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A PROSPECTIVE STUDY TO ASSESS THE CARDIOVASCULAR RISK USING FRAMINGHAM RISK SCORE IN A COAL MINE HOSPITAL

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ABSTRACT

Aim and Objectives: The aim of study is to assess and predict the cardiovascular risk using Framingham Risk Score in a coal mine hospital and the objective of the study is to assess the prevalence of various risk factors, 10 years risk of cardiovascular diseases and to develop strategies to reduce the cardiovascular disease burden in high-risk individuals and, to improve the quality of life. **Methods:** This study is an observational, prospective, population-based study in which 211 patients aged 41-74 years devoid of cardiovascular diseases were included by random sampling from SCCL Main Hospital for a period of 6 months. The FRS was estimated using a computer program. **Results:** From the analysis, among 109 males-3 (2.8 %) are at low risk of CVD, 10 (9.1 %) are at moderate risk of CVD; 96 (88.1 %) are at high risk; 102 females-12 (11.8 %) are at low risk of CVD, 43 (42.1 %) are at moderate risk and 47 (46.1 %) are at high risk of CVD interpreted using FRS. **Conclusion:** This population based study depicts that increase in age, family history of CVD, overweight, lack of physical activity, smoking, alcohol consumption, other co-morbid conditions like hypertension, hyperglycemia, hyperlipidaemia serge the risk of CVD. The findings of the study may aid in convincing health care professionals and people at high risk of developing CVD to take stern action towards a healthy lifestyle and achieving the goal of "Health for all".

KEYWORDS: Cardiovascular Diseases, Framingham Risk Score, hypertension, hyperglycemia, hyperlipidaemia.

INTRODUCTION

Cardiovascular Diseases (CVD's) are a cluster of disorders of the heart and blood vessels. They include coronary death, myocardial infarction, coronary insufficiency, angina, ischemic stroke, hemorrhagic stroke. Cardiovascular disease (CVD) is now the most prevalent cause of death globally.[1] The worldwide surge in CVD is the result of a phenomenal change in the causes of morbidity amid twentieth century.[2] Cardiovascular diseases (CVD's) lead to 17.9 million deaths worldwide in 2015, a number that has increased globally by 12.5% since 2005, with almost 80% of these deaths occurring in low and middle-income countries.[3] Risk factors for CVD include tobacco and alcohol consumption, unhealthy diet, and physical inactivity, which are individually modifiable. Increase in age, gender, heredity (including race) are un-modifiable. These influence metabolic pathways and ultimately result in intermediate-risk factors: obesity, hypertension, diabetes, and dyslipidemia which synergistically induce the CVD risk.[2]

The Framingham Heart Study has helped to explicate the major risk factors for CVD. Through its various multivariate risk scores, it has helped to spot those who are at highest risk for developing CVD. The Framingham Risk Score (FRS) is the most applicable method for predicting the person's chance of developing disorder. It is a simplified and common tool for the assessment of risk levels of CVD over 10years. This considers six coronary risk factors including age, gender, total cholesterol, HDL, smoking habit and systolic BP.[4] These strategies help in lessening the deaths by the occurrence of CVD.

In this study, we aimed to assess the prevalence of various risk factors, 10-year risk of cardiovascular diseases using FRS and, to develop strategies to reduce the cardiovascular disease burden in high-risk individuals and to improve the quality of life.

METHODOLOGY

Study Site: This study was conducted in Singareni Colleries Company Limited, Main Hospital, Badhradri Kothagudem- 507101, Telangana, India. The patients were enrolled from the general medicine department of the hospital.

Duration of Study: 6 months.

Study Population: Total number of population is three hundred and fifty-six (356). From that, two hundred and eleven (211) patients were selected & one hundred and forty-five (145)

patients were not considered due to insufficient data. This study was approved by the Institutional Ethics Committee.

Inclusion Criteria: The patient inclusion criteria of enrolment includes patients between the age group >40yrs and <75yrs (including both males and females), patients who are able to give written informed consent for study participation and, the patients without any cardiovascular diseases.

Exclusion Criteria: The exclusion criteria of enrolment were- patients with the previous history of cardiovascular diseases, if data on risk factors or socioeconomic deprivation were missing and, male and female patients of age groups <40 yrs and ≥75 years.

Study Design: This study is an observational, prospective, population-based study in a coal mine hospital.

Materials Used: Patient data collection form was used to collect the demographic details of patients, patient history, medication history, BMI and, laboratory values. Computerized Framingham Risk Score calculator was used to calculate the 10 year cardiovascular risk.

Method: A Precise information was obtained from the individuals such as socio-demographic variables, tobacco and, Alcohol use, medical history, family history, physical activity, anthropometric measurements like height, weight and Body Mass Index (BMI). The values of various screening parameters like blood pressure, random blood sugar, lipid profile, ECG were drawn up from the patient records in hospital.

The study participants were categorized as normal and overweight based on BMI calculation {body weight (kg) divided by height^2 (m^2)} and as hypertensive, diabetic, HTN+DM, HTN+CKD, HTN+DM+CKD considering the past medical history. The hereditary patterns of attaining hypertension or diabetes were distinguished based on maternal and paternal origin. Accordingly, the individuals were categorized with different stages of hypertension based on systolic and diastolic blood pressure; normal and abnormal levels of RBS and lipid profile.

The 10 year risk of cardiovascular disease was calculated using computerized Framingham Risk Score and the study population were categorized into low risk (>10%), intermediate risk (10-20%) and high risk (>20%).

Statistical Analysis: A randomized sampling method was executed and therefore the data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 19.0 for Windows (SPSS Inc., Chicago, IL, USA). The qualitative variables were interpreted as the exact amount and percentage and the quantitative variables as the mean and standard deviation. Significant associations were defined by $P < 0.05$.

RESULTS

Out of 211 patients, there were 109 (51.7%) males and 102(48.3%) females and out of those 109 males, there were 15(13.8%) in-between age group of 41-50yrs, similarly 58(53.2%) in 51-60yrs, 20(18.3%) in 61-70yrs, 16(14.7%) in 71-80yrs and out of those 102 females, there were 26(13.8%) in 41-50yr, 32 (31.4%) in 51-60yrs, 29(28.4%) in 61-70, 15 (14.7%) in71-80. More number of patients was found among the age group of 51-60 years i.e., 53.2% in males and 31.4% in females.

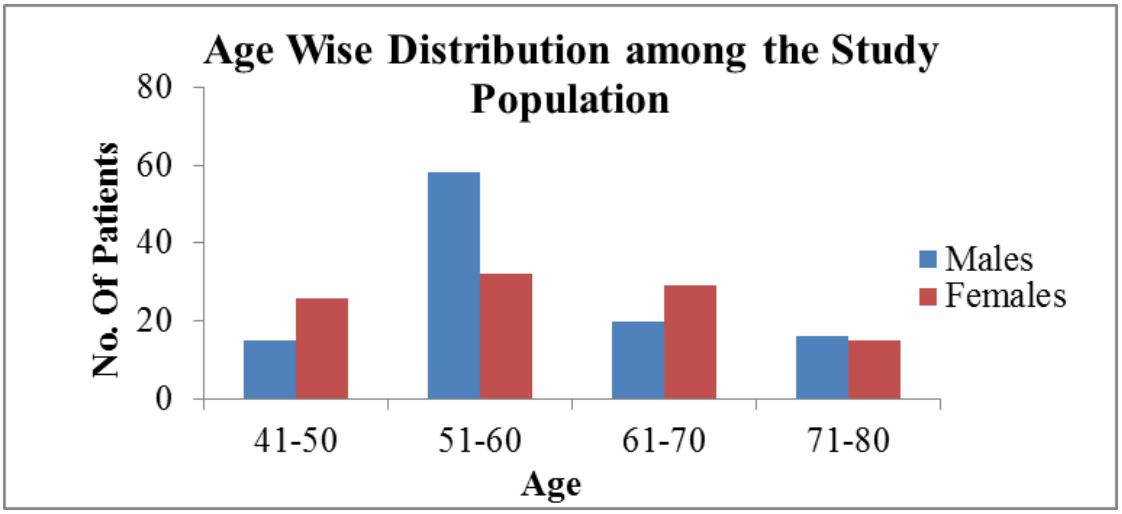

Figure No 1: Age Wise Distribution among the Study Population.

Out of 109 males, 52(47.7%) have normal BMI values and 57(52.3%) have abnormal BMI values i.e., over weight. Similarly, out of 102 females, 42(41.2%) have normal BMI values and 60(58.8%) have abnormal BMI values i.e., over weight.

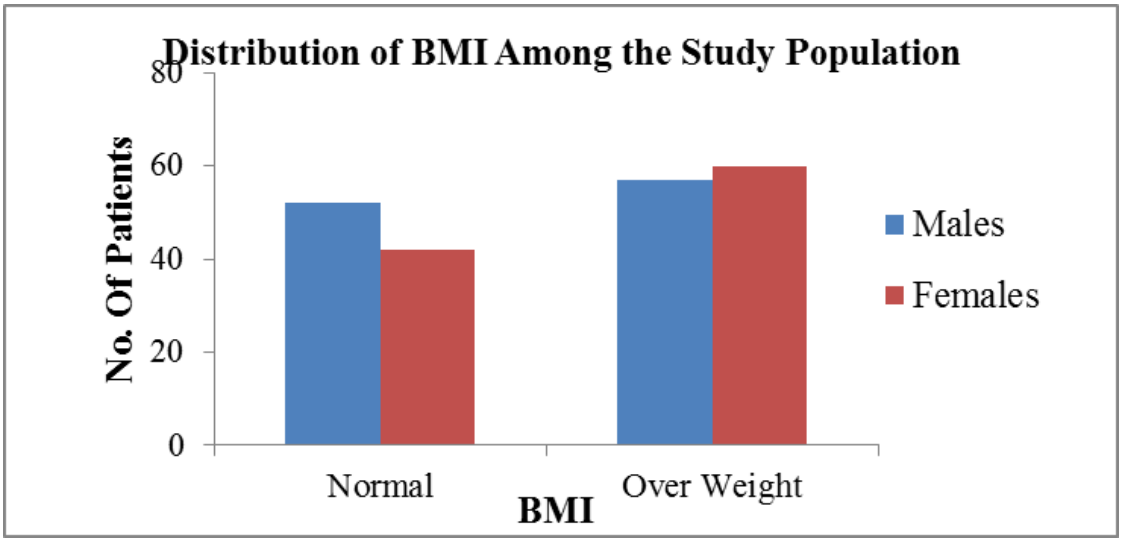

Figure No 2: Distribution of BMI among the Study Population.

Of the study patients 45(41.3%) had HTN; 52 (47.7%) had HTN+DM; 4(3.7%) had HTN+CKD; 8(7.3%) had HTN+DM+CKD in Males and 33(32.4%) had HTN; 6(5.9%) had DM; 57(55.9%) had HTN+DM; 1(0.9%) had HTN+CKD; 5(4.9%) had HTN+DM+CKD in females.

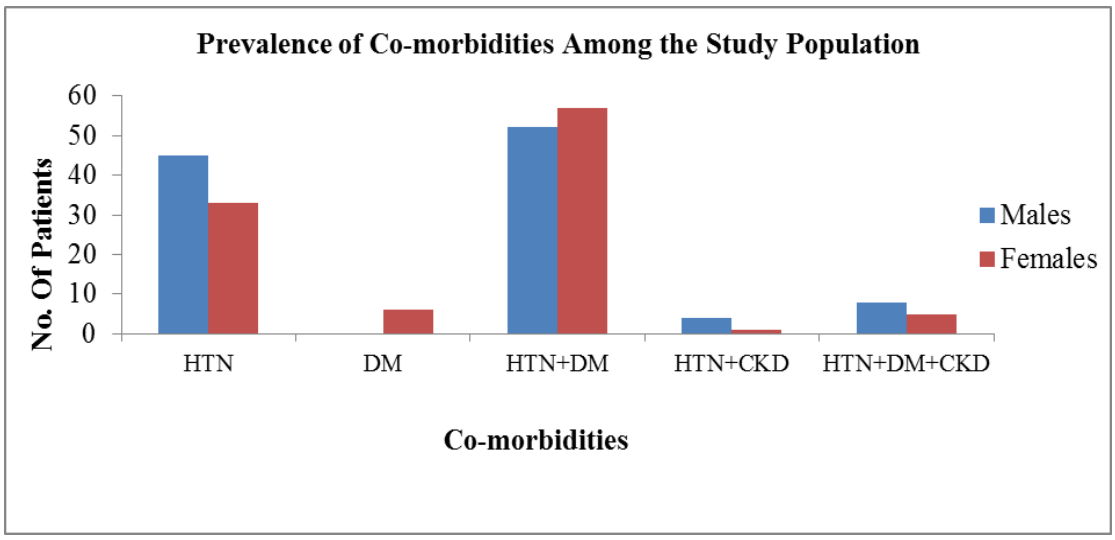

Figure No 3: Prevalence of Co-morbidities among the Study Population.

Out of 109 male patients, had HTN 11(10.09%) from mother and 16(14.68%) had HTN from father. 2(1.84%) had DM from mother and 7(6.42%) had DM from father. Similarly, out of 102 females, 7(6.9%) had HTN from mother and 13(12.74%) had HTN from father. 8(7.84%) had DM from mother and 9(8.82%) had DM from father. 73(66.97%) had no history and 65(63.7%) had no history.

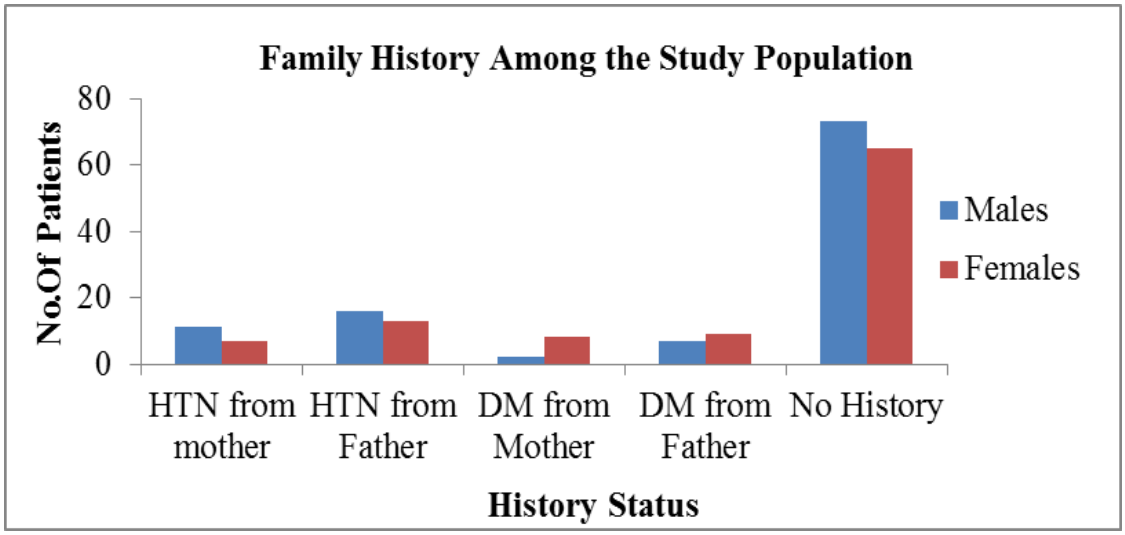

Figure No 4: Family History among the Study Population.

Out of 109 males, there were 9 persons who have a habit of pan chewing, 64 persons consume alcohol regularly, while 15 persons consume alcohol occasionally. Similarly, there were 29 smokers and 5 ex-smokers. Out of 102 females, there were 5 members who have a habit of pan chewing and 7 members, who consume alcohol occasionally. There are 30 males without any habits and 90 females who don't have any of the habits.

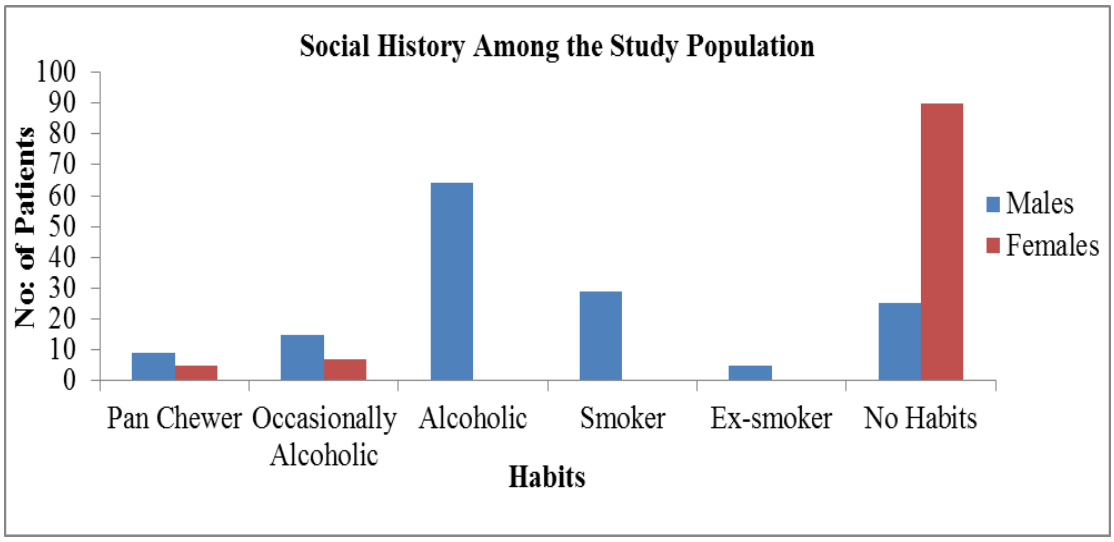

Figure No 5: Social History among the Study Population.

Out of 109 males, 8(7.4%) were having normal BP, 38(34.9%) were pre-hypertensive, 34(31.1%) were in Stage-I and 29(26.6%) were in Stage-II. Similarly, out of 102 females, 14(13.7%) were having normal BP, 32(31.4%) were pre-hypertensive, 32(31.4%) were in Stage-I and 24(23.5%) were in Stage-II.

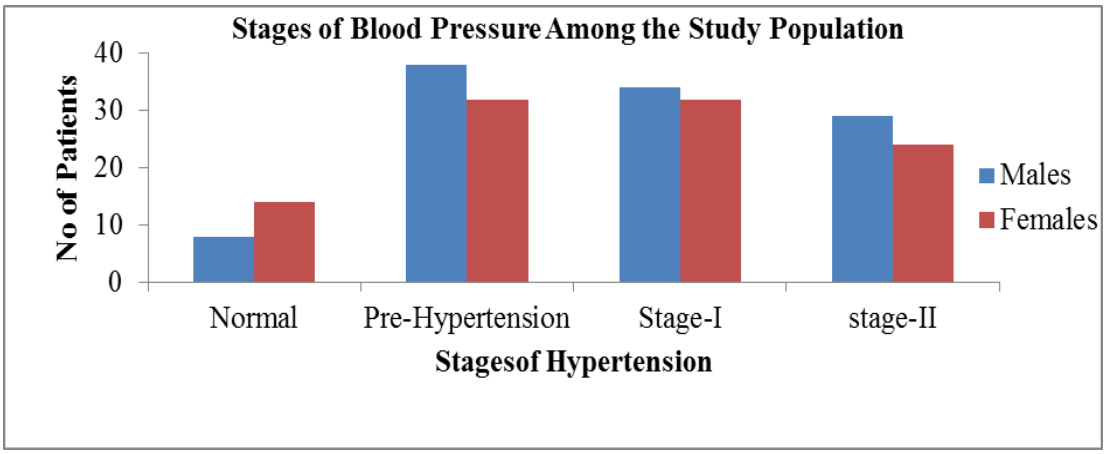

Figure No 6: Stages of Blood Pressure among the Study Population.

Out of 109 males; 52(47.7%) have RBS levels less than the normal range, 56(51.4%) have normal RBS levels and 1(0.9%) have RBS levels above normal. Similarly, Out of 102 females, 43(42.2%) have RBS levels less than the normal range, 56(54.9%) have normal RBS levels and 3(2.9%) have RBS levels above normal.

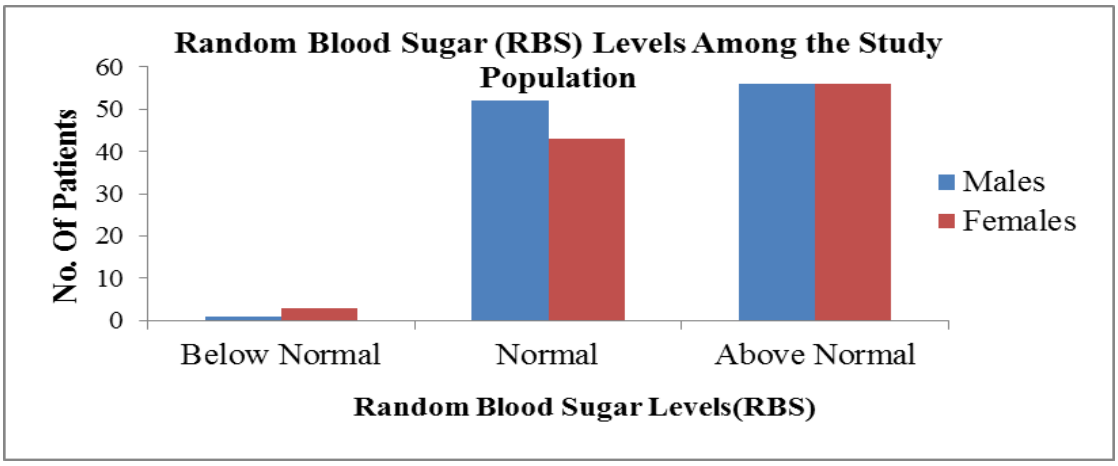

Figure No 7: Random Blood Sugar (RBS) Levels among the Study Population.

Out of 109 males, 86(78.9%) have normal Tot. Cholesterol levels and 84(21.1%) have abnormal level; 57(52.3%) have normal triglycerides level and 25(47.7%) have abnormal levels; 73(67%) have normal LDL levels and 36(33%) have abnormal levels; 69(63.3%) have normal HDL levels and 40(36.7%) have abnormal levels 62(57.9%) have normal VLDL levels and 47(43.1%) have abnormal levels.

Similarly, out of 102 females, 84(82.4%) have normal Tot. Cholesterol levels and 18(17.6%) have abnormal level; 40(39.2%) have normal triglycerides level and 62(60.8%) have abnormal levels; 65(63.7%) have normal LDL levels and 37(36.3%) have abnormal levels;

83(81.4%) have normal HDL levels and 19(18.6%) have abnormal levels 63(61.8%) have normal VLDL levels and 39(38.2%) have abnormal levels.

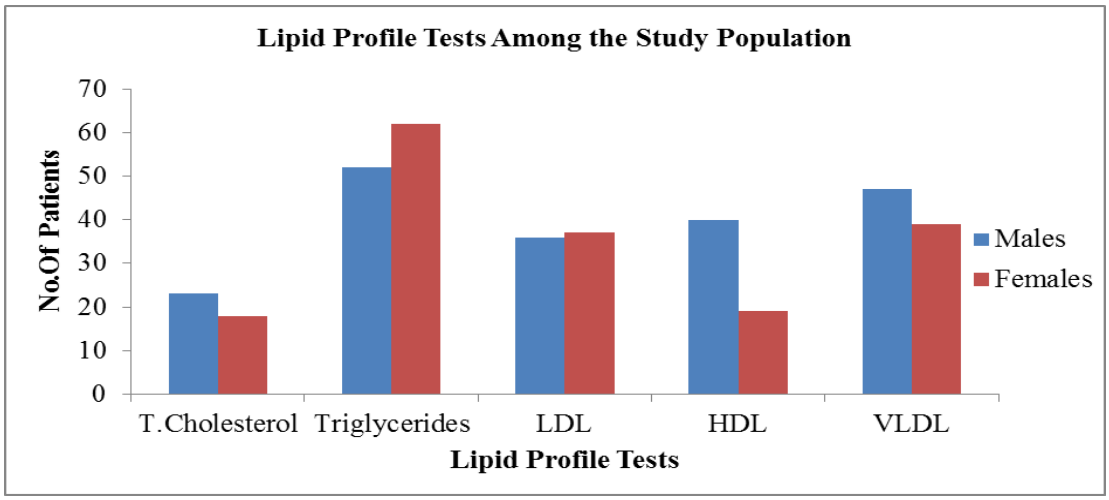

Figure No 8: Lipid Profile Tests among the Study Population.

Table No.1: Prevalence of Predisposing Factors in Both Males and Females.

Predisposing Factors		Males (n=109)		Females (n=102)	
AGE					
40-50		15	13.80%	26	25.50%
51-60		58	53.20%	32	31.40%
61-70		20	18.30%	29	28.40%
71-80		16	14.70%	15	14.70%
BMI					
Normal		52	47.70%	42	41.20%
Abnormal		57	52.30%	60	58.80%
CO-MORBIDITIES Hypertension(HTN)		45	41.30%	33	32.40%
Diabetes Mellitus(DM)		0	0%	6	5.90%
HTN + DM		52	47.70%	57	55.90%
HTN + CKD		4	3.70%	1	0.90%
HTN + DM + CKD		8	7.30%	5	4.90%
FAMILY HISTORY					
Hypertension	From mother	11	10.09%	7	6.90%
	From father	16	14.68%	13	12.74%
Diabetes Mellitus	From mother	2	1.84%	8	7.84%
	From father	7	6.42%	9	8.82%
No Family History		73	66.97%	65	63.70%
HYPERTENSION					
Normal		8	7.40%	14	13.70%
Pre-Hypertension		38	34.90%	32	31.40%
Stage- I		34	31.10%	32	31.40%
Stage- II		29	26.60%	24	23.50%

RBS					
Normal		52	47.70%	43	42.20%
Abnormal	Above Normal	56	51.45%	56	54.90%
	Below Normal	1	0.90%	3	2.90%
LIPID PROFILE					
Tot. Cholesterol	Normal	86	78.90%	84	82.40%
	Abnormal	23	21.10%	18	17.60%
Triglycerides	Normal	57	52.30%	40	39.20%
	Abnormal	52	47.70%	62	60.80%
LDL	Normal	73	67%	65	63.70%
	Abnormal	36	33%	37	36.30%
HDL	Normal	69	63.30%	83	81.40%
	Abnormal	40	36.70%	19	18.60%
VLDL	Normal	62	57.90%	63	61.80%
	Abnormal	47	43.10%	39	38.20%

Mean and Standard Deviation of the Obtained Data

From the Table No.2, the P value of BMI (0.043*) is significant and systolic BP (0.072) is nearly significant.

Table No.2: Mean and Standard Deviation of the Predisposing Factors.

Predisposing Factor	Male (Mean± SD)	Female (Mean± SD)	P Value
Age	62.11±12.49	60.45±9.97	0.289
BMI	24.58±2.59	25.29±2.47	0.043*
Systolic BP	147.64 ±26.38	141.7±20.8	0.072
Diastolic BP	89.19 ±12.35	87.16±12.7	0.24
RBS	194.43±95.89	191.91±94.58	0.85
Tot. Cholesterol	196.13 ±48.41	202±38.94	0.33
Triglycerides	164.38± 64.7	154.74±47.1	0.22
HDL	38.47 ±17.81	38.40±5.26	0.96
LDL	118 ±40.17	117.78±28.07	0.96
VLDL	40.25± 20.4	38.04±9.14	0.31

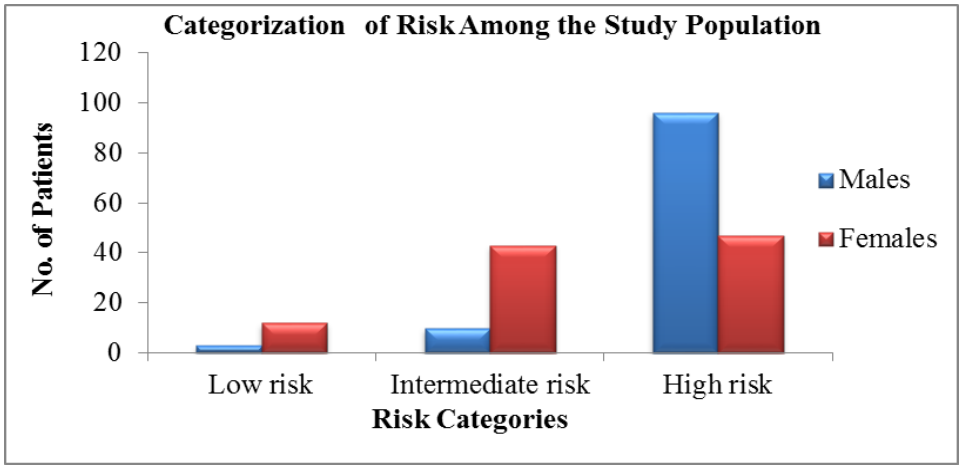

Figure No 9: Categorization of Risk among the Study Population.

From figure 9, out of 109 males, 3 (2.8 %) are at low risk of CVD, 10 (9.1 %) are at moderate risk of CVD and 96 (88.1 %) are at high risk. Similarly, out of 102 females, 12 (11.8 %) are at low risk of CVD, 43 (42.1 %) are at moderate risk and 47 (46.1 %) are at high risk. Among the study population, highest number of females, 43 (42.1 %) are at moderate risk whereas highest number of males, 96 (881 %) are at high risk of CVD.

DISCUSSION

In our study, 211 subjects were included; of which, 51.6% were males and 48.3% females. Other studies also found a higher prevalence among women but the difference was statistically not significant.

The risk of CVD goes along with mounting evidence of clinically important Gender and Gender differences. The risk is more frequently diagnosed based on the history of HTN, DM; which are more common among individuals with increasing age. Obesity, lipid profile, nutritional factors, sedentary lifestyle affect risk differently in both the gender. Both biological and psychological factors are liable for gender differences in CVD risk and outcomes. In the present study, there is a significant relationship between FRS risk scores and Increasing age, BMI, high blood pressure, high blood glucose, high lipid profile and the social habits. All the above risk factors are used in calculating the future risk of cardiovascular disease by using FRS. Moreover from the logistic regression analysis, high SBP makes patients 3-5 times more vulnerable to be at intermediate and high risk of cardiovascular diseases.

From the results, 2.8% of patients were at low risk of CVD, 9.1%, 88.1% were in intermediate and high risk of CVD. On assessing the risk of CVD in the subjects, there is a base to improve the quality of life and develop strategies to reduce the cardiovascular disease burden in the individuals.

CONCLUSION

CVD is often prevented through lifestyle modification, diet control, control of overweight and obesity, maintaining the normal/traditional glucose, total cholesterol, triglycerides, LDL, HDL, VLDL in the blood and, maintaining normal blood pressure. Different drugs are used developed, yet no cure is out there within the sight of the disease. Management should be tailored to enhance the standard of life of individuals.

Among the modifiable risk factors that played a considerable role are BMI, Dietary patterns, smoking, alcohol, high blood pressure, high blood glucose and high lipid profile levels. If modifiable risk factors are altered, the risk-assessment score is often considerably reduced. People with high-risk of CVD should be referred for early intervention and changes to a healthy life style and primary prevention to prevent or delay the onset of CVD.

Non-modifiable risk factors like increasing age, family history of CVD, modifiable risk factors like over-weight, smoking, hypertension, hyperglycemia, hyperlipidaemia are found in participants who were at high risk for CVD.

Thus this study concludes that pharmacist can play a major role in improving the patient care by counselling and advising about the modifiable risk factors which can improve the health outcomes of the patient.

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