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Prevalence of Risk Factors of Major Non-Communicable Diseases among Adolescents of Higher Secondary Schools of Kaski District

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ABSTRACT

Background: The main aim of this study is to determine the prevalence of major non communicable disease risk factors among higher secondary school students.

Methods: A cross-sectional study was conducted among higher secondary students of grade 11 and 12 of Kaski district in Nepal. The study period was from July 2016 to June 2017. Total sample 640 higher secondary students were recruited through two-stage cluster sampling. Self-administrated questionnaire was used for the data collection tool along with other tools which were used such as UNICEF electronic weighing scale, stature meter and mechanical aneroid sphygmomanometer. Ethical approval was obtained from IRC, Pokhara University. Data were entered intoEpiData software and analysis was performed with the help of the Statistical Package for Social Science (SPSS).

Results: The prevalence of smoking was 6.1% which was high in male (11.9%) than female (0.6%). Alcohol consumption practice among the adolescents was 18.9%. Family history of hypertension was seen higher than family history of diabetes.The prevalence of hypertension was 11.7%. High prevalence of abnormal values of systolic and diastolic BP was found in male than female students. Overweight was seen in 6.1% students. Prevalence of obesity was almost equal in both groups.

Conclusions: There is high prevalence of smoking, alcoholism among adolescents. Hypertension was more common than overwieght among adolescents.

Keywords: Adolescent; college students; non-communicable diseases; risk factors.

INTRODUCTION

Non-communicable diseases (NCDs) are significantly growing burden on global health. NCDs are one of the major development challenges of the 21st century, in terms of both the human suffering they cause and the harm they inflict on the socioeconomic fabric of countries, particularly low and middle-income countries. Nearly 52% of deaths and 44% of the diseases burden in the South-East Asia Region are attributed to NCDs.[1] Although NCDs manifest largely in adulthood, the precursors of their conditions manifest during childhood and adolescence. Early detection and management are key tools in the control of NCDs. [2]

NCDs are predisposed by various risk factors including behavioral, environmental and metabolic. The four common NCDs (CVD, cancers, diabetes, and chronic respiratory diseases) which account for 80% of the NCD burden share four common risk factors. These are unhealthy diet, insufficient physical activity, harmful use of alcohol, and tobacco smoking.[2] These modifiable risk factors are major causes of overweight and obesity, raised blood pressure (BP), raised blood glucose and dyslipidemia, all important biological risk factors for major NCDs.[3] The present study therefore studied the prevalence of major NCD risk factors among higher secondary students of Kaski district of Nepal.

METHODS

This was a cross-sectional study conducted in Kaski district of Nepal from July 2016 to June 2017. The sample size was determined by assuming prevalence of risk factors of NCDs to be 50 per cent with an error of five per cent, 95 per cent confidence limit, design effect of 1.5 and a non-response rate of 10 per cent, the sample size was 640.

Adolescent students from 11 and 12 grades in different schools of Kaski district were included in this study. List

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of schools in Kaski was obtained from regional higher secondary office, Kaski. From the list of 118 higher secondary schools (66 are public and 52 are private), and approximately 18,000 students are studying in 11 and 12 classes in Kaski district. Seventy seven and fourty one higher secondary schools were running in urban and rural areas respectively. Two stage cluster sampling were adopted for the selection of participants. In first stage, all the higher secondary schools which had running in Kaski district were listed in to two strata such as urban and rural; eight clusters (eight public higher secondary schools) were selected from rural areas and eight clusters (eight private higher secondary schools) were selected from urban areas from the list. This was followed by random selection of class from the selected schools after that all students were selected within the class. The surplus data, exceeding the required serial number, were omitted to maintain the sample size.

Self-administrated questionnaire was prepared based on WHO STEPS Instrument version 3.1 and used for the data collection tool. Biochemical measurements of step 3.1were not performed because of logistic limitations. Other different tools were used such as UNICEF electronic weighing scale for measuring weight, stature meter for measuring height and mechanical aneroid sphygmomanometer for measuring blood pressure. This questionnaire has been previously used in Nepal by Nepal health research council. The self-administrated questionnaire was made in simple, clear and Nepali language. Pretesting of research tools was conducted among higher secondary students in Lekhnath Municipality of Kaski district. An elaborative briefing on the questionnaire was done to all the students of the class prior to data collection.

Height and weight were measured in order to calculate BMI. The heights and weights of the participants were measured in a standing position without shoes on, whilst they looked straight ahead. The height and weight were measured in centimeters and kilograms respectively.The blood pressure measurements were taken in a quiet room at school/college. It was ensured that the individual was seated with his/her feet flat on the floor and rested at least 5-10 minutes. All measurements were taken as once time and measurements were recorded.

Data were entered in Epidata software and analyzed by using SPSS 20 version software. Descriptive statistics (i.e., frequency, percentage, mean and standard deviation) were applied to calculate the prevalence of the risk factors. Associations between socio-demographic, behavioural, and physical risk factors were analyzed by multiple logistic regression. Multiple logistic regression analysis was applied to test association between dependent and independent variables.Univariate and bivariate analysis were performed. Statistical significance was considered at $p<0.05$ and the strength of statistical association was assessed by odds ratios with 95 % confidence interval.

Ethical clearance was acquired from the institutional review committee of Pokhara University at the beginning of the study. We obtained written permission from the school authorities before interacting with the students. Informed consent was taken from participants whose age was more than 18 years, but for those less than 18 years of age assent was taken from their guardian. Written consent was taken from the participants. One day prior to the data collection date that participant's guardian was informed to come to school. Respective guardians were informed regarding research such as research objectives, risks, benefits and tools & techniques of data collection before the taking assent. Detail information was given in English and Nepali version to all participants. Confidentiality was maintained and the information was used for research purpose only. Participation in the study was entirely voluntary and full confidentiality of the objectives of the study.

Participants were informed about their BP and BMI status. In case of the abnormal range, educational counseling was given regarding balanced diet, physical exercise, and they were suggested to visit the health facility for further management.

RESULTS

Out of 640 participants, more than half (51.60%) were female and nearly half (48.40%) were male, within the age ranging from 15 to 19 years. Participants who were Brahmin by ethnicity and Hindu by religion were predominant. (Table 1)

Table 1. Socio-demographic characteristics of the participants (n=640).

Background Characteristics	n	%
School setting		
Urban	320	50.0
Rural	320	50.0
Students enrolled in different schools		
Public	320	50.0
Private	320	50.0
Sex		
Male	310	48.4
Female	330	51.6
Age		
15	40	6.3

16	134	20.9
17	241	37.7
18	155	24.2
19	70	10.9
Ethnicity		
Brahman	307	47.9
Chhetri	131	20.5
Dalit	63	9.8
Janajati	131	20.5
Muslim	8	1.3
Religion		
Hindu	581	90.8
Buddhist	45	7.0
Christian	6	0.9
Islam	8	1.3
Marital status		
Unmarried	627	98.0
Married	13	2.0

Table 2 shows the summary of risk factors for NCDs among students. About 6% of total students were currently smoking, males in majority. About three-fourths of total students admitted adding extra salt to their food. About 29% of total students (184) claimed to have family history of chronic diseases; among them, about three-fourths and one-fourths of total students said that they had a family history of hypertension and diabetes mellitus respectively.

Table 2. Summary of risk factors for NCDs among students.

Risk factors	Male n_1(%)	Female n_1 (%)	Total N (%)
	n_1= 310	n_1=330	N=640
Currently smoking	37 (11.9)	2 (0.6)	39 (6.1)
Alcohol consumption at least one time last one month	100 (32.3)	21 (6.4)	121 (18.9)
Extra salt added in food	214 (69.0)	263 (79.7)	477 (74.5)
BMI≥ 25	19 (6.1)	20 (6.1)	39 (6.1)
Hypertension (≥140/≥90)	42 (13.54)	33 (10)	75 (11.7)
Systolic BP≥140	31 (10.0)	24 (7.3)	55 (8.6)
Diastolic BP≥90	19 (6.1)	16 (4.8)	35 (5.5)
	n_1 =178	n_1 =179	n=357 (55.8)
Fruit consumption >3 days/week	122 (47.5)	135 (52.5)	257 (72)
Fruit consumption <3 days/week	56 (31.5)	44 (24.6)	100 (28)
	n_1 =230	n_1 = 232	n=462 (72.2)
Vegetable consumption ≥ 5 days	111 (44.8)	137 (55.2)	248 (53.7)
Vegetable consumption <5 days	119 (55.6)	95 (44.4)	214 (46.3)
	n_1 =255	n_1 =191	N=446
Vigorous Exercise (carrying or lifting heavy loads, digging or cycling for atleast 10 minutes)<3 days/ week	96 (37.6)	91 (47.6)	187 (41.9)
Family history of chronic diseases	n_1 =100	n_1 =84	N=184
Family history of hypertension	74 (74)	65 (77.4)	139 (75.5)
Family history of DM	28 (28)	19 (22.6)	47 (25.5)

± ≥

Out of 640, 234 participants (36.6%) had checked hypertension by health worker, and only 17.9% (42) of participants claimed they were diagnosed with hypertension by health worker. Out of 42 hypertensive participants, only 23.8% of participants consumed hypertension medicine in last two weeks. Only 23 participants (3.6%) ever had checked diabetes by health worker, and 17.4% (four) participants said they were diagnosed with diabetes by health workerand 25% (one) participants were use medicine.According to the measurements taken, among total participants, 75 (11.7%) were found hypertensive, 180 (28.1%) were underweight, 39 (6.1%) were overweight.

Participants were spent time to walk or bicycle for at least 10 minutes continuously to get to and from places as considered as medium exercise. This study revealed that medium exercise was performed by 87.34% of participants among them, male were 53.5% and female were 38.3%.

Table 3 shows ethnicity, residence, fruit consumption were significantly associated with systolic BP. Diastolic BP and systolic BP were seen to be significantly associated ($p<0.001$) with each other showing that they both rise together. BMI was seen to be associated with ethnicity and urban and rural residence.

Male had the highest mean intake of smoking (4) while female had comparatively less intake of drinking (1.5). There was insignificant difference in mean BMI for males and females (20.25, 20.29 kg/m2, p=0.713). Mean

Table 3. Variables associated with systolic BP, diastolic BP and increasing BMI.

	Systolic BP		Diastolic BP		BMI	
Model	Unadjusted Exp, 95 % CI	p-value	Unadjusted Exp, 95 % CI	p-value	Unadjusted Exp, 95 % CI	p-value
Ethnicity (upper/other than upper caste)	2.083 (1.192-3.640)	0.009	0.993 (0.477-2.070)	0.98	1.943 (1.011-3.732)	0.04
Residence (urban/rural)	2.905 (1.570-5.374)	0.001	0.738 (0.371-1.488)	0.38	0.479 (0.241-0.950)	0.03
Fruit consumption (<3/≥3 days per week)	0.444 (0.205-0.961)	0.035	0.563 (0.223-1.422)	0.21	1.383 (0.444-4.306)	0.57
Systolic (no hypertension/ hypertension)	-	-	10.594 (5.043-22.255)	0.001	0.880 (0.262-2.955)	0.83
Diastolic (no hypertension/ hypertension)	10.594 (5.043-22.255)	0.001	-	-	0.930 (0.215-4.028)	0.92
BMI (No obese< 25/Obese≥25)	0.880 (0.262-2.955)	0.83	0.930 (0.215-4.028)	0.92	-	-
Family history of hypertension (yes/no)	0.831 (0.221-3.122)	0.78	0.672 (0.140-3.231)	0.61	1.033 (0.316-3.377)	0.95
Alcohol consumption at least one time last one month (yes/no)	1.672 (0.398-7.022)	0.47	0.622 (0.159-2.441)	0.49	0.375 (0.891-1.576)	0.16
Currently smoking (yes/no)	1.137 (0.338-3.818)	0.83	2.279 (0.304-17.1)	0.41	0.765 (0.225-2.603)	0.66

Table 4. Comparison of mean values of risk factors between male and female students.

Risk Factor	Male (Mean SD)	Female (Mean SD)	P* Value Male Versus Female
Behavioral Factors:			
Number of cigarettes (n=32)	4±2.92	1.5±0.7	0.290
Standard drinking/last 30 days(n=45)	2.78±2.09	1.5±0.57	0.303
Eating fruits/ per week (n=178)	3.61±1.76	3.66±1.68	0.574
Vigorous intensity activities in minutes/typical day (n=256M, n=190F)	109.29±99.92	103.42±91.96	0.876
Physical Measurement:			
BMI (kg/m²)	20.25±2.88	20.29±2.80	0.713
Systolic (mm of Hg)	115.06±15.98	114.21±15.14	0.390
Diastolic (mm of Hg)	74.15±9.10	73.78±9.32	0.585

systolic BP and diastolic BP was slightly more in male that female students (Table 4).

DISCUSSION

In this study,the prevalence of smoking was 6.1% which was high in male (11.9%) than female (0.6%). Smoking was found to be associated with sex. Male were more likely to smoke than female. Among current smokers, mean intake of smoking had higher in male (4±2.92) than in female (1.5±0.7). So these adolescents who have tried smoking in our study have a high risk of becoming regular smokers which would then increase their risk of developing non-communicable diseases. The similar findings were found in other studies, i.e. smoking was more common in male than female.[4-6] In contrast, another study showed that there was no difference with regards to sex for smoking and socio-demographic and school-related variables were associated with smoking.[7]

Merely 18.9% of the studentsconsumed alcohol where male students were in majority than females. Mean intake of alcohol within last thirty days was higher in male(2.78±2.09) than female(1.5±0.57). Alcohol intake did not seem to contribute as a risk factor to developing hypertension or obesity in our study. The similar finding was found in other studies, i.e. sex was associated with alcohol consumption.[4,8] In contrast, a study showed sex was not associated with alcohol consumption.[7] This study revealed study setting was associated with alcohol consumption. The similar finding was found in another study, Mountain 6% versus Terai<1%. [8]

This study revealed 55.8% consumed fruits among them 72% consumed more than 3 days in a week and 72.2% consumed vegetables in a week. Consumption of fruits ≥3 days in per week appears to be negatively correlated with systolic BP. Other studies showed 66.7% [7], 95% [9] consumed fruits and vegetables respectively and majority of participants consumed inadequate fruits and vegetables.[4] In this study, age and sex were not found to be associated frequency of with fruits consumption in other hand another study showed fruits intake was significantly high among male than female.[10]In this study, sex was found to be associated with vegetable consumption. This finding was supported by another study.[10]

In this study, 65.6% participants have normal BMI and only 6.1% participants have overweight. BMI was seen to be associated with ethnicity and urban and rural residence. Comparatively, more percentage of adolescents was seen overweight in a study conducted in Nepal (12.1%).[11] The study conducted by Zaman and Bhuiyan and reported that the prevalence of overweight was 20%.[9] This study shows that more participants were obese in urban setting than in rural setting; a similar finding was shown in a study conducted by Bhagyalaxmi, at al.[12] This study showed the equal proportion of male and female were found overweight, but previous research reported that more female adolescents (15.5%) were found overweight than males (6.6%).[11]

This study showed that there was insignificant association between systolic BPand sex, and similar finding was revealed from study conducted by Garg.[7] Similarly, diastolic BP was indistinctly higher in males than females, while similar finding was depicted by another study.[4,11]

CONCLUSIONS

The prevalence of smoking was 6.1% which was high in male (11.9%) than female (0.6%). Alcohol consumption practice among the adolescents was 18.9%. The prevalence of hypertension among students was 11.7%. High prevalence of abnormal values of systolic and diastolic BP was found in male than female students. Overweight was seen in 6.1%. Health education and promotion programs should be designed for targeting students to increase levels of knowledge on harmful effects of risk factors and motivate them to quit smoking and alcohol consumption and encourage them on healthy diet consumption and physical exercise in family, school and community residence.

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