



Original Article

A Study to Focus on Risk Assessment of Various Cardiovascular Diseases by Using Framingham Heart Study

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ABSTRACT

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Background: Cardiovascular diseases (CVD) account for nearly one third of all deaths worldwide. The available rehabilitation and preventive measures include life style modification, treatment with drug and intervention procedures. The appropriate application of risk assessment should result in a better quality of life for people with cardiovascular diseases and improve cost effectiveness of healthcare. The present study reveals that risk assessment can answer many questions in best therapeutic outcomes. **Objective:** This study was conducted to focus on risk assessment of various cardiovascular diseases by using Framingham heart study. The main objective is to investigate variability of various risk factors, to assess the risk for the development of cardiovascular diseases over period of 10 years. **Methods:** It is a prospective observational study done at Guntur city hospital. The records of all patients who had cardiovascular diseases and relevant data was extracted by using patient data collection form and filled forms are analysed. **Results:** A total of 180 patients consisting of 102 males (56.7%) and 78 females (43.3%) were enrolled. Among these systolic blood pressure 35(34.32%) males and 30(38.47%) females fall in the stage I hypertension, and 31(30.39%) males and 12(15.39%) females were in the stage II HTN. 49(48.04%) males and 49(62.42%) females were having increased levels of FBS. The scoring based on risk factors has shown 35 patients (14 males and 21 females) and 10% risk is found in 35 patients (13 males and 22 females) were in the 10-20% risk category and 110 patients (75 males and 35 females) had 20% risk. **Conclusion:** this study concluded that male (22.787%) has more risk than females (17.707%). There is a need for the prevention and control of risk factors like hypertension, diabetes, lipid levels. Calculating the risk may help the patient to change his/her life style or take corresponding precautionary measures to improve his/her health condition.

key words : Cardio vascular disease, risk assessment, Framingham heart study, scoring system

1. INTRODUCTION

Cardiovascular disease (CVD) has been recognized as the world's major healthcare burden in recent decades, accounting for 17.3 million deaths in 2012¹. The Framingham Risk Score (FRS) is a valid assessment tool

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 used to predict the coronary heart disease in the next 10 years after the evaluation ^{2,3}

Table 1: Risk factors of CVD

INDEPENDENT /ESTABLISHED /MAJOR	DEPENDENT/EMERGING /NOVEL/ EMERGING
Non modifiable <ul style="list-style-type: none"> Age Gender Family history established Modifiable risk: <ul style="list-style-type: none"> Diabetes mellitus Hypertension Hypocholesteremia Sedentary life style Low HDL Cigarette smoking Obesity 	<ul style="list-style-type: none"> Homocysteine Small dense HDL cholesterol Other lipid disorders Abnormalities in blood coagulation <ul style="list-style-type: none"> plasma fibrinogen Coagulation factors V VII VIII Platelet abnormalities Inflammatory markers <ul style="list-style-type: none"> Interleukins C- reactive protein Impaired glucose tolerance Increased oxidative stress LVH Air Pollution <ul style="list-style-type: none"> ↑ Serum Creatinine

SCORING SYSTEMS:

- Scoring systems depend up on assigning a number of points to selected major risk factors. the type and level of risk factor will define the number of points.
- Examples of some scoring systems: FRAMINGHAM, PROCAM, SCORE etc.

Framingham Scoring System:

- The most popular scoring system is based upon data collected during long term follow-up of Framingham participants. It has excellent methodology. Points are given based on the level of risk factors (Age, total and HDL cholesterol, SBP, Plasma Glucose, Smoking) ⁴.

Limitations:

- It does not account for other established major risk factors, e.g. hypertriglyceridemia, obesity, family history, physical inactivity.
- It does not account for severe abnormalities of risk factors e.g. severe hypertension, familial hypercholesterolemia, very low HDL-C, heavy cigarette smoking.
- It underestimates the absolute risk of type 2 diabetes.
- It is limited to white Caucasian population. It may not accurately apply to other populations since risk functions derived from one population may not be valid for risk prediction in other population. It overestimated coronary risk in southern European countries (France, Spain, Italy) and in Japanese, while it underestimated risk in south Asian populations. South Asians have higher absolute risk than whites.

2. MATERIALS AND METHODS

The present research was a prospective study carried out in cardiology department of Guntur City Hospital. The duration

of study was 6 months; study was conducted from August to January. A total of 180 patient's data was collected and analysed. The patients who were mentally retarded, below 30yrs, pregnant women were excluded from the study.

3. RESULTS

Age and sex distribution: A total of 180 patients were taken for the study. In this, 102(56.67%) were males and 78(43.33%) were females. The maximum number of patients enrolled was in the age group of 60 to 69 years. There were more males than females.

Table 2: Age and sex distribution

S.NO	SEX	30-39	40-49	50-59	60-69	70-74	75+	TOTAL
1.	MALE	10	12	35	35	9	1	102(56.67%)
2.	FEMALE	7	11	21	34	3	2	78(43.33%)
3.	TOTAL	17	23	56	69	12	3	180



Fig: 1 Age Distribution in Patients

Risk percentage in males:

Less risk is seen in below 40 years patients and more risk is in above 60 years age patients. 40-59 years patients have moderate risk.

Table 3: Risk percentage in males

RISK PERCENTAGE	<40 YEARS	40-59 YEARS	60 YEARS
<10%	10	4	0
10-20%	0	12	1
>20%	0	31	44

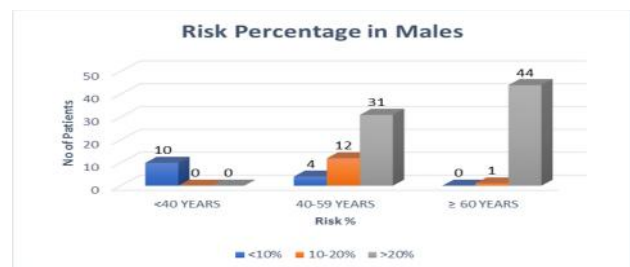


Fig 2: Risk percentage in Males

Risk percentage in females:

In females, less than 10% risk is seen in 7 patients in below 40 years age, 11 patients in 40-59 years age, 3 patients in above 60 years. 10-20% risk is not seen in below 40 years, 14 in 40-59 years, 8 in above 60 years. More than 20% risk

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 is not seen in below 40 years age, 7 in 40-59 years and 28 patients in above 60 years.

Table 4: Risk percentage in females

RISK PERCENTAGE	<40 YEARS	40-59 YEARS	60 YEARS
<10%	7	11	3
10-20%	0	14	8
>20%	0	7	28

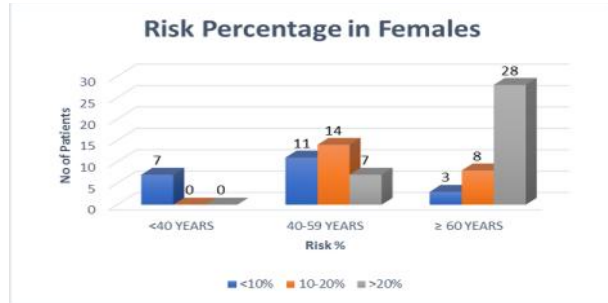


Fig 3: Risk percentage in Females

Average cardio vascular risk percentage in different age groups :

Average Cardiovascular risk percentage in all age groups is more in males than females. More risk was found in patients of age above 70 years.

Table 5: Average risk percentage in different age groups

Age	Avg. Risk %	
	Female	Male
30-39	3.20%	6.57%
40-49	8.54%	16.46%
50-59	15.43%	25.09%
60-69	22.97%	28.60%
70-74	26.10%	30%
74+	30%	30%

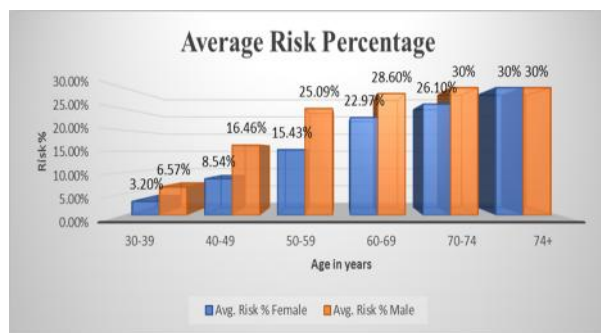


Fig 4: Average Risk Percentage

OVERALL CARDIO VASCULAR RISK PERCENTAGE:

The average cardiovascular risk percentage of the male population sample was calculated to be 22.787% and female was 17.707%.

Table 6: Overall CVD risk percentage

GENDER	RISK PERCENTAGE
Female	17.707%
Male	22.787%

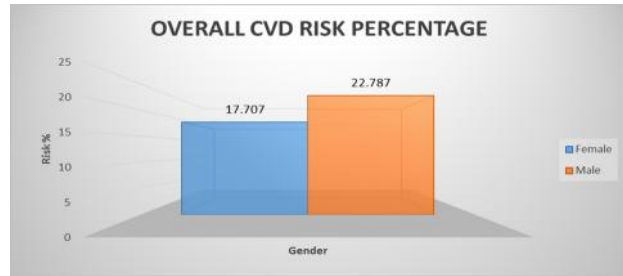


Fig 5: Overall CVD Risk Percentage

4. DISCUSSION

Cardiovascular diseases are now becoming the major leading cause of mortality in India, and thus the study of hypercholesterolemia and other risk factors for CVD is important and timely.

Abnormality in lipid levels is one of the major risk factor for CVD. Since it is a modifiable risk factor, monitoring and treating lipid abnormalities in normal adults will have a bearing on reducing the rates of CVD.

This study reveals the prevalence of Hypertension, Diabetes, increased levels of TC and low levels of HDL-C, which are well known risk factors for cardiovascular diseases in all groups. Of the 180 patients, a higher number of male population was noted.

Diets with high fat and caloric intake and lack of physical activity would be the major culprits of dyslipidemia in our population. References have shown that our diets are rich in saturated fats. Besides it also involves over cooking of food which results in destruction of nutrients like folate, deep frying and refrying in the same oil leading to trans fatty acid formation which probably contributes to increased levels of lipids in our population⁵

The other CVD risk factors like blood pressure and diabetes were also found to more in the ages of 40-59 years in both the genders.

Subjects with hypertension possess two-fold higher risk of developing CAD⁶. Several studies like The UKPDS study, the CUPS study and the other intervention trials indicate the association of Hypertension with CVD. Here we observed that in Systolic blood pressure 35(34.32%) males and 30(38.47%) females fall in the Stage I HTN, and 31(30.39%) males and 12(15.39%) females were in the Stage II HTN.

Diabetics have two to three times higher risk of developing CVD⁷. More than 80% of all deaths in diabetic patients are due to CVD⁸. Currently India has approximately 20 million diabetics, which is expected to increase to 57.2 million by the year 2025. In this study, we have observed that 49 (48.04%) males and 49(62.42%) females were having increased levels of FBS.

In this study, Coronary risk prediction algorithms were used to predict the risk for Coronary heart disease using TC and HDL-C categories.

The scoring based on risk factors has shown
35 patients (14 males and 21 females) had < 10% risk
35 patients (13 males and 22 females) were in the 10-20%
risk category and
110 patients (75 males and 35 females) had >20% risk.

5. CONCLUSION

This study concludes that there is a need for the prevention and control of risk factors like hypertension, diabetes mellitus, lipid levels. Calculating the risk may help the patient to change his/her life style or take corresponding precautionary measures to improve his/her health condition and there is a need to develop a new scoring system for Indian population.

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