

Diet and Physical Activity Among Women in Urban and Rural Areas in South India: A Community Based Comparative Survey

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ABSTRACT

Introduction: Noncommunicable diseases (NCDs) such as diabetes, hypertension, and heart diseases are increasing in India. There is a clear need to study risk factors for NCDs in various population groups in the country. **Materials and Methods:** This community based cross-sectional survey was conducted to study the diet and physical activity of women in urban and rural areas in Vellore district. Dietary data was collected using 24-h dietary recall and physical activity was collected using the International Physical Activity Questionnaire (IPAQ). Sociodemographic variables were collected to assess the risk factors for unfavorable diet and physical activity. **Results:** The odds of the rural women engaging in high physical activity are 3.61 times greater than urban women (95% confidence interval (CI) = 2.36–5.54). The odds of the urban women consuming a high calorie diet are 1.923 times that of the rural women (95% CI = 1.282–2.857). The odds of the urban women being overweight/obese are 5.555 times than that of the rural women (95% CI = 3.333–10). Women who were housewives and not doing household work were significantly less physically active, took higher calorie diet, and were more overweight and obese compared to women who were involved in active household work. **Conclusions:** Urban women had unfavorable diet and physical activity levels compared to rural women. They also had higher levels of overweight and obesity. There is a need for targeted NCD prevention interventions among urban women.

Keywords: Diet, physical activity, rural, urban, women

Introduction

Noncommunicable diseases (NCDs), lifestyle diseases as they are also called, are caused mainly due to unhealthy dietary patterns and low levels of physical exercise among other causes.^[1] India contributes substantially to the worldwide burden of NCDs. By 2020, it is estimated that the NCD deaths would rise sharply in India and most of these deaths would happen in the middle age group.^[2] Modern lifestyle associated with easy access to food, lack of exercise, sedentary lifestyles, calorie dense foods, and excessive television viewing contribute to development of NCDs.^[3] Women generally have lower levels of physical activity compared to men.^[4] They also are more likely to have a change (either an increase or a decrease) in calorie intake in their lifetime.^[5] In a major

population based survey from urban north India, the prevalence of moderate to heavy physical inactivity among women was 52.4%.^[6] The same survey also showed that only 4.4% of the women took adequate portions of fruits and vegetables.^[6] In a comparative study of physical activity between urban and rural women in south India, time spent on household activities (mild to moderate physical activity) was longer among rural women compared to their urban counterparts.^[7,8] A community based survey of NCDs risk factors in Gujarat showed that rural women had greater use of smokeless tobacco. Urban women were more likely to have lower physical activity compared to rural women. There was no significant difference between urban and rural women in consuming unhealthy diets. Urban women were more likely to have central obesity compared to rural women.^[9] The Indian Migration Study done in 1,600 villages from 18 states of India revealed the high prevalence of certain NCD risk factors such as tobacco use, low intake of fruits and vegetables, obesity,

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dyslipidemia, diabetes, and hypertension in the rural areas. The risk factors were found to be higher in the south Indian states compared to the north Indian states.^[10] The current study was conducted to compare the diet and physical activity levels among women in an urban and rural setting in south India and add evidence to focus NCD prevention interventions.

Materials and Methods

The survey was done using a cross-sectional study design. The urban area selected for the study comprised of a total population of around 7,000 people. This area is located in Vellore city within 5 km radius of the Christian Medical College Hospital, Vellore. It has good access to markets, schools, college, electricity, water, and healthcare. The rural area which included two villages in the K.V. Kuppam block comprising of a total population of 2,000 people, is served by the Rural Unit for Health and Social Affairs (RUHSA), a part of the Department of Community Health of the Christian Medical College, Vellore. The people living in these villages are mostly involved in agriculture. RUHSA provides primary healthcare in these villages through mobile clinics.

The prevalence of the urban women engaged in physical activity which was taken as 40%^[8] and for a power of 80% and an alpha error of 0.05, a sample size of 150 in the urban area was calculated. The same sample size was taken for rural area also.

The sample included women between 30 and 50 years of age who were permanent residents of these areas. Women with mental and physical disabilities, pregnant women, and those with known NCD were excluded. Sampling was done using a multistage method. First, the urban and rural areas were selected by a lot method. The streets in these selected areas were chosen by simple random sampling using lot method. The women for the study were selected by systematic random sampling based on the inclusion criteria from the selected streets.

The International Physical Activity Questionnaire (IPAQ) was used for measuring the levels of physical activity. There were four domains in the instrument. They are domains of work, transportation, domestic activities, and leisure time activities.^[11] Assessment of food consumption was done by 24-h diet recall method. The respondents were asked to recall all the foods eaten during the reference time period and describe the foods consumed. The amount of food eaten was measured using standardized spoons, glasses, and bowls and was recorded. The weight of the women was measured in kilograms using a standardized weighing scale. The height was measured in centimeters by a standardized meter scale. Body mass index (BMI) is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). The BMI were classified based on World Health Organization (WHO) criteria as undernourished, normal, overweight, and obese. The sociodemographic variables were also collected.

The physical activities were converted to metabolic equivalent scores (MET scores). Based on the score people were classified as:

MET score < 600 = low physical activity.

MET score 600-3,000 = moderate physical activity.

MET score > 30,00 = high physical activity.^[11] The calorie levels of the foods in the 7 day recall were calculated.^[12] Since most women engaged in moderate physical activity, 2,100 kcal was taken as the cutoff. Those who consumed less than 2,100 kcal were said to have low dietary intake, while those who consumed more than 2,100 kcal were said to have a high dietary intake.

Descriptive statistics were used for measures of diet and physical activity. Association between demographic factors and diet and physical activity was studied using chi-square tests and odds ratios. The study was approved by the Institutional Review Board of the Christian Medical College, Vellore and individual verbal informed consent was obtained from the participants.

Results

Table 1 depicts the sociodemographic characteristics of the study population. Among the women surveyed in the urban areas, 53.3% were between 30 and 40 years of age and the rest between 40 and 50 years. About 89% were married and 90% were literate. About 29% of the women were involved in household work which included work in small cottage industries such as making 'beedi' (local cigars made of unrefined tobacco), rolling incense sticks, and arranging match sticks. Of the households to which these urban women belonged, 38.6% had more than four members. The characteristics of the women from the rural area were similar with respect to age and marital status. Only 76% of the rural women were literate and about 52% of them were involved in household work including agricultural labor. Forty-four percent of the households had more than four members in the rural area. Comparing the socioeconomic status of the urban and rural areas, there was a statistically significant difference with more people in the higher status in the urban areas (68.6% urban vs 48.6% rural).

The measured physical activity levels of the women in the urban and rural areas classified according to MET scores are shown in Table 2. The odds of the rural women engaging in high physical activity are 3.61 times greater than urban women (95% CI = 2.36-5.54). Based on the calorie requirement, the urban and rural women were classified and this is depicted in Table 3. The odds of the urban women consuming a high calorie diet are 1.923 times that of the rural women (95% CI = 1.282-2.857).

The BMIs of the urban and rural women are shown in Table 4. The odds of the urban women being overweight/obese are 5.555 times than that of the rural women (95% CI = 3.333-10). Further the BMI was compared to the levels of calorie intake and physical activity. This is shown in Table 5. The odds of the women who engage in moderate physical activity being overweight/obese are 3.87 times than that of the women who

Table 1: Characteristics of the study population

Sr. no.	Sociodemographic variables		Locality				Chi-square	P-value
			Urban (N=150)		Rural (N=150)			
			No.	Percentage	No.	Percentage		
1	Age (years)	30-40	80	53.3	88	58.6	0.86	0.35
		41-50	70	46.6	62	41.3		
2	Marital status	Unmarried	16	10.6	19	12.6	0.29	0.59
		Married	134	89.3	131	87.3		
3	Educational status	Illiterate	14	9.3	36	24.0	11.61	0.001**
		Literate	136	90.6	114	76.0		
4	Occupational status	Housewife alone	108	72.0	71	47.3	18.96	<0.001***
		Household work ^Ω	42	28.0	79	52.6		
5	Religion	Hindu	143	95.3	139	92.6	0.94	0.33
		Others	7	4.6	11	7.3		
6	Number of family members	1-4 members	92	61.3	84	56.0	0.88	0.34
		>4 members	58	38.6	66	44.0		
7	Type of house	Kutchha and thatched	32	21.3	68	45.3	19.44	<0.001*
		Pucca	118	78.6	82	54.6		
8	Social status	Upper	103	68.6	73	48.6	12.37	<0.001*
		Middle and lower	47	31.3	77	51.3		

***P < 0.001, **P < 0.01, ^Ωhousehold work with other occupation like beedi making, arranging matchsticks, agricultural work, coolie, etc

Table 2: Physical activity among the urban and rural women

Locality	Physical activity				Chi-square	P-value	Odds ratio (95% CI)
	Low/moderate		High				
	No.	%	No.	%			
Rural (N = 150)	74	49.3	76	50.7	46.08	0.001**	3.61 (2.36-5.54)
Urban (N = 150)	129	86.0	21	14.0			
Total (N = 300)	203	67.7	97	32.3			

**P < 0.01; CI: Confidence interval

Table 3: Calorie intake among rural and urban women

Locality	Dietary intake				Chi-square	P-value	Odds ratio (95% CI)
	Low calories		High calories				
	No.	%	No.	%			
Rural (N = 150)	122	81.3	28	18.7	10.57	0.001**	0.52 (0.35-0.78)
Urban (N = 150)	97	64.7	53	35.3			
Total (N = 300)	219	73	81	27			

**P < 0.01; CI: Confidence interval

engage in high physical activity (95% CI = 2.10-7.12) and the odds of the women who consume high calories being overweight/obese is five times than that of the women who consume high calories (95% CI = 3.333-10). Table 6 depicts the association between the sociodemographic variables and physical activity, diet, and BMI of the women. Women who were housewives and not doing household work were significantly less physically active, took higher calorie diet, and were more overweight and obese compared to women who were involved in active household work.

Table 4: Body mass index of the urban and rural women

Locality	Body mass index				Chi-square	P-value	Odds ratio (95% CI)
	Underweight, normal		Overweight, obese				
	No.	%	No.	%			
Rural (N=150)	136	90.7	14	9.3	62.60	<0.001***	0.18 (0.10-0.30)
Urban (N=150)	73	48.7	77	51.3			

***P < 0.001; CI: Confidence interval

Discussion

Of all rural women, 50.7% engaged in high physical activity, while 14% among the urban women were physically active. In case of dietary intake, 18.7% of the rural women consumed high calories, while it was 35.3% in the urban area. Considering BMI, in the rural area, 9.3% were overweight/obese while 51.3% were overweight/obese in urban area. The women who were engaged in high physical activity (89.7%) were found to be underweight/normal. About 39.9% of the women who engaged in low/moderate physical activity were found to be overweight/obese. The women who consumed low calories (81.3%) were found to be underweight/normal. Whereas, 61.7% of the women who consumed high calories were found to be overweight/obese. About 76.5% of the housewives and 72.5% of those who live in pucca houses engage in low/moderate activity. The women who were housewives (36.9%) and live in pucca houses (35%) consume high calories. The literate women (34.8%), the women who were housewives (40.8%), and those who stay in pucca houses (39.5%) were overweight/obese compared to their counterparts.

India and other developing countries are undergoing rapid urbanization and changes in lifestyle.^{1,31} There is a shift in the

Table 5: Association between body mass index versus calorie intake and physical activity levels

	Body mass index				Chi-square	P-value	Odds ratio (95% CI)
	Underweight, normal		Overweight, obese				
	No.	%	No.	%			
Moderate physical activity	122	60.1	81	39.9	27.19	<0.001***	3.87 (2.10-7.12)
High physical activity	87	89.7	10	10.3			
Low calories	178	81.3	41	18.7	51.75	<0.001***	0.30 (0.20-0.42)
High calorie	31	38.3	50	61.7			

***P <0.001; CI: Confidence interval

Table 6: Association between sociodemographic variables and physical activity, diet and body mass index among the women studied

Sociodemographic variable	OR for high physical activity (95% CI)	OR for high calorie diet (95% CI)	OR for overweight and obesity (95% CI)
Age 30-40 years	1.39 (0.98-1.96)	0.73 (0.50-1.05)	0.73 (0.52-1.03)
Unmarried vs married	0.96 (0.57-1.62)	0.29 (0.27-0.87)*	0.93 (0.53-1.62)
Housewife vs household work	0.51 (0.37-0.71)*	2.97 (1.78-4.95)*	2.74 (1.72-4.34)*
Family members <4	0.92 (0.66-1.28)	0.75 (0.52-1.09)	0.82 (0.58-1.15)
Kutch house vs pucca house	1.52 (1.10-2.10)*	0.31 (0.17-0.56)*	0.30 (0.17-0.53)*
Socioeconomic status higher vs lower	1.00 (0.72-1.40)	1.33 (0.89-1.98)	1.76 (1.19-2.60)*

*Significant odds ratios; OR: Odds ratio; CI: Confidence interval

pattern of morbidity from infectious diseases to NCDs. This epidemiological transition is more so in the south Asian region. Urban living has been consistently reported as a risk factor for obesity, diabetes, and cardiovascular disease.^[14-17] This association is probably mediated through higher socioeconomic status, higher education, lesser levels of physical activity, and higher calorie diet among people living in urban areas.^[18] Another important study showed that the urban living conditions per se, independent of these sociodemographic variables led to obesity and NCD's.^[19] Thus urban populations should be targeted for NCD prevention interventions. In a population survey of risk factors for NCD's done in north India, it was found that rural women were seven times more physical active than urban and urban slum dwelling women. Obesity was also highest for urban women followed by urban slums and lastly rural women. Urbanization leads to a greater prevalence of risk factors for NCD's, the effect being much greater among women than men.^[20] Thus, the findings of the current study, which correspond to the theme of higher prevalence of NCD risk factors such as high calorie intake, low physical activity, and higher BMI among urban women, are very much relevant.

While interpreting the results of this study, the validity of the instrument that was used for collecting the information has to be considered. The IPAQ is a standard validated tool for measuring levels of physical activity.^[21] Since this is an international tool; the relevance of certain aspects of the questionnaire in the current study context is questionable. The activities that may be considered as mild in some settings may be severe in others. Another issue to be considered is the relevance of the different domains of work that are measured in the questionnaire. In rural settings, where women work in their fields, physical activity

associated with transportation may not be a regular affair, especially if their homes are inside the fields, whereas in urban areas where the routine is to travel to work, this is important. Similar problems might arise with the domain of leisure time physical activity, which is almost never practiced in the cultural milieu of the study population. But the hours spent watching television can be taken as a good proxy measure, because there is very little subjectivity involved in this measure and higher hours of television watching correlates fairly well to sedentary lifestyle.^[22] The physical activity questionnaire used in this study may not exactly cover all the physical activities of urban and rural women in the Indian context. This needs to be kept in mind while interpreting the results.

The findings of this study suggest that women in urban areas have a high prevalence of risk factors such as low physical activity, high calorie diet, and high levels of overweight and obesity which puts them at a high risk for NCDs. These findings are consistent with previous studies and indicate a need for specific interventions targeted at women in the urban areas. Further, women who were not involved in any active work including household work, and women belonging to the higher socioeconomic status were found to be those with low physical activity and higher calorie food consumption. Health education and lifestyle change motivation interventions should be targeted at these women.

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