Gender based comparison of anthropometric assessment across rural-urban interface of Bangalore.

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Abstract

Diet, composition of nutrients in the body and normal metabolic integrity is the requirement of human health and represented by nutritional status. The socially constructed gender roles of men and women interact with their biological roles to affect the nutrition status. Urbanization and global change has an impact on the nutritional status of individuals. Present study focused on assessment and comparison of nutritional status of men and women across rural-urban interface of Bangalore. A total of 300 households were selected from 30 localities based on purposive random sampling which are classified as rural, transition and urban areas. Anthropometric measurements were taken and indices were calculated. Results revealed that, underweight was more among women (13.56%) compared to men (8.88%). Obesity incidence was more in urban in case of women (15.34%), among men it was in rural (3.55%). Urban women had more percentage for increased waist hip ratio (58.7%) compared to men. However, incidence of non-communicable diseases were more among men compared to women. In conclusion, even though malnutrition was more prevalent among women, men had more incidence of non-communicable diseases. This indicates essentiality to study the other lifestyle related factors other than anthropometry, which are significant contributors to health status of the individual across rural-urban interface of Bangalore.

Keywords: Nutritional status, BMI, Gender, Rural-urban interface.

Accepted on 15 February, 2021

Introduction

Diet, composition of nutrients in the body and normal metabolic integrity is the requirement of human health and represented by nutritional status (OMICS, 2014) [1]. Normal nutritional status is managed by balance food consumption and normal utilization of nutrients. Malnutrition is caused by imbalance food intake and faulty utilization of nutrients. Anthropometric parameters are valuable instrument and nutritional indices, namely Body Mass Index (BMI), Waist to Hip Ratio (WHR), are the important and quick tools to define individual's nutritional status. There has been a change in the lifestyles of populations, including reduced physical activity and consumption of foods high in calories. Overweight and obesity are now replacing the more traditional public health concerns such as under-nutrition and infectious diseases as some of the most significant contributors to ill health [2]. Body Mass Index (BMI) has been shown to be an important predictor of risk of non-communicable diseases (NCDs). Further, BMI has been associated with several risk factors for NCDs such as fasting blood glucose, dyslipidemia, hypertension, and abnormal waist circumference [3].

The socially constructed gender roles of men and women interact with their biological roles to affect the nutrition status of the entire family and of each gender. Because of women's cyclical loss of iron and their childbearing, their nutrition status is particularly vulnerable to deficiencies in diet, care, and health or sanitation services. Apart from this, the difference in nutrition status of men and women are attributed to several socio-cultural factors. A comparative study of nutritional status between men and women helps in understanding gender differences in prevalence of malnutrition and associated risks for non-communicable diseases. Further this comparison, in the rural urban interface, provide outline on influence of growing urbanization on nutritional status of adults. Hence, present investigation was undertaken to conduct the gender based analysis of nutritional status across rural-urban interface of Bangalore.

Materials and Methods

Selection of localities

Rural-urban interface of the Bangalore (two transects) was defined as a common space for interdisciplinary research. The northern transect (N-transect) is a rectangular strip of 5 km width and 50 km length, the lower part of this transect cuts into urban Bangalore, and the upper part contains rural villages. The Southern transect (S-transect) is a polygon covering a total area of 300 km2. Rural-Urban interface was further divided into three sub regions viz., Rural, Transition and Urban areas based on the simplified Survey Stratification Index (SSI) by following the logic of the Urban-Rural Index which considered distance to the city centre (VidhanaSoudha) and percentage of built-up area [4]. This classification of regions, formed basis for selection of 300 middle income households based on purposive random sampling, in the rural-urban interface of Bangalore. In which 479 women and 474 men were assessed for nutritional status.

Data Collection

A schedule was developed and pretested in selected localities. The necessary changes were incorporated to develop standardized schedule to elicit information on socio-demographic profile, nutritional status and incidence of non-communicable diseases among men and women.

Socio-demographic profile

Data collected on age, education and occupation of individuals among the selected households constituted socio-demographic profile.

Nutritional status assessment

Anthropometric measurements viz, height, weight, waist and hip circumference were taken according to standard protocols, for all the adults among selected households. Anthropometric indices such as Body Mass Index (BMI) and Waist Hip Ratio (WHR) were calculated to classify based on WHO standards.

Incidence of non-communicable diseases

Prevalence of non-communicable diseases such as diabetes, hypertension, heart diseases, osteoporosis and other diseases associated with lifestyle pattern and nutritional status was recorded.

Statistical analysis

All the collected information from households was compared between men and women across rural urban interface of Bangalore. Data was pooled in Microsoft excel and analysed with application of Chi-square test. Multiple linear regression analysis was carried out to determine the factors influencing BMI of adults.

Results

The findings of the research are categorized under following headings

Socio-demographic profile

The socio-demographic profile of men and women is presented in Table 1. Irrespective of gradient majority of themen (33.7%) and women (35.9%) belonged to the age group of 18-30 years, followed by 40-60 (Men=30.8%, Women=29%) years of age group. Most of the women were illiterate (31.5%) compared to men (13.8%). Irrespective of gender majority of them studied up to secondary school (Men=29.7%, Women=27.3%), however number of degree holders were more among men (16.9%) compared to women (9.8%). Among men 45.6 per cent of them involved in agriculture in rural, whereas majority of them were self-employed in urban (42.8%). Along the rural-urban gradient most of the women were housewives (57.0%). It was observed that 24.9 per cent of rural women were occupied in agriculture, whereas 9.9 and 13.3 per cent of women in transition and urban area respectively were working in private firms.

Anthropometric assessment

Body Mass Index (BMI): Table 2 represents the classification of men and women based on Body Mass Index (BMI). underweight was more prevalent in rural irrespective of gender, however incidence was more among women (13.56%) compared to men (8.88%). Obesity incidence was more in urban in case of women (15.34), whereas surprisingly among men it was in rural (3.55). It was observed that 34 per cent of men were overweight however it was 18.0 per cent among women. Malnutrition depicted by underweight and obesity conditions was higher among women compared to men. Statistically significant difference was noted between men and women for classification based on BMI, in all the three study areas, i.e. rural ($\chi 2$ =17.56**), transition ($\chi 2$=21.25**) and urban ($\chi 2$=27.00**). This classification

Table 3. *Socio-demographic profile of men and women across rural-urban interface of Bangalore (n=953).*

	Men (n=474)						Women (n=479)					
	R (n=169)	%	T (n=160)	%	U (n=145)	%	R (n=177)	%	T (n=152)	%	U (n=150)	%
Age												
18-30	57	33.73	54	33.75	49	33.79	62	35.03	59	38.82	51	34.00
30-40	40	23.67	38	23.75	39	26.90	38	21.47	37	24.34	36	24.00
40-60	48	28.40	53	33.13	45	31.03	49	27.68	44	28.95	46	30.67
>60	24	14.20	15	9.38	12	8.28	28	15.82	12	7.89	17	11.33
Education												
Illiterate	34	20.12	30	18.75	20	13.79	69	38.98	46	30.26	36	24.00
Primary	31	18.34	25	15.63	26	17.93	35	19.77	24	15.79	29	19.33
Secondary	48	28.40	52	32.50	41	28.28	36	20.34	47	30.92	48	32.00
PUC/Diploma	26	15.38	28	17.50	26	17.93	22	12.43	14	9.21	14	9.33
Degree	27	15.98	25	15.63	28	19.31	13	7.34	16	10.53	18	12.00
Post Graduates	3	1.78	0	0.00	4	2.76	2	1.13	5	3.29	5	3.33
Occupation												
Government	5	2.95	6	3.75	9	6.21	1	0.56	4	2.63	6	4.00
Private	41	24.26	25	15.63	43	29.66	5	2.82	15	9.87	20	13.33
Self Employed	12	7.10	55	34.38	62	42.76	19	10.73	12	7.89	18	12.00
Business	0	0.00	0	0.00	0	0.00						
Housewife	0	0.0	0	0.00	0	0.00	80	45.20	95	62.50	98	65.33
Unemployed	14	8.28	17	10.63	12	8.28	8	4.52	10	6.58	3	2.00
Agriculture	77	45.56	26	16.25	4	2.76	44	24.86	4	2.63	0	0.00
Student	12	7.10	7	4.38	7	4.83	13	7.34	5	3.29	4	2.67
Daily wages	8	4.73	24	15.00	8	5.52	7	3.95	7	4.61	1	0.67

Table 2. *Classification of adults based on BMI in the rural-urban interface of Bangalore (n=953).*

Women (N=479)	Rural	%	Transition	%	Urban	%	χ^2 Test
Undernutrition	24	13.56	10	6.58	8	5.33	29.54**
Normal	61	34.47	50	32.90	44	29.33	
Overweight	29	16.38	27	17.76	30	20.0	
Pre-Obese	48	27.12	53	34.87	45	30.0	
Obese I	15	8.47	12	7.89	23	15.34	
Total	177		152		150		
Men (N=474)							
Undernutrition	15	8.88	5	3.13	03	2.07	30.87**
Normal	69	40.83	59	36.88	46	31.72	
Overweight	51	30.18	53	33.13	57	39.31	
Pre-Obese	28	16.57	42	26.25	36	24.83	
Obese I	06	3.55	01	0.63	03	2.07	
Total	169	100.0	160	100.0	145	100.0	
χ^2 Test	17.56**		21.25**		27.00**		

based on BMI across rural-urban interface was also found to be statistically significant both among men ($\chi 2$=30.87**) and women (χ^2=29.54**).

Waist Hip Ratio (WHR): Waist Hip Ratio for adults was compared with WHO standards (< 0.85: Women and < 0.9: Men) and classified as normal and increased waist to hip ratio. Among all the three gradients most of the women had increased WHR (Rural=53.1, Transition=49.3, Urban=58.7 %) compared to men (Rural=51.5, Transition=38.1, Urban=40.0 %). It was found to be higher among urban women (58.7%) and in contrast to this among men it was in rural (51.5%) (Figure 1).

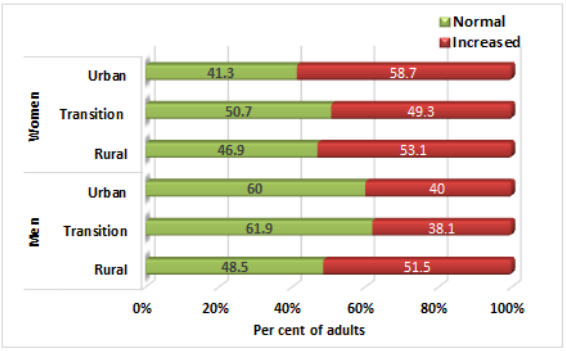

Figure 1. *Waist Hip Ratio comparison between gender across the rural urban interface of Bangalore.*

Incidence of Non-communicable diseases

Irrespective of gradients overall prevalence of non-communicable diseases was more among men compared to women. Urban residents had more prevalence of diseases both among men (20%) and women (16%). Diabetes and hypertension were predominant compared to other non-communicable diseases such as heart diseases, cancer, hyper or hypothyroidism. Diabetes was more among transition men (11.3%), however among women it was in urban (8.7%). It is interesting to note that comparatively more hypertension incidences were seen among rural women (5.1%) whereas among men it was in urban (9.7%) (Figure 2).

Discussion

Socio-demographic profile

Among 300 household's information was collected for 479 men and 474 women. Majority of them were young adults (18-30 years). Literacy rate among women is much lower than men. The conservative socio-cultural patterns restrict women education. Most of the rural scenario provides education up to secondary school and rural population must depend upon their neighbourhood towns for further studies. Major occupation for men in rural is agriculture, however the influence of urbanization has created opportunities for diversified occupations in transition (peri-urban) area and urban. In rural, women are mainly engaged in agriculture (own farm), livestock management and household activities. However, the increasing expenditures as a result of urbanization in transition and urban areas makes dual income necessary and hence women are involved in private firms. It was noted that, majority of the women across rural-urban gradients were housewives.

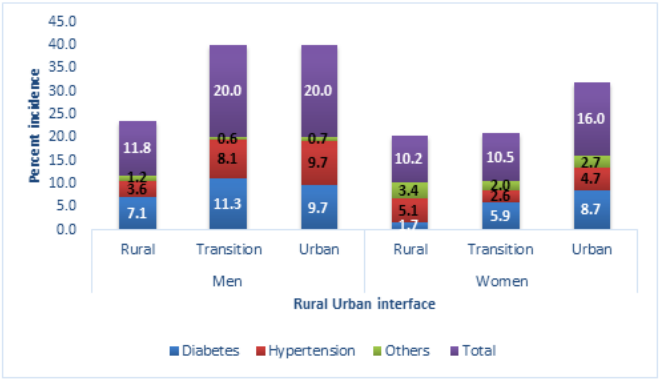

Figure 2. *Incidence of non-communicable diseases among men and women across the rural-urban interface of Bangalore.*

Body mass index

The body mass index, or BMI (weight in kilograms divided by the square of the height in meters), is recommended by the World Health Organization as the most useful epidemiological measure of obesity.Assessment of Body Mass Index, facilitates determining nutritional status of the selected subjects, based on anthropometric measurements. Obesity is a major health problem throughout the world.Interactions between genetic predisposition and dietary and lifestyle factors are believed to account for the recent obesity epidemic. An excess amount of body weight has been associated with increased risk of cardiovascular disease, diabetes, certain types of cancer, mortality and the obesity associated co-morbidities are of major public health concerns [5].A study conducted at Shivamogga district, Karnataka state, India, Nagendra reported that, the

prevalence of obesity was more in females (34.9%) compared to males (28.4%) among urban population [6]. A Compared to these figures, in present study the prevalence of obesity was less among both men and women, as several physiological and environmental factors may also influence on BMI.

Waist hip ratio

Higher abdominal fat (android obesity) is known to be a greater risk factor than accumulation of body fat around the hips. Android obesity is associated with hypertension, hyper-triglyceridemia, hyperinsulinemia and diabetes. The waist-hip ratio is used as an indicator of this type of body-fat distribution. In the present study, compared to men, urban women had increased WHR, which may be due to occupationally most of them were housewives and urban living increases accessibility to various facilities, such as transport, communication, electricity (Essential for electronic equipment used to reduce household activities) and thereby reduces physical activity. Among men, it was more in rural, which may be due to changing occupational and food habits which reduces physical activities and addiction to non-food habits. A study was conducted in Japan to investigate [7], the gender differences in association between anthropometric indices of obesity and blood pressure and reported that, waist circumference has the strongest association with BP and the prevalence of hypertension in men and BMI had the strongest association with BP and hypertension in women. Hence, Waist circumference in men and BMI in women should be given more importance in the screening of hypertension in Asians.

Incidence of non-communicable diseases

Non-communicable diseases (NCDs) are diseases or conditions which are non-transmittable and chronic in nature. The causes of NCDs are multifactorial; these diseases may arise from any combination of underlying, modifiable and non-modifiable risk factors.,Prevalence of non-communicable diseases by age and gender in publicly funded primary care settings in Qatarwas studiedand reported that, highest increases in the prevalence of NCDs were seen in a relatively young age group (30–49 years) [8]. The prevalence of all NCDs except cancers was higher in men. These findings support results of present investigation. Gender is one of the important socioeconomic determinants of health. Although men have higher rates of mortality, women report and have more morbidity than men have. This gender difference may be attribute to two broad theories: (1) biological, contending that most of them problem is related to hormonal and genetic differences between men and women, and (2) psychosocial, according to which the difference is due mainly to women's role in society and their behaviour towards illness. A study conducted in Pune reported that, higher prevalence of overweight and obesity among urban women as compared to rural women. And also urban females were more central obese than rural females [9].In the present investigation, though major risk factor for NCDs, i.e. overweight and obesity is high among women, incidence of diseases was found be more among men, which may be attributed biological or psychological theories discussed above.

Conclusion

Nutritional status assessment across rural-urban interface of Bangalore indicated malnutrition was more prevalent among women. Undernutrition was more in rural which may be due to socio-cultural practices affecting food consumption in the villages. However, in contrast obese women were more in urban as majority of them were housewives and urban setting promotes consumption of processed foods with increased intake of fats and sugars. However, incidence of non-communicable diseases especially diabetes and hypertension were more among men compared to women. This indicates essentiality to study the other lifestyle related factors other than anthropometry. There may be behavioural risk factors (Alcohol, smoking, tobacco), biological and psychosocial differences between men and women, contributing to health status of the individuals. In this regard, future investigations compounded with nutritional status and lifestyle must be of added value for research related to gender issues in the field of nutrition.

Acknowledgments

We acknowledge the financial support received from Department of Biotechnology, GOI for the project "Urbanization effects on consumption pattern, dietary diversification and human nutritional status in Bangalore" (I-C04) as part of the Indo-German collaborative research project FOR-2432.

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