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RESEARCH PAPER

EVALUATION OF RISK FACTORS AND RISK VARIATIONS AMONG CARDIOVASCULAR AND NON CARDIOVASCULAR DISEASE PATIENTS.

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ABSTRACT

BACKGROUND AND OBJECTIVES: Heart diseases are one of the leading causes for death in Indian population but, majority is due to lack of awareness and proper prediction. Main objective is to evaluate risk factors and risk prediction variations among cardiovascular and non-cardiovascular disease patients.

METHODOLOGY: It was a prospective observational study conducted in a multi-specialty hospital for a period of 6 months. A total of 300 cases were considered for study and all the cases have met the inclusion and exclusion criteria of study. Required data for the study is collected from the patient medical records and answers for the questioners were opted directly by asking patient under the presence of their attenders. Risk prediction chart and calculators are used for determination of risk in patients. All the data is collected over the period of 4 months and 2 months for the analysis of the data.

RESULTS: Total 300 patient's prescriptions were studied and analyzed in a super specialty hospital during the period of six months. Among 300 patients, 55% of patients are admitted in the cardiology department and 45% patients are from various departments. During the study period there is a positive response from the patients and 90% of the patients who are admitted in the cardiology department do have high grade stress then that of the non-cardiovascular disease patients.

CONCLUSION: From the stats it was found that male is having higher risker of cardiovascular disease than that of the females. FRS and WHO risk values are higher in the people who are having the social habits like smoking, drinking and both. We have observed that patient with the less than age 40-45 years are mostly <10% of risk in both the predictive tools irrespective of their social habits. Most of the research studies in India based on the FRS and WHO/ISH.

KEY WORDS : Cardiovascular Diseases, Stress questioneer, WHO-ISH, FRS.

INTRODUCTION

Cardiovascular disease epidemiological transition graph in India has drastically changed from past 2 decades. Cardiovascular diseases are one of the leading mortality cause in Indian population. When fatality data of various counties is compared among them Indian population stood top. In western population 25% of the population with the age above 75 dies with cardiovascular disease where as in the India the rate is 52%. Reasons for the high propensity to develop CVD, the high case fatality and high premature mortality include biological mechanisms, social determinants, and their interactions. As per world health organization diseases are classified as communicable diseases and non-communicable diseases. At tyro of the 18th century rate of the communicable disease are high but from the intermediate of the 19 th century scenario has totally changed the rate of non-communicable disease has increased across the world, it may be due to advancements in modern era especially in science field which also shown few negative effects on humans health.1 Cardiovascular diseases comes under the non-communicable disease. In a recent survey which has conducted at the start of the 20th century has illustrates that Non-Communicable disease are at high rate in the incidence of deaths it is because of the cardiovascular diseases which occupies nearly half of the ratio of deaths in non-cardiovascular disease.[2]

Causes of Heart Diseases:

Understanding of the heart disease is not only enough but in order to control the heart disease better to focus on the factors that are provoking cardiovascular diseases and preventing them or controlling them is also important criteria. For easy understanding risk factors are classifieds into two major categories they are modifiable factors and non-modifiable factors. Modifiable factors are those which can be controlled whereas the non-modifiable factors are those which cannot be controlled. Examples of the modifiable factors are over-consumption of alcohol, Hyperlipidemia, Hypertension, Diabetes, Smoking, Physical inactivity, Depression, mental stress and etc. Non-modifiable factors includes age, ethnicity, gender, genetic disposition and etc.[3,4]

Identification of cardiovascular disease is not an easy task in earlier days but due to the development of the medical science has lead to the lots of changes in the medical sciences. Identification of the disease can be done based on the condition of the patient and selection of the appropriate identifying tool. For diagnosis of the cardiovascular disease Echocardiogram, 2D echo, Treadmill test, Angiogram, Cardiac computerized tomography (CT) scan, Cardiac magnetic resonance imaging (MRI) are the tests that helps in the identifying the disease condition.

Risk Prediction:

In order to identify the cardiovascular disease identifying the impact

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of the triggering risk factors is important task, Out of curiosity to find the risk few health organization has developed risk scale or risk score based on the conditions like systolic heart pressure, blood lipid value, body mass index. One of the best and oldest prediction scales is Framingham risk scale. ASCVD, WHO/ISH and etc. are also used in present scenario. The ultimate goal of this is to find the risk and control the main risk.[5]

Framingham scale was prepared and started research work at a town named Framingham in the year 1948. Project was initiated by National Heart Institute, which was newly established in 1948 (renamed the National Heart, Lung, and Blood Institute [NHLBI] in 1976). The result of the project has shown a positive effect and helped in the 10 year chance of getting cardiovascular diseases among the people. Risk ranges are divided into 4 section they are <10%, 10%-20%, 20%-30% and >=30%. Moreover, Framingham researchers found that an unhealthy diet, sedentary lifestyle, and weight gain increase the risk of cardiovascular disease and influence the progression and severity of cardiovascular problems. They also proved that smokers are at increased risk of myocardial infarction (heart attack). On the other hand, Smoking cessation was found to halve the risk of myocardial infarction. Framingham 10 year cardiovascular disease prediction can be calculated by using the interactive color charts and excel sheet with specified formula.

By seeing the results of the Framingham risk prediction world health organization also started color based charts, where they have classified the charts into the various types based on the ethnicity of the population and standards of living. In India, interventions for CVD and associated risk factors like diabetes are through the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke (NPCDCS) that prescribes the WHO/ISH South East Asian Region -D (SEAR-D) charts for CVD risk assessment. SEAR-D category countries are Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Maldives, Myanmar, and Nepal. One of the advantage of the WHO/ISH charts are they available in two versions: the low information model (LI) requires age, gender, systolic blood pressure, smoking status and presence of diabetes mellitus to predict 10-year CVD risk; the high information (HI) model uses all the LI model predictors as well as total cholesterol (TC) for risk prediction. In WHO/ISH 10 year risk model is divided into 5 levels they are less than 10%; 10 to <20%; 20 to <30%; 30 to <40%; and ≥ 40%. But the information regarding the accuracy and or validation is limited available.6, 7

Role of stress in cardiovascular disease

Stress is the body's natural defense against predators and danger. It flushes the body with hormones to prepare systems to evade or confront danger. This is known as the "fight-or-flight" mechanism. The stress response is the body's way of protecting. When working properly, it helps in staying focused, energetic, and alert. In emergency situations, stress can save lives by giving extra strength to defend from that situation. For example, if a person is walking in the forest on a sunny day and suddenly he realized that he is facing a hungry grizzly bear. A grizzly bear is a REAL stressor. Stress hormones, such as cortisol, adrenaline, and noradrenalin are released into our bloodstream. Heart rate and blood pressure increases. His breathing becomes faster to meet the increased oxygen demands of muscles and organs. All senses are primed, all muscles are tensed, and he is ready to either fight or flee to save his life. Stress affects one's behavior and factors that increase heart disease risk: high blood pressure and cholesterol levels, smoking, physical activity, and overeating. Some people may choose to drink too much alcohol or smoke cigarettes to "manage" their chronic stress, however, these habits can increase blood pressure and will damage artery walls leads to cardiovascular disease. [8]

In order to find the stress in patients who have admitted into the hospital for various complaints, we developed a stress questionnaire to find the patient psychological stress over past few months and admitted in the hospital for various reasons.

Stress questionnaire contains 5 questions all of them contains 3 options of answers based on the selected answers stress score will be obtained option 'A' will be given 2 points, 'B' will be given 4 points and 'C' will be given 6 points. Based on points they obtained stress range will be obtained. Stress ranges are 10-19 points is considered as the high level of stress, 20-25 points are considered as the moderate level of stress and 26-30 points are considered as low-level stress.

The main goal of this stress questionnaire is to obtain the stress range data from the patients and also to show how the stress is indirectly affecting in the cardiac patients to hospitalize

MATERIALS AND METHODS

To predict the risk of cardiovascular disease in cosmopolitan city multi-specialty hospital. For this study specific age group is selected that is 30-80 years. People how are having past history as the cardiovascular disease and also people without any history of cardiovascular disease is selected, there is no gender variation. Data is collected from the patient case reports and answers for the stress questions answers are collected from the patient under the presence of the patient attenders. Recently updated prediction charts and scales are used. A detailed history of the specific patient is collected information is analyzed by using the SAS software tool.

RESULTS

In this study 300 subjects has been involved among them 165 subjects are admitted in cardiology department and remaining 135 subjects are from other departments of hospital. Age group between 21-80 years is selected average of the age for the overall study subjects is 59.02. 212 are male subjects and 88 are female subjects. 46 subjects have only smoking habit, 39 subjects has only alcoholic habit and 47 subjects have both smoking and alcoholic habits.

As the risk minimum factor range for both the scales is same so the risk percentage is divided into two types they are <20% and >20% risk ranges, age intervals are divided into 6 groups for both the male and female gender. The results are as shown below.

Table.1 Risk distribution according to the age intervals and gender

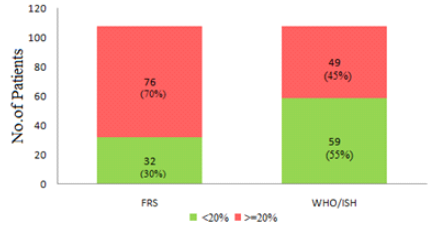
Age intervals	Gender	FRS (%)*		WHO/ISH (%) *	
		<20%	>=20%	<20%	>=20%
21-30	Male	3(1)	0(0)	-	-
	Female	1(0.3)	0(0)	-	-
31-40	Male	7(2.4)	0(0)	7(2.3)	0(0)
	Female	1(0.3)	0(0)	0(0)	1(0.2)
41-50	Male	28(9.3)	15(5)	39(13.2)	4(1.4)
	Female	10(3.3)	4(1.3)	12(4)	4(1.4)
51-60	Male	19(6.3)	49(16.3)	56(19)	12(4)
	Female	20(6.6)	9(3)	24(8.1)	7(2.3)
61-70	Male	5(1.7)	66(22)	28(9.5)	43(14.5)
	Female	8(2.7)	29(9.6)	15(5)	22(7.5)
71-80	Male	1(0.3)	19(6.3)	7(2.4)	13(4.4)
	Female	0(0)	6(2)	0(0)	6(2)

(%)* percentage from 300 patients

Age interval from 51-60 males and females are in higher number for <20% risk and the age interval of 61-70 male and females are with higher number for >20% risk, where as in the case of Framingham risk score there is no specific significance for male and female in <20% age intervals and where as in the case of the >=20% higher number for both the female and males are at the age intervals of 61-70.

In order to determine individual risk variation from risk predictors.

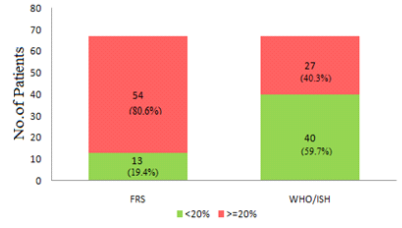
Risk among them is detected by separating the data as the people who are with no cardiovascular events till the date but admitted in the hospital due to some other health issues are selected as one category, 108 patients are under this category for easier identification risk ranges is divided into two categories they are <20% and >=20% like as before. Results are like, for >=20% risk range 70% of FRS category and 45% for the WHO/ISH whereas, for the <20% range 30% by FRS and 55% in case of WHO/ISH category.



(%)*percentage of 108 patients

Fig 1: Risk comparison between FRS and WHO/ISH In patients with non-cardiovascular event

Similarly as of above for risk comparison the data of the patients with the history of the cardiovascular events in their life and also admitted in the hospital with the cardiac related abnormality. 67 patients fitted under this category for easier identification risk ranges is divided into two categories they are <20% and >=20% like as before. Results are like, for >=20% risk range 80.6% of FRS category and 40.3% in the WHO/ISH whereas, for the <20% range 19.4% by FRS and 59.7% in case of WHO/ISH category.



(%)*percentage of 67 patients

Fig 2: Risk comparison between FRS and WHO/ISH for the patients admitted in cardiology and with previous history of CAD.

In order to identify the stress variation in the patients data is divided into two groups they are group 1 includes the patients who are admitted under cardiology department and also patients with the history of heart diseases. 192 patients are under sample 1, in this condition nearly 50% of patients that is 97 members under high stress condition.

Group 2 includes the patients how are not having any cardiac related problems till the date. 108 patients are under this category; in this 64(59%) of the population is under moderate stress. The probability of the data is <0.005 which is significant.

Table 2 : Comparison of Stress range between the two groups.

Stress range	Group1 (%)*	Group 2 (%) **	P-Value
High stress	97(50.5)	42(38.9)	<0.05
Moderate stress	87(45)	64(59.3)	
Low stress	8(4.5)	2(1.9)	

(%)*percentage of 192 patients, (%) ** percentage of 108 members

DISCUSSION:

A total of 300 prescriptions were studied analysed in a super speciality hospital during six months study period. Among 300 patients, 165 patient data from cardiology department and 135 patients are from other departments. Around 132(44%) patients of all the patients who are into the study has reported their social habits in that 46(15.4%) are smokers, 39(13%) members are alcoholic and 47(15.6%) members are both smoker and alcoholic. which is similar to study done by S.Mayor Doctor et al.[9]

Risk score for FRS and WHO/ISH has been divided into two categories those are <20% and >=20%. In cases of males risk based on the FRS, age group of 41-50 is 28(9.4%) members <20% and 61-70 age interval of 66(22%) members are with >=20%. For females at the age interval of 51-60 20(6.6%) members are with <20% risk and at the age interval of 61-70 29(9.6%) are with >=20% risk. For the WHO/ISH risk prediction color chart, Males with the age group of 51-60 has 56 members with <20% and 43(14.5%) are with >=20%. In case of females 24(8.1%) at the age interval of 51-60 and 22(7.5%) are with age group of 61-70 are with.>=20% according to the WHO/ISH risk prediction colour chart. Among all the patients 94(31.4%)males and 52(17.4%) are with hypertension and diabetes mellitus, 75(25%) males and 25(8.4%)females are having hypertension, 43(14.4%) males and 11(3.7%) females are having diabetes mellitus.

For instance, BP levels in Andhra Pradesh are largely identical to those reported in urban India for similar age groups, which suggests that the Andhra Pradesh region is at an advanced stage of transition.10 The lack of recorded CVD outcomes in the APHRI study is a barrier to validate both LI and HI models of WHO/ISH risk prediction charts with a gold standard. However, it is worth noting that there have been little or no large-scale prospective studies with recorded CVD events in India.[11]

Results of WHO/ISH CVD risk prediction has similar to the results of (Implications of Cardiovascular Disease Risk Assessment Using the WHO/ISH Risk Prediction Charts in Rural India. According to research done by Manish Bansal et al(12) they study showed that risk charts of WHO/ISH provided the lowest risk estimates with 86. 6% patients estimated to be having <20% 10-year risk. In comparison, FRS risk score was 69.8% with risk <20%, respectively; p values <0.001 as similar of our study showed almost same results as WHO/ISH risk decreases and FRS risk score increases accordingly with age, respectively p value is <0.001.

Total no. of patients involved is 108 members this patients don't have any previous history of cardiac problems. According to the FRS among 108 patients who don't have any previous history of cardiac problems, 32(30%) members are under <20% and 76(70%) members are under >20%. But in case of WHO/ISH value are totally different 59(55%) members are under <20% and 49(45%) members are >=20% risk of getting cardiovascular diseases in their life. Sharkey et al.13 reported similar findings in terms of acute and reversible cardiomyopathy provoked by catastrophic stress in patients with no prior history of cardiovascular disease. The INTERHEART study 14 investigated the relation of chronic stressors to incidence of CVD in a sample of ~25,000 people from 52 countries. Question we developed was similar to that of merridycasson's questionnaire.

As it was explained about the stress importance in cardiovascular disease 7 (2.3%) male patients and 4(1.3%) females are with low stress, 103(34.3%) males and 49(16.4%) of females are with the moderate stress, 102(34%) males and 35(11.7%) females are with high risk of stress.[15]

As per our research results patients with the cardiovascular problem have the high stress and people who are with no history of cardiovascular events in their life are with moderate stress.

CONCLUSION

300 members are involved in the study; male patients are higher in number than the females admitted in the hospital. Only male patients have the potential social habits that can trigger

cardiovascular disease. We have observed that patient with the less than age less than 40-45 years are mostly <10% risk of risk in both the predictive tools irrespective of their social habits.

Most of the research studies in India based on WHO/ISH found that social habits have influenced a lot in prediction of risk. The CVD risk was also high amongst the retired person because of aging & age related risk factors, while high risk in executives was mainly due to diabetes & obesity.

We observed there is significance for the FRS and not in case of WHO/ISH model when it was compared between two genders. Due to the lack of proper risk prediction in Indian population this leads to the rise in the cardiovascular diseases death rate every year. In order to predict incidence of 10 years risk of cardiovascular disease few risk prediction models has developed based on the various aspects one among them is ethnicity of the populations. Our study has shown the difference between FRS and WHO/ISH while considering gender as a main variable.

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