over-nutrition is a threat that increases body weight and causes several non-communicable diseases such as, metabolic syndrome, high cholesterol, type 2 diabetes mellitus, high blood pressure, and cardiovascular disease which are a threat to the public health in the developing countries like India (Little et al., 2016; Bhattacharya et al., 2019; Muslim et al., 2021). On the other hand, it is well documented that, undernutrition results in both short- and long-term health effects

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and even death by decreasing body immunity (Maleta, 2006; Kuruvilla et al., 2016). The short-term effect of undernutrition includes, weakness and recurring illness, which ultimately, in the long run hampers all vital physiological functions of the body causing measurable effect on body composition i.e., low weight, growth retardation in children (stunting, wasting, Kwashiorkor and Marasmus) and adolescent. Furthermore, undernutrition induced decreased immunity leading to recurring infections (Muller et al., 2005) and also the occurrence of chronic diseases like diabetes mellitus, hypertension, coronary heart diseases (Hoet, 1997), anemia (Thakur et al., 2014) and impaired mental development (Martins et al., 2011) in later adult life. Moreover, among women, undernutrition may cause obstetric complications leading to maternal and infant mortality and also increases the probability of giving low birth weight babies (Maleta, 2006; Rotimi et al., 1999; Allen et al., 1994) and thus starts the undernutrition cycle again, spanning several generations. Beside this, chronic undernutrition also alleviates the ability to sustain economically productive work by reducing working capacity of an individual which ultimately results in low income (Roy, 2002; Stewart et al., 2003). Therefore, undernutrition is not only a health burden but an economic burden affecting development of human beings as well as the whole nation.

Anthropometry being one of the methods used to assess the nutritional status, is widely used for its non-invasive, inexpensive and provides detailed information on different components of body structure especially muscular and fat components (Bharati et al., 2007; Bhattacharya et al., 2019). Studies reported (Szczepanska et al., 2019; Bhattacharya et al., 2019), among the widely used anthropometric measurements, body mass index (BMI) and mid-upper-arm-circumference (MUAC) as most significant and reliable one. Besides anthropometric measurements, hemoglobin (Hb) level is another important indicator of improper nutritional condition (McLean et al., 2007; Mondini et al., 2009) as it is associated with both macro- and micronutrient deficiencies including iron, vitamin B12 and folic acid deficiency, considered as the major cause of low hemoglobin level i.e., anemia (Emiroglu et al., 2019).

The Northeastern region of India is inhabited by a number of small and large tribes. Meghalaya is one of the eight sisters states in the Northeastern part of India,comprising Khasi, Garo and Jaintia as the three main tribes of Meghalaya (Singh et al., 2019). Due to poor healthcare coverage and lack of healthcare infrastructure, all the northeastern states have been given particular focus under the National Rural Health Mission (NRHM) (Meitei, 2020) and Prime Minister's 20-point program (Gopalan, 1992). A trend of developmental transition is underway in India and its Northeastern parts (Amuna et al.,2008, Sikdar, 2008; Sikdar, 2012), in all aspects of human life including disease pattern, demographic pattern, nutritional status, socioeconomic and ecological conditions (Dasgupta et al., 2008) but the progress is uneven and inequitable. Therefore, it is necessary to design region-specific public health policies (Yu et al., 2019) to find early intervention strategies and mitigate the human resource and economic burden of those regions and ultimately to India by investigating the nutritional status. Several studies are there in this regard in different regions (Swain et al., 2018; Bhattacharya et al., 2019) on different age groups (Kanjilal et al., 2010; Agarwalla et al., 2015; Padma et al., 2016) but most of the previous studies on nutritional status from Meghalaya, North-east India and Garos of East Garo Hills are conducted on children (Rao et al., 2005; Chyne et al., 2017; Singh et al., 2019; Meitei, 2020) and a very few on women (Chyne et al., 2017; Nongrum et al., 2021) while, research related to the prevalence of malnutrition among the adults (men and women) of North-eastern part of India, particularly from the Garo tribes of Meghalaya are meagre.

Objectives

So, in this backdrop the present study has been undertaken, to investigate the nutritional status of the adult Garos, living in Asananggre Village of West Garo Hills, Meghalaya (North-east India).

Materials and Methods

The present study comprises of 100 adult individuals including both male and female (non-pregnant), from 152 households of Asananggre Village, West Garo Hills, Meghalaya (Figure 1). Prior to study verbal consent were obtained from the participants. Data has been collected on anthropometric variables (Height and Weight) by using standard technique (Weiner and Lourie, 1981). Then by using these anthropometric measures required indices (BMI) were calculated and classified according to WHO classification of BMI for Asian adults 2013. Mid-calf circumference and mid –upper arm circumference was taken by putting the tape around the most developed muscles and categorized using WHO classification of MUAC 1995.

Figure 1 Map of West Garo Hills in Meghalaya, North-east India

Hemoglobin concentration was estimated by Sahli's method. The tube is filled with 2 grams marked with N/10 HCl. Blood was collected using finger prick method, using a disposable needles and blood was drawn into Sahli's pipette up to 20 micro liter marking. HCl and blood were stirred, the solution is left for 5 minutes to form acid haemitin. Then the acid haemitin is diluted by adding distilled water drop by drop till it matched the standard color plates of the comparator. Results were read as gram/dl and classified according to WHO, 1975. Necessary descriptive and inferential statistics are calculated by using SPSS version 18.

Results

Present study envisaged that, the males are taller and heavier than the females (Table 1). Not only that, the nutritional markers also vindicated higher values in case of the males. Furthermore, Hemoglobin level is lower in females than males. According to BMI (Table 2) maximum number of females belong to normal category (52.6%) followed by overweight (35.1%) and underweight (12.3%). But males were prone to overweight (48.8%). BMI status did not differ significantly ($p<0.05$) between males and females. Distribution of MUAC (Table 3) envisaged that, the nutritional status of both the males and females were normal.

Significant ($p<0.05$) differences were found between males and females in terms of Hemoglobin level (Table 4). Most of the males and females are mild anemic or normal and only 1.8% females belong to severe anemic category.

Table 1. Distribution of anthropometric variables among the males and females

Variables	Males (43) (Mean ± SD)	Females (57) (Mean ± SD)
Height	162.6 ± 7.4	149.4 ± 5.4
Weight	60.6 ±10.9	51.9 ±10.1
Mid-upper arm Circumference	26.2 ± 2.7	24.9 ± 2.9
Mid-calf Circumference	35.3 ± 2.8	33.5 ± 3.5
Body Mass Index	22.7 ± 2.9	22.3 ± 3.1
Hemoglobin Level	13.2 ± 1.6	11.1 ± 1.7

The results of the linear regression analysis (Table 2) indicate that together all examined socioeconomic and demographic factors significantly affect BMI values and together explain 9% of variability. Gender, age, mother's education and the number of children in the family have the most significant influence on BMI.

Table 2. Distribution of Body Mass Index (BMI) among adult males and females

Category	Underweight (%)	Normal (%)	Overweight	Total Frequency (100%)	Chi-square value
Males	2 (4.7)	20 (46.5)	21 (48.8)	43	0.87
Females	7 (12.3)	30 (52.6)	20 (35.1)	57	

Table 3. Distribution of Mid Upper Arm Circumference (MUAC) among adult males and females

Category	Male (%)	Category	Female (%)
Undernourished (<23)	4 (9.3)	Undernourished (<22)	7 (12.3)
Normal (≥24)	39 (90.7)	Normal (≥23)	50 (87.7)

Table 4. Distribution of hemoglobin level among adult males and females

Category	Severe Anemia (%)	Moderate Anemia (%)	Mild Anemia (%)	Normal (%)	Total Frequency (100%)	Chi-square value
Males	0	0	16 (37.2)	27 (62.8)	43	16.1*
Females	1 (1.8)	16 (28.0)	18 (31.6)	22 (38.6)	57	

*significant $p < 0.05$

Discussion

Malnutrition is associated with both short (weakness and recurring illness) and long- term health consequences (low weight, growth retardation, infections, low birth weight baby and non-communicable diseases) and even death by decreasing body immunity (Muller et al., 2005; Bhattacharya et al., 2019; Muslim et al., 2021; Hoet, 1997; Thakur et al., 2014; Maleta, 2006; Kuruvilla et al., 2016) which can pass on to several generations. Undernutrition is not only a health burden but an economic burden too, (Roy, 2002; Stewart et al., 2003) that hinder the development of the whole nation. Thus, study on nutritional status requires urgent attention in order to prevent malnutrition related health outcomes.

The present study envisaged maximum number of the females belonging to normal weight category followed by overweight. These corroborated with earlier studies done among two ethnic groups of Tripura, Northeast India (Bhattacharya et al., 2019; Ghosh et al., 2018) and Karbi Women of Assam, Northeast India (Little et al., 2016). This may be due to nutritional transition because of an interplay among economic, demographic, environmental and cultural changes occurring in the society (Swain et al., 2018). But in case of males, they were found to be more prone to the overweight category, which was in contrast with the previous studies (Rengma et al., 2015; Mungreiphy et al., 2008) done in the regions of North-east India, which reported higher prevalence of overweight in female than males. Furthermore, the present study also comprehensively indicates that, nutritional status of most of the males and females are normal in terms of both MUAC and hemoglobin level, only 1.8% females belong to severe anemic category. Looking into the hemoglobin level, the present study reveal females having more tendency to be anemic compared to male. Similar findings also reported in the previous studies (Azad et al., 2017, Bentley et al., 2003) done in India and in districts of Meghalaya (Mongsang et al., 2018).

Therefore, from the foregoing study we can conclude that, most of the males and females of Asananggre Village, West Garo Hills, Meghalaya are well-nourished and only few of the females are severely anemic i.e., undernourished. Therefore, further prospective studies are needed on the factors that instigate the low level of hemoglobin among females, which could help in taking appropriate measures for preclusion and in promoting the health status of the individuals of the studied area. The present study attempted, also implies that more such studies are needed in other ethnic groups of North-eastern part of India to find out who are at the higher risk and need an immediate intervention Program.

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