Predicting 10-year Cardiovascular Risk Using WHO/ISH Risk Prediction Chart among Rural Population in Haryana, India

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Abstract

Background: CVD are leading cause of premature Deaths worldwide. Coronary vascular disease (CVD) risk estimation tools are a simple means of early identifying those at high risk in a community. It seems to be a cost-effective strategy for CVD prevention in developing countries. The WHO /ISH risk prediction charts estimates risk of people having CVD's for next ten years, who do not develop coronary heart disease or stroke. **Methods:** A total of 100 subjects between 40 to 70 years of age were included in this cross sectional study. Total 100 families were visited and subjects were selected randomly. CVD risk was calculated by asking information from the subjects regarding Age, gender, smoking status, measuring their blood pressure, history of diabetes. The chart classifies an individual into different risk of having CVD'S that categorized into low (<10%), moderate (10% to <20%), high (20% to <30%), and very high (>30%) risk groups. **Results:** Less than two-third (62%) of population has less than 10% CVD risk, followed by less than one-third (31%) of the population had CVD risk of between 10- to <20% for the next 10 years. Only 6 subjects had 20-<30% of risk followed by 1% CVD risk between 30-<40%.Age, More SBP, Abdominal obesity, smoking, diabetes mellitus and More BMI ($p<0.0001$) were significantly associated with higher CVD risk. **Conclusions:** WHO/ISH Chart should be used by peripheral health workers for early identification of people with a high risk for CVD and provide timely services in reducing the complications and premature deaths related to CVD in India.

Keywords: *Cardiovascular diseases, WHO/ISH chart, Risk prediction*

Introduction

Cardiovascular diseases (CVDs) are classified as diseases of heart and blood vessels. Globally CVDs are the number one cause of death. Most of the people every year die due to CVDs as compared to other causes. In 2016, CVDs responsible for 17.9 million deaths, that makes 31% of global deaths. Out of these deaths, Heart attack and stroke both are the single most cause responsible for 85% deaths. Low and middle income countries are mostly affected by CVD's as maximum of deaths take place in these countries.[1] Most CVDs can be prevented by addressing and creating awareness among community regarding ill effects of behavioral risk factors like tobacco use, unhealthy diet, overweight and obesity, sedentary lifestyle and lack of physical activity. Practical and feasible approaches are needed to prevent people from getting heart attacks and strokes. Early identification and screening of risk factors among individuals in Health and wellness centers and primary health centers would be a potentially benefit step for primary prevention efforts that critically contribute in reducing the burden of CVD in India.

There are various simple CVD tools which help in early identification of population at high risk. The tool should be reliable and cost-effective so that it can be used in low resource setting areas and in developing countries. The WHO /ISH risk prediction chart helps in estimating the risk of developing atherosclerotic disease, stroke and other heart diseases for the next 10 years among people who are free from these disease but having some risk

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factors. Very few studies have been conducted in India to estimate the cardiovascular risk of community using this chart. This study was undertaken to estimate 10 year cardiovascular risk among rural population using WHO/ ISH risk prediction charts.

Aim

The objective of the study was to estimate 10 year risk of cardiovascular diseases among rural population in Haryana by using WHO/ISH risk prediction charts.

Definition of variables

Smokers: All current smokers and those who quit smoking less than 1 year.

Current drinker: Those who consumed alcohol in the year preceding the Survey but ≤5 (for women ≤4) standard drinks on any occasion.

Insufficient physical activity: Insufficient physical activity can be defined as less than 150 minutes moderate activity per week, or less than 60 minutes of vigorous activity per week.

Examples of moderate intensity physical activity includes walking briskly, gardening, dancing, swimming, bicycling, volleyball, scrubbing floors, carrying water from river or well, manual grinding or pounding of cereals, manual washing of clothes.

Vigorous intensity activity includes jogging, running, high impact aerobic exercise, rowing, lifting heavy loads, digging or construction work, football and cycling uphill.

Abdominal obesity: Waist circumference >90 cm in males and > 80 cm in females.

Method

A cross sectional study was conducted in the village Adhoya of Ambala district. Written Informed consent from the study participants was obtained prior to the collection of data.. Total 100 families were included under the study. Eligible respondent was selected from each of the households. More than 40 years of adults were included in the study. In case a household had more than one eligible respondent, one respondent was selected randomly. After three times visit houses found locked were excluded from the study. Clients with coronary heart disease and stroke were excluded from the study. The study participants were interviewed with the help of a structured questionnaire. The tool was divided into three sections that included demographic variables, behavioral risk factors, and physical measurements. The behavioral risk factors were smokers, current drinkers, and insufficient physical activity. Physical measurements included waist circumference, weight, Height, BMI and blood pressure measurement using the standardized techniques.

WHO/ISH CVD risk prediction chart

In present study SEAR (D) risk estimation chart without cholesterol was used to estimate the total 10-year risk of all subjects. Risk was calculated by asking information from subjects regarding Age, gender, current smoker or not, checking mean systolic BP, history of increased blood sugar. The chart categories an individual into different groups according to risk that includes low (<10%), moderate (10% to <20%), high (20% to <30%), and very high (>30%) risk.

SPSS software package version 19.0 was used for entering and analyzing of data. To find the association between the risk factors (alcohol use, physical inactivity, and abdominal obesity, smoking, BMI) and cardiovascular risk Chi-square test was performe.

Results

Table 1: Frequency and percentage distribution in terms of sample characteristics

N=100

Variables	f (%)
1. Age in years	
40-49	54 (54)
50-59	20 (20)
60-69	26(26)
2. Gender	
Male	25 (25)
Female	75 (75)
3. Level of Education	
Non-Formal education	33 (33)
Primary School completed	19 (19)
Middle school completed	8 (8)
High school completed	19 (19)
Degree/diploma	21 (21)
4. Socio-economic status*	
Upper class	20 (20)
Upper middle class	21 (21)
Middle class	23 (23)
Lower middle class	19 (19)
Lower class	17 (17)
5. Religion	
Hindu	57 (57)
Muslim	12 (12)
Sikh	29 (29)
Christian	02 (02)
6. Systolic BP (mm of Hg)	
Less than 120	29 (29)
120-129	47 (47)
130-139	17 (17)
140-160	07 (07)
7. Smoking	
Yes	10 (10)
No	90 (90)
8. Diabetes Mellitus	
Yes	12 (12)
No	88 (88)
9. Alcohol Use	
Never	82 (82)
Current Drinker	18 (18)
10. BMI (Kg/m2)	

Cont... **Table 1: Frequency and percentage distribution in terms of sample characteristics**

N=100

Underweight	07 (07)
Normal	42 (42)
Overweight	31 (31)
Obese	20 (20)
11. Diet	
Vegetarian	76 (76)
Non-vegetarian	24 (24)
12. Physical Activity	
Yes	31 (31)
No	69 (69)
13. Abdominal Obesity	
Yes	48 (48)
No	52 (52)

*Modified B.G Prasad scale

Table 1 shows a total of 100 subjects between 40 to 70 years of age were included in the study. More than half (54%) of the subjects were in the age group of 40-49 years. Majority of the subjects (75%) were females. 33% of subjects had no formal education followed by 21% subjects with Degree/diploma (21%).

Less than one fourth (23%) of subjects belonged to the middle class followed by upper middle class (21%). More than half (57%) of the subjects were Hindu. Less than half (47%) of the subjects had SBP in between were 120-129 mm of Hg. Only 17% of respondents had Systolic Bp between 130-139 mm of Hg followed by 7% between 140-160 mm of Hg.

10% of males were current smokers and 18% were current drinkers. On the other hand all the female respondents were lifetime abstainers. Most of the subjects (88%) were non-Diabetic. Only12 % of subjects had Diabetes and was on regular treatment. In terms of Body Mass Index (BMI) Less than half (42%) had normal BMI, less than one third (31%) of subjects were overweight and 20% of subjects were obese. Majority (76%) of subjects was vegetarian and one-fourth (24%) were non- vegetarian. More than two-third (67%) of subjects were engaged in some kind of physical activities. Less than half (48%) of the population has abdominal obesity.

Figure 1 shows Less than Two-third (62%) of subjects has less than 10% CVD risk, followed by less than one-third (31%) of the subjects has CVD risk of between 10- to <20% for the next 10 years. Only 6 subjects had 20-<30% of risk followed by 1% CVD risk between 30-<40%.

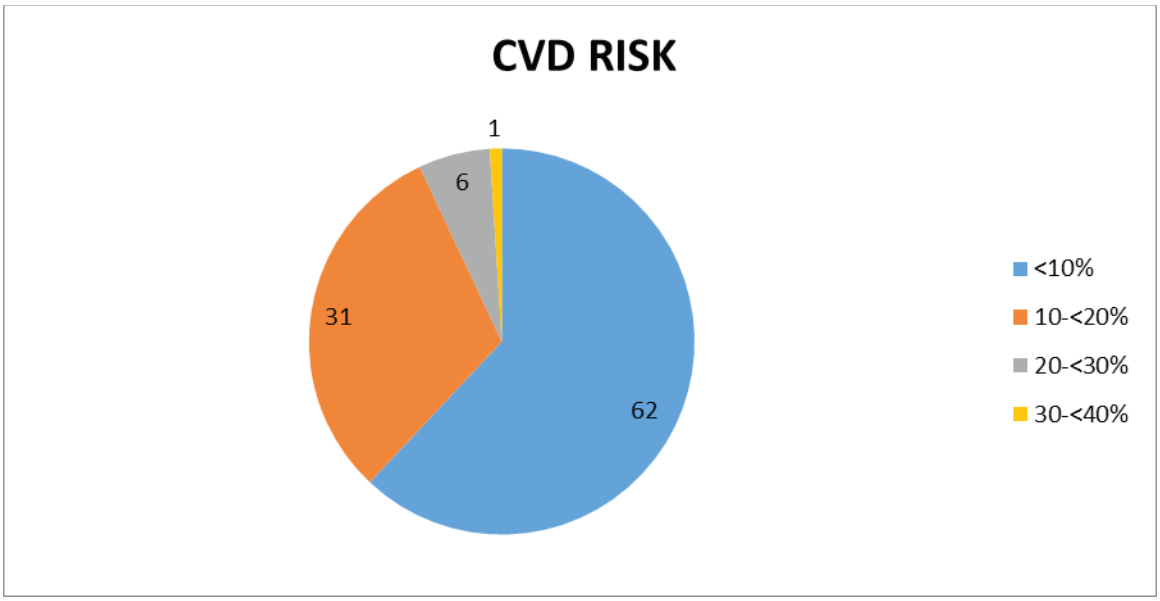

Figure 1: Pie chart showing CVD risk among study participants

Table 2: Chi-square value showing association of CVD with selected variables

N=100

Variable	CVD Risk		p
1.Age in Years	<10% n=62	>10% n-38	
40-49	48	06	<0.0001
50-59	12	08	
60-69	02	24	
2.Gender			
Male	13	12	0.23
Female	49	26	
3.Socio-economic status			
Upper class	12	08	0.50
Upper middle class	15	06	
Middle class	11	12	
Lower middle class	12	07	
Lower class	12	05	
4.Systolic BP (mm of Hg)			
Less than 120	25	04	< 0.0001
120-129	29	18	
130-139	07	10	
140-160	01	06	
5.Smoking			
Yes	01	09	<0.0001
No	61	29	
6. Diabetes Mellitus			
Yes	1	11	<0.0001
No	61	27	
7.Alcohol Use			

Cont... **Table 2: Chi-square value showing association of CVD with selected variables**

N=100

Never	57	25	<0.0001
Current Drinker	05	13	
8.BMI (Kg/m2)			
Underweight	05	02	<0.0001
Normal	33	09	
Overweight	20	11	
Obese	04	16	
9.Diet			
Vegetarian	59	17	1.0
Non-vegetarian	03	21	
10.Physical Activity			
Yes	08	23	<0.0001
No	54	15	
11. Abdominal Obesity			
Yes	21	27	<0.0001
No	41	11	

Table 2 shows that the CVD risk was found to be significantly associated with Age, SBP, smoking, diabetes mellitus, alcohol consumption, BMI, Physical activity, Abdominal obesity (p=<0.0001).

Discussion

With the increase in the burden of Non-communicable diseases, CVD being a leading cause of premature death. Prevention of CVD is an essential component in reducing overall mortality related to NCDs. Detecting risk factors contributing towards NCDs at the earliest along with predicting next 10 years of CVD risk helps in preventing any unexpected outcome in the future. In present study, less than one-third (31%) of the subjects has moderate risk for next 10 years. A study conducted in Salem (Premanandh K, Shankar R (2018)) revealed that most of subjects had low CVD risk.[4] A study was conducted in Malaysia (2013) with a cross-sectional design. Total 196 subjects (aged 40-70 years) were selected who was attending outpatient clinic, USM hospital. Results of study showed that majority of patients showed <10% CVD risk.[5] A study conducted in three countries of Asia (Cambodia, Malaysia and Mongolia) on adults of age 40-64 years using data from national STEPS survey. It was found that majority of people were on developing CVD risk of <10% in next 10 years. In Mongolia (89.6%) to 94.4% in Malaysia and 97% in Cambodia.[6]

In the present study there was significant relationship was seen between age and risk of CVD. The results was similar with the findings of Dhungana RR et al which was conducted to assess the Risk of CVD among adults in Kathmandu, Nepal.[7] The results was also consistent with the results of a study carried out in rural areas of north India by Bansal P et al (2016).[8]

The present study identified high blood sugar and high systolic Blood pressure as strong foretell of CVD risk. This result was similar to the findings of a study carried out in rural Nepal that concluded Increase blood pressure and presence of diabetes mellitus are the strong risk factors for the development of CVD.[7] A study done in 2013 by Norhayati et al identified diabetes and hypertension as a major factor in contributing towards cardiovascular diseases.[5] The results was also similar with the results of a study carried out in rural areas of north India by Bansal P et al (2016).[8]

Study result showed abdominal obesity had a higher cardiovascular risk compared with normal individuals, and was statistically significant (p=0.0001). Waist circumference (WC) used as a measure of central

obesity. It is simple to measure with very few articles and considered as more practical. In present study Alcohol consumption was also a strong risk factor associated with CVD. A cross-sectional study in Salem (Premanandh K, Shankar R (2018)) also showed that abdominal obesity and alcohol consumption were significantly associated with higher CVD risk.[4] A study with community based approach and cross-sectional design was carried out in rural areas of Mysuru concluded that High BMI, abdominal obesity, smoking and alcohol is significantly related to Increasing the risk of CVD.[9]

Conclusion and Recommendation

WHO/ISH CVD risk charts which are simple and colour coded chart can be used as a tool for early screening of CVD's among high risk group especially in low-socio-economic countries by the peripheral health workers. This can further helps the Governments in planning and implementation of strategies and policies among identified high risk population which can prevent further catastrophe of cardiovascular diseases.

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