ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Prevalence of Risk Factors of Non-Communicable Diseases among Adolescent in Parsa District of Nepal

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ABSTRACT

Non-communicable disease (NCD) refers to non-infectious diseases or illnesses that are caused by something other than pathogens. The combined burden of these diseases is rising fastest among lower-income countries, populations and communities, where they impose large, avoidable costs in human, social and economic terms. Programmes and policies targeted for NCDs are in their infancy phase in these countries. To assess the prevalence of risk factors of NCDs among adolescents we conducted a cross-sectional study in Parsa District by adopting step-2 approach of World Health Organization's (WHO) stepwise framework for the surveillance of risk factors of NCDs. Different anthropometric measurements were taken. Body mass index (BMI) and waist: hip ratio (WHR) were calculated, blood pressure (BP) measurements were also taken. Nearly half of male respondents and about one third of female respondents were using some or other types of addiction. Prevalence of class I obesity was slightly more among females based on BMI classification criteria whereas waist-hip ratio (WHR) criteria suggested females to be 4 times more obsessed than males. Nearly 12% and 5% of the adolescents fall in pre-hypertension and hypertension category respectively. Over weight/obesity was significantly associated with systolic and diastolic Blood Pressure. (p=0.05) The study finding suggests that there is an urgent need of health programmes aimed as primordial prevention.

Keywords: Non communicable diseases (NCDs), Risk factors, Obesity, Blood pressure (BP)

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ISSN: 0975-8585

INTRODUCTION

Non-communicable disease refers to those conditions which are chronic, evolve slowly, and progress relentlessly. The World Health Organization (WHO) defines NCDs as including chronic disease (principally cardiovascular disease, diabetes, cancer, and asthma/chronic respiratory disease), injuries, and mental health. They are commonly thought of as "diseases of affluence", but in reality, four-fifths of deaths from NCDs are in low- and middle-income countries and older people in developing countries are particularly at risk. [1] NCDs are increasing rapidly in the developing world. The World Health Organization (WHO) report shows that some 60 per cent of all deaths in the world are now caused by NCDs where every third death in the world is due to cardiovascular diseases, and coronary heart disease is the number one killer in the world. [2] The NCDs have become serious threats to the health of developing countries which ranked as third most likely risk to come true and the forth most severe in its impact in 2009. [3] Non-communicable diseases (NCDs) are the leading causes of death globally, killing more people each year than all other causes combined. [4] Contrary to popular opinion, available data demonstrate that nearly 80% of NCD deaths occur in low- and middle-income countries. Of the 57 million deaths that occurred globally in 2008, 36 million, almost two thirds, were due to NCDs, comprising mainly cardiovascular diseases, cancers, diabetes and chronic lung diseases. [5]

Non-communicable diseases are increasingly becoming a major cause of morbidity, mortality and disability in the WHO South-East Asia Region. Rapid changes in the economic, social, and demographic determinants of health as well as adoption of unhealthy lifestyles by large segments of population are contributing factors for NCDs. [1]

The impact of NCDs is devastating in terms of premature morbidity, mortality, and economic loss. [6] There is an extensive literature demonstrating that NCDs are more likely to occur with unhealthy diet, physical inactivity, active and passive smoking, and use of betel nut and smokeless tobacco [6-9], whereas prevention of these factors has positive effects on reducing NCDs rates and all-cause mortality. [10, 11] It has been reported that up to 80% of deaths due to heart disease, stroke, and type 2 diabetes and 40% of deaths due to cancers could be prevented by eliminating known lifestyle risk factors. [5]

As there is an absence of a routine surveillance or registry system, the actual burden and trend of NCDs in Nepal is unknown so very high proportion of death due to NCDs may be unnoticed or excluded. Death due to NCDs in Nepal is estimated to be 42.1% compared to 48.9 for South Asia. [12] Research work done particularly in the last decade has shown that the conventional risk factors of NCDs are present in a high proportion in the Nepalese population.[13] Parsa District is one of the industrial districts of Nepal and the life-style and behaviors of people here is being changed rapidly.

High-risk behaviors are initiated usually in the adolescent age group. Therefore, this group is important target for primordial prevention. To estimate the trend of NCDs proper surveillance for the risk factors of NCDs is prerequisite in every country. Studies on risk factors of non-communicable diseases in Nepal are inadequate. To construct the policy and programmes regarding NCDs, there should be numbers of such studies. So, our present study is conducted with the objective of identifying the prevalence of risk factors of non-communicable diseases.

MATERIALS AND METHODS

Study area

Nepal is a landlocked poor developing country in the South East Asian Region (SEAR) of WHO with total land area of 1,41,181 square kilometers. According to the latest census 2011, the total population of Nepal is 26.6 million with population density of 181 per square KM. The sex-ratio is 94.41 males for 100 females. Parsa District lies in the southern part of Nepal bordering to India. Being industrial zone, there are numbers of factories which may be helpful to raise economic status of its residents. Birgunj Sub Metropolitan city is 180 kilometers to south of the capital city Kathmandu and 5 km to the north of Raxaul of India. There are a total of 1, 12,484 population with annual growth rate of 4.89 in Birgunj sub-metropolitan city according to 2001 census.

Study design

It was a cross sectional study based on framework of the WHO stepwise approach for surveillance of risk factors of non-communicable diseases. [14] WHO stepwise approach
STEPS is a sequential process, starting with gathering information on key risk factors by the use of questionnaires (Step 1), then moving to simple physical measurements (Step 2), and only then recommending the collection of blood samples for biochemical assessment (Step 3). Our study followed Step 2 approach which includes as a minimum the Step 1 core module (Information by questionnaire) and adds simple physical measurements i.e. blood pressure, height, weight and waist circumference.

Study population and sampling method

Adolescents of age group 15 to 19 years from different wards of Birgunj sub-metropolitan city in Parsa district constituted the study population. Adolescents of age group 10-14 years were excluded to avoid Variability of blood pressure and use of multi-sized cuff. Sample size was calculated by using the formula:

$$N = \frac{z^2 \, p \, q}{e^2}$$

Where,
n = sample size
z = 1.96 for 95% confidence interval
P = Prevalence (prevalence of one of risk factor i.e. smoking in Nepal-23.45%)

q = 1- p (0.7655)
e^2 = Permissible error (5%)

A total of 241 adolescents (121 males and 120 females) were taken by following multistage sampling technique. In the first stage, Birgunj sub-metropolitan city was chosen purposively. In the second stage, 6 wards were selected randomly among total 19 wards of Birgunj sub-metropolitan city by using lottery method. In the third stage, samples were drawn from each selected ward randomly by following probability proportionate sampling technique. For getting the actual respondents from each ward, name list of adolescents (male and female of 15-19 years) were made and required number of respondents were chosen by following systematic sampling technique. And finally, selected study subjects were met in their actual households and required information were collected. Body mass index waist-to-hip ratio and blood pressure were also measured. BMI was calculated and classified according to WHO proposed criteria. [15] Classification of BP was based on JNC-7 (criteria set by seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High BP) criteria. [16]

RESULTS

49.8% of the respondents were male while 50.2% were female. Higher percentage of the respondents were students (82.6%) followed by laborer (12.4%) and others (5.0%).

Overall prevalence of substance use was found to be 36.5%, of which 42.1% were male and 30.8% were female. Forty two point two per cent male and 30.8% female were using tobacco products followed by alcoholic beverages 28.9% of male and 17.5% female. (Table 1)

Majority of respondents (82.0%) spent their time by sitting and relaxing more than 60 minutes a day. Nearly 13.0% didn't involve in moderate physical activities whereas 31.0% involved in such activities more than sixty minutes a day. Likewise, majority of respondents (47.0%) never involved in vigorous physical activities whereas only 8.0% spent more than 60 minutes per day. (Table 2)

By following the weight classification based on BMI, 66.0% male and 15.5% female falls under the category of overweight while 4.9% and 5.0% respectively falls under the category of class one obesity. According to weight classification based on waste-to-hip ratio 19.0% male and 33.3% female fall under the overweight category. Overall obesity was 5.8% following WHR criteria. (Table 3, 4)

Overall 12.0% of respondents were found pre-hypertensive and the prevalence of stage one hypertension was found more (8.3%) in male than female (0.8%). (Table 5)

More numbers of increased blood pressure have found among the respondents of increased body weight. Pre-hypertension and stage one hypertension have found positive correlation with the increased body weight. ($p<0.05$) (Table 6)

Table 1 Types of substances used by the respondent

Substances	*Male (n=121)*	*Female (n=120)*
Tobacco products	51 (42.2)	37(30.8)
Alcoholic beverages	35 (28.9)	21 (17.5)
Narcotics products	12 (9.9)	7 (5.8)

*Multiple responses *figures in the parenthesis denote percentages

Table 2 Time spend by the respondents in different physical activities

Time spent	**Never**	**<30 minutes**	**30-60 minutes**	**>60 minutes**	**Total**
By sitting or relaxing /day	3 (1.2)	18 (7.5)	20 (8.3)	200 (82.3)	241 (100.0)
By doing [1]Moderate Phy. Act. /day	30 (12.5)	62 (25.7)	74 (30.7)	75 (31.1)	241 (100.0)
By doing [2]Vigorous phy. Act. /day	113 (46.9)	98 (40.7)	9 (3.7)	21 (8.7)	241 (100.0)

*Multiple responses *figures in the parenthesis denote percentages

[1] It includes continuous walking, slow bicycling, carrying light load etc.

[2] It includes heavy lifting, digging, fast bicycling, etc

Table 3 Weight classification of the respondents according to BMI

Sex	*Weight of the respondent according to BMI*				*Total*
	Under weight (BMI <18.5)	Normal weight (BMI 18.5-24.99)	Over weight (BMI 25-29.9)	Class I obesity (BMI 30-34.99)	
Male	34 (28.1)	73 (60.3)	8 (6.6)	6 (4.9)	121 (100.0)
Female	28 (23.3)	65 (54.2)	21 (15.5)	6 (5.0)	120 (100.0)
Total	62 (25.6)	138 (57.3)	29 (12.1)	12 (4.9)	241 (100.0)

*figures in the parenthesis denote percentages

Table 4 Weight classification according to waist to hip ratio

Sex	*Waist to hip ratio*			*Total*
	Normal	Over weight	Obese	
Male	95 (78.5)	23 (19.0)	3 (2.5)	121 (100.0)
Female	68 (56.7)	40 (33.3)	12 (10.0)	120 (100.0)
Total	163 (67.6)	63 (26.1)	15 (6.2)	241 (100.0)

*figures in the parenthesis denote percentages

Table 5 Blood pressure classification of respondents

Sex	*Waist to hip ratio*			*Total*
	Normal Blood Pressure	Pre-Hypertensive	Stage I Hypertensive	
Male	97(80.2)	14 (11.6)	10(8.3)	121 (100.0)
Female	104 (86.7)	15 (12.5)	1 (0.8)	120 (100.0)
Total	201 (83.4)	29 (12.0)	11 (4.6)	241 (100.0)

*figures in the parenthesis denote percentages

Table 6 Relation of BMI with Blood pressure

Weight classification according to BMI	*Blood pressure (MmHg)*		*Total*	*p value*
	Normal	Pre-hypertension and stage I hypertension		
Under weight and normal body weight	185 (92.1)	16 (7.96)	201 (100.0)	< 0.05
Over weight and obesity	16 (40.0)	24 (60.0)	40 (100.0)	
Total	201 (83.4)	40 (16.6)	241 (100.0)	

*figures in the parenthesis denote percentages

DISCUSSION

Present study revealed that 42% of male respondents and 31% of female respondents were using some or other types of addiction. Among the substance users, surprisingly, most of the respondents were using tobacco products with or without other substances. Similar study conducted on junior college students of western Nepal has reported over all 13.9% of respondents ever used tobacco product in any form. [17] Similar study conducted among school students in western Nepal highlighted prevalence of ever tobacco chewing as 21.3% (males 30.2% and females 10.9%). [18]The cause of increased prevalence of tobacco use in the present study may be due to including illiterate and school dropped adolescents also compared to college going groups.

It was found that nearly one third of the males and one fifth of female respondents were using some type of alcohol. This finding is similar to the study conducted by R Dhital and *et al*. [19]

Substance abuse related findings suggest that addiction habits are becoming more and more common in adolescents where females are also not exception.

Present study shows that only one-third respondents spent time by doing moderate physical activities of more than 60 minutes a day whereas some percentage of respondents never engaged in such activities. Likewise, only 8% respondents spent time by doing vigorous physical activity more than 60 minutes a week whereas nearly fifty percentage respondents never engaged in such activities. So, in context of physical activity, it can be concluded that, majority of respondents were not living sufficiently active lives and they are potentially at increased risk of varieties of NCDs.

Prevalence of class I obesity was slightly more among females (5%) than males (4.9%) based on BMI classification criteria whereas waist-hip ratio (WHR) criteria suggested females to be 4 times more obsessed than males i.e. 12% and 2.48% respectively.

It was found that the prevalence of Pre-hypertension among male and female was 11.6% and 12.5% respectively. There were also 8.3% male and 0.8% female respondents having stage one hypertension. The overall prevalence of pre-hypertension and stage one

ISSN: 0975-8585

hypertension were 10.7% and 4.56% respectively. A study by Meena *et al* reported that nearly one third of the study subjects were overweight and obese respectively using the BMI criteria and BMI was significantly and positively correlated with blood pressure and waist hip ratio. [20]A study by Sharma *et al* reported 34% of the participants were suffering from hypertension in eastern Nepal. [21] Another study by Vaidya *et al* Found overall 22.7% prevalence of hypertension in the study population. [22] The higher percentage of smoker in these studies could be due to taking respondents of higher age group comparing to that study.

It is found that the trend of blood pressure is increasing as the weight variable is increasing. Among the people who falls under the category of underweight and normal weight together 201 subjects, only 8% fall under the category of Pre-hypertension and stage I hypertension whereas among 40 respondents, who belonged to overweight and obese category, 60% fall under the category of Pre-hypertension and stage I hypertension. Systolic and diastolic blood pressures were significantly ($p < 0.05$) and positively related to BMI. Similar finding were reported by other studies. [23, 24]

CONCLUSION

It is found from the present study that fair numbers of today's adolescents even in developing countries are following high risk practices and are also having many of the hidden conditions of non-communicable diseases like hypertension and obesity which are not usually diagnosed and paid attention. It is therefore very important to be alarmed about their health status in this early phase of life and start full flagged screening of the adolescent population to minimize sever problems in future.

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