Pandit Vinodh Bandela et al /J. Pharm. Sci. & Res. Vol. 8(5), 2016, 338-342

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

Assessment of Cardiovascluar Risk of Rural Populaiton in Kurnool District Using WHO/ISH Multivariable Risk Prediction Algorithm.

Pandit Vinodh Bandela[1*]
Research Scholar, Department of Biochemistry,
BLDEU'S, Shri B.M. Patil Medical College, Hospital and Research Centre, Vijayapur, Karnataka

Dr. Nilima N Dongre[2]
Associate Professor, Department of Biochemistry,
BLDEU'S, Shri B.M. Patil Medical College, Hospital and Research Centre, Vijayapur, Karnataka

Dr. Jeevan.G. Ambekar [3]
Professor, Department of Biochemistry, BLDEU'S, Shri B.M. Patil Medical College, Vijayapur, Karnataka

Dr. K. Durga Prasad [4]
Professor, Department of Biochemistry, Santhiram Medical College, Nandyal, Andhra Pradesh

Abstract:

Background: The Indian subcontinent is undergoing epidemiological transition as non communicable diseases like type 2 diabetes mellitus and cardiovascular diseases are becoming the leading cause of morbidity and mortality. This increased prevalence has been ascribed to the rapid changes in the demographic, nutritional as well as the socio economic factors i.e., transition phase. World Health Organization (WHO) estimates that with 19.4 million people with diabetes in India in 1995, the number is projected to increase to 80 million by the year 2030. Establishment of scientific data on predominance of CVD risk factors that will reflect a population can be helpful to implement or formulating prevention strategies in order to decrease or prevent the mortality. There is no published data on multivariable risk prediction for cardiovascular disease from rural population of Kurnool district, Andhra Pradesh.

Aims and objective: To determine the cardiovascular risk profile and fatal and non fatal cardiovascular in rural population of Kurnool district

Materials and Methods: This is a cross sectional study done among total 344 [male n=205; female n=139] adults aged between 20-60 years. The assessment of CVD risk profile of participants was done using WHO/ International Society of Hypertension (ISH) CVD risk prediction algorithm.

Results: The study has revealed that among this population; 69.76% were pre-hypertension, 27.61% had hypertension; 14.24% found to be pre-diabetes 4.36% were having diabetes; 57.84% showed overweight/obesity; 83.33% has no physical inactivity; 27.03% alcoholism; and 23.83% smoking. 36.62% subjects were with 2 or more risk factors; 26.74% participants are without any physiological or behavioral CVD risk factors. 93.84% subjects were at <10%; 5.48% were at 10-30% and only 0.69% more than 30% CVD risk. Modifiable risk factors were high among this population. Older age, physical inactivity, smoking, alcohol consumption were associated with high risk of CVD.

Conclusion: The prevalence of cardiovascular risk factors and fatal and non fatal CVD risk is high in this rural population. This scenario alarming the need to strict implementation of prevention strategies that could create awareness on life style modifications to reduce CVD risk of this population.

Keywords: Cardiovascular risk (CVD); prevalence; risk factors; rural population; World Health Organization /International Society of Hypertension WHO/ISH;

INTRODUCTION:

According to World Health Report 2002, cardiovascular diseases (CVDs) will be the largest cause of death and disability by 2020 in India. In 2020 AD, 2.6 million Indians are predicted to die due to coronary heart disease which constitutes 54.1 % of all CVD deaths. Nearly half of these deaths are likely to occur in young and middle aged individuals (30-69 years). Several cross-sectional studies have confirmed that hypertension, dyslipidemia, diabetes, overweight, obesity, physical inactivity and tobacco use are highly prevalent CVD risk factors in Indians.[1] The exact etiology for predisposition to CVD in Indians still a debate. Increased health care costs make it difficult to identify or diagnose the individuals with CVD risk at an early stage eventually most of them were left un-diagnosed. It is very essential to implement primary health care interventions and public health measure targeting diet, lifestyles and environment, in order to minimize or prevent the risk of CVD. It requires a nationally representative data collected through standardized techniques.

The current study designed with an aim to estimate the individual and aggregated risk factors and predict the risk of fatal and non-fatal cardiovascular event among the rural population of Kurnool district using WHO/ISH CVD risk prediction chart. [2].The study is very useful to identify the persons at high CVD risk and to motivate patients to change lifestyle behavior and to take antihypertensive and lipid-lowering drugs when appropriate.

MATERIALS AND METHODS:

This cross-sectional study carried out in rural area of Nandyal, Kurnool district, Andhra Pradesh, during 4-01-2014 to 19-06-2014. Total 344 eligible male and female adults between 20-60 years were screened for CVD risk factors randomly. The study includes a face to face interview using semi structured questionnaire such as demographic details, history of hypertension, diabetes and heart disease, physical activity, smoking and alcohol intake. The subsequent health examination includes anthropometric parameters like body mass index (BMI). BMI was calculated by dividing weight by height squared (kg/m^2); Systolic and Diastolic blood pressure (BP) was measured by using Sphygmomanometer in supine position. Average of two brachial systolic and diastolic blood pressure readings was taken. 5ml fasting blood samples after 12 hours overnight fasting were collected to estimate serum cholesterol (cholesterol oxidase and peroxidase method) and fasting blood glucose level (glucose oxidase and peroxidase method)]

Diagnostic criteria:

Hypertension was diagnosed as per Seventh Report of the Joint National Committee (JNC 7) on Prevention Detection, Evaluation, and Treatment of High Blood Pressure criteria (JNC 7). Normal <120/80; Prehypertension 120-130/80-90; Stage 1 hypertension 140-159/90-99; stage 2 hypertension ≥160 /≥100; Hypertension >140/90 mmHg or past medical history of hypertension

Diabetes Mellitus was diagnosed as per World Health Organization criteria (WHO criteria). The patients were labeled as diabetics who had fasting blood glucose level ≥126 mg/dl or past diabetic history and prediabetes were those having fasting blood glucose level 100-125 mg/dl.

The assessment of CVD risk profile of participants was done by using three different Guidelines 1) Study of individual and aggregated risk cardiovascular risk (Hypertension, diabetes, BMI, inadequate physical activity, smoking and alcohol consumption) 2) Risk profiling using WHO/ International Society of Hypertension (ISH) CVD risk prediction algorithm-D (with serum cholesterol) and 3) Direct risk cardiovascular risk factor (hypertension, diabetes and pre-existing heart disease) assessment.

WHO/ISH risk prediction D chart (with serum cholesterol) can be used for countries of the WHO region of South-East Asia. It can predict the combined myocardial infarction and stroke (fatal and non-fatal) risk in people who do not have established coronary heart disease, stroke or other atherosclerotic disease by gender, age, systolic blood pressure, total cholesterol, smoking status and presence or absence of diabetes mellitus. The risk level is classified as <10%; 10%-20%: 20%-30%; 30%-40%; and >40%. [3]

During the entire study the utmost care was taken according to Helsinki Declaration about patient confidentiality. [4]The study was approved by Institutional Ethical Committee (IEC). Written Informed consent of participants was taken prior to study.

Statistical Analysis:

Prevalence rates were calculated for the risk factors and presented as percentages.

RESULTS:

The screened population baseline characteristic were as follows – all were belongs to below poverty line status, 36.33% of them were illiterate. The mean age of the screened subjects was 37.67±11.5 [males 38.67±11.60; females 36.20±11.41].

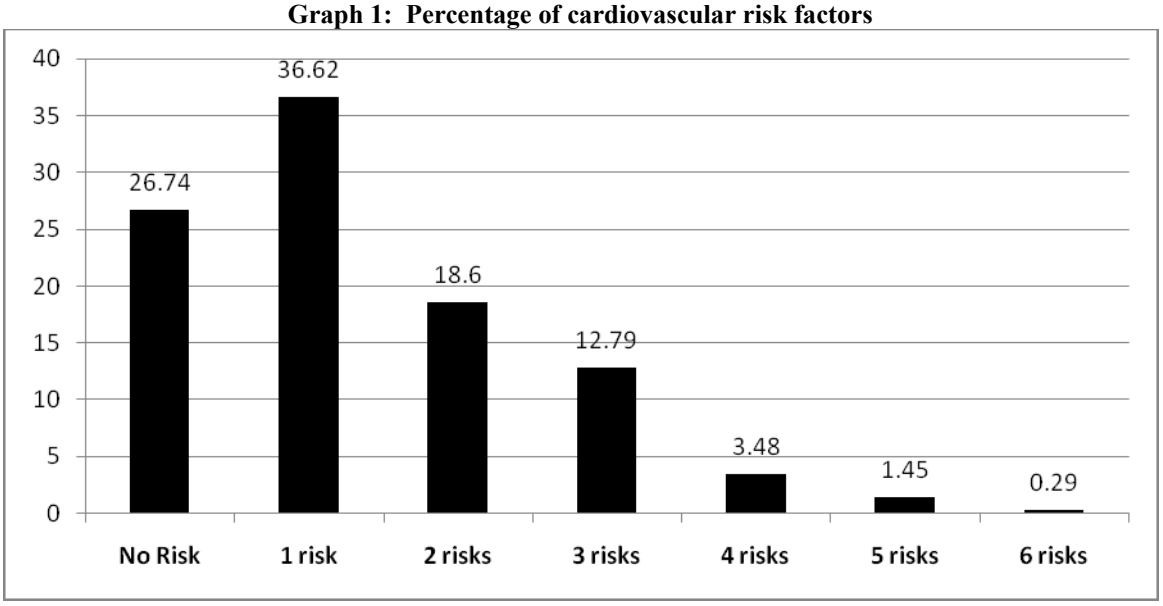
The mean blood pressure is 123.50±6.83/82.51±4.92; fasting blood sugar 90.80±27.81; body mass index (BMI) 25.88±5.05 Table 1 shows the prevalence of CVD risk factors among the study population. Hypertension is the most prevalent risk factor, a total of 27.61% subjects were hypertensive and 69.76% were pre-hypertensive. Majority 297 (83.33%) of the population did not reported (should be report) adequate physical activity.

Graph 1: Delineate the presence of the aggregated CVD risk factors. Classified based on the number of risk factors present either single or in combination. The presence multiple risk factors in an individual lead to greater risk for getting myocardial infarction (MI) or Stroke. 26.74% participants are without any physiological or behavioral CVD risk factors. 36.62% subjects were with 2 or more risk factors. Hypertension, diabetes, risk of BMI, lack of physical activity, smoking, alcohol consumption were taken as CVD risk factors

Table:1 Prevalence of Cardiovascular (CV) risk factors

Variable	Male (N=205) Number (%)	Female (N=139) Number (%)	Total (N=344) Number (%)
Physiological Risk Factors			
Pre hypertension	144 (70.24)	96 (69.06)	240 (69.76)
Hypertension	57 (27.80)	38 (27.33)	95 (27.61)
Stage-I Hypertension	57 (27.80)	38 (27.33)	95 (27.61)
Stage-II Hypertension	Nil	Nil	Nil
Pre diabetes	34 (16.58)	15 (10.79)	49 (14.24)
Diabetes	9 (4.39)	6 (4.31)	15 (4.36)
Behavioural Risk Factors			
Overweight &obese	125 (60.97)	64 (46.04)	199 (57.84)
Alcohol consumption	87 (42.43)	6 (4.31)	93 (27.03)
Smoking	77 (37.56)	5 (3.59)	82 (23.83)

Graph 1: Percentage of cardiovascular risk factors



Graph 2: Depicts risk prediction of screened participants based on WHO/ISH risk prediction chart of fatal or nonfatal (MI or stroke) CVD events. This algorithm was applied only on 146 participants of the total. The risk of CVD events were grouped as low risk (<10%); moderate risk (<10 %-< 30%) and high risk (≥ 30%). It was found that only a negligible portion (0.69%) is with more than 30% risk for MI or stroke. And 5.48% of participants were with moderate risk for CVD events.

Graph: 2 Stratification of subjects according to WHO/ISH CVD risk categories

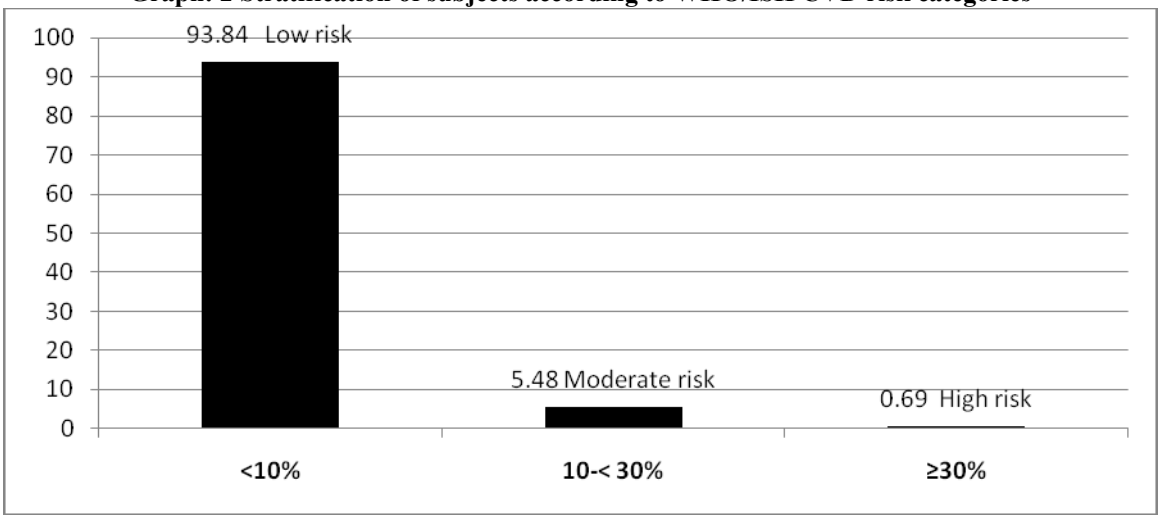


Table 2: Shows the association of variables (age, education and smoking) with WHO risk groups. In univariate analysis of variables advanced age was significantly associated with WHO risk categories.

Table -2 Association of variables with WHO/ISH risk categories

Variables		Low (<10%) No (%)	Moderate (10-30%) No (%)	High (≥30%) No (%)	X^2	P value
Age	40-49	76	0	0	10.41	0.005**
	50-59	61	8	1		
Education	None	72	4	1	1.321	0.8578
	School	56	3	0		
	College	9	1	0		
Smoking	yes	44	5	1	5.032	0.08
	No	93	3	0		

Table 3: explains that in multi-nominal logistic regression analysis, advanced age was significantly associated with moderate risk as compared to high risk.
*significant; R reference category dependent variable

Table:3 Multi-nominal regression analysis of parameters and WHO/ISH risk categories								
Parameter		Low Risk	Moderate Risk			High Risk		
			Odds Ratio	CI	P Value	Odds Ratio	CI	P Value
Age	40-49 R	R	21.146	1.196-373.92	0.0021**	3.732	0.1493-93.300	0.4493
	50-60	R						
Education	Educated	R	0.9028	0.2169-3.7518	1.000	2.710	0.1084-67.753	1.000
	None R	R						
Smoking	No R	R	1.268	0.2899-5.549	0.7142	6.303	0.2155-157.296	0.3261
	Yes	R						

Table 4: Shows the association of variables with direct risk factors (hypertension, diabetes) alone or in combination by multivariate logistic regression analysis. Age >40 years (OR=15.526); gender (OR=12.788); increased BMI (OR=4.467) alcohol consumption (OR=15.375); and family history (OR=17.911) were independently associated direct risk factors.

Table:4 Multivariate regression analysis of direct CVD risk factors and its correlates				
Parameter		Odd Ratio	CI	P value
Age	<40R	15.526	8.543-21.287	0.0001**
	>40			
Gender	Female R	12.788	7.527-21.725	0.0001**
	Male			
Alcohol	No R	15.375	8.962-26.377	0.0001**
	Yes			
Family History	No R	17.911	9.585-33.469	0.0001**
	Yes			
BMI risk	No R	4.467	2.915-6.844	0.0001**
	Yes			

DISCUSSION:

India approximately 25% are cardiovascular-related deaths and would serve as a home to more than 50% of the patients with heart ailments worldwide within next 15 years.[5] Framingham risk score is a widely recognized tool used by clinicians worldwide to calculate cardiovascular risk in an individual and classify them for risk of coronary death or myocardial infarction (MI).[6] The study has estimated CVD risk factors prevalence and myocardial and stroke risk based on WHO/ISH risk prediction chart.[2]

Most of the Indian studies have shown that prevalence of hypertension ranged from 26% - 33%. In accordance the study has identified the prevalence of hypertension was 27.61% with mean blood pressure ranged from 123.50±6.83/82.51±4.92. Anchala R [7] etal has also noted 27.6% prevalence of hypertension among rural population of India. It was also found that Prehypertension was 69.76% highly prevalent among this population; this is very high when compared to other studies of India (20%, 40%; [8, 9] 27.14%. [3]

The first phase of ICMR-INDIAB study has reported 62.4 million diabetes; 77.2 million prediabetes in India, diabetes was reported ranging from 5.3%-13.6%. [10] In our study we noted 4.36% of diabetes and 14.24% prediabetes which is consistent with overall diabetic and pre-diabetic rate of India. Zaman etal [11] noted higher prevalence of diabetes 19.78% among the rural population of Arunachal Pradesh. The mean fasting blood glucose level was noted as 90.80±27.81 which is in normal range.

Our study has shown 57.84% population overweight/obese based on their BMI. Males were highly susceptible 60.97% than females 46.04%. The mean BMI was noted as 25.88±5.0 (Males 26.19±4.94; Females 25.32±5.13 two tail p value 0.1182). Whereas all the other Indian studies have shown high overweight/obesity among females. Koukoulis GN[12] etal noted overweight being more prominent in males (27.8%) than in females (25.6%), the mean BMI was also significantly higher in males (28.2±4.4) than in females (26.9±6.2) among the adults of Central Greece.

This study has also reported higher prevalence of behavioral CVD risk factors among this population. Alcohol consumption is high in both the sex (males 42.43%/females4.31%)compared to smoking (males 37.56%/females 3.59%). Overall 27.03% alcoholism; and 23.83% smoking was reported. According to Global Adults Tobacco Survey (GATS) – 2010, smoking is about 15% in males and 1.90% in females.[13] Ganesh Kumar et al[14] has reported 16.8% alcohol consumption in males and 1.3% in females among the rural population of Tamilnadu. The National health profile survey reported 11%-20% alcohol consumption. [15] In our study alcohol consumption and smoking is high in females compared to other studies.

The current study has recorded 6.17% were at >10% of CVD risk among the age group 40-60 years. The other studies using WHO/ISH prediction chart has recorded 6%; 2.3% and 1.3% >20% chance of developing a cardiovascular event in Mongolia, Malaysia and Cambodia at 40-64 years age group.[16] Nordet P [17] has reported 2.9% with cholesterol; 4.6% without cholesterol ≥20% CVD risks in Cuba at 40-80 years age group. Aswin K [18] reported 3.7% subjects had >10 % risk of developing cardiovascular disease. Gift Norman [3] reported >20% CVD risk among 28.04% the rural population of India at 40-80 years age. The difference may attribute to the age group and sample size taken.

CONCLUSION:

The cardiovascular risk factors such as high central obesity, smoking, alcohol consumption are quite alarming in this rural population. The cardiovascular risk is also correspondingly high. This warrants strategies that would improve awareness and promote healthy life-styles to reduce the risk of CVD in this population.

Study limitations: The screened population was very less in number to generalize the population as a whole. Large multi-centric studies are required to establish more accurate findings. However Sharmini Selvarajah [19] has recommended FRS (Framingham Risk Score) and SCORE (Systemic Coronary Risk Evaluation) models in Asian population, this arises a need to establish a suitable CVD risk model that is applicable to local people setting.

ACKNOWLEDGEMENTS:

We acknowledge the cooperation of the participants in this study. I am very thankful to Dr. Madhavi Latha-Chairperson and all the technical staff of Santhiram Medical College & GH Nandyal.

REFERENCES:

1. World Health Organization, The World Health Report 2002. Geneva: WHO; 2002
2. WHO/ISH model World Health Organization Prevention of cardiovascular disease: guidelines for assessment and management of cardiovascular risk 2007, World Health Organization.
3. Norman G, George CE, Krishnamurthy A, Mukherjee D. Burden of cardiovascular risk factors of a rural population in South India using the WHO multivariable risk prediction algorithm. Int J Med Sci Public Health 2014; 3:764-768.
4. World Medical Association Declaration of Helsinki Ethical Principles for Medical Research involving human subjects. JAMA November 27, 2013; 310:2191-2194.
5. Gupta R, Joshi P, Mohan V, Reddy KS, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. Heart 2008; 94:16-26.
6. Wilson PW, D Agostino RB, Levy D, Belanger AM, Silbershatz H, Kannel WB. Prediction of coronary heart disease using risk factor categories. Circulation 1998; 97:1837-47.
7. Anchala R[1], Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E, Prabhakaran D Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. J Hypertens. 2014; 32(6):1170-7.
8. Gupta R, Deedwania PC, Achari V, Bhansali A, Gupta BK, Gupta A, et al. Normotension, pre-hypertension, and hypertension in urban middle-class subjects in India: prevalence, awareness, treatment, and control. Am J Hypertens 2013; 26(1):83-94.
9. Singh RB, Fedacko J, Pella D, Macejova Z, Ghosh S, de Amit K, et al. Prevalence and risk factors for pre-hypertension and hypertension in five Indian cities. Acta Cardiol 2011; 66(1):29-37.
10. Anjana RM etal. Prevalence of diabetes and pre-diabetes (impaired fasting glucose and /or impaired glucose tolerance) in urban and rural India: phase I results of the Indian Council of Medical research India DIABetes (ICMR-INDIAB) study. Diabetologia.2011 Dec; 54(12):3022-7.
11. Zaman FA et al , Prevalence of diabetes mellitus amongst rural hilly population of north eastern India and its relationship with associated risk factors and related co-morbidities J Nat Sci Biol Med 2014 July 5 (2) 383-8.
12. Koukoulis GN sakka C, Katsaros F Goutou M Tsirona S Tsiapali E, Piterou A, etal High rates of Obesity prevalence in adults living in central Greece: data from the ARGOS study Hormones (Athens) 2010 July-sep ;9(3) 253-62
13. MOHFW (2010) Global Adult Tobacco Survey: fact sheet: India: 2009-2010. International Institute for population sciences, Deonar, Mumbai, India.
14. Ganesh Kumar S, Premarajan KC, Subitha L etal, Prevalence and pattern of Alcohol consumption using alcohol use disorders Identification Test (AUDIT) in rual Tamil Nadu India. J.Clin Diagn Res. 2013 Aug 7(8) 1637-39.
15. National Health Profile 2010- Health status indicators. [Cited 2013 Oct 9]. Available from: http://cbhidghs.nic.in/writereaddata/mainlinkfile/file1012.pdf
16. Otgontuya D Oum S, Buckley BS Bonita R ,Assessment of total cardiovascular risk using WHO /ISH risk prediction charts in three low and middle income countries in Asia, BMC Public Health , 2013;13:539
17. Nordet P; Mendis S , Duenas A Total cardiovascular risk assessment and management using two prediction tools with and without blood cholesterol MEDICC Rev 2013; 15 (4) 36-40.
18. Aswin K Ghorpade AG Kar SS Kumar G. Cardiovascular disease risk factors profiling of group C employees in Jipmer , Puducherry J Fam Med Primary Care 2014;3:255-9.
19. Sharmini Selvarajah etal, Comparision of Framingham risks Score, SCORE and WHO/ISH cardiovascular risk prediction models in an Asian population. International Journal of Cardiology. 2014; 176 (1): 211-218.