ORIGINAL ARTICLE
pISSN 0976 3325 | eISSN 2229 6816
Open Access Article
www.njcmindia.org

PREVENTABLE RISK FACTORS FOR NON-COMMUNICABLE DISEASES IN URBAN SLUM OF MUMBAI: A PREVALENCE STUDY USING WHO STEPS APPROACH

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Financial Support: None declared
Conflict of interest: None declared

How to cite this article:
Kadarkar KS, Velhal GD, Tiwari SR. Preventable Risk Factors for Non-Communicable Diseases in Urban Slum of Mumbai: A Prevalence Study using WHO STEPS Approach. Ntl J Community Med 2016; 7(8):672-676.

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Date of Submission: 01-04-16
Date of Acceptance: 25-08-16
Date of Publication: 31-08-16

ABSTRACT

Context: India is experiencing a rapid health transition with a rising burden of non-communicable diseases causing significant morbidity and mortality, both in urban and rural population. The STEPwise approach is WHO-recommended framework for NCD surveillance. Study was conducted to assess the prevalence of risk factors of NCDs among residents of urban slum.

Methods and Material: Using WHO STEPwise approach a cross-sectional study was carried out among participants of 25-64 years age group in the slum. Information on behavioural and physiological risk factors of non-communicable diseases was obtained through standardized protocol.

Results: Smoking prevalence was high among men (27.5%) compared to 2% in women. The use of smokeless tobacco was reported by 38.5% of men and 9.5% of women. The prevalence of raised blood pressure was slightly more in males (40.5%) as compared to females (37.5%). Mean BMIs and prevalence of obesity was nearly same among men and women. Women were less physically active when compared to men. Fruits and vegetable consumption was low among both men and women.

Conclusions: The high prevalence of risk factors in urban slum alarms the likelihood of a high future burden of diseases highlights need for different interventions and approaches for prevention of risk factors of non-communicable diseases.

Key-words: Smokeless tobacco, Raised blood pressure, Obesity, Fruits and vegetables, Cross-sectional study.

INTRODUCTION

Chronic non-communicable diseases (NCDs) have replaced communicable diseases as the most common causes of morbidity and premature mortality worldwide. About 80% of the burden occurs in low / middle-income countries, and 25% is in individuals younger than 60 years. The global economic impact of NCDs is enormous: by 2015, just two diseases (cardiovascular diseases and diabetes) are expected to reduce global GDP by 5%. Approximately half of the total economic burden is reported to account for by CVD including stroke, ischemic heart disease and peripheral vascular disease, which together cause more deaths than HIV/AIDs, malaria and tuberculosis combined.[1] Based on available trends, by 2020 NCDs are predicted to account for 73% of deaths and 60% of disease burden.[2]

The epidemiological transition has resulted in double burden of communicable and chronic non-communicable diseases. Most of these NCDs share common preventable risk factors, such as tobacco use, high alcohol consumption, raised blood pressure, inadequate physical activity and obesity.[3] Clustering of these factors significantly increases the risk of morbidity and mortality. Burden of NCDs unequally distributed among different social classes as well as their risk factors also show

variation between men and women and different socioeconomic classes.[4]

To estimate the epidemic of NCDs, WHO has developed WHO STEPwise approach to surveillance of risk factors for NCDs.[5] This approach uses standardized instruments and protocols to monitor trends within countries and to make comparison between them. Information generated from these surveys is useful for community based intervention to reduce risk factors.

As per Census-2011, 31.8% population in India was living in urban area, an increase of 3.35% in urban population.[6] Rapid urbanization cause increase in population living in urban slums. Urban slum population expose to urbanized lifestyle which places them at a higher risk for NCDs as well as they have poor access to healthcare. This study aimed at to assess the prevalence of risk factors of NCDs among residents of urban slum in Mumbai.

SUBJECTS AND METHODS

A cross-sectional, community based, descriptive epidemiological study was carried out in urban slum which is field practice area of the institute during the period of March 2013 to December 2013. The inclusion criteria for study subjects were individuals, both males and females aged between 25-64 years residing in urban slum.

Based on the report of 'Working Group on Disease Burden for 12th Five Year Plan' by Government of India,[7] lowest prevalence of at least one non-communicable disease, about 20 % was considered for the study. By using formula for sample size calculation $n=4pq/l^2$, where 'l' is admissible error which is 20% of 'p', we got sample size of 400. The study included males and females in the age group of 25-64 years and this age group was further stratified in to four age and sex categories, each stratum with 10 years interval. There were 100 individuals (50 males and 50 females) in each of these strata, with this the total sample size of study came to 400. As the study area comprises of 50 plots and each plot consist of nearly 180 households. We had selected 8 households by simple random sampling technique (table of random numbers) from each plot. When any house was found locked, or inclusion criteria not fulfilled then the consecutive house was targeted. From each house one individual was interviewed according to need.

The study protocol was based on the WHO STEPS approach. After taking written informed consent participants were interviewed using pre-structured and pretested questionnaire adopted from WHO STEPS 1 (Interview) and STEPS 2 (Physical examination) approaches for non-communicable diseases risk factor surveillance.[5] Due to limited resources available for the collection of blood samples, only step 1 and step 2 were conducted with core and expanded items for these steps.

STEP 1 (Interview): By using a proforma translated in local language, information on socio demographic variables and behavioral risk factors, such as tobacco-use, alcohol-use, physical exercise, and diet was obtained.

STEP 2 (Physical examination): Height, weight, blood pressure, waist circumference were recorded. Body mass index (BMI) was calculated.

Participants were classified daily smokers or smokeless tobacco user if they smoked ≥ 1 cigarette or bidi per day or using smokeless tobacco daily. Blood pressure was measured by using a standard mercury sphygmomanometer in quite room, on right arm in sitting position. Measurement was done three times over a period of 3 minute interval, lowest among the readings was recorded. Raised blood pressure was defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥ 90mmHg or under antihypertensive medication. Overweight was defined as BMI ≥ 25 kg/m^2, and obesity as BMI ≥ 30 kg/m^2. Low physical activity was defined as <150 minutes of moderate physical activity per week. Low consumption of fruits and vegetables at less than five servings per day (one cup of raw leafy vegetables or half cup of other vegetables (cooked) was considered one serving. One medium-sized piece of fruit or half cup of chopped fruit was measured as one serving).

Instruments for anthropometry and blood pressure measurements were standardized and routinely calibrated. Height was measured with a standard tape to the nearest 0.1 cm and weight was measured using a standard balance to the nearest 0.5kg. Participants were requested to stand bare foot and upright with back against wall, heels together.

The ethics committee of the institute approved the study. Socio economic status of the study population was determined as per the Modified Prasad's classification April 2013.[8] Results were analyzed by using Statistical Package of Social Sciences (SPSS) version 16.0. A 95% confidence level was used and statistical significance was set at P ≤0.05.

RESULTS

A total of 400 participants between age 25-64 years were surveyed for risk factors for non-communicable diseases under this study. Partici-

pants were stratified by age interval and sex. Table 1 shows the socio-demographic characteristics of study participants. As urban slum community consist mainly of Muslim population and therefore 77% of participants belonged to Muslim religion, followed by other. About 54% participants were educated up to secondary education and nearly 15% were illiterate. Most of participants belonged to socio-economic class IV (51.25%) followed by class III (22.5%) and class II (12.7%). Average per capita income was 1360.5±978.4 Indian national rupees. Table 1.

The sex adjusted and age adjusted prevalence of smoking, raised blood pressure, and overweight and obesity are shown in table 2. The prevalence of smoking was high among men at all ages, and only 2% females who were daily smoker. The prevalence of raised blood pressure was slightly more in males (40.5%) as compared to females (37.5%). Mean systolic as well as diastolic blood pressure was higher in all age groups of male as compared to that of female. Mean BMIs and prevalence of obesity was nearly same among male and female. Table 2.

As observed from table 3, only 4 (2%) females in survey gave history of smoking. However the use of smokeless tobacco was 9.5%. Prevalence of smokeless tobacco user was more than smokers in both sexes. Mean age of initiation of smoking was 20.4±8.3 years as compared to 21.6±9.7 years for smokeless tobacco use. Females were less physically active as compared to males. Fruits and vegetable consumption was low among males as well as females. Table 3.

Table 1: Socio-demographic profile of study population

Socio-demographic variables	Age (years)				Total (n=400)
	25-34 (n=100)	35-44 (n=100)	45-54 (n=100)	55-64 (n=100)	
Sex					
Male	50	50	50	50	200
Female	50	50	50	50	200
Religion					
Hindu	22	25	17	21	85
Muslim	76	74	80	78	308
Other	2	1	3	1	7
Educational status					
Illiterate	6	18	15	20	59
Primary	8	13	9	14	44
Secondary	56	47	58	54	215
High school completed	23	18	13	9	63
Graduate	7	4	5	3	19
Socio-Economic status*					
Class 1	1	4	2	1	8
Class 2	11	8	14	18	51
Class 3	19	11	33	27	90
Class 4	62	64	40	39	205
Class 5	7	13	11	15	46

***(modified B.G. Prasad's classification)**

Table 2: Prevalence and mean level of risk factors stratified by sex and age groups

Age(years)	Risk Factor					
	Daily Smoker (%)*	Mean systolic blood pressure†	Mean diastolic blood pressure†	Raised blood pressure (%)	Body mass index*	Overweight or obese (%)‡
Male (n=200)	27.5(21.44- 34.24)	132.5±14.2	83.8±9.4	40.5(33.63- 47.65)	23.6±3.9	38.5(31.72- 45.62)
25-34	22	128.8	80.4	26	21.9	22
35-44	28	129.4	84.6	38	22.8	36
45-54	24	134.2	84.9	46	24.3	44
55-64	36	137.6	85.3	52	25.3	52
Female (n=200)	2(0.54-5.04)	125.9±12.8	79.9±7.8	37.5(30.77- 44.61)	22.8±4.7	40(33.15- 47.15)
25-34	2	120.4	77.4	20	19.7	22
35-44	0	121.6	79.6	32	21.6	34
45-54	4	127.8	80.9	42	23.9	46
55-64	2	133.4	81.7	56	25.8	58

* Values in parentheses are 95% confidence interval

†Values are given in mmHg and with 95% confidence intervals.

‡ Participants with body mass index ≥ 25 were classified as being overweight or obese.

Table 3: Prevalence of risk factors for non-communicable diseases

Risk factor	Male (n=200)		Female (n=200)		Total (n=400)	
	Frequency	CI		CI	Frequency	CI
Daily smoking*	55 (27.5)	(21.44- 34.24)	4 (2)	(0.54- 5.04)	59 (14.75)	(11.42- 18.61)
Daily use of smokeless tobacco*	77 (38.5)	(31.72- 45.62)	19 (9.5)	(5.8- 14.4)	96 (24)	(19.9- 28.49)
Overweight or obese	77 (38.5)	(31.72- 45.62)	80 (40)	(33.1- 47.1)	157 (39.25)	(34.44- 44.23)
Raised blood pressure	81 (40.5)	(33.63- 47.65)	75 (37.5)	(30.7- 44.6)	156 (39)	(34.19- 43.97)
Low physical activity*	86 (43)	(36.04- 50.17)	57 (28.5)	(22.3- 35.2)	143 (35.75)	(31.05- 40.66)
Low fruit and vegetable consumption	169 (84.5)	(78.73- 89.22)	166 (83)	(77.1- 87.9)	335 (83.75)	(79.76- 87.23)

* Chi-square p value <0.05 for male and female comparison; CI = Confidence interval.

Table 4: Clustering of risk factors by socio-economic class (modified B.G. Prasad classification 2013) (n=400).

	Socioeconomic class I and II	Socioeconomic class III	Socioeconomic class IV	Socioeconomic class V
No. of participants	59	90	205	46
% daily smokers	8.47(2.8- 18.68)	12.22(6.26- 20.82)	16.59(11.77- 22.4)	19.57(9.35- 33.91)
% with raised blood pressure*	50.85(37.5- 64.11)	42.22(31.88- 53.09)	36.10(29.52-43.08)	30.43(17.74- 45.75)
% Overweight or obese†	59.32(45.74- 71.93)	46.67(36.07- 57.49)	33.66(27.23- 40.57)	23.91(12.59- 38.77)
Clustering of risk factors mentioned above				
% with no risk factor	33.90(22.08-47.39)	44.44(33.96- 55.3)	54.15(47.06-61.11)	54.35(39.01- 69.1)
% with 1 risk factor	37.29(25.04- 50.85)	34.44(24.74- 45.2)	29.27(23.14- 36.01)	21.74(10.95- 36.36)
% with ≥ 2 risk factors	28.81(17.76- 42.08)	21.11(13.21- 30.99)	16.59(11.77- 22.4)	23.91(12.59- 38.77)

Values in parentheses are 95% confidence interval

* Raised blood pressure was defined as having blood pressure ≥ 140/90 mmHg or taking an antihypertensive drug.

†Participants with a body mass index ≥ 25 were classified as being overweight or obese.

Table 4 shows, smoking was most common among participants belonging to socioeconomic class V. Conversely, the prevalence of both raised blood pressure and being overweight were more common among participants belonging to socioeconomic class I and II. It was observed that a trend of risk factors increasing as socioeconomic class improved. The risk of clustering of risk factors was highest among socioeconomic class I and II when compared to class IV and V. (Table 4)

DISCUSSION

There are few comprehensive studies done in developing countries especially in urban slums on NCD risk factors using WHO STEPS. Present study documents a high prevalence of risk factors for NCDs in an urban slum of Mumbai. Almost one-third of the study population had at least one risk factor and almost one-fourth had two or more risk factors for NCDs. However data from these slum can't be generalized to the rest of the country, it does point out that this segment of the population is also vulnerable to NCDs. A limited number of studies have done to assess the prevalence of risk factors for NCDs among urban slum dwellers.[10-12]

Present study documented more prevalence of smoking in men (27.5%) as compared to women (2%). National family health survey III (NFHS III) also reported slightly high prevalence of smoking in men (29.1%) as compared to women (0.5%) in urban areas.[9] However prevalence of smoking is low compared to the findings of study by Gupta et al in Haryana (men-40.8% and women- 2.2%).[10] More prevalence of daily smokeless tobacco users (men-38.5% and women- 9.5%) when compared to study done by Gupta et al (men-10.5% and women- 3%) and NFHS III (men-31.1% and women- 5.5%).[9,10] Though a mean age of initiation of tobacco was between 20 and 22 years with standard deviation of 8-9 years, few start using tobacco especially smokeless tobacco as early as 10-12 years of age. Early initiation of tobacco use causes serious public health problem. Poor implementation of tobacco control act and easy availability of pan masala, areca nut and gutkha resulted in increased prevalence of the use of smokeless tobacco.

Although raised blood pressure is more prevalent in men as a group, it is evident from our study that the gap between men and women decreases as age advances. Among the older age groups, women had a higher mean blood pressure. Study done by Gaurav et al in urban slum of Mumbai in >35 years age group showed similar trend.[11] Different trend of mean systolic blood pressure (men-116.6 mmHg and women- 136.8 mmHg) in the 25-64 years of age group of men and women was noted in study done by Chadha et al in Delhi.[12]

In current study, obesity was present in 39.25% of participants. Of these, women showed a significantly higher prevalence (40%) as compared to men (38.5%). NFHS II and III showed an increasing prevalence of obesity in Indian women from 10.6% in 1998-99 to 12.6% in 2005-06.[9] This is less than that seen in the current study. Similar trend of higher prevalence of obesity in female as compared to male (men- 13.3% and women- 23.7%) also noted in Indonesian study.[13] In present study prevalence of obesity increased as socio economic status improved from poorest to richest.

A study done by Gupta R et al in eleven cities across India reported that 38.8% of men and 46.1% of women were physically inactive.[14] Different trend and findings noted in our study (men-43% and women-28.5%) which may be due to lower socioeconomic status and sociocultural factors among urban slum. Consumption of fruits and vegetables was very low among study participants which probably could be due to the low per capita income and lack of awareness. A study estimated that increased consumption of fruits and vegetables is associated with 16% lower risk of cardiovascular diseases.[15]

CONCLUSION

From finding from our study we conclude that the epidemiological transition is occurring in urban slum. The urban slum population already has a high burden of risk factors for NCDs, especially smoking and smokeless tobacco. Urban slum population is facing an increasing burden from raised blood pressure and obesity. Finding a way against NCDs requires action at national, local and community levels. At national level, forming appropriate policies for tobacco and alcohol control, promotion of adequate physical activity and healthy diet is required. At local level, health system needs to be reoriented to address the challenge of NCDs. We have to create an environment that helps adoption of healthy lifestyle.

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