ORIGINAL ARTICLE

A PRELIMINARY STUDY ON ASSOCIATION BETWEEN ANTHROPOMETRIC INDICATORS (N.C, H.C, C.C) AND B.M.I AMONG BENGALEE POPULATION OF SUNDARBANS, WEST BENGAL

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Abstract: *Anthropometric measurements and indices assessment sometime indicates towards a social problem which already a biological exposure in the population. Being able to be fed well sometime a reason for dietary disorders, sometime it happens otherwise. Present study was conducted among people of Ganges Delta, Sundarbans. Neck circumference, Hip circumference, Chest circumference and Body Mass Index were preliminary used to find out the correlations which indicate positive and negative effect both in different cases. This study is also focusing partially on these people social life and health consciousness though main objective was to find the relations between obesity indicators and anthropometric measurements. While considering the impacts of globalized supply of resources and unavailability of nutritional resources due to severe natural disaster. Positive correlations were found between hip circumference, chest circumference and BMI which indicates excessive regional body fat deposition despite of agricultural life.*

*Key Words***:** BMI, hip circumference, obesity.

1. INTRODUCTION

BMI (Body Mass Index) is an indices value which helps to determine one's body weight with comparison of stature. BMI is one of the most significant and scientific calculations which helps to understand the obesity and overweight situations. There are other indicators like waist hip ratio, neck circumference, and hip circumference etc. But BMI is more anthropometric and can be used to assess situations in both pre-pubertal and post-pubertal conditions, in case of small and large populations. In epidemiology, BMI is used as a positively associated indicator for cardiovascular diseases. Though BMI values cannot be use to differentiate between different areas of human body (based upon their subcutaneous fat layer deposition).

Like sub scapular and sub-iliac fat deposition can't be observed separately in BMI values. In case of men BMI value within 25-29.9kg/m^2 is considered as overweight condition and more than 30kg/m^2 will be considered as Obese. World Health Organization [1] defines obesity as a condition with excessive fat mass which causes morbidity, health hazards and negative impact on psychological and social wellbeing. Obesity is a situation where body weight increases more than standard mean value of population which is associated with multiple co-morbidities like Hypertension, Hyperthyroidism, Cardiovascular diseases. But the basic value of BMI can only be used to identify whole body weight. To identify the specified obesity and excessive fat deposition different methods of Anthropometric measurements can be used. Like Neck Circumference and Waist-Hip Ratio sometime indicates conditions like obesity [1]. In Anthropological studies, Obesity and its indicators are well studied and variation from population to population is significantly found. Sometime it is considered as a result of well diverse diet patterns and sometime class differences [3]. Sundarbans region as being delta of Ganges holds one of the unique biodiversity of West-Bengal. People residing in these areas have complex diet pattern considering their ecology and social seclusion. Supplementation in diet by using various natural resources was not a unique thing in world tribes and communities. However, due to globalization, these factors and resources can be altered by more available urban foods [4]. Despite of that Impact of Severe Cyclonic storm 'Alia' during 2008 destroyed many resources and created a huge gap in supply of adequate nutrition. Unavailability of proper nutrition and diet can become the cause of overweight and obesity. For these reasons disease like obesity and cardio-vascular disorders can penetrate these communities. In this study the main aim is to find associations and correlations between multiple indicators of Obesity.

2. METHODS AND STUDY SUBJECTS

The data was collected from Pakhiraloy, Sundarbans-West-Bengal. Participants are Bengalee speaking ethnic agricultural community. Data was collected among 80 males and 84 females within age group of 3-70 years.

For socio cultural perspectives semi structured interviews and case studies were taken while using transcriptions and voice recording. Neck Circumference, Hip Circumference, Waist Circumference, Chest Circumference, Head Circumference were taken by standard technique [5, 6] using calibrated plastic and steel tape (within 0.5cm). Neck Circumference was measured near mid-cervical spine just inferior to neck and Occipital region joining [7]. In case of male laryngeal prominence was considered and measurement was taken from inferior position of that. Stature data was collected by scale standards prepared and used in local school office of public health. Subjects were positioned in anthropometric position being barefoot (within 5mm-1mm). Weight was taken by standard technique of Digital Scale (within 100g of consideration of heavy clothing and light clothing).

Statistical analysis was done by using Bivarite correlation (Pearson correlation) and software was SPSS 16.0.

3. RESULTS

The sample was comprised of 80 male and 84 females (total n =164, randomly selected based upon caste and poverty limit). Initial analysis shown that in case of both sexes (at a time and separately) no obesity is visible in mean values. Though in some individual cases obese and overweighs were found.

In table no 1 BMI value and WHR are significantly low but waist circumference and hip circumference are indicating higher deposition of sub-iliac fat storage. While the neck circumference and head circumferences are near standard value.

Table 1- Characteristics of Participants (Both)

Variables	Mean	SD	SE
Age (years)	36.24	±19.814	2.149
HeC (cm)	54.364	±5.362	0.581
NC (cm)	33.377	±3.192	0.346
CC (cm)	84.302	±11.192	1.214
WC (cm)	82.658	±12.592	1.36
HC (cm)	89.824	±11.009	1.194
BMI (kg/m^2)	19.839	±4.336	0.77
WHR (cm)	0.92	±0.0871	0.009

- HeC- Head Cir. NC – Neck Cir. CC – Chest Cir. WC- Waist Cir. HC- Hip Cir. N = 164

Table 2- Characteristics of Participants (Male)

Variables	Mean	SD	SE
Age (years)	37.675	±22.414	3.68
HeC (cm)	52.045	±5.813	0.955
NC (cm)	33.491	±3.607	0.593
CC (cm)	80.956	±11.621	1.91
WC (cm)	81.773	±13.052	2.145
HC (cm)	84.635	±12.568	2.066
BMI (kg/m^2)	19.141	±3.704	0.609
WHR (cm)	0.967	±0.069	0.0114

- HeC- Head Cir. NC – Neck Cir. CC – Chest Cir. WC- Waist Cir. HC- Hip Cir. N = 80

In case of male database (Table no 2) BMI is little less than standard (Female<0.1). Hip circumference, chest circumference and waist circumference are visible with less differences of regional fat deposition. But waist hip ratio is bit higher than female and data set and whole data set (<0.1).

Table 3- Characteristics of Participants (Female)

Variables	Mean	SD	SE
Age (years)	35.125	±17.718	2.55
HeC (cm)	56.15	±4.244	0.612
NC (cm)	33.289	±2.867	0.413
CC (cm)	86.88	±10.239	1.477
WC (cm)	83.341	±12.321	1.778
HC (cm)	93.825	±7.62	1.099
BMI (kg/m^2)	20.37	±4.734	0.683
WHR (cm)	0.885	±0.082	0.011

- eC- Head Cir. NC – Neck Cir. CC – Chest Cir. WC- Waist Cir. HC- Hip Cir. N = 84

In Table 3, female data set indicates higher hip circumference with higher BMI. Due to sex differentiation sub-iliac fat deposition is probable cause.

The results of analysis show multiple correlations and association between variables like Hip circumference, neck circumference, chest circumference and indices, ratio values like BMI and WHR. In

scatter dot diagram no 1 it is shown that BMI and Hip circumference are significantly correlated in case of no sex differentiation.

Such significance is also found in BMI and Chest circumference. But in case of Neck circumference correlation is only significant in female subjects. Waist Hip Ratio and BMI are also founded as dependent variables.

In case of females, Hip circumference is more significantly correlated with BMI. In some subjects, strong association is also found within BMI and WHR. Standard cut off lower level is 25kg/mt^2 for BMI but in females it is little higher than male though both data base indicates lower BMI than standard.

During analysis it was found that neck circumference is strongly associated with chest circumference and Head circumference. But its association and correlation with obesity indicators like BMI and WHR is not found. All statistical significance was tested against Pearson correlations with 2 tailed significances (significant at 0.01).

Bio-Cultural Perspective

This studies aim was to find out any significant changes in supply of nutrients   or lifestyle (through anthropometric indicators) which may affect the basic nutritional status and the reason of its replacement. Subjects despite of their age and sex, consume standard food supply available through agricultural crops and local market supply. Though due to globalization urban foods were introduced to them and booming in tourism business leads them to adapt in a more resource-based life style than their ancestor but using natural resources (fish from groves, wild plants and fruits) were also found.
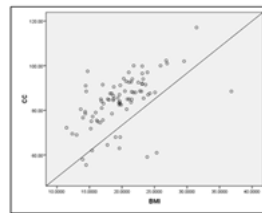

Figure 1a. Positive correlation between chest circumference and BMI
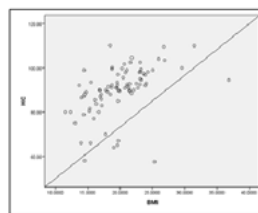
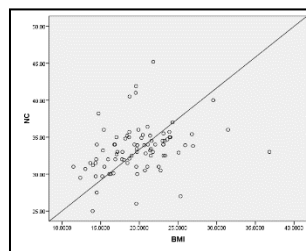**Figure 1b. Positive correlation between Hip circumference and BMI**

Figure 2. Negative correlation between Neck circumference and BMI

4. DISCUSSION

Focus of this study was originally set for obesity and other cardiovascular disorders presence or absence in these people of Sundarbans, Delta of Ganges. But socio-cultural context was also considered. Effect of globalization and availability of proper nutrients are not much impactful due to excessive climatic disasters

happened in past and current time period. Even in these statistical analysis's being underweight is more common among them. Few of them was observed as overweight but that is very minimal. Hip circumference indicates excessive abdominal and sub-iliac fat deposition which leads to conclusion that availability of foods and regularity is severely obstructed. Neck circumference and BMI is not associated which signifies as an indicator for no obese disorders. Through our present study, we can also see that neck circumference cannot be used overall as a secondary indicator for obesity identification. Though chest circumference and BMI is correlated and CC is also correlated with Neck circumference [7, 8]. Present study was a preliminary communication-based work depending on a small population size, which provides some indications towards anthropometric measurements and public health assessment while considering cultural habitat and social adaptation. More studies may provide significant association between social and cultural factors which may have strong impact on biological health and growth.

5. ACKNOWLEDGEMENTS

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