

Comparative Assessment of two behavioural risk factors (Physical Inactivity and Unhealthy Diet) among obese Bengali women in rural and urban areas of West Bengal, India

Chaitali Bose¹, Julekha Sultana², Oly Banerjee³, Sidhartha Singh⁴,
Sandip Mukherjee⁵, Alak Kumar Syamal⁶

^{1,2}Research Fellow, Post Graduate Department of Physiology, Hooghly Mohsin College, University of Burdwan, West Bengal-732101, India.

^{3,4}M.Sc., Research Fellow, Department of Physiology, Serampore College, 9 William Carey Road, Hooghly, West Bengal-712201, India.

⁵Associate Professor, Department of Physiology, Serampore College, 9 William Carey Road, Hooghly, West Bengal-712201, India.

⁶Post Graduate Department of Physiology, Hooghly Mohsin College, University of Burdwan, West Bengal: 732101, India.

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Abstract

This study was aimed to assess dietary pattern and unhealthy dietary factors and to determine the prevalence of physical inactivity among obese Bengali women in rural and urban areas of West Bengal. **This study was conducted in Hooghly district of West Bengal, India and 150 female subjects of 20-50 years age group were recruited for the study considering inclusion and exclusion criteria.** Different physical, anthropometric and socio-demographic variables were documented and dietary information was collected using questionnaire. Global Physical Activity Questionnaire was used to collect information about physical activities. Daily energy comes mainly from carbohydrate in the diet of both groups. Consumption of animal protein and dairy products, fruits, visible fat and sugar were significantly higher in urban group whereas dietary fibre, green leafy and other vegetables, pulses and nuts intake was significantly high in rural group. Physical inactivity prevalence was 64.0% in rural and 78.7% in urban and there was significant differences between rural and urban group regard to all the anthropometric indices.

In summary, the behavioural risk factors are undoubtedly apprehensive and anthropometric indices are pointing out towards associated possible metabolic risks which were poorer in urban group than rural. Further clinical investigation along with proper intervention measure is indispensable.

Keywords: adiposity, food habit, non communicable diseases, sedentarism.

Introduction

Unhealthy eating, physical inactivity and obesity are the trio, amongst many others to heighten the ubiquity of Non Communicable Diseases (NCDs) for the last few decades worldwide. Since the late nineteenth century the pattern of diseases and the cause of mortality of the then developed countries had started to take a shift from communicable

infectious diseases to chronic diseases which were not infectious or transmissible¹. Like the other low or middle income countries, India is also a witness of such transition and these led to the development of 'Lifestyle Diseases' [also called non-communicable diseases, NCD] which are the by-products of 'fast-paced modern lifestyle'. According to report of World Health Organization (WHO), amongst all

Corresponding Author:

Dr. Alak Kumar Syamal

Associate Professor

Post Graduate Department of Physiology, Hooghly Mohsin College, University of Burdwan, West Bengal : 732101

Email : alaksyamal@gmail.com

global deaths 71.0% is accountable to NCDs^{2,3}. Disease burden of NCDs is rising by leaps and bounds every year in India as well. As per WHO report 2014, India contributes two- third of all deaths from NCDs occur in south East Asia region of world health organization.

The behavioural risk factors (unhealthy diet; physical inactivity; tobacco and alcohol consumption) interact with one's genetic make-up and lead to metabolic changes and provide the complex aetiology behind the commencement of NCDs⁴. The scenario of NCDs among Indian is quite distressing. Age standardized prevalence of obesity, hypertension and hyperglycaemia have raised by 22.0%, 10.0% and 9.0% respectively among both sexes (age group ≥ 18 years) within four years i.e. 2010-2014. So, India which is facing 'double burden of diseases' (both non-communicable and infectious diseases), time to time monitoring and surveillances on the behavioural and metabolic risk factors among people residing in different states or regions of the country, are utmost important for making health care policies and programmes. Further, 54.4% Indians are physically inactive⁵ and it is more prevalent in urban than rural and among women than men; and urban people are more hypertensive than rural⁷. So Indian women, who have been kept in the centre of Sustainable Development Growth (2015-30) need more surveillances to lessen their burden of NCDs.

West Bengal also follows the similar trends as prevalence of overweight or obesity in female has risen from 11.4% (NFHS-3, 2005-6) to 19.9% (NFHS-4, 2015-16) and in every cases urban women were more prevalent than rural⁶. So, this study was aimed to assess dietary and physical activity pattern among obese women in both the selected rural and urban parts of West Bengal to make a comparison between these two groups.

Materials and Methods

Study Population

This study was a community based cross sectional study of urban and rural areas of Hooghly district in West Bengal. As inclusion criteria, all the females were Bengali (Hindu), permanent residents in those households, age group were 20-50 years and with a body mass index (BMI) between 25-30 kg/m² and free from any clinically diagnosed NCDs; also, they never consumed any form of tobacco or alcohol. As exclusion criteria, those, who were physically, mentally challenged or non-ambulatory; already

suffering from chronic diseases or are on certain medications. Total 150 (n) obese females were selected from both rural ($n_1=75$) and urban ($n_2=75$) areas. Data were collected during January 2017 to January 2018.

Dietary Information

24 hour recall method on multiple, non-consecutive days was done avoiding days of fasting or feasting. Dietary diversity on week days or on weekends also considered. Mean consumption of different nutrients and foods under various food groups were calculated using Diet Cal software (which used nutritive values of Indian foods).

Physical Activity

Global Physical Activity Questionnaire (GPAQ) developed by WHO (2012)⁷ and was standardised and validated in nine countries⁸ was used in the study to collect information on physical activities of subjects. Metabolic Equivalent (MET) scores was calculated and used for physical activity classification.

Anthropometric Measurement

Body weight, height, waist circumference (WC) and hip circumference (HC) were measured using standardized protocols and instruments⁹. Body Mass index (BMI), ratio of waist circumference to hip circumference and waist circumference to body height i.e. Waist to Hip Ratio (WHR) and Waist to Height Ratio (WHtR) were respectively calculated as well. Cut off of BMI, WC and WHR as normal for Indian women were considered according to Bhalerao et al (2014)¹⁰. WHtR >0.5 is seen as strong predictor of cardio-metabolic risk in obesity¹¹.

Statistical Analysis

Descriptive statistics like mean, standard deviation (S.D.) was done and to compare the mean values between the groups two tail, unpaired t-test was performed. $P<0.05$ was considered as significant.

Results

Dietary Profile

Mean intake of calorie/day by rural subjects is 1941.5 ± 168.9 kcal and urban is 2027.4 ± 166.3 kcal and this difference is significant (Table 1). In contrast, mean daily dietary fibre intake is significantly higher in rural females than their urban counterparts. However, no significant difference was observed between rural and urban groups regarding the mean consumption of whole and refined cereals and the root

and tuber groups which is mostly potato. Significant difference between rural and urban groups in terms of having other food groups like dairy products and other animal protein food group ($p=0.0001$), visible fats ($p=0.003$), fruits ($p=0.004$) and added sugar ($p=0.01$) were observed. Alternatively, mean daily intake of food groups like pulses ($p=0.02$), green leafy vegetables or other vegetables ($p=0.0001$) and nuts and oil seeds ($p=0.001$), rural women showed significantly higher intake than urban women. No significant difference was found between both the group regards to dietary salt intake (mean intake of rural subject 10.1 ± 1.6 gm and in urban 9.8 ± 1.6 gm).

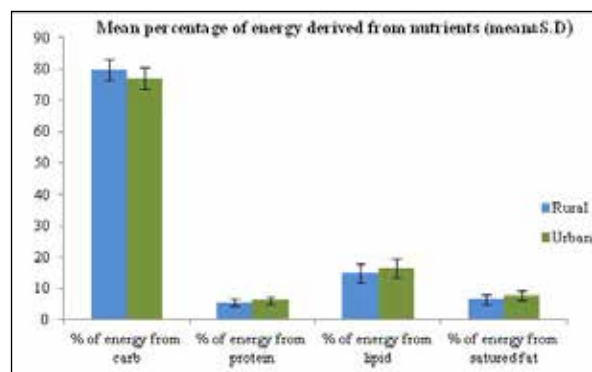
Data of mean percentage of energy/day derived from macronutrients like carbohydrate (carb), protein, fat and saturated fat showed rural subjects derive more energy from carbohydrate than urban subjects. Figure 1A has represented the mean consumption of percentage of energy from those nutrients along with its S.D. values.

Table 1. Average nutrient consumption of study participants

Variables	Rural (Mean $\pm$ S.D.)	Urban (Mean $\pm$ S.D.)	Level of Significance (<0.05)
Calorie (Kcal)	1941.5 ± 168.9	2027.4 $\pm$ 166.3	0.002
Dietary fibre (gm)	19.5 $\pm$ 5.5	16.5 ± 4.4	0.0003
Consumption of food groups			
Whole grain+refined cereals (gm)	314.7 $\pm$ 29.1	310.2 ± 21	≥ 0.05
Pulses (gm)	30.3 ± 4.7	28.0 ± 7.2	0.02
Egg/ meat/ fish/poultry (gm)	23.5 $\pm$ 7.7	30.6 ± 10.3	0.0001
Dairy products (gm)	64.1 $\pm$ 23.9	84.2 ± 23.4	0.0001
Root & tubers (gm)	100.2 ± 26.6	99.7 ± 9.9	≥ 0.05
Green leafy vegetables (gm)	22.1 ± 8.4	15.7 ± 8.4	0.0001
Other vegetables (gm)	74.1 ± 10	50.7 ± 11.2	0.0001
Fruits (gm)	21.8 ± 6.7	25.2 ± 7.3	0.004
Visible fats & oils	38.7 $\pm$ 7.4	42.4 ± 7.9	0.003

Variables	Rural (Mean $\pm$ S.D.)	Urban (Mean $\pm$ S.D.)	Level of Significance (<0.05)
Nuts& oilseeds(gm)	2.2 ± 1	1.7 ± 1	0.001
Added sugar (gm)	31.5 ± 6.2	34.5 ± 8.1	0.01
Added Salt (gm)	10.1 $\pm$ 1.6	9.8 ± 1.6	≥ 0.05

A.



B.

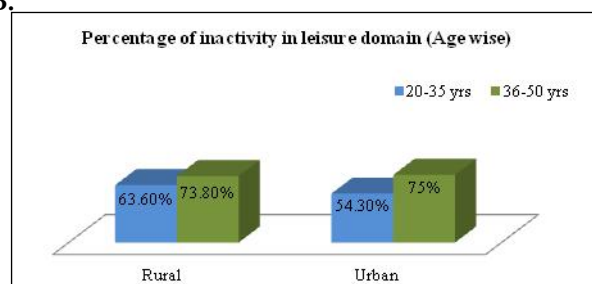


Figure 1. [A] Mean percentage of energy derived from nutrients. [B] Percentage of inactivity in leisure domain (age wise)

Physical Activity

Data revealed that 64.0% of rural subjects and 78.7% of urban subjects are physically inactive i.e., MET scores was <600 ; percentage of active females (MET score 600-1200) is 32 and 21.3 in rural and urban areas respectively; whereas only 4.0% rural female subjects are highly active (MET score ≥ 1200) and unfortunately among urban subjects that is nil considering all the domains of activity, shown in Table 2.

Table 2. Sample distribution on total energy expenditure on low/ moderate/ vigorous activity/week

BASED ON TOTAL ENERGY EXPENDITURE		
MET VALUE	RURAL $n_1=75(\%)$	URBAN $n_2=75(\%)$
PHYSICALLY INACTIVE <600	48 (64.0%)	59 (78.7%)
ACTIVE 600- 1200	24 (32.0%)	16 (21.3%)
HIGHLY ACTIVE ≥ 1200	3 (4.0%)	0
BASED ON PHYSICAL INACTIVITY		
DOMAIN	RURAL $n_1=75(\%)$	URBAN $n_2=75(\%)$
WORK	45(60.0%)	57(76.0%)
TRAVEL	38(50.6%)	44(58.7%)
RECREATION	52(69.3%)	49(65.3%)

Table 2 also has depicted that among the subjects in both the areas prevalence of physical inactivity in particular domains were also assessed and it was found that among rural subjects, most was inactive in recreational domain (69.3%) and lowest percentage of inactivity was seen in travel domain (50.6%). On the other hand among urban female subjects mostly was inactive in occupational domain (76.0%) and least in travel domain (58.7%). Age group-wise distribution indicated that subjects belong to the 36-50 yrs of age group was more inactive than the age group of 20-35 yrs in both the areas (Figure 1B).

Mean time/ day spend on various domains with vigorous to moderate intensity activity was also calculated (Table 3). No significant differences were found regard to mean time spent on vigorous work and recreation but differences were significant in terms of travel and moderate intensity occupational work domains. Urban obese subjects spend more time on sitting than rural and the difference was significant ($p=0.03$).

Table 3. Mean time spend on different activities/day (Mean $\pm$ S.D.) and level of significance

ACTIVITY	DOMAIN	Rural	Urban	Level of Significance <0.05
VIGOROUS	WORK	9.61 $\pm$ 40.1	1.4 $\pm$ 3.21	≥ 0.05
	RECREATION	0.61 $\pm$ 1.9	0.83 $\pm$ 1.64	≥ 0.05
MODERATE	WORK	16.6 $\pm$ 35.6	6.5 $\pm$ 12.3	0.02
	TRAVEL	8.9 $\pm$ 10.1	5 $\pm$ 6.8	0.005
	RECREATION	3.09 $\pm$ 5.4	3.12 $\pm$ 5.1	≥ 0.05
SITTING		327.7 $\pm$ 99.9	366.5 $\pm$ 117	0.03

Anthropometric Profile

Anthropometric indices of urban obese female subjects had significantly higher values than their rural counterparts (Table 4). Body weight and BMI which indicates generalised obesity among both urban and rural females. WC and WHR value were also significantly higher in urban group. WHtR was 0.57 $\pm$ 0.02 for rural and 0.58 $\pm$ 0.02 for urban group and was significantly different ($p=0.04$).

Table 4. Anthropometric profile of rural and urban samples (Mean $\pm$ S.D.)

Variables	RURAL	URBAN	Level of significance <0.05
Body weight (kg)	69.5 $\pm$ 5.05	71.6 $\pm$ 5.9	0.01
BMI(kg/m ²)	27.4 $\pm$ 1.4	28 $\pm$ 1.6	0.008
WC (cm)	91.7 $\pm$ 3.4	93 $\pm$ 3.4	0.02
WHR	0.89 $\pm$ 0.02	0.9 $\pm$ 0.02	0.001
WHtR	0.57 $\pm$ 0.02	0.58 $\pm$ 0.02	0.04

Discussion

In our study, two major behavioural factors like unhealthy diet and physical inactivity of NCDs along with anthropometric parameters among the obese Bengali women (20-50 years of age) from selected parts of both rural and urban groups were studied. Previous study on changed dietary pattern of Indians has noted that consumption of dietary fibre, fruits and vegetables are gradually decreasing whereas intake of visible fats and added sugar are escalating rapidly¹². Consumption of plant and animal protein was lower than the recommended value in both groups. Urban obese group was having more animal protein, dairy products, fruits, visible fat and oil and added sugar than rural group whereas rural group was consuming more pulses, green leafy and other vegetables and nuts and oil seeds. Our study also revealed that most of the daily energy is coming from carbohydrate, possibly be a reason behind increasing diabetes in India. Poor consumption of dairy products and animal protein especially in rural group as reported in this study is in line with the reporting of Sharma et al. (2020)¹³ differs from the observations of Shetty (2002)¹².

Physical activity which has been measured in this study, another behavioural risk factor for lifestyle diseases was also not satisfactory as well. More than half of all subjects, in both groups were inactive i.e. MET score <600. Urban obese women were more inactive (78.7%) than rural group (64.0%). Across all the domains, urban subjects were mostly inactive in occupational domain whereas highest percentage of inactivity among rural subjects was found in recreational domain. Age group wise participation in leisure activity was measured and emerged that older age group was less active in leisure among both the groups.

Ample researches have been done on physical activity pattern among adults (both sexes) in different regions covering both the rural-urban parts across India and most of them specified more physical inactivity amongst urban females than their rural counterparts, which also goes with our observation¹⁴. In contrast, other studies^{15,16} found no significant differences between rural and urban females regarding diet, physical activity and obesity in North India population. Whereas, Newtonraj et al. (2019)¹⁷ noted lesser percentage of physical inactivity in rural females than urban which was 22.5%, almost comparable to the prevalence of global physical inactivity i.e. 27.5%.

The subjects from both the rural and urban areas were found obese i.e. BMI >25 kg/m² and all the selected anthropometric parameters were significantly higher in urban females than their rural counterparts indicating higher obesity in urban females. These findings are well in line with earlier studies^{18,19}. Thus, we hypothesised that such lofty parameters are indicators of different health issues like cardio-vascular diseases, insulin resistance, diabetes mellitus, metabolic syndrome, reproductive hassles, different cancer and so on among both the groups.

Conclusion

This study reported unhealthy diet in both the rural-urban groups whereas physical activity profile was worse in urban females than the rural group. Lifestyle modification through dietary intervention and recommendation of enough physical activity can be beneficial to cut down the risk factors which could be investigated in future as well.

Conflict Of Interest

The author declared no conflict of interest.

Source of Funding

Self

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