



CASE REPORT

## RISK FACTOR PROFILE OF NON COMMUNICABLE DISEASES AMONG YOUTH IN URBAN CITY OF NORTHERN INDIA

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### ABSTRACT

**Introduction:** Youth population is a vulnerable age group who can develop risk factors for non communicable diseases (NCDs) in their life style as the behaviour changes are initiated and long term decisions are taken at this stage of life. They are also considered more likely to quit the wrong habits in time before further harm, if appropriate intervention is taken. This study was conducted to determine the prevalence and distribution of major risk factors for NCDs among youth as currently negligible data is available.

**Materials and methods:** A STEPS Survey, comprising of three steps for assessment of risk factors of NCDs, was conducted in an Urban City (Shimla) during 2015–16. A multistage sample of 603 youth, aged 15–24 years, was taken. WHO STEPs questionnaire was used to collect information on behavioural, physical and biochemical risk factors.

**Results:** Tobacco consumption was observed in 30.5% (95% CI-26.8-34.2%) of the participants (50.16% and 11.68% among males and females respectively). 29.8% (95% CI-26.2-33.5%) of the participants had consumed alcohol in last one year. Low levels of physical activity were recorded among 63.7% of the participants. 81.76% of participants were consuming fruits only 3 days per week or less. The prevalence of overweight and obesity was 9.45% (95% CI: 26.3–30.9%) and 1.99% (95% CI: 11.2–14.4) respectively. Prevalence of raised blood pressure, raised blood sugar and raised blood cholesterol was 7.5%, 11.6% and 10.1% respectively. 43.1% of the study participants had 3 or more than 3 behavioural/metabolic risk factors for the non-communicable diseases.

**Conclusion:** High prevalence of the major risk factors for NCDs was reported. There is an urgent need to direct and implement prevention and control interventions to this section of population in order to lower the serious consequences of NCDs.

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### INTRODUCTION

Non-communicable diseases (NCDs) are responsible for 40 million deaths each year, accounting to 70% of all deaths globally. Every year 15 million people die from NCDs in between the ages of 30 and 69 years and 80% of these premature deaths occur in low- and middle-income countries. 80% of all premature NCDs deaths are accounted to four groups of diseases i.e. cardiovascular diseases (17.7 million deaths annually), cancers (8.8 million), respiratory diseases (3.9 million) and diabetes (1.6 million deaths). [1] In India where NCDs account for 53% of the deaths and 44% of DALYs lost, all these four groups of diseases are projected to increase in prevalence in the near future [2,3]

It is therefore necessary to understand the driving force behind this epidemic i.e. the risk factors which enhances the risk of NCDs. They are important in predicting the future

disease burden and in the prevention and control strategies. The concept of screening for disease has now extended to the screening for risk factors. The world health organization (WHO) had listed six chronic disease related risk factors amongst the ten most important risk factors across the globe i.e. Tobacco use, Physical inactivity, Low fruits and vegetable intake, Overweight/obesity, Hypertension and Hypercholesterolemia. [4]

Tobacco accounts for around 7.2 million deaths every year and is projected to increase markedly over the coming year. About 1.6 million deaths annually can be attributed to insufficient physical activity. More than half of the 3.3 million annual deaths from harmful drinking are from NCDs. In terms of attributable deaths, the leading metabolic risk factor globally is elevated blood pressure (to which 19% of global deaths are attributed) followed by overweight/obesity and raised blood glucose. [5]

NCDs and its related deaths are associated with behaviours (tobacco and alcohol use, poor eating habits, and lack of

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exercise) that begin or are reinforced during early stages of life. Alarming, NCD-related mortality is occurring at earlier ages in developing countries. [6] A focus on strengthening protective factors and earlier investment in prevention of NCDs among young people is therefore essential. Late adolescence and youth population are the most vulnerable age group to develop these behaviours in their life style. It makes mandatory for the health concerned authorities to develop the basic information regarding prevalence and distributions of these factors in these subgroups of population.

Nevertheless, this will also help in taking timely and appropriate interventions to prevent the progression of this slow epidemic. Keeping all these evidences in view, this community based cross sectional study was designed to find out the magnitude of major NCDs risk factors among the Youth in the municipal corporation area of Shimla city, using standardized WHO STEPs approach.

## **MATERIALS AND METHODS**

**Study area:** This study was conducted among the urban youth of Shimla, capital city of Himachal Pradesh. Municipal corporation area of Shimla represents the urban population in this study.

**Study population:** This study was conducted among male and female youth population between the age group 15 years to 24 years.

**Study design:** It was a community based cross sectional study.

**Sample size:** The planned sample size designed was to involve 280 individuals in each group as appropriate sample size taking in account the standard protocol devised by ICMR (which itself is based on W.H.O. STEP wise approach) for assessing NCDs risk factors in India . In order to provide an equivalent distribution of the participants in regards to age groups and gender a total of minimum 560 individuals were supposed to be enrolled for the study i.e. 280 males and 280 females.

**Sampling technique:** Multistage sampling was used to select eligible individuals from the selected area as study units. Five wards were selected randomly from the municipal corporation area of Shimla City. Thereafter, a house to house survey was done in each ward until required sample size is achieved. Only one eligible participant was selected from one house for the study.

**Inclusion criteria:** Population in between 15-24 years who consented to participate were included in the study.

### **Exclusion criteria**

- Those suffering from serious illness, bed ridden/debilitating, psychiatric condition (not in condition to participate in the study).
- Pregnant women

**Study period:** One year, i.e. September 2015 to August 2016  
WHO STEPs strategy: WHO STEPs strategy is a worldwide used strategy for NCDs risk factor surveillance. It is based on use of standardized and validated methods; and information gathered can be analysed and compared at various levels i.e. regional to national comparison. [7]

Those consenting to participate in the study and fulfilling the inclusion criteria were interviewed and screened at their respective home by using a standardized questionnaire. Data collection was done in standard three steps of WHO STEPs approach.

**Step I:** Questions regarding the demographic information of individual, i.e. age, sex, marital status, education, and occupation were asked.

The behavioural information section included questions on Tobacco use, Alcohol consumption, Diet and physical activity, History of raised blood pressure and diabetes.

Information was collected in private, in a separate room or place so as to gather a reliable data taking participants in confidence and ensure them regarding the confidentiality and anonymity of the study.

**Step II:** In next step Weight, Height and Blood pressure were measured using standard techniques.

**Weight:** Weight measurements were taken using portable weighing scale in light clothing and barefoot. Measurements were taken to the nearest 0.5 kg.

**Height:** Height was measured with the participant standing upright against a wall in barefoot, standing with the back against the wall and head in the Frankfurt plane with heels together. The height was measured using a non-stretchable inch tape in centimetres and taken to the nearest 0.1cm.

**Body mass index (BMI):** Height and weight measurements were taken to calculate the Body mass index that is used to determine the overweight and obesity i.e. Weight in kg/height in  $m^2 \times 100$

BMI value  $> 22.99 \text{ kg/m}^2$  and  $>24.99 \text{ kg/m}^2$  were taken as cut off values for overweight and obesity respectively.

For the age group 15-19 years WHO standard percentile charts (BMI for age for girls and boys) were used to determine the overweight and obesity. Individuals with BMI falling in between 85<sup>th</sup> to 97<sup>th</sup> percentile were considered as overweight and those falling above 97<sup>th</sup> percentile as obese.

**Blood pressure:** Blood pressure measurements were taken using mercurial sphygmomanometer apparatus. Three blood pressure measurements were taken. During data analysis the means of the second and third readings were calculated. The participants were asked to rest for 5 minutes between each of the readings. JNC-7/8 cut off criteria has been used for raised blood pressure.

**Step III:** In step III biochemical estimation of the “at risk” individuals was done. The subjects having 3 or more than 3 behavioural and/or anthropometric risks were being identified as being “at risk”. Those consenting and complied with advice (fasting overnight) were assessed biochemically for fasting blood glucose and total cholesterol. WHO cut off criteria’s were used to label them as normal or raised.

**Ethical consideration:** Prior permission was taken from institute ethical committee to go ahead with the study. Informed written consent was taken from each participant after explaining the full purpose and consequences of the study. Consent of parents or guardians was taken in case the participant is below the age of 18 years. Separate consent was taken before doing fasting blood sugar of selected

participants. Participants were fully assured regarding the confidentiality and anonymity of the information provided by them. Fasting blood sugar measurement was done under all aseptic condition and waste generated was managed accordingly. Participants were provided information regarding NCDs and related risk factors and those with raised blood pressure and blood cholesterol were helped as per need.

**Data analysis**

Data collected was entered into Microsoft excel sheet for further processing and analysis. Proportions, 95% confidence intervals, means and standard deviations were calculated using MS excel and Epi info v-7. Socio-demographic distribution of each risk factor was determined and association with different factors were analysed. Non parametric tests (Chi square test and Fischer exact test) of significance were used to test the association between categorical variables. Probability value of less than 0.05 has been considered statistically significant during analysis.

**RESULTS**

Total of 603 youth fulfilling inclusion criteria were studied in current study with 308 (51.08%) females. Study population was divided into two groups i.e. age group 15-19 years which include 55.72% of participants and age group of 20-24 years that include 44.28% of the total participants. Mean age of participants was 19.82 ± 2.88 years. 59% of the participants were students and most them had either completed secondary school education or were pursuing higher education. (Table 1)

**Table 1** Demographic distribution of study participants (n-603) in current study

Age group distribution			
Age-group (years)	Frequency	Percentage (%)	Cumulative (%)
15-19	336	56.62	56.62
20-24	267	44.28	100
Gender distribution			
Male	295	48.92	48.92
Female	308	51.08	100
Distribution by marital status			
Married	20	3.32	3.32
Never Married	583	96.68	100
Distribution by occupation			
Student	356	59.03	59.03
Professional/Big business	5	0.82	59.85
Clerical/Medium business	26	4.32	64.17
Agriculture/Self-employed	39	6.47	70.64
Household & domestic work	9	1.49	72.13
Services	15	2.49	74.62
Skilled manual	70	11.61	86.23
Unskilled manual	46	7.63	93.86
Do not work	37	6.14	100
Distribution by education level			
Primary education	6	0.99	0.99
High School	106	17.57	18.56
Secondary School	236	39.13	57.63
Graduate	215	35.65	93.28
Post graduate/masters	40	6.62	100

Table 2 is showing prevalence of different risk factors assessed in current study. Tobacco consumption was observed in 30.5% (95% CI-26.8-34.2%) of the participants (50.16% among males and in 11.68% in females). 29.8% (95% CI-26.2-33.5%) of the participants had consumed alcohol in last one year. Low levels of physical activity were recorded among 63.7% (95% CI-59.8- 67.5%) of the participants. 81.76% of participants were consuming fruits only 3 days per week or less (not in table).

**Table 2** Prevalence of various risk factors among study participants (n-603)

Risk factors	Prevalence	95% Confidence interval
Current tobacco use (n-184)	30.51%	26.83% to 34.19%
Current alcohol use (n-174)	29.86%	26.21% to 33.51%
Insufficient physical activity (n-384)	63.68%	59.84% to 67.52%
Overweight/obese (n-69)	11.44%	8.9% to 13.98%
Raised blood pressure (n-45)	7.45%	5.35% to 9.55%
Raised blood sugar level* (n-15)	11.57%	5.87% to 17.27%
Raised blood cholesterol* (n-09)	10.98%	4.21% to 17.75%

\*blood sugar and cholesterol level was assessed among 121 and 82 study participants respectively

The prevalence of overweight and obesity was 9.45% (95% CI: 26.3–30.9%) and 1.99% (95% CI: 11.2–14.4%) respectively. Prevalence of raised blood pressure was 7.46% (95% CI: 5.3% to 9.5%) i.e. pre-hypertensive (5.97%); hypertensive (0.33%) and isolated systolic hypertension (2.37%).

121 participants were subjected for blood sugar measurement, among which 11.57% (95% CI-5.9-17.3%) had raised blood sugar i.e. diabetic (2.48%) and pre-diabetic (9.09%). Results of blood cholesterol level were available for 82 participants. 10.98% (95% CI-4.2-17.7%) of these participants had raised blood cholesterol level.

Table 3 is showing the summary of combined behavioural/metabolic NCDs risk factors in the study participants. Low level of fruit and vegetable consumption as risk factors for NCDs was universally present among all the participants. 43.1% of the study participants had 3 or more than 3 behavioural/metabolic risk factors for the non-communicable diseases. Most common risk factors found were Low level of fruit and vegetable consumption, physical inactivity, unhealthy diet, smoking and alcohol consumption.

**Table 3** Summary of combined NCDs risk factors in the study participants, shown in percentage

Total no of risk factor	Number of participants	Percent	Cum. Percent
1	59	9.78%	9.78%
2	284	47.10%	56.88%
3	185	30.68%	87.56%
4	57	9.45%	97.01%
5	18	2.99%	100.00%
Total	603	100.00%	100.00%

Table 4 is showing distribution of major risk factors among study participants. All the risk factors except alcohol use were found uniformly distributed among both the age groups studied without any statistically significant difference. Alcohol use has been found statistically higher among older age group i.e. 19 to 24 years [Odd's ratio 0.4 (0.3-0.6) and p-value 0.01]. Risk factors including, tobacco and alcohol consumption, overweight/obesity and raised blood pressure were found higher among male participants, while physical inactivity was higher among females with a statistically significant difference. (Table 4) Prevalence of Tobacco and alcohol use among students in comparison to other participants was statistically lower while physical inactivity was statistically at the same level. There is significant difference in the proportion of overweight/obesity in these two groups also [Odd's ratio 0.2 (0.1-0.4) p-value <0.01]. Tobacco and alcohol consumption, physical inactivity and raised blood pressure were found higher in the participant group of having at least secondary education. (Table 4)

**Table 4** Distribution of various risk factors among study participants

		Risk factors - n (%)						
		Current Tobacco use	Current alcohol use	Physical inactivity	Overweight /obesity	Raised blood pressure	Raised blood sugar	Raised blood cholesterol
Age group	15-19 years	102 (30.35)	73 (21.73)	210 (62.50)	35 (10.42)	26 (7.74)	5 (11.11)	3 (9.38)
	20-24 years	82 (30.71)	101(37.83)	174 (65.17)	34 (12.72)	19 (7.12)	9 (11.84)	6 (12)
	Odd's ratio	0.98 (0.69-1.39)	0.4 (0.3-0.6)	0.8 (0.6-1.2)	0.7 (0.4-1.3)	1.1 (0.6-2.1)	0.9 (0.3-2.9)	0.7 (0.2-3.2)
	(p value)	0.92	<0.01	0.49	0.37	0.77	0.91	0.71
Gender	Male	148 (50.16)	140 (47.46)	162 (54.93)	53 (17.97)	37 (12.54)	13 (12.50)	8 (10.67)
	Female	36 (11.68)	34 (11.04)	222 (72.70)	16 (5.19)	8 (2.60)	1 (5.88)	1 (14.29)
	Odd's ratio	7.6 (5.01-11.5)	7.2 (4.7-11.1)	0.4 (0.3-0.6)	3.9 (2.2-7.1)	5.3 (2.4-11.7)	2.2 (0.3-18.7)	0.7 (0.1-6.7)
	(p value)	<0.01	<0.01	<0.01	<0.01	<0.01	0.44	0.77
Occupation	Student	62 (17.41)	61 (17.13)	219 (61.52)	22 (6.18)	22 (6.18)	5 (10.84)	4 (11.76)
	Other	122 (49.39)	113 (45.75)	165 (66.80)	47 (19.03)	23 (9.31)	9 (12)	5 (10.42)
	Odd's ratio	0.2 (0.1-0.3)	0.5 (0.3-0.8)	0.7 (0.5-1.1)	0.2 (0.1-0.4)	0.6 (0.3-1.1)	0.8 (0.3-2.8)	1.1 (0.2-4.6)
	(p value)	<0.01	<0.01	0.18	<0.01	0.15	0.85	0.84
Education	Primary	3 (50)	3 (50)	0 (0)	1 (16.67)	0 (0)	0 (0)	0 (0)
	High school	16 (15.09)	13 (12.26)	53 (50)	16 (15.09)	3 (2.83)	1 (6.67)	0 (0)
	Secondary school	74 (31.35)	50 (21.18)	175 (74.15)	23 (9.74)	11 (4.66)	5 (12.5)	1 (3.33)
	Higher education	91 (35.58)	108 (42.35)	156 (61.17)	29 (11.37)	31 (12.15)	8 (13.11)	8 (15.38)
	Odd's ratio	0.4 (0.2-0.6)	0.3 (0.2-0.6)	0.4 (0.2-0.6)	1.5 (0.8-2.7)	0.3 (0.1-0.9)	0.5 (0.1-4.2)	7.7 (0.1-413)
	(p value)	<0.01	<0.01	<0.01	0.17	0.04	0.53	0.31

**DISCUSSION**

In current study 603 eligible participants had been assessed for NCD risk factors. Considering behavioural risk factors, prevalence of current tobacco and alcohol use was found 30.51% and 28.86% respectively. 81.76% of participants were consuming fruits only 3 days per week or less. 63.68% participants were having insufficient of physical activities. Majority of the studies in similar settings show high prevalence of NCD risk factors. In a worldwide systemic review, the prevalence of insufficient physical activity varied from 18.7% to 90.6%, with a median of 79.7%. The prevalence was higher among girls than boys similar to our study. [8] In another study from Kathmandu, prevalence of current smoker in the age group of 15-24 was found 14.6% (24% in male and 8.5% in female). Current drinker prevalence was 23.4% (41.3% in male and 12% in female). 32% of study subjects had low physical activities (40.2% among female and 20 % among male). [9] Similar to our findings, nearly one third of the participants were found to be smoking cigarette and consuming alcohol in a study from Jordan on prevalence of risk factors for NCDs. [10]

Low consumption of fruits and vegetables and high prevalence of physical inactivity in our study was comparable to nationwide average of 62.6% in urban population as reported by ICMR. [11] Study on NCD risk factors in Delhi revealed that 8.6% of the participants in age group 18-30 years were daily tobacco smokers. 17.1 % were current alcohol user, and 82.8% were consuming less than 5 serving of fruits and vegetables. 71.4% had low physical activities. [12] Other study from a district of Gujarat on prevalence of risk factors in urban male of age 15-24 revealed high prevalence of NCDs risk factors. [13] Similarly in a cross sectional study on behavioural risk factors for NCDs in Kerala, the two major risk factors observed among males was smoking and alcohol consumption. About two fifths (40%) of them were current smokers as well as current users of alcohol (41%). [14] High prevalence of tobacco and alcohol consumption among school and college going adolescent has been reported throughout the country. [15-20]

In metabolic risk factors, prevalence of overweight and obesity was 9.45% and 1.99% respectively. Prevalence of raised blood pressure is 7.46% i.e. pre-hypertensive (5.97%); hypertensive (0.33%) and isolated systolic hypertension (2.37%). Prevalence of hypertension and overweight/obesity was approximately 10% in the study from Kathmandu. 13% of the participants were having 3 or more risk factors for non-communicable diseases. [9] A study from Kenya on prevalence & distribution of risk factors for NCDs using WHO STEPwise approach revealed the most common individual risk factors as physical inactivity, HTN and overweight/obesity accounting for 42%, 24% and 11% of the sample respectively.[21] 17.1% had raised BMI while 8.6% were found hypertensive in a similar study from Delhi. [12] High prevalence of overweight/obesity was reported among youth from Kerala also i.e. females (33%), males (17%). [14] Prevalence of two biochemical risk factors i.e. raised blood sugar and total blood cholesterol was 11.57% and 10.98% respectively. Study from Delhi reported 8.6% diabetic and 5.7% participants with high blood cholesterol level. [12] Other studies report lesser prevalence in the range of 2-3% but that may be due to use of different cut off criteria's. [10] Most common risk factors found were Low level of fruit and vegetable consumption, physical inactivity, unhealthy diet, smoking and alcohol consumption. More than two fifth (43.1%) of the study participants had 3 or more than 3 behavioural/metabolic risk factors for the NCDs which raise the concern level for the future. High prevalence probably reflects the current urban lifestyle and economic situation, as was seen by the higher risk among persons with higher education.

Prevalence of smoking and alcohol use among students was found lower in comparison to other participants. School-based educational strategies to increase knowledge and awareness about the risk factors of NCDs and their prevention seem most feasible option. A robust Screening and monitoring system at school, college and community level is still missing. Currently functional school health programs and NCDs clinics should be utilized effectively for providing different services for the prevention of NCD risk factors. Along with this, a comprehensive multifaceted program is needed that should focus on wider perspective of NCDs control.

Formulation of public policies and legislations should be in the line of promoting healthy food and lifestyle rather than restricting it to the current state i.e. bans on the sale of tobacco product and alcohol to minors. Information technology and social media should be utilized as a platform for spreading awareness regarding NCDs.

These preventive steps will provide cost-effective results in comparison with the very costly treatment and management of NCDs later. This study provides grounds for conducting further research on a larger scale to identify the magnitude of preventable and modifiable risk factors. Nonetheless, this information can be utilized for the development and testing of educational and other preventative interventions for the control of NCDs.

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