Original research article

Risk Factor Assessment in Hypertensive Patients in Association with Framingham Criteria.

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Abstract

Introduction: Guidelines for the prevention of cardiovascular disease recommend the use of risk scores to identify adults at higher risk for whom preventive therapy has absolute benefits. Coronary heart disease (CHD) risk estimation tools are a simple means of identifying those at high risk in a community and hence a potentially cost-effective strategy for CHD prevention. Understanding the risks of atherosclerotic cardiovascular disease (CVD) allows for better patient education and management. **Aim:** 1)To study various risk factors in hypertensive patients according to Framingham criteria. 2)To asses risk of future cardiovascular events in hypertensive patients. **Methodology:** Study was conducted in 255 hypertensive patients in tertiary care center in south Gujarat, age 18 years or more without any previous history of cardiovascular disease. Framingham risk score was used to assess for estimating 10 years risk of developing cardiovascular disease. **Results:** In our study 44.70%, 37.25% and 18.03% population had high, intermediate and low 10- year CVD risk. Males had significantly higher CVD risk as compared to females (60% of males & 28.80% of female had high CVD risk). **Conclusion:** Higher risk in males was mainly due to history of smoking and diabetes. Significantly higher total cholesterol, low HDL cholesterol in the high risk group as against the low risk one.

Keywords : Risk factor assessment, Hypertensive patients, Framingham Criteria.

Introduction

Depression is a common illness worldwide, with more than 264 million people affected. [1] Hypertension is a silent, invisible killer that rarely causes symptoms. Complications of hypertension account for 9.4 million deaths worldwide every year. It is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke. Increasing public awareness is a key to early detection. (1) Cardiovascular disease(CVD), of which ASCVD (atherosclerotic cardiovascular disease) is the major component, is responsible for >4million deaths in Europe each year. It kills more women(2.2million) than men(1.8million),although Cardiovascular deaths before the age of 65 years are more common in men (490000 vs.

193000).(14) Prevention is defined as a co-ordinated set of actions, either at the population or individual level, aimed at eliminating or minimizing the impact of Cardiovascular diseases and their related disabilities. The overall prevalence of Hypertension in India ranges between 17 to 21%.The 'rule of halves' for hypertension states that: 'half the people with high blood pressure are not known ("rule 1"), half of those known are not treated ("rule 2") and half of those treated are not controlled ("rule 3")'. (2) Risk factors that tend to accompany hypertension include glucose intolerance, obesity, left ventricular hypertrophy, and dyslipidemia (elevated total, LDL, and small dense LDL cholesterol levels, raised triglyceride, and reduced HDL cholesterol levels). Among persons with hypertension, about 40% of coronary events in men and 68% in women are attributable to the presence of two or more additional risk factors. Only 14% of coronary events in hypertensive men and 5% of those in hypertensive women occurred in the absence of additional risk factors. (3) There is now incontrovertible experimental, pathophysiologic, clinical, and epidemiologic evidence that hypertension promotes atherosclerotic cardiovascular disease. (4,5) There is now abundant and consistent evidence from randomized trials to document that early detection and control of hypertension can slow the rate of development of initial and recurrent cardiovascular events.(6,7) Risk factors responsible are tobacco, alcohol, obesity, sedentary lifestyle, unhealthy diet, raised blood pressure, cholesterol, glucose, uric acid levels. It is important to be able to predict risk of an individual patient in order to decide when to initiate lifestyle modification and preventive medical treatment. (15) Framingham risk score include age, sex, HDL cholesterol, LDL cholesterol, blood pressure (whether patient is treated or not), diabetes and smoking.(16) Multivariate risk formulations from Framingham Study data are available for assessing hypertensive risk of coronary disease, stroke, peripheral artery disease, and heart failure.(8,9,10,11) Isolated systolic hypertension is associated with an increase in pulse pressure, which in the Framingham Study predicts cardiovascular disease, in a continuous-graded fashion at all levels of blood pressure.(3) Several decades of population research at the Framingham Study show that elevated blood pressure is a common and powerful contributor to the major cardiovascular diseases. High risk of cardiovascular sequelae of hypertension is concentrated in those with dyslipidemia, glucose intolerance, cigarette smoking.(3) Less than 20% of hypertension occurs in the absence of one or more of the following risk factors: high triglyceride and LDL cholesterol levels, reduced HDL cholesterol levels, glucose intolerance, hyperinsulinemia, obesity.(3) The optimal target blood pressure for safely reducing risk of cardiovascular events is uncertain, although a recent trial has indicated that bringing diastolic blood pressure down to as low as 82.6 mm Hg is safe and beneficial. (12) Although treatment has been shown to reduce risk, the risk of treated hypertensive patients remains higher than that of the general population of the same age. Uncorrected concomitant risk factors have been shown to reduce the success of antihypertensive therapy. (13) Goals of therapy are now to prevent cardiovascular sequelae rather than simply to less intrusively decrease the blood pressure. (12) Aims of this study is to study various risk factors in hypertensive patients according to Framingham criteria and to asses risk of future cardiovascular events in hypertensive patients. Framingham risk score include age, sex, HDL cholesterol, LDL cholesterol, blood pressure (whether patient is treated or not), diabetes and smoking. Framingham risk score give an indication of the likely benefits of prevention, they are useful for both the individual patient and for clinician in helping decide whether to start treatment or not. (16)

Material and Methods

The present study was conducted in the department of general medicine, in tertiary care center in south Gujarat from January 2020 to July 2020. Number of Patients: Sample size will

be 255 by using proportion of Hypertension 20.9%, at 95% confidence level with design effect 1.

Inclusion criteria :

1) All patients willing to participate in the study and willing to give consent.
2) Patients above 18 years of age and patients below 70 years of age (male/female) with hypertension with or without taking antihypertensive treatment.

Exclusion criteria :

1) Patients below 18 years of age and above 70 years of age, pregnant women are excluded.
2) Patients with history of cardiovascular event and/or cardiac surgery and patients with recent history of cardiac ischemic event.

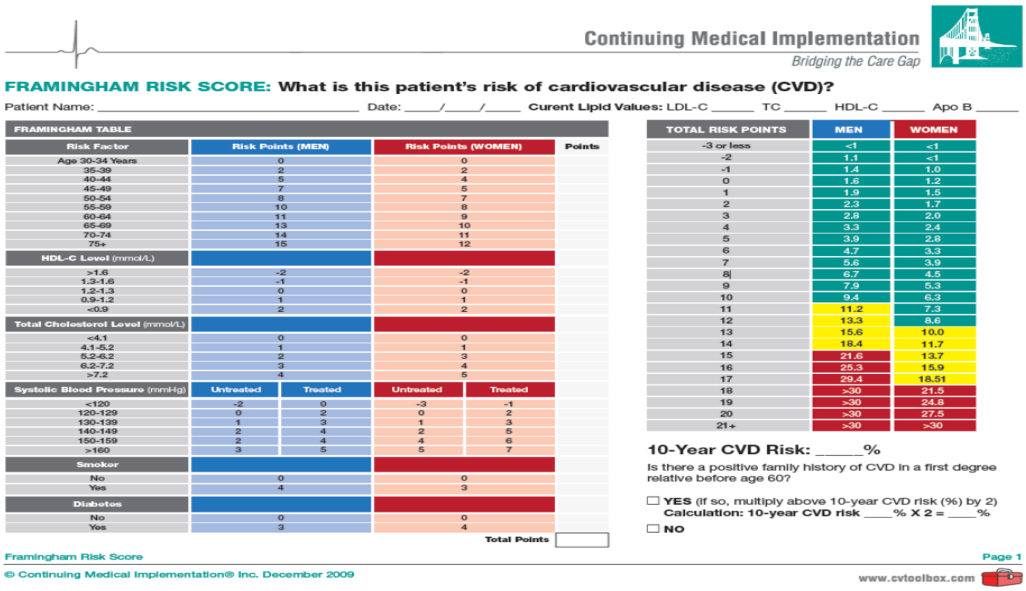
Study design- cross sectional study.

Investigation specifically related to projects - FBS, PPBS, Lipid profile (Total cholesterol, HDL cholesterol)

a) Study tools- Predesigned and semi structural Performa.
b) Study period- Data collection period of 6 months
c) Sampling technique- convient sampling
d) Consent - ≥18 year patient consent will be taken
e) Data collection method - All patient's medical histories and general physical examination shall be documented. A blood sample from each patient will be collected for measuring lipid profile(Total cholesterol, HDL cholesterol), FBS, PP2BS,Serum Uric acid, Serum Creatinine which is routinely done in all the patients of hypertension. A pretested semi structured Performa will be used for data collection.
f) Data analysis- Data will be entered in MS Excel and Stastical testing has been conducted with statistical package for the social science software (SPSS version 20.0).

Framingham Criteria:

1. Age
2. Sex
3. Total cholesterol
4. HDL cholesterol
5. Hypertension
6. Smoking
7. Diabetes



Continuing Medical Implementation
Bridging the Care Gap

FRAMINGHAM RISK SCORE: What is this patient's risk of cardiovascular disease (CVD)?

Patient Name: _____ Date: ____/____/____ Curent Lipid Values: LDL-C _____ TC _____ HDL-C _____ Apo B _____

FRAMINGHAM TABLE

Risk Factor	Risk Points (MEN)		Risk Points (WOMEN)		Points
Age 30-34 Years	0		0		
35-39	2		2		
40-44	5		4		
45-49	7		5		
50-54	8		7		
55-59	10		8		
60-64	11		9		
65-69	13		10		
70-74	14		11		
75+	15		12		
HDL-C Level (mmol/L)					
>1.6	-2		-2		
1.3-1.6	-1		-1		
1.2-1.3	0		0		
0.9-1.2	1		1		
<0.9	2		2		
Total Cholesterol Level (mmol/L)					
<4.1	0		0		
4.1-5.2	1		1		
5.2-6.2	2		3		
6.2-7.2	3		4		
>7.2	4		5		
Systolic Blood Pressure (mmHg)	Untreated	Treated	Untreated	Treated	
<120	-2	0	-3	-1	
120-129	0	2	0	2	
130-139	1	3	1	3	
140-149	2	4	2	5	
150-159	2	4	4	6	
>160	3	5	5	7	
Smoker					
No	0		0		
Yes	4		3		
Diabetes					
No	0		0		
Yes	3		4		
				Total Points	

TOTAL RISK POINTS	MEN	WOMEN
-3 or less	<1	<1
-2	1.1	<1
-1	1.4	1.0
0	1.6	1.2
1	1.9	1.5
2	2.3	1.7
3	2.8	2.0
4	3.3	2.4
5	3.9	2.8
6	4.7	3.3
7	5.6	3.9
8	6.7	4.5
9	7.9	5.3
10	9.4	6.3
11	11.2	7.3
12	13.3	8.6
13	15.6	10.0
14	18.4	11.7
15	21.6	13.7
16	25.3	15.9
17	29.4	18.51
18	>30	21.5
19	>30	24.8
20	>30	27.5
21+	>30	>30

10-Year CVD Risk: _____%

Is there a positive family history of CVD in a first degree relative before age 60?

☐ **YES** (if so, multiply above 10-year CVD risk (%) by 2)
Calculation: 10-year CVD risk ____% X 2 = ____%
☐ **NO**

Framingham Risk Score Page 1

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The absolute cardiovascular disease (CVD) risk percentage over 10 years was classified as low risk (< 10%), intermediate risk (10-20%), and high risk (> 20%). Participant were enrolled from OPD No 12 according to inclusion criteria . Details of study were explained to Participant and consent for study was taken. Participant were examined and history was taken according to study questionnaire. Investigation related to study were done. Participant were explained to come for follow up with reports. Risk score was calculated according to Framingham criteria.

Results

Table 1: shows percentage of frequency distribution of total number of subjects according to age-group, gender and risk category.

Sex	Age Group	Risk category according to Framingham criteria			
		Total	High	Intermediate	Low
Male					
	30-39	**0 (**0.00%)	0 (0.00%)	**0** (0.00%)	**0** (0.00%)
	40-49	**47 (**36.16%)	**9** (11.54%)	**32** (69.56%)	**6** (100%)
			19.14%	68.08%	12.76%
	50-59	**47 (**36.15%	**33** (42.31%)	**14** (30.43%)	**0** (0.00%)
			70.21%	29.78%	0.00%
	60-69	**36 (**27.69%)	**36** (46.15%)	**0** (0.00%)	**0** (0.00%)
			100%		
	Total	**130 (**100.00%)	**78 (**100.00%**)**	**46 (**100.00%)	**6 (**100.00%)
		100.00%	**60.00%**	**35.38%**	**4.62%**
Female					
	30-39	**16 (**12.80%)	**0** (0.00%)	**0** (0.00%)	**16** (40%)
					100%
	40-49	**32 (**25.60%)	**7** (19.44%)	**8** (16.32%)	**17** (42.50%)
			21.87%	25%	53.12%
	50-59	**42 (**33.60%)	**6** (16.67%)	**29** (59.18%)	**7** (17.50%)
			14.28%	69.04%	16.66%
	60-69	**35 (**28%)	**25** (63.89%)	**12** (24.49%)	**0** (0.00%)
			71.42%	34.28%	0.00%
	Total	**125 (**100.00%)	**36 (**100.00%)	**49 (**100.00%)	**40 (**100.00%)
		100.00%	**28.80%**	**39.20%**	**32.00%**
	TOTAL 255		**44.70%**	**37.25%**	**18.03%**
			(114)	**(95)**	**(46)**

Table 1 shows in high risk category 60% were males, 28.80% were females. 35.38% and 39.20%, males and females respectively in intermediate category. In low risk category 4.62% males and 32% females. Chi-square test was applied to know the correlation (p <0.05 being significant) between gender and risk (chi square 40.62), p value <0.01 suggest statistically significant correlation between the two parameters.

Table 2: shows frequency distribution of total number of subjects according to their history of smoking, history of diabetes, history of medication for hypertension and history of vascular disease

Sex	Age Group	Total	History Of Smoking		History Of Diabetes		On medication for hypertension		History Of Vascular Disease	
			Yes	No	Yes	No	Yes	No	Yes	No
Male	30-39	**0**	0	0	0	0	0	0	0	0
	40-49	**47**	5	42	1	46	45	2	0	47
	50-59	**47**	18	29	3	44	44	3	0	47
	60-69	**36**	10	26	12	24	30	6	0	36
	Total	**130**	**33**	**97**	**16**	**114**	**119**	**11**	**0**	**130**
	Total		**130**		**130**		**130**		**130**	
Female	30-39	**16**	0	16	0	**16**	**13**	3	0	16
	40-49	**32**	0	32	7	25	30	2	0	32
	50-59	**42**	0	42	0	42	38	4	0	42
	60-69	**35**	0	35	14	21	26	9	0	35
	Total	**125**	**0**	**125**	**21**	**104**	**107**	**18**	**0**	**125**
	Total		**125**		**125**		**125**		**125**	

Table 2 shows frequency distribution of total number of subjects according to gender, age group and histories of smoking, diabetes, history of medication for hypertenison and history of vascular disease. Out of 130 male subjects, 33 subjects had history of smoking, Out of 125 female subjects, none of them had history of smoking. Out of 130 male subjects 16 subjects had history of diabetes. Out of 125 female subjects, 21 subjects had history of diabetes. Out of 130 males, 119 were having history of medication for hypertension. Out of 125 female subjects, 107 were having history of medication for hypertension.

Table 3: shows frequency distirbution of total number of subjects according to age-group, gender and risk category

Sex	Age Group	Total	Risk Category according to Framingham criteria		
			High	Intermediate	Low
Male	30-34	**0**			
	35-39	**0**			
	40-44	**28**	5	19	4
	45-49	**19**	4	13	2
	50-54	**25**	14	11	
	55-59	**22**	19	3	
	60-64	**26**	26		
	65-69	**10**	10		
	Total	**130**	**78**	**46**	**6**
	Total		**130**		
Female	30-34	**3**			3
	35-39	**13**			13
	40-44	**17**	3	4	10
	45-49	**15**	4	4	7
	50-54	**16**	2	13	1
	55-59	**26**	4	16	6
	60-64	**18**	14	4	
	65-69	**17**	9	8	
	Total	**125**	**36**	**49**	**40**
	Total		**125**		

Table 3 shows frequency distribution of total number of subjects according to gender, age group and risk category. Out of 255 total subjects, 130 were males and 125 were females. In males, age group of 40-44 had maximum number of subjects whereas in females, age group of 55-59 had maximum number of subjects . Out of 130 males, high risk category had highest number of subjects while in females, Intermediate risk category had highest number of subjects (17).

Table 4: shows frequency distribution of total number of subjects according to their Gender, uric acid levels, total cholesterol levels, and levels of HDL

Sex	Age Group	Total	Total Cholesterol	HDL	Uric Acid
Male	30-34	**0**	0	0	0
	35-39	**0**	0	0	0
	40-44	**28**	28	28	28
	45-49	**19**	19	19	19
	50-54	**25**	25	25	25
	55-59	**22**	22	22	22
	60-64	**26**	26	26	26
	65-69	**10**	10	10	10
	Total	**130**	**130**	**130**	**130**
	Total				
Female	30-34	**3**	3	3	3
	35-39	**13**	13	13	13
	40-44	**17**	17	17	17
	45-49	**15**	15	15	15
	50-54	**16**	16	16	16
	55-59	**26**	26	26	26
	60-64	**18**	18	18	18
	65-69	**17**	17	17	17
	Total	**125**	**125**	**125**	**125**
	Total				

Table 4 shows frequency distribution of total number of subjects according to gender, age group and levels of Uric acid, Total Cholesterol and HDL. Out of 255 total subjects, 3 females were in the age group of 30-34, 13 females in age group of 35-39, 28 males and 17 females in the age group of 40-44 and 19 males and 15 females in age group of 45-49 were observed. In 50-54 years age group, there were 25 males and 16 females while 55-59 had 22 males and 26 females. Age group 60-64 had 26 males, 18 females while 65-69 age group had 10 males and 17 females respectively. The levels of uric acid, total cholesterol and HDL were recorded separately for each subject according to gender and risk category for further evaluation and for establishing correlation with risk of vascular disease.

Table 5: shows Mean Value, Standard Deviation, Range (Minimum & Maximum) and Pearson Chi Sqaure test (p-value, confidence interval 95%) for Total Cholesterol levels in male subjects

Sex	Age Group	Total	Risk Category	Total Cholesterol					
				Mean	S.D.	Minimum	Maximum	Pearson Chi Sqaure Test (p value)	
male	40-44	5	High	208.6	23.21	190	234	0.101	NOT SIGNIFICANT
		19	Intermediate	113.58	29	79	182		
		4	Low	143	12.94	129	154		
	45-49	4	High	251	12.7	240	262	0.009	SIGNIFICANT
		13	Intermediate	203.31	42.41	125	236		
		2	Low	140	22.63	124	156		
	50-54	14	High	149.29	22.26	116	189	0.174	NOT SIGNIFICANT
		11	Intermediate	112	39.81	81	210		
		0	Low	0	0	0	0		
	55-59	19	High	144.32	38.78	73	212	0.276	NOT SIGNIFICANT
		3	Intermediate	115	41.51	73	156		
		0	Low	0	0	0	0		
	60-64	26	High	151.42	30.68	74	224		
		0	Intermediate	0	0	0	0		
		0	Low	0	0	0	0		
	65-69	10	High	138.6	38.73	74	225		
		0	Intermediate	0	0	0	0		
		0	Low	0	0	0	0		
	Total	130		149.4	45.94	73	262		

The frequencies of the Male subjects in different risk categories and levels of Total Cholesterol (Mean, Standard Deviation) were calculated and Pearson Chi-square test was applied to know the statistical significant correlation ($p < 0.05$ being significant) between the subjects in the age groups and Total Cholesterol levels. It was observed that age groups 40-44, 50-54 and 55-59 had p values as 0.101, 0.174, and 0.276 which were indicative that the correlation between the two parameters was statistically not significant. For the age group of 45- 49, the p value 0.009 suggests statistically significant correlation between the two parameters.

Table 6: shows Mean Value, Standard Deviation, Range (Minimum & Maximum) and Pearson Chi Sqaure test (p-value, confidence interval 95%) for Total Cholesterol levels in Female subjects

Sex	Age Group	Total	Risk Category	Total Cholesterol					
				Mean	S.D.	Minimum	Maximum	Pearson Chi Sqaure Test (p value)	
Female	30-34	0	High	0	0	0	0		
		0	Intermediate	0	0	0	0		
		3	Low	171.67	42.36	124	205		
	35-39	0	High	0	0	0	0		
		0	Intermediate	0	0	0	0		
		13	Low	191.62	29.19	158	233		
	40-44	3	High	141.33	70.44	60	182	0.047	
		4	Intermediate	209	8.08	202	216		
		10	Low	148	13.49	136	182		
	45-49	4	High	145.75	6.65	136	150	0.185	NOT SIGNIFICANT
		4	Intermediate	213.25	42.84	152	252		
		7	Low	149.71	14.38	133	165		
	50-54	2	High	250	0	250	250	0.01	SIGNIFICANT
		13	Intermediate	177.69	18.99	142	205		
		1	Low	178	-	178	178		
	55-59	4	High	215.5	9.81	207	224	0.052	NOT SIGNIFICANT
		16	Intermediate	141.75	54.83	59	243		
		6	Low	141.17	20.46	101	156		
	60-64	14	High	178.14	57.56	60	236	0.128	NOT SIGNIFICANT
		4	Intermediate	164.5	34.73	140	216		
		0	Low	0	0	0	0		
	65-69	9	High	179.78	54.69	59	213	0.074	NOT SIGNIFICANT
		8	Intermediate	134.88	23.39	103	186		
		0	Low	0	0	0	0		
	Total	125		168.35	44.18	59	252		

The frequencies of the Female subjects in different risk categories and levels of Total Cholesterol (Mean, Standard Deviation) were calculated and Pearson Chi-square test was applied to know the statistical significant correlation ($p < 0.05$ being significant) between the subjects in the age groups and uric acid levels. It was observed that age groups 45-49, 55-59, 60-64 and 65-69 had p values as 0.185, 0.052, 0.128 and 0.074 which were indicative that the correlation between the two parameters was statistically not significant. For the age group of 40-44 and 50-54, the p values 0.047 and 0.01 suggests statistically significant correlation between the two parameters.

Out of 255 patients, 130 were males and 125 were females. In our study 44.70%, 37.25% and 18.03% population had high, intermediate and low CVD risk respectively. In high risk category 78(60%) were males,36(28.80%) were females, there were (46)35.38% and 49(39.20%), males and females respectively in intermediate category and in low risk category (6)4.62% males and 40(32%) females. Significant association observed between gender and cardiovascular risk in hypertensive patients. Out of 130 male subjects, 33 subjects had history of smoking were in high risk category, Out of 125 female subjects, none of them had history of smoking. Significant association observed between history of smoking and cardiovascular risk in hypertensive patients. Out of 130 male subjects 16 subjects had history of diabetes. Out of 125 female subjects 21 subjects had history of diabetes. No significant association observed between history of diabetes mellitus and cardiovascular risk in hypertensive patients. Out of 130 males, 119 were having history of medication for hypertension. out of 125 female subjects, 107 were having history of medication for hypertension.Out of 130 male subjects in different age groups, age group of 45-49 years (high risk category) had highest Mean value of total cholesterol levels (251) with standard deviation (± 12.7). Lowest mean value of total cholesterol levels was found in age group of 50-54 years (intermediate risk category) (112) with standard deviation (± 39.81). Out of 125

female subjects in different age groups, age group of 50-54 years (high risk category) had highest Mean value of total cholesterol levels (251) with standard deviation (± 0). Lowest mean value of total cholesterol levels was found in age group of 65-69 years (Intermediate risk category) (134.88) with standard deviation (± 23.39). In male subjects out of different age groups, age group of 50-54 years (high risk category) had highest Mean value of HDL level (39.71) with standard deviation (± 9.22). Lowest mean value of HDL level was found in age group of 40-44 years (high risk category) (25.8) with standard deviation (± 5.85). In female subjects out of different age groups, age group of 55-59 years (Low risk category) had highest Mean value of HDL level (51) with standard deviation (± 1.1). Lowest mean value of HDL level was found in age group of 40-44 years (high risk category) (24.33) with standard deviation (± 4.04). HDL cholesterol had a negative correlation with cardiovascular risk which is statistically significant in this study. Significant association observed between total cholesterol level and cardiovascular risk.

Discussion

The absolute cardiovascular disease (CVD) risk percentage over 10 years was classified as low risk (< 10%), intermediate risk (10-20%), and high risk (> 20%). In our study 44.70%, 37.25% and 18.03% population had high, intermediate and low CVD risk respectively compared with study by Ling Zhang MD, 41.80%,42.34% and 15.84% population had high, intermediate and low CVD risk respectively. In the study by Sonal Parikh et al, 10.6%,11.7% and 77.7% population had high, intermediate and low CVD risk respectively. In the study by S Kanjilal et al, 5.32% population had high, 14.85% had intermediate and 79.83% had low CVD risk.In study done by Earl s ford et al population under high, intermediate and low category was 2.9%, 15.5% and 81.7%.

In our study, out of 114 subjects in high risk category 60%(78) were males and 28.80%(36) were females. p value <0.01 statistically significant correlation between the two parameters. A study conducted by Sonal Parikh et al also demonstrated similar findings, with females having a lower 10-year cardiovascular disease risk compared to males (25% and 75% respectively),while in a study by S Kanjilal et al, in high risk subjects 61% were males and 39% were females. In the study by Earl s ford et al out of 345 high risk subjects 5.3% were males and 0.9% were females. The higher cardiovascular disease risk among males might be due to the higher prevalence of smoking, high systolic blood pressure, low HDL level, and higher prevalence of diabetics among males as compared to females.

Age is one of the important non-modifiable risk factor for cardiovascular disease, older the age, higher is the CVD risk. In our study, male subjects in age group 50-59 had 70.21% and 60-69 had 100% risk, female subjects in age group 50-59 had 14.28% and 60-69 had 71.42%.cardiovascular risk as age increases. Earl s ford et al reported 7.4% in 50-59 age group and 10.8% in 60-69 age group in male subjects, female subjects in age group 50-59 had 0.4% and 60-69 had 0.3%.

Smoking gives the risk of coronary heart disease. The longer a person smokes, he will be increasingly exposed to the active substance that can damage the vascular endothelium. smokers are more at risk of getting coronary heart disease than nonsmokers. In our study,33 subjects in high risk category who had history of smoking. p value 0.008 suggests statistically significant correlation between the two parameters. In the study by Ling Zhang MD, there were 759,377 and 100 subjects had high, intermediate and low risk. S Kanjilal et al reported 24,42 and 117 subjects in high, intermediate and low risk category respectively.

In our study, 37 subjects in high risk category who had history of diabetes mellitus. p value 0.3105 suggests statistically not significant correlation between the two parameters. S Kanjilal et al reported 52, 62 and 47 subjects in high, intermediate and low risk category respectively. According to the Framingham study, HDL cholesterol had a negative correlation with total cholesterol that give risk of cardiovascular disease. Higher the HDL value, lower the cardiovascular risk. In our study, Out of different age groups, age group of 50-54 years (high risk category) had highest Mean value of HDL level (39.71) with standard deviation (± 9.22). Lowest mean value of HDL level was found in age group of 40-44 years (high risk category) (25.8) with standard deviation (± 5.85) in male subjects. For the age group of 40-44 and 50-54, the p values 0.015 and 0.037 suggests statistically significant correlation between the two parameters. In female subjects, out of different age groups, age group of 55-59 years (Low risk category) had highest Mean value of HDL level (51) with standard deviation (±1.1). Lowest mean value of HDL level was found in age group of 40-44 years (high risk category) (24.33) with standard deviation(± 4.04). It was observed that the age group of 40-44, 45-49, 50-54, 55-59, 60-64 and 65-69, the p values 0.024, 0.018, 0.037, 0.0001, 0.021 and 0.009 suggests statistically significant correlation between the two parameters. S Kanjilal et al reported highest mean value of HDL level 36.92 with standard deviation ± 8.22,Lowest mean value of HDL level was 43.36 with standard deviation ± 10.88.while in a study by Ling Zhang MD ed al, highest mean value of HDL level 58.5 with standard deviation± 16.0, Lowest mean value of HDL level was 49.2 with standard deviation ± 12.9.In a study by Boekhtiar Borhanuddin et al, mean value of HDL level 46.06 with standard deviation ±14.81 in male subjects, mean value of HDL level was 56.84 with standard deviation ±20.53 in female subjects. In our study, male subjects out of different age groups, age group of 45-49 years (high risk category) had highest Mean value of total cholesterol levels (251) with standard deviation (± 12.7). Lowest mean value of total cholesterol levels was found in age group of 50-54 years (moderate risk category) (112) with standard deviation(±39.81). For the age group of 45- 49, the p value 0.009 suggests statistically significant correlation between the two parameters. In female subjects out of different age groups, age group of 50-54 years (high risk category) had highest Mean value of total cholesterol levels (251) with standard deviation (± 0). Lowest mean value of total cholesterol levels was found in age group of 65-69 years (moderate risk category) (134.88) with standard deviation (± 23.39). For the age group of 40-44 and 50-54, the p values 0.047 and 0.01 suggests statistically significant correlation between the two parameters. S Kanjilal et al reported highest mean value of total cholesterol level 195 with standard deviation ± 34.57,Lowest mean value of total cholesterol level was 173.39 with standard deviation ±38.76. In a study by Boekhtiar Borhanuddin et al, mean value of total cholesterol level 215.48 with standard deviation ±53.93 in male subjects, mean value of total cholesterol level was 213.67 with standard deviation ±52.70 in female subjects.

Conclusion

The key to combating the globally rising incidence of CVD lies in the identification and control of known and emerging risk factors by a population based strategy aimed at comprehensive risk reduction. The analysis of total 255 population in which 130 were males and 125 were females showed a high 10-year cardiovascular disease risk 44.70%(114). Findings from our study certainly seem to imply that risk factors can make a significant contribution to CVD risk prediction. In this study we observed, as expected, significantly higher prevalence of the risk factors in the high risk group as compared with the low risk group. We found significantly higher total cholesterol, low HDL colesterol in the high risk group as against the low risk one. Significantly high number of males (60% of male) had high CVD risk than females (28.80% of females).The higher cardiovascular disease risk among

males might be due to the higher prevalence of smoking, high systolic blood pressure, low HDL level, and higher prevalence of diabetics among males as compared to females. The result from our analysis may help to better define percentage and numbers of people at risk of cardiovascular disease during 10 year interval.such information may be helpful for prevention and treatment of cardiovascular disease.

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