Original Article

PREVALENCE OF RISK-FACTORS OF NON-COMMUNICABLE DISEASES IN RURAL POPULATION OF BLOCK DOIWALA DEHRADUN

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Abstract

Background: The important risk factors identified for NCDs are high blood pressure, high concentration of cholesterol in the blood, overweight and obesity and tobacco use . Non-communicable diseases (NCDs), especially cardiovascular diseases, cancers and type 2 diabetes mellitus account for 53% and 44% of all deaths and disability-adjusted life years (DALYs) respectively in India[1] Therefore, primordial prevention of occurrence of risk factors along with their early identification and management can help delay the progress to non-communicable diseases

Objectives: Profiling risk-factors for non-communicable diseases in rural population.

Material & Methods: 707 study participants of more than 15 years of age were included in the study. Behavioural risk factor profile was obtained by interview technique, followed by anthropometric measurements and biochemical assessment of all the individuals. **Statistical Analysis :** Percentage calculation of subjects having Risk factors for non-communicable diseases & correlation analysis.

Results : 14.8% study population was found to be overweight and obese($\geq$25 kg/m^2).Overweight & Obesity was two times more in females than males As per the weight hip ratio 44.8% population was in the moderate to high risk category(Male ->0.96, female ->0.80). Overall 6.7 % population was found to be hypertensive. About 3.7% of the subjects were in frank diabetic status (random blood sugar level more than 200 mg/dl).Blood cholesterol levels were above 200 mg/dl.(At risk category) in 7.4% subjects.

Conclusions : Prevalence of NCD risk factors is comparatively lower in the area however "At risk" population is large requiring appropriate & timely actions to stop even the emergence epidemic of NCDs.

Keywords: Rural population, non-communicable diseases, risk factors

Prevalence of Risk-factors of non-communicable diseases in rural population of India

Introduction -

Non-communicable diseases (NCDs), especially cardiovascular diseases, cancers and type 2 diabetes mellitus   account for 53% and 44% of all deaths and disability-adjusted life years (DALYs) respectively in India[1] . By 2030, while most people with diabetes in developed countries will be aged 65 years or more, in the developing countries the majority will be in the 45-64 years age bracket and affected in their most productive years[1,2] .

The important risk factors identified for NCDs are high blood pressure, high concentration of cholesterol in the blood, overweight and obesity, physical inactivity and tobacco use. Smoking also increases the risk for these diseases, although largely through independent mechanisms[3, 4, 5]. Therefore, primordial prevention of occurrence of risk factors along with their early identification and management can help delay the progress of non-communicable diseases.

So far most of the studies have been conducted in the urban areas[6] considering the rapid lifestyle change in these areas, However, as it is evident that the wave of lifestyle changes is griping the rural areas also, and still more than 70% population of the state is residing in the rural areas, therefore it is equally important to assess the prevalence of risk-factors for non –communicable diseases in the rural population. This will help in providing appropriate recommendations for formulating state specific preventive strategies for Non- communicable diseases. This study has attempted to assess the prevalence of obesity, hypertension, diabetes Cholesterol level, habit of tobacco and alcohol in the rural population.

Material and Methods

Uttarakhand is one of the hilly states of the India with more than 70% rural population. The present study was conducted in Doiwala block of Dehradun district as it is the field practice area of the department of Community Medicine, Himalayan Institute of Medical Sciences, HIHT University. Study was conducted from March to June 2009. In the above mentioned block a village was randomly selected for the study and a cross sectional survey was done covering all the households in the randomly selected village by house to house visit. Persons who were above15 years of age and willing to participate were included in the study after obtaining the informed consent. A semi-structured questionnaire adapted from WHO STEPS method was used for studying the risk factor profile[7, 8.] Questionnaire included information on Bio-demographic profile, health status and risk factors for non-communicable diseases Questionnaire also had information on basic physical parameters- height, weight, hip and waist circumference. Height, waist and hip circumference were measured upto nearest 0.1 cm. Weight was recorded upto nearest 0.5 kg. BMI and WHR were calculated using these parameters. Study population was classified for BMI and waist –Hip ratio as per WHO's guidelines.[9, 10] Hypertensive's were categorized as per the classification of seventh Joint National committee on Prevention, Detection, Evaluation and treatment of High Blood pressure.[11] Blood investigations like Blood sugar and Blood cholesterol level were carried out after informed consent and classified as per WHO's & American Medical association's guidelines[12,13]. Data has been processed by SPSS version 10.0 of Microsoft windows. All values were expressed as percentages for qualitative variables.

To ensure the accuracy, completeness as well as comparability of blood pressure, anthropometric measurements and interviewees response by all the investigators a common manual of operations was developed.

Observations –

Total 707 individuals (age more than 15 years) participated in the study.

Biosocial profile –

Approximately two third study participants were in the age group of 19-60 (72.1%) which is considered the potentially productive years of life. There were 43.3% males and 56.7% females who have participated in the study. 60% subjects reported to be educated up to secondary level and above, however 21.2% subjects reported no formal schooling. Study has included 62% married individuals besides 6.2%widow/widower cases .41% Individual in the study were from BPL families (Below Poverty Line)

Overweight and Obesity-

14.8% study population was found to be overweight and obese ((e"25 kg/m^2). Prevalence of

Overweight and obesity in females (18.9%)was twice of that in males(9.5%).However almost equal percentage of male and females were underweight(31.5%).

As per the WHR 44.8% population was in the moderate to high risk category (Male ->0.96, female ->0.80). Approximately three times more females (65.1%) were found to be in moderate to high risk category than males (19.6%).

Maximum overweight and obesity as per the BMI criteria was observed amongst female of 30-35 years age group, while as per WHR it was observed amongst 19-30 years of female.7.5% cases of "At risk" WHR were contributed by adolescent females(15-19 years).

Blood pressure –
Overall 6.7 % population was found to be hypertensive while 25.2% study participants were in pre-hypertensive category. Prevalence of hypertension and pre-hypertension was more in males (8.2%& 26.8%) than females (5.5%&23.9%). Out of total pre-hypertensive's and hypertensive's 7.9% cases were contributed by adolescents (15-19 years).

Biochemical Assessment (Blood sugar and Blood cholesterol)
Only 45.9% study participant consented for biochemical assessment for random blood sugar & cholesterol levels.

Blood sugar - About 3.7% of the subjects were in frank diabetic status (random blood sugar level more than 200 mg/dl) 2.8% individuals were in pre-diabetic status (Random Blood sugar level – 140 -200 mg/dl.).

Blood Cholesterol - Blood cholesterol levels were above 200 mg/dl. in 7.4% subjects. Out of this 1.2 percent cases were contributed by adolescents (15-19 year age group).

Table -1 Prevalence of risk factors associated with Non Communicable diseases

Indicator	Male No.(Percentage)	Female No.(Percentage)	Total No.(Percentage)
Body Mass Index(Kg/m²)			
Underweight(<18.50 kg/m²)	97(31.7)	125(31.2)	222(31.4)
Normal(18.50-24.99kg/m²)	180(58.8)	200(49.9)	380(53.7)
Overweight (25.00-29.99kg/m²)	23(7.5)	60(14.9)	83(11.7)
Obese(≥30.00kg/m²)	6(2.0)	16(4.0)	22(3.1)
Total	306	401	707
Waist –Hip Ratio			
Low risk Male ≤0.95,Female ≤0.80	245(80.1)	145(36.1)	390(55.2)
Moderate risk- Male -0.96 -1.0,Female-0.80- 0.85	47(15.4)	69(17.2)	116(16.4)
High Risk Male - >1.0 , Female > 0.85	13(4.2)	188(46.9)	201(28.4)
Total	306	401	707
Blood Pressure(mm. of Hg.)			
Normal(<120/80)	199(65.0)	283(70.6)	482(68.1)
Pre-Hypertension-120-139 or 80-99	82(26.8)	96(23.9)	178(25.2)
Hypertensive(>140/90)	25(8.2)	22(5.5)	47(6.6)
Total	306	401	707
Blood Sugar level			
Normal(≤ 140 mg/dl)	132(94.9)	172(92.5)	304(93.5)
Pre-diabetes (140-200 mg/dl)	2(1.4)	7(3.8)	9(2.8)
Frank diabetes (> 200 mg/dl)	5(3.6)	7(3.8)	12(3.7)
Total	139	186	325
Cholesterol level			
Normal (< 200 mg/dl)	130(93.5)	171(91.9)	301(95.4)
Borderline (200-239 mg/dl)	4(2.9)	12(6.5)	16(4.9)
High risk (-> 240 mg/dl).	5(3.6)	3(1.6)	8(2.5)
Total	139	186	325

Addiction habits-
Tobacco usage: Total tobacco usage habit, in any form, in both males and females in the rural area was 8.5%. Fewer females, however, indulged in this unhealthy behaviour; and even in those who had tobacco usage habit, use of both oral tobacco and cigarette was 3.3%.

Alcohol usage: 30.8% males and 1% females reported habit of alcohol consumption.

Table-II Age wise distribution of "At Risk Population" for NCDs

Indicator M=306, F=401 N=707	Age group(in years)												
	15-19		19-30		30-45		45-60		>60		Total		
	Male No.(%)	Female No.(%)	Male No.(%)	Female No.(%)	Male No.(%)	Female No.(%)	Male No.(%)	Female No.(%)	Male No.(%)	Female No.(%)	Male No.(%)	Female No.(%)	Grand total No.(%)
BMI>25kg/m²	1(0.33)	3(0.7)	7(2.3)	18(4.5)	15(4.9)	30(7.5)	1(0.3)	16(4.0)	4(1.3)	9(2.3)	29(9.4)	76(19.0)	105(14.8)
W/H ratio (M >0.9%, F>0.80)	0(0.0)	30(7.5)	8(2.6)	79(19.7)	31(10.2)	65(16.2)	10(3.3)	55(13.7)	11(3.6)	28(7.0)	60(19.6)	257(64.1)	317(46.4)
Pre-hypertensive &Hypertensive >120/80	14(4.6)	13(3.3)	22(7.3)	29(7.3)	30(9.9)	28(7.0)	17(5.6)	24(6.0)	24(7.9)	24(6.0)	107(34.9)	118(29.4)	225(31.8)
Blood sugar (>140mg/dl) M=139,F186,N=325	0(0.0)	2(1.1)	2(1.4)	3(1.6)	3(2.2)	2(1.1)	0(0.0)	5(2.7)	2(1.4)	2(1.1)	7(5)	14(7.5)	21(6.5)
Cholesterol >200mg/dl M=139,F186,N=325	1(0.7)	1(0.5)	1(0.7)	1(0.5)	5(3.6)	8(4.3)	0(0.0)	2(1.1)	2(1.4)	3(1.6)	9(6.5)	15(7.4)	24(7.5)
Tobacco chewing	1(.4)	0(0.0)	4(1.4)	1(.3)	21(7.4)	7(1.9)	13(4.6)	2(.5)	9(3.2)	2(.5)	48(15.7)	12(2.9)	60(8.5)
Alcohol	4(1.3)	0(0.0)	21(6.7)	1(.2)	45(14.3)	1(.2)	25(8)	1(.2)	30(9.6)	1(.2)	125(30.8)	4(0.9)	129(18.2)

Table 3: Pearson correlation among risk factors for non communicable diseases in rural population

	BMI(Kg/m²)	WHR	Cholesterol mg/dl	Systolic Blood pressure (mm. of Hg)	Diastolic Blood pressure (mm. of Hg)	Blood sugar(mg./dl)
BMI(Kg/m²)	1	0.07	0.03	-0.02	0.05	0.02
WHR	-	1	0.01	0.03	0.01	-0.1
Cholesterol(mg./dl.)	-	-	1	0.25	0.138**	0.06
Systolic Blood pressure (mm. of Hg)	-	-	-	1	0.64***	-0.02
Diastolic Blood pressure (mm. of Hg)	-	-	-	-	1	-0.06
Blood sugar(mg/dl)	-	-	-	-	-	1

p>0.05 - non significant, *p<0.05 - significant, **p<0.01 - highly significant, ***p<0.001 - very highly significant

Pearson correlation matrix composed of risk factors for non communicable diseases in rural population showed a positive correlation to both BMI and WHR except for SBP which was negatively correlated (r = -0.02). As expected levels of cholesterol correlated significantly to the levels of DBP (p = 0.012). No other correlation coefficient was found to be statistically significant in the study population. (Table 3).

Discussion

The risk factors of today are the diseases of tomorrow. Identifying these risk factors in populations occupies a central place in the surveillance system because of the importance of the lag time between exposure and disease. Therefore, public health strategies have to be driven by the motive of identifying risk factors in populations, and countries need to know the profile of risk factors of populations in different settings.[8] This study was conducted with the same aim of identifying the prevalence of various risk factors in the rural population.

Obesity is an important factor in the pathogenesis of hypertension, dyslipidemias, diabetes mellitus, which, together with hyperinsulinemia, make up the 'deadly quartlet' for the metabolic syndrome [14] . The prevalence of overweight & obesity(BMI -> 25 kg/m was found to be 14.6% in the current study which is comparatively lower than a study done in the rural areas of Tamil Nadu (2003) [16] which reported 17% prevalence. Kutty VR carried out a study in rural Kerala during 1991 using the criteria of BMI (BMI>27) and the prevalence was found to be 5.8%. In this study prevalence of overweight and obesity was 15.9% among elderly population (BMI- >25kg/m^{2}), however a higher prevalence of 54% (criteria: BMI>22.25) was recorded among elderly populations (age group: >=60) during 2000[17] by Hypertension study group in a multi centric study from India and Bangladesh. As per the WHR criteria current study reported 46.4% population is in moderate to high risk group which is lower than the report of ICMR Task force project [18] which reported 52% prevalence of high waist hip ratio in rural Haryana in 1994 using the criteria (WHR: M->0.9, F->0.8) but higher than the prevalence reported by Vikram et al [19] (34%)(WHR: male->0.95, female->0.8) among urban slum dwellers [20] in Delhi during 2000. An epidemiological survey conducted in 1993 in rural Rajasthan reported a prevalence of 21% (WHR: male->0.93) amongst male which is again higher than the reported figure of 19.6% in the current study amongst males. Recent studies done in Delhi [21] during 2002, among adolescents shows a high rate of overweight-obesity (19%) using the criteria (WHR: male->=0.87, female->=0.85). However in the current study no male adolescent (15-19 years) was having WHR more than 0.95 & only 7.5% cases of overweight and obesity were contributed by female adolescents(WHR more than 0.85).Study findings clearly indicative of lower prevalence of obesity and overweight in the study population which can be attributed to the fact that still in majority of families traditional lifestyle is being practiced, however cases of overweight and obesity amongst adolescent indicates that lifestyle changes are gripping the younger generation.

In the present study Blood pressure was measured for all the participants and 6.6% came out to be hypertensive having Blood pressure more than 140/90 mm of Hg. This is lower than the prevalence reported in the ICMR study [19] in 1994 involving 5537 individuals (3050 urban residents and 2487 rural residents) which demonstrated 13 and 10% prevalence of hypertension (Criteria: >=140/90 mm of Hg) among males and females respectively in rural Haryana. However another study carried out in rural areas of Haryana [22] (1994-95) demonstrated 4.5% prevalence of hypertension as per JNC V criteria in rural areas. The important finding which has come out from the study is that 25.2% study participants are in pre-hypertensive category, for whom preventive strategies should be applied so that they do not slip into hypertensive stage.

Random blood sugar level more than 140 mg/dl is being considered as pre-diabetic or at Risk status, in the study population only 2.8% population was found to be in this category and only 3.7% population was in the frank diabetic status(RBS>200mg/dl.) which is lower than the report of ICMR Task force which was carried out involving more than 5000 individuals (3050 urban residents and 2487 rural residents) as part of the ICMR task force project [19], this study demonstrated 3% prevalence of diabetes (criteria: FBS>126mg% or history) in rural Haryana. In 1994, Wander GS reported 5% prevalence of diabetes (criteria: random venous blood glucose >180mg/dl or history) among a rural population in Ludhiana, Punjab [23] .So the study findings are suggestive of lower prevalence of diabetes in this area. Elevated serum total cholesterol (TC) is one of the major risk factors for atherosclerotic CVD. In the current study high risk cholesterol level was found in 7.5% population and prevalence was almost equal amongst male and females.

In the current study the tobacco usage came out to be 8.5% which is far less than the reports from other areas like a study from Gujarat reported tobacco usage habit, in any form was very high in males vs females (44.6% *vs.* 3.1%)[6]. This can be attributed to the fact that in the Indian population mostly men indulge in this unhealthy practice. This can be seen in another study where again the intake of tobacco was higher in males (26.1% *vs.* 1.7%) [24.] . However the habit of alcohol was reported from 30.8% males in the current study and this was only 7.1% in the study conducted in Gujrat[6] .So the study findings indicate that although tobacco usage is low but the alcohol consumption is very high in the population which may be attributed to the fact that in the Garhwal region of the state for generations women is taking care of household chores as well as they work outside for collection of food and fodder from the forest, and most of the time male remain idle and indulge in alcoholism not only during night time but in the day time also. Second reason is that there are very limited opportunities for recreation, so most of the men-folk indulge themselves in this harmful habit.

So the overall findings indicates that prevalence of risk factors in this region is lesser in comparison to other areas of the country however the prevalence of risk factors is higher amongst females in comparison to males except for alcoholism and pre-hypertensive and hypertensive state. One more important factor which has emerge out from the study is that adolescent population has started showing sizeable prevalence of risk factors indicating that younger generation may come under the grip of lifestyle diseases if appropriate and timely measures are not taken.

Study recommends creation of general awareness for adopting healthy lifestyle for the prevention of NCDs. There is need for introducing lifestyle modification strategies especially targeting the "At risk" population in the rural areas with special focus on strategies for weight reduction for women.

Alcoholism is a complex issue which require multipronged approach for it's reduction from Health, Administration and Rural Development Departments.

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