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IS THERE ANY DIFFERENCE OF RISK PREDICTION OF MYOCARDIAL INFARCTION AND STROKE AMONG ADULTS OF RURAL AND URBAN POPULATION? A CROSS SECTIONAL STUDY

Community Medicine

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ABSTRACT

Introduction: Cardio vascular disease is one of the major leading causes of death in both developed and developing countries affecting the productive age group. There is a need to evaluate the risk prediction of major cardiovascular events in adult population of rural and urban areas. **Objectives:** 1. To predict the ten year risk of major cardiovascular events using WHO/ISH risk assessment chart among adults aged 40 to 70 years of urban and rural areas of Gadag. 2. To determine the association between risk prediction of major cardiovascular events and socio-demographic factors among adults aged 40 to 70 years of urban and rural areas of Gadag. **Methodology:** A community based cross sectional study was conducted among adults aged 40 to 70 years among 200 adults, 100 from rural and 100 from urban areas. The study subjects were interviewed using predesigned and pretested questionnaire containing information on socio – demographic profile, WHO/ISH risk assessment chart and Blood pressure. **Results:** In the study the risk prediction of myocardial infarction and stroke was less than 10% among majority of study participants (rural = 79%, urban = 84%). **Conclusion:** risk predication was more in rural population compared to urban population and increases with age.

KEYWORDS

Risk prediction, Myocardial Infarction, Stroke, rural and urban adult population.

INTRODUCTION

Cardio vascular disease (CVD) has emerged as modern epidemics affecting different countries at different times. **[1]** It is the number one cause of death in the western world and one of the leading causes of death worldwide **[2].** Globally coronary heart disease (CHD) accounts to 7.2 million deaths and stroke 6.1 million deaths **[3].** In India CHD accounts for 0.8 per 1000 population in urban area and 0.4 per 1000 population in rural area with prevalence of 37 per 1000 population, whereas stroke with prevalence of 1.54 per 1000 population and accounts for 0.6 per 1000 deaths. **[4, 5]**

India is experiencing a rapid health transition with a rising burden of cardio vascular disease causing significant morbidity and mortality. **[1]** It tends to occur at an earlier age with mean age of onset almost a decade earlier compared to the western world with considerable loss in potentially productive years (age 35-64years) of life and affecting their quality of life along with constant apprehension about the future and the treatment is quite costly. **[5, 6]**

Risk factors for Myocardial Infarction and Stroke are age, gender, family history, genetic factors, cigarette smoking, diabetes, hypertension, obesity and stress etc**. [7, 8, 9]** The lifetime risk of atherosclerotic CVD for persons at age 50 years depending on risk factor burden, on an average was estimated to be 52% for men and 39% for women **[10]**. Individual high risk strategy aims at identifying individuals with a higher probability of developing CVD, because of presence of certain major risk factors, so that concerted preventive as well as treatment efforts may be directed to these individuals. **[11]**

The development of "Individual Risk Prediction Charts" by the WHO for various regions of the world is useful for the identification of high risk, which was most likely to benefit from clinical management of risk factors and lifestyle modification. **[6]** Risk scoring moves the focus of treatment from the management of individual risk factors to the best means of reducing an individual's overall risk of disease. It enables the intensity of interventions to be matched to the degree of total risk. The risk of myocardial infarction and stroke can be reduced by 23 – 28 % by intervention of the modifiable risk factors. **[6]** The great strength of the risk prediction approach provides a rational means of making decisions about intervening in a targeted way, thereby making best use of resources available to reduce cardiovascular risk.

The literature available on risk prediction of major cardio vascular events was more in the developed countries with few studies in an Indian setup. Hence a need was felt to carry out the present study to determine the risk prediction of major cardio vascular events in Gadag, Karnataka.

AIMS AND OBJECTIVES:

1. To predict the ten year risk of major cardiovascular events (Myocardial Infarction and Stroke) using WHO/ISH risk assessment chart among adults aged 40 to 70 years of urban and rural areas of Gadag.
2. To determine the association between risk prediction of major cardiovascular events and socio-demographic factors among adults aged 40 to 70 years of urban and rural areas of Gadag.

METHODOLOGY:

A community based cross sectional study was conducted among adults aged 40 to 70 years from rural (Mallasamudra area) & Urban (Gadag city) areas of Gadag Taluk, North Karnataka for 3 months.

Sample size (n) was calculated using the formula

$n = 4pq/l^2$

Where p=50% [**1**], q=100-P, l=15%

n= 176.

We have included Non responsive rate=10% ≈18,

n =176+18=194 ≈200.

In sample size of 200 adults, 100 from rural and 100 from urban, who gave consent to participate were selected by purposive sampling. People with life threatening conditions and bedridden patients were excluded from the study. The Institutional Ethics Committee approval was obtained from the Gadag Institute of Medical Sciences, Gadag. After taking informed consent in local Kannada language and the study subjects were interviewed using predesigned and pretested questionnaire containing information on socio – demographic profile and WHO/ISH risk assessment chart. Height, weight and Blood pressure were recorded. Risk prediction for CHD was done by using WHO/ISH risk assessment chart**[12]**.

Who/ish Risk Prediction Chart [12]:

The charts indicate 10-year risk of a fatal or non-fatal major cardiovascular event (myocardial infarction or stroke) according to age, sex, blood pressure, smoking status, total blood cholesterol and presence or absence of diabetes mellitus for 14 WHO epidemiological sub-regions. Each chart can only be used in countries of the specific WHO epidemiological sub-region, e.g. Two charts for South East Asia sub-region are SEAR B and SEAR D. **SEAR B** can only be used in Indonesia, Sri Lanka and Thailand whereas **SEAR D** for Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Maldives, Myanmar and Nepal. The chart stratifies an individual into <10%, 10% to <20%, 20% to <30%, 30% to <40% and >40% risk levels. (**Figure 1**)

Statistical Analysis:

Data was coded and entered in Microsoft excel sheet. Descriptive statistics will be analyzed for frequency and proportions. Association between socio-demographic factors with risk prediction for CHD was calculated using chi-square test by SPSS statistical software trial

(version 16). Two-sided 'p' value of ≤0.05 was considered as statistically significant.

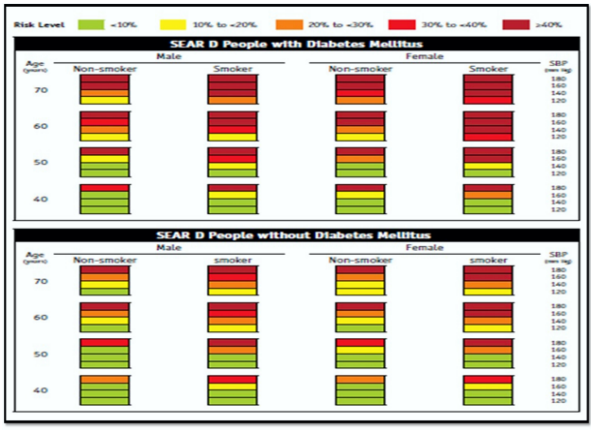

Figure 1: WHO/ISH Risk prediction chart[12]

RESULTS

In the study the mean age of study subjects was 52.51 ± 8.093. Hypertension stage1 systolic blood pressure was more in rural area compared to urban area whereas pre-hypertension stage systolic blood pressure was more in urban area than in rural area. ($\chi2$=8.728, df=3, p=0.033) which is depicted in **Table 1**

Table no 1: Distribution of study population according to Systolic and Diastolic Blood Pressure

Category	Systolic Blood Pressure			Diastolic Blood Pressure		
	Rural	Urban	p value	Rural	Urban	p value
Normal	15	13	$\chi2$=8.728 df= 3 p=0.033	56	50	$\chi2$ =2.642 df- 3 p=0.450
Pre – Hypertension	59	76		33	42	
Hypertension 1	25	11		10	8	
Hypertension 2	1	0		1	0	
Total	100	100		100	100	

Risk prediction of myocardial infarction and stroke according to WHO/ISH Risk prediction chart SEAR D was less than 10% among majority of study participants (rural = 79%, urban = 84%) and risk prediction 10% to <20% was more in rural area than in urban area. **(Table 2)**

Table no 2: Distribution of study population according to WHO /ISH Risk Prediction Chart

Risk Prediction	Rural	Urban	Total (%)	p value
(<10 %)	79	84	163 (81.5)	$\chi2$ =1.796 df-3 p=0.616
10% -< 20%	15	9	24 (12.0)	
20%-<30%	3	4	7 (3.5)	
30% - <40%	3	3	6 (3.0)	
Total	100	100	200	

Risk prediction of myocardial infarction and stroke among all (n=102) the study subjects belonging to age group 40-50 years was less than 10% followed by age group 51-60years (n=50) and age group 61-70years (n=11). As age increases the risk prediction of myocardial infarction and stroke increases and was more in males than females as depicted in **Table 3.** Risk estimates was more in study subjects belonging to nuclear family and in study subjects belonging to lower middle class according to modified B. G. Prasad classification. **(Table 3)**

Table no 3: Distribution of study population according to association between Risk Prediction and Socio-demographic factors.

Socio-demographic factors			Risk Prediction					
	Category	<10%	10-<20%	20-<30%	30-<40%	Total	%	p value
Age (year)	40-50	102	0	0	0	102	51	$\chi2$ = 90.282 df- 6 p= 0.00
	51-60	50	10	1	1	62	31	
	61-70	11	14	6	5	36	18	
	Total	163	24	7	6	200	100	
Gender	Male	98	16	5	6	125	62.5	$\chi2$=4.559 Df- 6 p= 0.601
	Female	65	8	2	0	75	37.5	
	Total	163	24	7	6	200	100	
Type of family	Nuclear	138	14	5	2	159	79.5	$\chi2$ =24.772 df- 9 p= 0.003
	Joint	23	8	2	4	37	18.5	
	Three generation	1	2	0	0	3	1.5	
	Broken	1	0	0	0	1	0.5	
	Total	163	24	7	6	200	100	
Socioeconomic status	Upper class	16	1	2	1	20	10	$\chi2$ =9.519 df -12 p= 0.658
	Upper middle class	42	6	2	1	51	25.5	
	Lower middle class	63	9	2	2	76	38	
	Upper lower class	36	8	1	1	46	23	
	Lower class	6	0	0	1	7	3.5	
	Total	163	24	7	6	200	100	

DISCUSSION

A cross sectional study was conducted in North Karnataka to assess the risk prediction of Myocardial Infarction and Stroke among adults. It was found from the current study that, there were 135 participants with systolic blood pressure in the pre-hypertension stage and 75 participants with diastolic blood pressure in the stage. Likewise, numbers reduced further in case of increasing grades of hypertension. A study done by Alam MN, Ekka A, Khatoon S[13] in a tertiary care hospital in Northern India in the period of 2017-2018 showed that, majority of the participants were with blood pressure readings in the normal state i.e., n = 269. 9 participants were in the hypertension grade II, 81 in the pre hypertension stage which was found to be similar to the current study findings. Another study done in Haryana by Kaur M[14] in the period of 2009 showed that, there were 1200 study participants with 600 each in the urban and rural areas. Here too majority (n = 462) of the participants had normal blood pressure readings in the rural areas and similarly, 318 urban participants had normal blood pressure readings. It was noted that, the urban participants had comparatively higher blood pressure readings than rural participants wherein, 84 rural and 122 urban participants were in pre-hypertensive stage followed by 52 rural and 144 urban participants were in the stage I of the hypertension and similarly in the stage II hypertension was seen (2 rural and 16 urban) which was relatively similar to the current study findings suggesting that urban participants were stressed comparatively on the higher side than the rural participants.

In the current study, there were 163 participants in the <10% risk prediction from WHO/ISH risk prediction chart and 24 in the 10-20%, 7 in the 20-30% and 6 in the 30-40% risks. Relatively there was lesser risk in the rural areas than urban areas wherein, 15 rural and 9 urban participants had 10-20% risk, 3 rural and 4 urban had 20-30% risk and 3 each had 30-40% risk according to WHO/ISH risk prediction chart. In a study done by Jaswal P, Kaur P and Sarin J[15] in Haryana among rural population found that, among 100 study participants 62 had <10% risk prediction, 31 had 10-20% risk, 6 had 20-30% and 1 had 30-40% risk prediction according to the WHO/ISH risk prediction chart. Another study was done by Norman G et al[16] as part of CVD prevention project in Devanahalli taluk of Bangalore rural in Karnataka in the period of 2014. It showed that, 451 participants had <10% risk, 196 had 10-30% risk prediction and 116 had 30% and above risk prediction which was suggestive that risk was lower in the rural population. A study done by Amoghashree NC et al[17], in urban population of Mysuru in the period of 2019 found that, there were 250 study participants. 64 participants had 40% and above risk, 45 had 10-20% risk, 58 had 20-30% risk, 20 had 30-40% risk prediction according to WHO/ISH risk prediction chart suggesting that the risk prediction was rising among the study participants which was contradictory to the current study findings. Another study was done in urban area of Bangladesh by Ahmed MSAM, Moniruzzaman M, Chowdhury S and Banik PC[18] to predict the risk according to WHO/ISH risk prediction chart. There were 150 study participants, and it was found that, 122 participants had <10% risk, followed by 23 having 10-20% risk, 5 with 20% and above

risk suggesting although majority of the population had low risk there was relatively high risk among the urban participants which was similar to the current study.

Study Population and association between risk prediction and socio-demographic factors

There were total of 200 participants in the current study, 163 participants had <10% of risk, 24 participants had from 10% up to 20% of risk for MI whereas; 13, participants had >20% risk prediction for MI and Stroke and it was found to be statistically significant (p = 0.00). It was found that, 102 participants in the age group of 40-50 years had <10% risk prediction from WHO/ISH risk prediction chart, and it progressed to 10-20% and above in the progressive ageing population as 10 participants were in 10-20% risk prediction and 2 participants had >20% risk prediction in the 51-60 years age group. In the 61-70 years age group, it was understood that, 11 participants had >20% risk prediction and only 11 participants had <10% risk prediction and thus it was found that with ageing there is increase in the risk prediction for MI/Stroke and it was found to be statistically significant (p = 0.00). A similar study was done in rural area of North India by Bansal P et al[19], in the period of 2010. It was found from the study that, there were 133 participants. Among them, 74 participants had <10% risk prediction and 59 participants had ≥10% risk prediction according to WHO/ISK CVD risk prediction chart and it was found to be significant (p = 0.00). It was found that, with the advancing age there was increase in the risk prediction for MI/Stroke. 40-49 years age group showed 48 participants with <10% risk prediction and only 1 participant had ≥10% risk prediction. Whereas, 32 participants in the age group of 60-69 years had ≥10% risk prediction and only 8 participants had <10% risk prediction and it was found to be statistically significant (p = 0.00). The current study assessed the association of gender with risk prediction and it did not any kind of significant difference. Wherein, there were, 98 males had <10% risk prediction, 16 participants were having 10-20% risk prediction and 11 with ≥20% risk prediction. Similarly, females had risk prediction as 65 in <10% risk prediction, 8 in 10-20% risk prediction and 2 participants having ≥20% risk prediction. A similar result was found from a study done by Bansal P et al[19], in rural North India in the period of 2010. It showed that, 24 male participants each were in <10% risk prediction and ≥10% risk prediction and near similar were females having 50 participants in <10% risk prediction and 35 participants with ≥10% risk prediction. A similar study was done in Varanasi, India by Shankar H, Kumar D, Singh P and Keshan P[20] in the period of 2015. It was found from the study that among 155 participants with 71 males and 85 females there were 49 males and 64 females with <10% risk prediction. Likewise, the number of cases came down with progression of risk prediction i.e., 7 males and 1 female with 20-30% risk prediction and only 3 each of males and females had risk prediction of ≥30%.

It was found from the study that, there were 16 participants in the upper class followed by 42 in the upper middle class and 63 in the lower middle class; all they come under <10% of risk prediction. Whereas, 1 participants each had 10-20%, and >30% risk prediction in the upper class. However, there were very few participants in the >30% risk prediction margin and it did not any significant difference. A similar study done in Haryana by Jaswal P, Kaur P and Sarin J[15] in the period of 2021 found that, among 100 participants, 12 each participants from upper class, lower middle class and lower class had <10% risk prediction and comparatively on the contrary 8 participants in the upper class, 7 from lower middle and 5 from lower class had >10% risk prediction suggesting no significant difference as found in the current study.

CONCLUSION AND RECOMMENDATIONS

The study concluded that risk predication of 10% to less than 20% was 12% followed by 20% to less than 30% was 3.5% and 30% to less than 40% was 3% respectively, which was more in rural population compared to urban population. Risk predication increases with age, more in male population, nuclear family, lower middle class and people with obesity. Multi-centric studies should be conducted to identify the risk at the earliest by screening. Health education is recommended to motivate the people for better lifestyle changes.

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