



Assessment Of Cardiovascular Risk In Patients Attending Hospital For The Treatment Of Other Disorders

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ABSTRACT

Main objective our work was to assess the cardiovascular risk in patients attending hospital with other diseases and to determine the effect of each risk factor on CVD risk. The study was a prospective observational study conducted for a period of 6 months from June 2019 to Nov 2019 in tertiary care hospitals in Khammam region. 200 subjects were selected as per inclusion criteria. CVD risk was assessed using Framingham scale and ASCVD scores. Among all the participants in the study, 102 were males and 98 were females. Abnormal HTN, RBS, FBS, PPBS, total cholesterol and Low Density Lipoproteins were found more in male subjects than female subjects. Males of age group 51 to 60 and females of age group 41 to 50 were found to be more susceptible to CVD risk. Our study showed that the age, physical inactivity, dietary habits, obesity, smoking, alcohol, dyslipidemia, Hypertension and Diabetes had direct effect on cardiovascular risk.



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INTRODUCTION

According to Global Burden of Disease Study, India has the greatest risk of Coronary Artery Diseases (Murray and Lopez, 1997). Cardiovascular diseases is the largest cause of death globally (Mendis et al., 2011). Recurrent ischemia results in adverse CV events following optimal treatment for an acute coronary syndrome which occurs

in approximately 10% of subjects in randomized controlled trials (Wallentin et al., 2009) and this number nearly doubles the registries (Jernberg et al., 2015). The unstoppable progress of CV disease, despite optimal guideline-based primary and secondary prevention suggests a multifactorial etiology and need to assess other precipitants that may worsen existing CV disease.

Patients having abnormal thyroid levels show hematologic and cardiovascular manifestations and accelerate the onset of CV diseases. Even a minor changes in thyroid levels have adverse impact on the heart function and it is observed that thyroid dysfunction causes 20% to 80% increase in vascular morbidity and mortality (Biondi and Cooper, 2008; Jabbar and S, 2014).

The cardiovascular system represents a major target of thyroid hormone action (Klein and Danzi, 2007). Both clinical and subclinical thyroid dysfunction have been associated with an increased risk

of coronary heart disease, heart failure and mortality (Thvilum *et al.*, 2013; Brandt *et al.*, 2012). Myocardial infarction, stroke and amputation are all manifestations of the aggressive atherosclerosis that can occur with diabetes. Not every person with diabetes is at equal risk of cardiovascular disease. Over the last 2 decades, strong evidence has continued to accumulate that the CV risks of diabetes can be reduced significantly through comprehensive and treatment target driven risk factor modification (Haffner *et al.*, 1998; Stevens *et al.*, 2001). People with diabetes have increased risk of premature morbidity and mortality related to CVD. Diabetes may lead to CVD risk which is equivalent to aging approximately 15 years, with a transition from intermediate to high risk in men at age 47.9 years and in women at 54.3 years (Booth *et al.*, 2006).

Obesity has been increasing in epidemic proportions in both adults and children. Obesity is an independent risk factor for cardiovascular disease (CVD) (Rabkin *et al.*, 1977; Manson *et al.*, 1990) and is associated with advanced CVD requiring procedures such as percutaneous coronary intervention, reduction in life expectancy (Fontaine, 2003), and a higher mortality rate (Calle *et al.*, 1999). It is reported that, reduction in weight improves the pre existing CV risk factors like hypertension, diabetes, and dyslipidemia and mortality (Lavie *et al.*, 2009; Sierra-Johnson *et al.*, 2008).

Methodology

This study was a prospective observational study conducted over a period of 6 months from June 2019 to November 2019 in Tertiary care hospitals in Khammam region. Sample size includes 200 patients. Adult of 18 years and above were selected for the study. Patients whose records have no established history of CVD and willing to participate in the study were included. Patients above 70 years, who were unresponsive and whose prescriptions were unreliable were excluded from the study.

Study Procedure

The patients were prospectively selected by simple random sampling. Along with demographic details, measurements like height, weight, Body Mass Index, physical activity, smoking, alcohol consumption and biochemical details like lipid profile - triglycerides, High density lipoproteins, Low density lipoproteins, blood pressure, RBS, FBS, PPBS data and Cholesterol data were recorded in the out-patient and inpatient departments.

The risk factors on total CVD risk were identified. CVD risk was assessed by using Framingham scale and ASCVD scores. The statistical analysis was car-

ried out by Microsoft Office (MS-Word and Excel). Descriptive data analysis was performed in the form of percentage of demographic variables.

RESULTS AND DISCUSSION

Of all the participants in our study 102 were males and 98 were females. 15 participants were in age group of 30 – 40. 74 participants were in the age group of 41 to 50 years. Majority of the patients 106 were in 51 to 60 age group. 5 participants were in age group of 61-70.

From the male respondents 83 were in normal weight. 16 were overweight. In female 82 were in normal weight and 15 were in over weight. No obese patients were observed in the study.

Majority of participants were from urban areas both in males and females. 59 males were from urban areas and 43 were from rural areas. 63 females were from urban and 35 were from rural areas. Among males 61 were educated and 41 were uneducated. Among females 52 were educated and 46 were uneducated.

It was found that 53 males and 23 females were involved in professional work areas. 49 males and 28 females were engaged in labour works on daily basis and 47 females were unemployed. Among male participants 25 had daily physical activity, 28 had weekly physical activity and 49 had rare physical activity. The dietary habits includes 20 had low sugar/ salt intake, 54 had moderate intake and 28 had high intake. 30 had low intake of fatty foods, 42 had moderate intake and 29 had high intake of fatty foods.

Among females participants 63 had daily, 25 had weekly, and 10 had rare physical activity. The dietary habits includes 43 had low sugar/ salt intake, 30 had moderate intake and 25 had high intake. 49 had low intake of fatty foods, 30 had moderate intake and 19 had high intake of fatty foods.

Among the participants 66 males and 58 females were reported having or under stress. Gender wise distribution was given in Tables 1 and 2.

Among males 80 were active smokers and 64 were alcoholics. The results were given in Table 3.

Normal RBS levels were found in 48 males and 37 females. Abnormal RBS level were found in 54 males and 61 females. Normal FBS levels were found in 40 males and 33 females. Abnormal FBS level were found in 62 males and 65 females. Normal PPBS levels were found in 48 males and 37 females. Abnormal PPBS level were found in 54 males and 61 females.

Table 1: Demographic Profile of Patients

Variables	Males age group in years				Females age group in years			
	30-40	41-50	51-60	61-70	30-40	41-50	51-60	61-70
BMI								
Underweight	—	2	1	—	—	1	—	—
Normal weight	5	18	59	1	7	42	30	3
Overweight	3	6	6	1	0	5	10	—
Civil Status								
Urban	3	15	40	1	7	35	20	1
Rural	5	11	26	1	—	13	20	2
Educational status								
Educated	4	18	38	1	7	23	21	1
Uneducated	4	8	28	1	—	25	19	2
Work Nature								
Professional	2	10	40	1	3	14	6	—
Labour	6	16	26	1	—	13	13	2
Unemployed	—	—	—	—	4	21	21	1

Table 2: Life Style and Food Habits of Patients

Variables	Males age group in years				Females age group in years			
	30-40	41-50	51-60	61-70	30-40	41-50	51-60	61-70
Physical Activity								
Daily	1	4	20	—	6	27	29	1
Weekly	4	7	15	2	1	14	9	1
Rarely	3	15	31	—	—	7	2	1
Sugar/ salt intake								
Low	1	4	15	—	1	20	20	2
Moderate	2	15	36	1	4	15	10	1
High	5	7	15	1	2	13	10	—
Fatty Foods								
Low	1	9	20	—	2	25	20	2
Moderate	4	8	30	1	4	15	10	1
High	3	9	16	1	1	8	10	—
Stress	2	17	46	1	2	30	25	1

Table 3: Age Wise Distribution of Smokers and Alcohol Consumers

Age group	Males	
	Smoking	Alcohol consumption
30-40	5	6
41-50	18	20
51-60	56	37
61-70	1	1

Table 4: Blood Sugar Levels in Patients

Blood sugar levels		Males age group in years				Females age group in years			
		30-40	41-50	51-60	61-70	30-40	41-50	51-60	61-70
RBS	Normal	2	9	36	1	5	15	15	2
	Abnormal	6	17	30	1	2	33	25	1
FBS	Normal	3	10	26	1	—	18	13	2
	Abnormal	5	16	40	1	7	30	27	1
PPBS	Normal	3	8	36	1	7	13	15	2
	Abnormal	5	18	30	1	—	35	25	1

Table 5: Lipid Profile in Patients

Lipid profile		Males age group in years				Females age group in years			
		30-40	41-50	51-60	61-70	30-40	41-50	51-60	61-70
LDL	Normal	3	9	20	1	—	15	15	2
	Abnormal	5	17	46	1	7	33	25	1
HDL	Normal	5	16	46	1	—	18	13	1
	Abnormal	3	10	20	1	7	30	27	2
TC	Normal	3	9	20	1	—	13	15	1
	Abnormal	5	17	46	1	7	35	25	2

Table 6: Blood Pressure Levels in Patients

Blood pressure	Males age group in years				Females age group in years			
	30-40	41-50	51-60	61-70	30-40	41-50	51-60	61-70
Normal	3	10	26	1	2	20	15	1
Abnormal	5	16	40	1	5	28	25	2

Table 7: Assessment of CVD Risk Using Framingham Scale in Females

Framingham score	% Risk	Females age group in years				Total	%
		30-40	41-50	51-60	61-70		
9 to 12	1	1	—	—	—	1	1
13 to 14	2	6	2	—	—	8	8.1
15	3	—	13	2	—	15	15.3
16	4	—	3	—	—	3	3.0
17	5	—	22	16	—	38	38.7
18	6	—	8	6	—	14	14.2
19	8	—	—	13	—	13	13.2
20	11	—	—	2	1	3	3.0
21	14	—	—	1	2	3	3.0

Abnormal values were observed in females than males. The results were summarized in Table 4.

Normal LDL levels were found in 33 males and 32 females. Abnormal LDL level were found in 69 males and 66 females. Normal HDL levels were found in 68 males and 32 females.

Abnormal HDL level were found in 34 males and 66 females. Normal TC levels were found in 33 males

and 29 females. Abnormal TC level were found in 69 males and 69 females. Abnormal values were observed in females than males. The results were summarized in Table 5.

Normal HTN levels were found in 40 males and 38 females. Abnormal HTN level were found in 62 males and 60 females. The results were summarized in Table 6.

Table 8: Assessment of CVD Risk Using Framingham Scale in Males

Framingham		Males age group in years					Total	%
score	% Risk	30-40	41-50	51-60	61-70			
9	5	1	2	—	—	3	2.9	
11	8	2		—	—	2	1.9	
12	10	1	2	1	—	4	3.9	
13	12	—	2	3	—	5	4.9	
14	16	2	3	15	1	21	20.5	
15	20	—	5	15	1	21	20.5	
16	25	1	—	3	—	4	3.9	
>17	>30	1	12	29	—	42	41.1	

Table 9: ASCVD % Risk in Males

ASCVD Score		Males age group in years					Total	%
Life time risk	30-40	41-50	51-60	61-70				
41 to 50	2	4	15	—	21	20.5		
51 to 60	4	16	30	—	50	49.1		
61 to 70	2	6	21	2	31	30.4		
Current risk								
0 to 10	5	8	2	—	15	14.7		
11 to 20	3	18	13	—	34	33.3		
21 to 30	—	—	19	—	19	18.6		
31 to 40	—	—	32	2	34	33.3		
Optimal risk								
0 to 0.9	4	7	—	—	11	10.8		
1 to 1.9	4	17	—	—	21	20.6		
2 to 2.9	—	2	15	—	17	16.6		
3 to 3.9	—	—	24	—	24	23.5		
4 to 4.9	—	—	10	2	12	11.7		
5 to 6	—	—	17	—	17	16.6		

Analysis of cardiovascular risk**Framingham Score**

The data obtained from patient profile was entered into a specially designed case sheet. The data was analyzed using Framingham scale and the score of individual patient was calculated. Based on the score obtained % risk of each patient was reported gender wise.

In females

It was found that 1% risk in 1 patients, 2% risk in 8 patients, 3% risk in 15 patients, 4% risk in 3 patients, 5% risk in 38 patients, 6% risk in 14 patients, 8% risk in 13 patients, 11% risk in 3 patients, 14% risk in 3 patients. In our study we

found that females were having less chances of cardiovascular risk based on the HTN, Diabetes and lipid profile data. The results are reported in Table 7.

In males

It was observed that 5% risk in 3 patients, 8% risk in 2 patients, 10% risk in 4 patients, 12% risk in 5 patients, 16% risk in 21 patients, 20% risk in 21 patients, 25% risk in 4 patients, More than 30 % risk in 42 patients. We found that males are having more cardiovascular risk. Among 102 patients 42 were having > 30 % risk. The results are tabulated in Table 8.

ASCVD Scale

Cardiovascular risk is analyzed using ASCVD scale

Table 10: ASCVD % Risk in Females

ASCVD Score	Female age group in years					Total	%
	Life time risk	30-40	41-50	51-60	61-70		
31 to 40	-	8	10	-	18	18.3	
41 to 50	5	25	20	3	53	54.2	
51 to 60	2	15	10	-	27	27.5	
Current risk							
0 to 10	7	25	36	-	68	69.4	
11 to 20	-	15	4	-	19	19.4	
21 to 30	-	8	-	3	11	11.2	
Optimal risk							
0 to .9	4	20	4	-	28	28.6	
1 to 1.9	3	17	32	-	52	53.1	
2 to 3	-	11	4	3	18	18.3	

to determine current, optimal and Life time in both males and females.

Life Time Risk Males

It was found that 41 to 50 % risk in 21 patients, 51 to 60 % risk in 50 patients, and 61 to 70 % risk in 31 patients. Based on the data males are having major life time risk of developing cardiovascular risk.

Current Risk Males

It was observed that 0 to 10 % risk in 15 patients, 11 to 20 % risk in 35 patients, 21 to 30 % risk in 19 patients, and 31 to 40 % risk in 33 patients. Major risk of CVD was seen in males in age group 51 to 60 years.

Optimal Risk Males

It was found that 0 to 0.9% risk in 11 patients, 1 to 1.9 % risk in 21 patients, 2 to 2.9 % risk in 18 patients, 3 to 3.9 % risk in 24 patients, 4 to 4.9 % risk in 11 patients, 5 to 6 % risk in 17 patients. The results are tabulated in Table 9.

Life Time Risk Females

Life time risk was found to be 31 to 40 % risk in 18 patients, 41 to 50 % risk in 53 patients and 51 to 60 % risk in 27 patients.

Current risk females

It that 0 to 10 % risk in 68 patients, 11 to 20 % risk in 19 patients, 21 to 30 % in 11 patients.

Optimal Risk Females

Optimal risk was found to be 0 to 0.9% risk in 28 patients, 1 to 1.9 % risk in 52 patients and 2 to 2.9

% risk in 18 patients. The results are tabulated in Table 10.

Our study reveals CVD risk is associated with many factors like BMI, lipid profile, Hypertension and diabetes, educational status and life style of the patients may also contribute to CVD risk. BMI, lipid profile have more impact on heart functioning.

Now a day's obesity is observed both children and adults due to their altered life style and food habits. Obesity can also lead to CV risk and is an independent risk factor for atherosclerosis. Waist circumference is a used as clinical marker for assessment of CVD risk even in patients having normal weight. Though majority of patients were in normal weight, the risk is found to be higher due to their waist circumference. It confirms that normal BMI does not indicate that they are less prone to risk.

But assessment of obesity by BMI method alone cannot be used to estimate CVD risk. It has also been proposed that vigorous physical activity can reduce adipose fat, achieve proper level of insulin and helps to maintain normal weight.

It was observed that 31 patients in age group 51 to 60 had rare physical activity and 15 patients in age group 41 to 50 had moderate physical activity. It shows that physical activity is more important to maintain healthy body. In female patients though they had regular physical activity but the chances of CVD are high due to their hormonal imbalance.

Intake of sugar and fatty foods can also have effect on heart function. Epidemiologic data found in our study shows a strong link between obesity, BMI and

Heart failure.

Smoking can also cause cardiovascular disease and their relationship is dose dependent. Greater the tobacco consumption higher is the risk of heart diseases. The relationship between alcohol consumption and heart diseases is more complex. Alcohol and tobacco, both have synergistic effects on cardiovascular risk. In our study we observed that more smokers and alcohol consumers were in 51 to 60 age group.

Evidences shows that diabetic patients have increased risk of premature risk of cardiovascular diseases. Women with diabetes are more prone to develop Coronary artery diseases than men. Abnormal RBS, FBS, PPBS were more in 51 to 60 age group followed by 41 to 50 age group in males and in females abnormal RBS, FBS, PPBS values were in 41 to 50 age group.

Hypertension can lead to artery disease, atrial fibrillation, stroke and heart failure. Abnormal HTN were more in 51 to 60 age group followed by 41 to 50 age group in males and in females abnormal HTN values were in 41 to 50 age group.

Patients with high serum lipids have high risk of CVD. Increased lipid levels causes formation of plaques and will lead to narrowing of blood vesicles. This may increase blood pressure causing myocardial infarction. Abnormal LDL, HDL, TC were more in 51 to 60 age group followed by 41 to 50 age group in males and in females abnormal LDL, HDL, TC values were in 41 to 50 age group.

From Framingham scale it was found that out of 102 males, 67 patients had 20 to 30 % risk, 30 patients had 10 to 20 % risk and 5 patients had < 10 % risk. Out of 98 females, 6 patients had 10 to 15 % risk, 84 patients had 5 to 10 % risk and 27 patients had < 5% risk.

% Risk of CVD in male patients was analyzed using ASCVD scale. The results were presented as life time risk, current risk and optimal risk. The results revealed that, among 102 male participants higher life time risk is in 66 patient from 51 to 60 age group followed by 26 patients in 41 to 50 age group. Same results were observed in current risk and optimal risk in ASCVD Score. Patients in 31 to 40 age group were less susceptible to CVD risk in our study.

The results revealed that among 98 female participants, life time risk is in 48 patients who were in 41 to 50 age group followed by 40 patients in 51 to 60 age group. Same results were observed in current risk and optimal risk in ASCVD Score. This shows that 41 to 50 age group females are more susceptible to CVD.

CONCLUSION

Our study reveals that age, physical activity, BMI, dietary habits, smoking, and alcohol consumption has direct effect on cardiovascular functioning. All the factors have direct relationship with each other in contributing to CVD risk. In male participants 80 were active smokers and 64 were found to be alcoholics. Abnormal HTN, Blood glucose levels and lipid profile are seen male of age group 50 to 60 and in females of age group 40 to 50. 41.1 % males had > 30 % of CVD risk and 38.7 % females had 5% CVD risk. Framingham scale and ASCVD score has revealed same results in both males and females.

Abbreviations

ASCVD = Atherosclerotic Cardiovascular Disease, CV = cardiovascular, CVD = cardiovascular diseases, HTN = Hypertension, RBS = Random blood sugar, FBS = fasting blood sugar, PPBS = Postprandial blood glucose, LDL= Low-density lipoprotein, HDL= high density lipoprotein, TC= total cholesterol, BMI = Body Mass Index.

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Conflict of Interest

None.

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