



# Ascertainment of risk factors for non-communicable diseases among medical students in Government Medical College, Nahan, Himachal Pradesh: A Cross-Sectional Study

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## ABSTRACT

### INTRODUCTION

Non-Communicable Diseases (NCD's) represent the largest disease burden of utmost concern from public health point of view. Major risk factors attributing for NCD's are physical inactivity, unhealthy diet, smoking and harmful use of alcohol. Present scenario shows that India's burden of NCD's is escalating. Onset occurs a decade earlier  $\leq 45$  years as compared to developed countries with onset  $\geq 55$  years.

### OBJECTIVE

To ascertain the risk factors for non-communicable diseases among undergraduate medical students in Government Medical College, Nahan, Himachal Pradesh.

### MATERIAL AND METHODS

Descriptive Cross-Sectional study. Modified WHO global STEP wise approach for risk factor assessment for Non-Communicable Diseases was used.

### RESULTS

A total of 329 students were enrolled. Mean age of the students was 20.7 years (range 18-25 years). History of consumption of tobacco products was present in 24(7.3%) students and alcohol in 126(38.3%). Fruit intake on all days of the week was present in only 52(15.8%) students. Majority 326(99.0%) students consumed less than five servings of vegetables per day. Moderate to vigorous physical activity was part of routine in 176(53.4%) students. Pre- hypertension was present in 77(23.4%) students. Pre-hypertensive state among study participants depicted waist hip circumference, BMI, duration of physical activity, servings of fruits and vegetables as most significant factors ( $r^2=0.383$ ,  $p<0.001$ )

### CONCLUSION

Predisposing factors like lack of physical activity, inadequate servings of fruits and vegetables altered waist hip ratio and body mass index were significant predictors detected in our study predisposing to non-communicable diseases. Awareness among medical undergraduates serves a dual purpose in the form of preventive measure for self and to the society at large.

**Key words:** Non-Communicable diseases, Risk factors, Medical students

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## INTRODUCTION

Non-Communicable Diseases (NCD's) represent the largest disease burden of utmost concern from public health point of view. NCD's kill 41 million people each year accounting for 71% of all deaths globally. Besides affecting the morbidity and mortality indicators of health, these also have significant impact on the economic brunt to the families worldwide. The major attributable risk factors for NCD's are physical inactivity, unhealthy diet, smoking and harmful use of alcohol. These risk factors result in metabolic/physiological alterations in the body like increased blood pressure, dyslipidaemia, obesity, increased hip and abdominal circumference which in due course result in major NCD's [1]. All these risk factors are interlinked and deeply rooted in the social, cultural, environmental, political and economic factors. However, prevention plays a significant role in curbing the burden of NCD's worldwide. Burden of NCD's in India is shows an upward trend. Onset of NCD's in India occurs a decade earlier among adults  $\leq 45$  years as compared to developed countries with onset among people aged  $\geq 55$  years [2,3]. India still bears the brunt of communicable and non-communicable diseases posing dual burden of disease at the national level and henceforth at global level. Research has shown that adoption of healthy lifestyle results in significant reduction in mortality and morbidity due to most of NCD's [4]. Sedentary behaviour along with lower intake of fruits, vegetables, cereals and fibres with high intake of salted, fried, fatty, fast foods, soft drinks is associated with increased risk of chronic diseases in children and adults [5,6]. Estimates from World Health Organization suggest 2 million deaths/year attributable to physical inactivity and unhealthy eating habits. Research on poor lifestyle behaviour among adults has been recognized as need of the hour to culminate the burden of NCD's in the society. Studies on medical students serves the dual purpose of imparting the knowledge of importance of avoiding acquisition of risk factors for NCD's within themselves and to the society at large as they are future doctors. Therefore, this study was planned with the objective of ascertainment of risk factors for Non-Communicable diseases among medical

students in a Government medical College, Himachal Pradesh.

### Material and methods:

**Study design:** Descriptive Cross-Sectional study

**Study period:** October 2020 to December 2020

**Inclusion criteria:** Undergraduate medical students from four batches who were willing to participate in the study

**Exclusion criteria:** Sick and those students not available at the time of study

**Sample size:** Sample size calculated based on formula  $N = t^2 * PQ / d^2$ , where t is 95% confidence interval (1.96), P is the prevalence of physical inactivity/week ( $< 150$  minutes) among undergraduate students as per review of literature [6] taken as 71%, d is degree of accuracy at 5%. Sample calculated to be 329.

The study was undertaken after obtaining institutional (ethical) committee approval (HFW/ME/DYSPGMC/IEC/2019/30). Written informed consent was obtained from all the student participants prior to the interview and examination. WHO global STEP wise approach for risk factor assessment for Non-Communicable diseases was used [7]. Questionnaire was modified with the help of experts. Step 1 included information regarding demographic and behavioural characteristics i.e. Age, Sex, alcohol consumption, tobacco use, history of raised blood pressure and diabetes. Students were provided guidance regarding filling up of the Proforma correctly and any queries were clarified prior to distribution. Unique identification number was given to each student so that anonymity and confidentiality of the data is maintained. Step 2 included recording of height by using SECA stadiometer to nearest 0.5 cm. The subject was asked to stand straight with closed heels, buttock and occiput touching against the wall, looking straight ahead with aligning tragus of the ear and inferior margin of the orbit parallel to the ground.

Weight was recorded as kilograms to nearest 0.5 kg in an electronic weighing scale. Machine was kept in smooth flat hard surface. Correction of the zero-error followed by subject in light clothing, without shoes, standing straight for

correct measure of weight was followed. Diagnosis of overweight and obesity was done using Body Mass Index (BMI) cut-offs of  $>23\text{kg/m}^2$  and  $>25\text{kg/m}^2$ , respectively, as per Consensus Guidelines for Asian Indians [8]. Waist hip ratio (WHR) was calculated by dividing waist circumference by the maximum hip circumference. The Waist circumference cut-offs for diagnosis of abdominal obesity in Asian Indian males and females are  $>90\text{ cm}$  and  $>80\text{cm}$ , respectively, and WHR cut-offs in males and females are 0.88 and 0.80 respectively [8]. Constant tension tape was used for measurement of these parameters. Waist circumference was measured at the midpoint of inferior margin of last palpable rib and top margin of iliac crest in the midaxillary plane and the hip circumference at the maximum bulge of the gluteus maximus with the tape parallel to the floor to the nearest 0.1 cm. Waist circumference was measured at the end of normal expiration. Each measurement was repeated twice. If the measures were within 1 cm of one another, then average of two shall be taken. If exceeding 1 cm, the two measurements was repeated.

Blood pressure was measured using OMRON digital sphygmomanometer (OMRONHEM7203) Mercury sphygmomanometer was used to validate digital BP recorder. Three readings were taken three minutes apart with student sitting comfortably on the chair, arm supported on the table at the level of heart, uncrossed legs resting on the ground after 15 minutes of rest. Average of the three readings were taken. Diagnosis of hypertension was made based on JNC 8 classification. Normal BP was defined as systolic blood pressure of  $<120\text{ mmHg}$  and diastolic blood pressure of  $<80\text{mmHg}$ . Pre-hypertension was defined as systolic blood pressure of 120-139mmHg and diastolic blood pressure of 80-89 mm Hg Stage I hypertension was classified as systolic blood pressure of 140-159mmHg and diastolic blood pressure of 90-99 and stage II hypertension as systolic blood pressure of  $>160\text{ mmHg}$  and diastolic blood pressure of  $>100$  [9]

Three health educators and one social worker were trained to record the measures. Distribution and collection of the proformas for risk factors assessment was done by another person not involved in the study.

### Operational definitions

**Tobacco use:** Current smokers were those who smoked  $\geq 100$  cigarettes in their lifetime and reported current smoking [10].

**Current drinker:** Someone who consumed one or more than 1 standard drink of alcohol in the past 30 days [7]

**At risk individuals:** Those who consumed less than 5 servings of fruits and vegetables per day [7]

**Abdominal obesity:** Abdominal circumference of more than 90 cm in males and 80 cm in females [7]

**Analysis:** Records of study was entered in the excel spread sheet followed by analysis using SPSS [Statistical Package for Social Sciences] version 23. Analysis included percentage, range, mean, standard deviation for the values for behavioural factors and physical measurements. Comparisons between groups was made using the Chi-square test for qualitative/categorical variables. Predictors for risk factors of non-communicable diseases were assessed using backward regression model. P value  $< 0.05$  was considered statistically significant.

### Results

A total of 329 students were enrolled in the study. Mean age of the students was 20.7 years (range 18-25 years). Majority 189(57.4%) were female and 140(42.6%) were male. Area specific distribution of residence showed that 183(55.6%) belonged to rural area and 146(44.4%) belonged to urban area. Majority 322(97.9%) were Hindus while 5(1.5%) were Sikh and 2(0.6%) Buddhist respectively. Semester wise distribution was as 93(28.3%) students from second semester, 89(27.1%) from third semester, 64(19.5%) from fourth semester, 67(20.4%) from fifth semester and 16(4.9%) were from sixth semester. Regarding response rate for the annual expenditure, 232(70.5%) responded whereas 97(29.5%) did not. Average annual expenditure by the students was Rs 129095 (SD 1000022.73). Minimum expenditure was Rs 36000 rupees and maximum was Rs 450000. Family history of hypertension and diabetes was present in 140(42.6%) and 110(33.4%) study participants. [Table 1]

**Table 1 Sociodemographic variables and family history of non-communicable diseases**

Variable	n(%)
Age (mean SD)	20.71(1.94)
Sex	
Male	140 (42.6)
Female	189 (57.4)
Area	
Rural	183(55.6)
Urban	146(44.4)
Religion	
Hindu	322(97.9)
Sikh	5(1.5)
Buddhist	2(0.6)
Semester	
Second semester	93(28.3)
Third semester	89(27.1)
Fourth semester	64(19.5)
Fifth semester	67(20.4)
Sixth semester	16(4.9)
Average yearly expenditure (SD)	1,29095(100022.73))
Family history of Hypertension	140(42.6)
Family history of Diabetes	110(33.4)

History of consumption of tobacco products was present in 24(7.3%) students. There were 22(15.7%) males and 2(1.05%) females who consumed tobacco products. Tobacco product used for smoking was cigarettes. Daily consumption of tobacco smoking was present in 14 (58.3%) and occasional in 10(41.6%). Frequency of smoking was one to two times/day among all the tobacco consumers. Age for starting tobacco consumption was less than 15 years in 2(8.3%) and between 15years to 20 years in 22(91.6%) students. Only 2(8.3%) students had tried to stop smoked tobacco consumption in last 12 months. History of consumption of alcohol was present in 126(38.3%) students. Half 70(50%) of the male students and 56(29.6%) female students gave positive history for the consumption of alcohol. Majority 42(33.3%) consumed beer, 18(14.2%) consumed whisky, 10(7.93%) consumed wine and more than 3 brands were consumed by 17(13.4%) students. Standard drinks consumed in each drinking session were 2 in 86(68.2%), 3 in 28(22.2%) and 4 in 12(9.5%) students. Alcohol drinks were consumed usually with meals in

48(38.0%) and rarely with meals in 26(20.6%) and 10(7.9%) students denied intake of alcohol with meals. [Table 2] Regarding the daily intake of fruits, only 256(77.8%) responded. History of intake of fruits on all days of the week was present in only 52(20.3%) students with only one serving of fruit every day. Regarding servings of vegetables in the diet every day, 326(99.0%) consumed less than five servings with only 3(0.9%) students who consumed more than five servings of vegetables daily. Only vegetable oil was consumed by 134(40.7%). Intake of combination of vegetable oil, ghee and butter was present in 32(9.7%) students. However 87(26.4%) were not aware of the type of oil consumed. Importance of lowering salt in diet was considered as very much in only 94(28.6%). Awareness regarding the harmful effects of intake of excess salt in diet was present in 300(91.2%) students. Buying low sodium or alternative as a measure to restrict salt in the diet was replied by 53(16.1%) students. However 74(22.5%) were of the opinion of limiting consumption of processed foods.



Table 2 Behavioural risk factors among study participants

Risk factor	n(%)
<b>Smoking</b>	
History of smoking present	24(7.3)
Daily	14(58.3)
Occasional	10(41.6)
<b>Age at initiation of smoking</b>	
<15 years	2(8.3)
15-20 years	22(91.6)
Tried to stop smoking during past 12 months	2(8.3)
<b>Alcohol</b>	
History of intake of alcohol present	126(38.3)
<b>Responders for alcohol intake semester wise</b>	
Second (n=93)	52(55.9%)
Third (n=89)	29(32.5%)
Fourth(n=64)	17(26.5%)
Fifth(n=67)	22 (32.8%)
Sixth(n=16)	6(37.5%)
<b>Alcohol brand (n=93)</b>	
Whisky	18(14.2)
Wine	10 (7.9)
Beer	42(33.3)
Wine and whisky	9(7.1)
Wine and beer	9(7.1)
Wine, whisky and beer	21(16.6)
More than 3 brands	17(13.4)
<b>Standard alcohol drinks per session</b>	
Two	86(68.2)
Three	28(22.2)
Four	12(9.5)
<b>Alcohol drinks with meals</b>	
Usually with meals	48(38.0)
Sometimes	42(33.3)
Rarely	26(20.6)
Never	10(7.9)

[Table 3] Moderate to vigorous physical activity was part of routine in 176(53.4%). Out of 176 students physical activity on daily basis was

present in 80(46.5%). Time devoted for physical activity for 30 minutes to one hour daily was present in 136(77.2%)

Table 3 Dietary Practices and awareness among study participants (N=329)

Dietary Practices and awareness	N(%)
<b>Fruit intake in last 7 days</b>	
History of intake of fruit present	256(77.8)
Daily intake	52(15.8)
<b>Servings/day</b>	
Less than five	51(98.0)
More than five	1(1.9)
<b>Vegetable servings/day</b>	
Less than five	326(99.0)
More than five	3(0.9)
<b>Awareness regarding oil and fat used for meal preparation</b>	
Present	242(73.5)
<b>Type of oil and fat used for meal preparation</b>	
Vegetable oil and mustard oil	134(40.7)

Butter	13(4.0)
Ghee	42(12.8)
Vegetable oil,Ghee	21(6.4)
Vegetable oilk,ghee,butter	32(9.7)
Lack of awareness	87(26.4)
<b>Awareness regarding importance of salt in diet</b>	
Very important to lower salt in diet	94(28.6)
Somewhat important to lower salt in diet	164(49.8)
Not at all	71(21.6)
<b>Awareness regarding too much salt consumption and health problems</b>	
Yes	300(91.2)
No	29(8.8)
<b>Action taken to control daily salt intake</b>	
Limit consumption of processed foods	74(22.5)
See contents in label	20(6.1)
Buy low sodium or alternative	53(16.1)
Non responders	182(55.3)

[Table 4] Blood pressure measurement showed mean systolic blood pressure of 117.25(SD 9.358) and diastolic blood pressure of 75.97(7.694). There was significant difference in the systolic and diastolic blood pressure measurements between female and male students ( $p < 0.001$ ). Pre hypertension was present in 77(23.4%) students. None of the students had hypertension. Measurement of body parameters showed mean body mass index of 22.59(SD 3.1643) and waist hip ratio of 0.86(SD 0.11). Gender wise segregation of data

showed body mass index of 22.7(SD 3.3) in males and 22.4(SD 3.0) in females ( $p = 0.318$ ). Waist hip ratio calculations in males and females showed values of 0.82(SD 0.09) and 0.81(SD 0.06) respectively ( $p = 0.491$ ). There was significant difference in the waist circumference measurements in the male 79.35(7.98) and female 75.72(7.38) students  $p$  value  $< 0.001$ . Weight measurements showed overweight in 26(18.6%) of male students and 37(19.6%) of female students. Obesity was present in 34(24.3%) male students and 37(19.6%) of female students.

Table 4 Frequency of physical activity among study participants: (N=329)

Frequency of physical activity	N(%)
<b>Moderate to vigorous physical activity for atleast 10 min /day</b>	
Present	176(53.4)
Absent	153(46.5)
<b>Frequency of physical activity/week</b>	
<3 days	58(32.9)
3 to 5 days	36(20.4)
>5 days	82(46.5)
<b>Time spent for physical activity</b>	
<30 min	45(25.5)
30 min-1 hour	136(77.2)

[Table 5] Assessment of predictors for presence of pre-hypertension among the study participants (using backward regression model) depicted waist hip circumference, BMI, duration

of physical activity, servings of fruits and vegetables as most significant factors ( $r$  square = 0.383,  $p < 0.001$ )



**Table 5** Physical measurements of study participants

Parameter(Mean (SD))	Male	Female	P value
BMI	22.7(3.3)	22.4(3.0)	0.318
Blood pressure			
Systolic Blood pressure	121.61(8.47)	114.02(8.66)	<0.001
Diastolic Blood pressure	80.08(7.33)	74.66(7.14)	<0.001
*Waist circumference	79.35(7.98)	75.72(7.38)	<0.001
**Waist Hip ratio	0.82(0.09)	0.81(0.06)	0.491

\*90 cm for male and >80 cm for female

\*\*>0.88 for male and >0.80 for female

## DISCUSSION

Risk factors assessment amongst the medical undergraduates serves a dual purpose. It not only acts as a measure of self-prevention from non-communicable diseases but also society at large. There is higher prevalence of cardiovascular disease manifestation at the younger age group in India [11]. Medical students are more at risk of acquiring non-communicable diseases because of stressful environment [12]. In the present study, assessment for various risk factors was conducted amongst the medical undergraduates' students. Risk factor assessment showed that history of consumption of tobacco products in 24(7.3%) students. Our findings are contrary to study by Yasmin S et al which showed prevalence of current smokers as 12.5% [13]. Findings of our study are similar with the studies done in other states of India as 5% in Tamilnadu, 6.4% in Uttar Pradesh and 8.7% in Odisha, [14,15,16]. Daily consumption of tobacco smoking was present in 14(58.3%) and occasional in 10(41.6%). Age for starting tobacco consumption was less than 15 years in 2(8.3%) and between 15 years to 20 years in 22(91.6%) students. Study by Alkhalaf M et al showed age of onset of smoking for 34.9% of the students between 18 and 21 years old. The difference could be due to varied Socio behavioural factors amongst societies. In our study, only 2(8.3%) students had tried to stop smoked tobacco consumption in last 12 months compared to study by Alkhalaf M et al in which 13.3% of the smokers were motivated to quit [17]. Findings of our study showed that history of consumption of alcohol was present in 126(38.3%). Study by Mehra J et al showed

prevalence of alcohol users among college students as 20% [18] The findings of our study are in contrast to other studies among medical students which mentioned prevalence of alcohol consumption in Tamilnadu as 5% [14] and Uttar Pradesh as (3.8%) [19]. Standard drinks consumed in each drinking session were 2 in 86(68.2%), 3 in 28(22.2%) and 4 in 12(9.5%) students. Alcohol drinks were consumed usually with meals in 48(38.0%) meals and mixed with energy drinks in 26(20.6%) and 10(7.9%) students took alcohol with energy drinks only. Literature review indicated that the consumption of energy drinks with alcohol is a relatively common practice among medical students [20-22]. Our study showed that majority of alcohol consumers are from second semester and sixth semester. Literature review has shown all drinking studies to be age-related with increased prevalence of drinking with increasing age [23]. However, our findings could be because of peer pressure in the early years and stress related issues at the end of course. Fruits were consumed on all days of the week in only 52(20.3%) students with only one serving of fruit every day. Regarding servings of vegetables in the diet every day, 326(99.0%) consumed less than five servings with only 3(0.9%) students who consumed more than five servings of vegetables daily much less than WHO recommended daily five servings of fruits and vegetables. Findings are similar to the observations of study by Biswajit Paul et al [14]. Intake of food cooked in vegetable oil and mustard oil was present in 134(40.7%) students. Use of refined and mustard oil for cooking has been also mentioned in literature [24]. This is a

good practice as these oils contain significant levels of poly unsaturated fatty acids, which help to lower total cholesterol, LDL cholesterol, and triglyceride concentrations and are protective against coronary artery disease. Lowering salt in diet was valued as very much in only 94(28.6%). Moderate to vigorous physical activity was part of routine in 176(53.4%). Inadequate physical activity was present in the remaining. Inadequate physical activity may be attributed to longer time span for studies for the medical undergraduates. A study conducted among 18-24 years participants also showed inadequate physical activity among 58.5% participants [25]. Overweight was present in 26(18.6%) male students and 37(19.6%) female students whereas obesity was present in 34(24.3%) male students and 37(19.6%) female students. Findings of our study are consistent with the study that mentioned the combined prevalence of 41.27% (19.1 % overweight and 22.1% were obese respectively) [26]. Pre-hypertension was present in 77(23.4%) students and no student was found to be hypertensive. Prehypertension was predominantly systolic. Findings are

consistent with a study from Kolkata which showed prevalence of prehypertension in 19.18% students [27]. A study by Khawandanh showed that Prehypertension was predominantly diastolic and participants with prehypertension had significantly higher body mass index [28]. Our study depicted waist hip ratio, BMI, duration of physical activity, servings of fruits and vegetables as most significant factors for acquisition of pre-hypertension by the study participants.

### CONCLUSION

Knowledge pertaining to the risk factors for various non-communicable diseases plays a significant role in controlling the associated morbidity and mortality. Awareness among medical undergraduates serves a dual purpose in the form of preventive measure for self and to the society at large. Lack of physical activity, inadequate servings of fruits and vegetables altered waist hip ratio and body mass index are significant predictors for non-communicable diseases.



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