Short Communication

Prevalence and Predictors of Risk Factors for Noncommunicable Diseases among Women in an Urbanized Village of India

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Abstract

Background: The burden of noncommunicable diseases (NCDs) and their risk factors among the underprivileged women of the urban areas are expected to increase**.** The objective of the study was to estimate the prevalence and sociodemographic predictors of these risk factors. **Materials and Methods:** A cross-sectional study was conducted among 370 women between 25 and 64 years in an urbanized village of India. Risk factors for NCDs were assessed using the WHO STEPS instrument. To determine the sociodemographic predictors of these risk factors binary logistic regression was used. **Results:** The prevalence of tobacco consumption, physical inactivity, and insufficient fruit and vegetable intake, overweight, and obesity was found to be 18.3%, 61.6%, 96.5%, 27.6%, and 5.9%, respectively. Raised blood pressure, blood glucose, and cholesterol were found to be present in 23%, 22%, and 42%, respectively. Older age was found to be a significant predictor of tobacco consumption, physical inactivity, raised blood pressure, and raised blood glucose. **Conclusion:** The current study reported a high prevalence of physical inactivity and insufficient fruit and vegetable intake, with age being a significant predictor of the majority of risk factors. Thus, arises the need for programs and policies tailored toward addressing the local needs, targeted toward older women.

Keywords: Noncommunicable diseases, risk factors, WHO STEPS

Introduction

Once considered "disease of rich," Noncommunicable diseases (NCDs) have now engulfed every socioeconomic stratum. The current prevailing myths contributing to neglect toward NCDs in women includes defining women's health in terms of her reproductive capacity, perceiving NCDs, especially cardiovascular diseases as disease of men or among women from high-income countries.[1]

The long natural history of NCDs provides numerous opportunities for their prevention. The majority of NCDs share common risk factors which are preventable. As per census 2011, the proportion of urban population in Delhi is 97.5%, of which nearly half are the urban poor.[2] Women, especially those belonging to the underprivileged section are more likely to be neglected during the assessment of NCDs and their risk factors. The study was conducted to know the burden of NCD risk factors and their socio-demographic determinants among the women belonging to this unattended section.

Access this article online

Quick Response Code:

Website: www.ijcm.org.in

DOI: 10.4103/ijcm.ijcm_603_21

Materials and Methods

A cross-sectional study was conducted in an urbanized village of Delhi from November 2016 to April 2018. Women 25–64 years of age residing in the area for more than 6 months were included in the study. Pregnant and postpartum women upto 6 months from childbirth were excluded as the above will hamper in anthropometric estimation. Furthermore, critically ill women who were unable to provide information were excluded from the study.

Sample size

A sample size of 362 was calculated (using Epi Info 7.2.0.1.), taking into account an expected prevalence of physical inactivity as 52.4% among women, with 95% confidence

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How to cite this article: Behera S, Chhabra P, Rajoura OP. Prevalence and predictors of risk factors for noncommunicable diseases among women in an Urbanized Village of India. Indian J Community Med 2022;47:266-71.

Received: 22-03-21, **Accepted:** 13-10-21, **Published:** 11-07-22

interval and absolute error of 5%, using a finite population of 6400, which was rounded off to 370.[3]

Sampling procedure

The village catered to a population of 30,000 with nearly 6400 women in the age group of 25–64 years. A list of eligible women was made from the survey registers of the Anganwadi Centers (AWC). Eighteen women were selected from each AWC using systematic random sampling method. Selected women were contacted at their home and were interviewed individually after taking informed consent. In the case of refusal to participate or nonavailability of participant after 3 consecutive visits, the next house was taken for selection.

Data collection

Data were collected using the WHO STEPS instrument (version 3.1).[4] Pretranslated Hindi version of the questionnaire was used. Physical activity was assessed using the Global Physical Activity Questionnaire. Anthropometric measurements including height, weight, and waist circumference were measured using standardized instruments. The measurements were taken as per the WHO STEPS manual. Blood pressure was measured to nearest to 1 mm of Hg. Three blood pressure measurements were taken at 3 min interval in the left arm in sitting position and average of the last two was considered for data analysis. Biochemical test was done on every third participant (126 participants). The participant was instructed for 12 hours of overnight fasting on the day of interview. Biochemical analysis was done next morning using the dry chemistry method under all aseptic precautions. Easy Touch® Blood Glucose and Cholesterol Monitoring System were used for estimation of glucose and cholesterol, which is designed for quantitative estimation of glucose and cholesterol level in fresh capillary whole blood. A written report of biochemical analysis was handed over to the participants. Participants with increased blood pressure, blood cholesterol and blood glucose, or untreated NCD were referred to the nearest health care facility. Approval from the Institutional Ethics Committee was taken for conducting the study.

Data analysis

The data were analyzed using the IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp., Armonk, NY, USA). The level of significance to test the statistical association of various risk factors and socioeconomic determinants was taken as $P < 0.05$. The Chi-square test was used for doing univariate analysis for categorical variables. To find out the predictors of risk factors for NCDs, binary logistic regression was applied taking individual risk factor as dependent variable.

Results

Almost 70% of the participants were in the age group of 25–44 years, and rest between 45 and 65 years of age. Of 370

Table 1: Results of binary logistic regression analysis relating behavioural risk factors with sociodemographic characteristics

Sociodemographic characteristics	Tobacco use# (*n*=370)		Physical inactivity$ (*n*=370)	
	Prevalence (%)	OR (95% CI)	Prevalence (%)	OR (95% CI)
Age (years)				
25-44	13.3	Referent	57.8	Referent
45-65	30.8	2.26 (1.21-4.22)*	71.0	1.87 (1.08-3.23)*
Residence				
Resident	17.9	Referent	56.0	Referent
Tenant	18.6	1.28 (0.67-2.47)	64.8	1.45 (0.89-2.37)
Religion				
Hindu	18.6	2.13 (0.25-17.80)	60.6	-
Muslim	10.0	Referent	100.0	-
Marital status				
Married	15.7	Referent	61.5	Referent
Unmarried/separated/widowed	46.9	3.58 (1.55-8.26)*	62.5	1.01 (0.45-2.30)
Education				
<Primary	23.4	2.10 (1.04-4.22)*	66.0	1.29 (0.80-2.09)
>Primary	9.6	Referent	54.1	Referent
Occupation				
Employed	28.2	2.04 (0.89-4.66)	43.6	Referent
Unemployed	17.2	Referent	63.7	2.28 (1.13-4.62)*
Socioeconomic status				
Upper	16.0	Referent	58.3	Referent
Middle	15.0	0.96 (0.45-2.04)	56.7	0.94 (0.55-1.62)
Lower	25.5	1.87 (0.91-3.84)	71.7	1.54 (0.85-2.78)
Total	18.3		61.6	

*P<0.05, #Current use (in last 30 days) and daily use of tobacco, $A person not achieving any combination of walking, moderate or vigorous intensity activities to a minimum of at least 600 MET-minutes per week. METs: Metabolic Equivalents, OR: Odds ratio, CI: Confidence interval

participants, 235 (63.5%) had less than primary education. Majority of the study participants were married (91.4%) and Hindu (97.3%) by religion. Only one-third were original residents of the village and rest were tenants, originally from Uttar Pradesh and Bihar. Only 10% of the total participants were employed.

The prevalence of smoking and smokeless tobacco was found to be 7.2% (3.5% bidi, 3.7% hookah) and 11.4%, respectively. Majority (92%; 25) of these study participants used to smoke daily. Smokeless tobacco consumption was significantly higher among tenants and women belonging to lower socioeconomic status on univariate analysis [Figure 1]. Odds of overall tobacco consumption was significantly higher among older women (45–65 years) (odds ratio [OR]: 2.26 [1.21–4.22]), unmarried/separated/widowed women (OR: 3.58 [1.55–8.26]), and those who had education less than primary school (OR: 2.10 [1.04–4.22]) [Table 1]. None of the women reported intake of alcohol.

The prevalence of physical inactivity was significantly higher among older (OR: 1.87 [1.08–3.23]) and unemployed women (OR: 2.28 [1.13–4.62]) [Table 1]. Majority of the study participants (96.5%) consumed <5 servings of fruits and vegetables per day.

The prevalence of overweight and obesity was found to be 27.6% and 5.9%, respectively. Almost one-third of the study participants had body mass index >25 kg/m^2. Central obesity was prevalent among three-fourth of the study participants. Odds of overweight/obesity were significantly higher among the original residents (OR: 1.75 [1.07–2.87]) and those belonging to upper socioeconomic status (OR: 1.85 [1.01–3.37]) [Table 2].

Less than one-third of the study participants had their blood pressure measured in the past 12 months. Twenty-three percent of the study participants had raised blood pressure, including those who were currently on medication for raised blood pressure. Significantly higher prevalence of raised blood pressure was observed among older age group (OR: 3.79 [2.14–6.70]) and participants with less than primary school education (OR: 2.50 [1.30–4.78]) [Table 3].

Raised blood glucose was found in 22.2% of the study participants whose blood glucose was measured. Women belonging to the older age group (OR: 6.35 [2.18–18.47]) and those belonging to lower socioeconomic status (OR: 4.79 [1.39–16.48]) were more likely to have raised blood glucose [Table 4]. There was no significant association between raised blood cholesterol and sociodemographic determinants of the study participants [Table 4].

Discussion

The study was conducted to assess the burden and predictors of behavioral and biological risk factors for NCDs. The prevalence of overall tobacco use was observed to be 18.4%,

Table 2: Results of binary logistic regression analysis relating obesity with sociodemographic characteristics

Sociodemographic characteristics	Overweight/obesity¥ (*n*=370)		Abdominal obesity^ (*n*=370)	
	Prevalence (%)	OR (95% CI)	Prevalence (%)	OR (95% CI)
Age (years)				
25-44	29.3	Referent	69.2	Referent
45-65	43.9	1.61 (0.95-2.76)	84.1	2.39 (1.25-4.56)*
Residence				
Resident	44.8	1.75 (1.07-2.87)*	85.8	2.40 (1.31-4.38)*
Tenant	27.1	Referent	66.5	Referent
Religion				
Hindu	34.4	-	73.9	1.10 (0.29-4.21)
Muslim	0	-	60.0	Referent
Marital status				
Married	34.0	2.34 (0.99-5.51)	73.4	1.71 (0.67-4.35)
Unmarried/separated/widowed	28.1	Referent	35.0	Referent
Education				
<Primary	34.5	1.25 (0.75-2.08)	70.2	Referent
>Primary	31.9	Referent	79.3	1.69 (0.97-2.93)
Occupation				
Employed	41.0	1.79 (0.86-3.70)	71.8	Referent
Unemployed	32.6	Referent	73.7	0.88 (0.40-1.93)
Socioeconomic status				
Upper	43.1	1.85 (1.01-3.37)*	82.6	1.55 (0.81-2.94)
Middle	29.2	1.05 (0.57-1.94)	68.3	0.99 (0.55-1.78)
Lower	25.5	Referent	67.0	Referent
Total	33.5		73.5	

*P<0.05, ¥BMI >25.5 kg/m^2, ^Waist circumference >80 cm. OR: Odds ratio, CI: Confidence interval

which is much higher than the figure of 1.6%, as reported by the National Family Health Survey (NFHS 4).[5] Overall tobacco consumption was higher among older age group and unmarried/separated/widowed women. However, smoking was practiced significantly more among the residents in the age group of 45–65 years which could be due to the prevailing sociocultural practices among older women in the community. A higher prevalence of smokeless tobacco consumption was also observed in the current study in comparison to other similar studies.[6,7] Higher prevalence of smokeless tobacco use was found among the tenants who were migrants mainly from Bihar and Uttar Pradesh. Studies done in the area also reported higher prevalence of smokeless tobacco among women.[8,9] Thus, the belief that smoking is a risk factor only in men may not hold true, and thus arises the need for counseling among women too.

None of the women reported alcohol consumption in the study, while NFHS-4 (Delhi) reported 0.7% alcohol consumption among women.[5] Various studies have reported similar findings.[8,10,11] Inadequate physical activity was found to be 61.6%. Almost similar finding were reported by Zaman *et al*. in Bangladesh and also by Anand *et al*. in India.[3,12] Sociocultural restrictions among women, lack of access to the facilities owing to the poorly planned urbanization in the area could be the reasons behind such findings. The lack of indulgence in vigorous and recreational activity also highlights toward rising trends of overweight and obesity.

In our study, inadequate fruits and vegetable intake was observed as the most prevalent risk factor. Overall consumption of fruits was much less as compared to vegetables.[3,10] Lower consumption of fruits could be due to the lack of affordability, and also, as women are the last in the family to consume food, these may not be available for them.

Almost one-third of the study participants in the current study were either overweight or obese. The findings were in concordance with studies done in India.[5,10,13,14] On the contrary, studies done by Misra *et al*. in Assam and Kumar *et al*. in Patna have reported much lower prevalence of overweight.[11,15] A high prevalence of overweight and obesity could have been due to inadequate dietary practices and easy availability and affordability of unhealthy foods. Overweight and obesity were significantly higher among older age group, similar to the findings reported by other studies.[11,16]

Among the respondents who gave a history of raised blood pressure, more than half of them were not on any antihypertensive medication which points toward significant amount of unmet need for control of hypertension. Trends of rising blood pressure with age have also been reported by other authors.[3,6,10]

Table 3: Results of binary logistic regression analysis relating noncommunicable disease risk factors with sociodemographic characteristics

Sociodemographic characteristics	Inadequate fruit and vegetable[$] intake ($n=370$)		Raised blood pressure[#] ($n=370$)	
	Prevalence (%)	OR (95% CI)	Prevalence (%)	OR (95% CI)
Age (years)				
25-44	95.8	Referent	14.8	Referent
45-65	98.1	1.55 (0.30-7.90)	44.9	3.79 (2.14-6.70)*
Residence				
Resident	96.3	Referent	28.4	1.18 (0.66-2.10)
Tenant	96.6	1.49 (0.44-5.01)	20.8	Referent
Religion				
Hindu	96.4	-	23.1	Referent
Muslim	100.0	-	40.0	2.68 (0.67-10.60)
Marital status				
Married	96.2	-	23.1	Referent
Unmarried/separated/widowed	100.0	-	28.1	0.64 (0.26-1.56)
Education				
<Primary	97.0	1.63 (0.48-5.51)	30.2	2.50 (1.30-4.78)*
>Primary	95.6	Referent	11.9	Referent
Occupation				
Employed	100.0	-	20.5	Referent
Unemployed	96.1	-	23.9	0.98 (0.40-2.37)
Socioeconomic status				
Upper	98.6	2.50 (0.37-16.62)	27.8	1.20 (0.61-2.33)
Middle	93.3	0.41 (0.14-1.64)	17.5	0.69 (0.34-1.38)
Lower	97.2	Referent	24.5	Referent
Total	96.5		23.0	

*$P<0.05$, [$]Consuming less than five servings of fruit and vegetables per day, [#]SBP >140 mm Hg or DBP >90 mm Hg or currently on medication. OR: Odds ratio, CI: Confidence interval, SBP: Systolic blood pressure, DBP: Diastolic blood pressure

Table 4: Results of binary logistic regression analysis relating Biochemical risk factors with sociodemographic characteristics

Sociodemographic characteristics	Raised blood sugar[ψ] (*n*=126)		Raised blood cholesterol[€] (*n*=126)	
	Prevalence (%)	OR (95% CI)	Prevalence (%)	OR (95% CI)
Age (years)				
25-44	11.4	Referent	40.5	Referent
45-65	40.4	6.35 (2.18-18.47)*	44.7	1.32 (0.58-2.98)
Residence				
Resident	18.5	Referent	40.7	Referent
Tenant	25.0	1.54 (0.53-4.45)	43.1	0.99 (0.45-2.18)
Religion				
Hindu	23.0	-	42.6	0.43 (0.04-4.62)
Muslim	0.0	-	25.0	Referent
Marital status				
Married	21.2	Referent	43.4	2.07 (0.55-7.85)
Unmarried/separated/widowed	30.8	1.07 (0.24-4.69)	30.8	Referent
Education				
<Primary	25.0	0.90 (0.26-3.09)	42.4	1.08 (0.44-2.62)
>Primary	14.7	Referent	41.2	Referent
Occupation				
Employed	20.0	Referent	70.0	3.58 (0.85-14.91)
Unemployed	22.4	1.72 (0.23-12.78)	39.7	Referent
Socioeconomic status				
Upper	15.8	Referent	42.1	Referent
Middle	15.8	1.14 (0.32-4.01)	39.5	0.84 (0.34-2.06)
Lower	41.9	4.79 (1.39-16.48)*	45.2	1.05 (0.40-2.76)
Total	22.0		42.0	

*P<0.05, [ψ]Fasting blood glucose >110 mg/dl or currently on medication for raised blood glucose, [€]Cholesterol >190 mg/dl or currently on medication for raised cholesterol. OR: Odds ratio, CI: Confidence interval

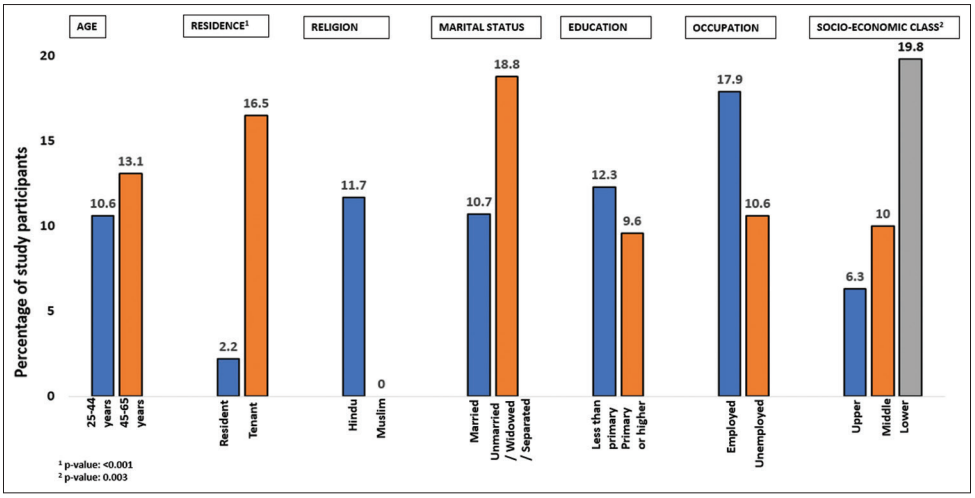

Figure 1: Association of socio-demographic determinants with current smokeless tobacco use among study participants (n = 370)

Significant proportion of the participants had raised blood glucose who never had their glucose checked by any health worker. Such a trend could have been due to the lack of awareness and accessibility to avail health services by the women. A study by Anand *et al*. reported a higher prevalence of raised blood glucose than our study.[3] On the contrary, a lower prevalence was reported by many studies conducted in other states and South East Asian countries.[8,10,16,17] Reason behind such varied findings could have been due to differences in the population studied, different methodology, and cutoffs used for defining raised blood glucose. The lack of knowledge regarding screening and health effects of the raised blood glucose could have been the reason behind higher proportion of raised blood sugar among participants with less than the primary level of education as also reported by Li *et al*.[17]

Almost 40% of the study participants had raised total cholesterol (>190 mg/dl), which was in agreement to study

by Garg *et al*. in Delhi.[7] However, the lower prevalence was found in studies conducted in other states and some SEAR countries.[8,10,16,17] This could have been either due to higher cutoff points taken by various studies or different age compositions of the participants.

Conclusion

The study shows a high prevalence of most of the known risk factors for NCDs, namely, physical inactivity, insufficient fruit and vegetable intake, overweight, and raised blood pressure, blood glucose, and cholesterol. Thus, the program and policies tailored toward addressing the local needs among this vulnerable group to prevent and control this growing burden of NCDs becomes essential with special emphasis among the older women.

Limitations

The blood glucose and cholesterol could not be done for the whole sample of 370, owing to the lack of resources. In view of resource and time constraints, subgroup analysis was not factored at the time of sample size estimation. A dry chemistry method for biochemical analysis was done, which is although a robust tool but is not the gold standard for estimation of blood glucose and cholesterol.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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