Metabolic Syndrome and Framingham Risk Score in Coronary Artery Disease Cases

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ABSTRACT
Metabolic syndrome is a group of simultaneous conditions that expanding your risk of heart disease, stroke, and type 2 diabetes. These conditions include increased blood pressure, high glucose level, and abundance muscle versus fat around the abdomen or triglyceride levels. The objective of the study is to demographic, biochemical, obesity indices and angiographic profile (severity of CAD) of patients with coronary artery disease (CAD). A prospective and observational study involving a number of 971 patients who had undergone coronary angiogram (CAG) for the 18-month CAD assessment. In present study about half of population had significant abnormality on coronary angiogram. Amongst abnormal coronary angiogram about 50% of patients had single vessel disease. The FRS had positive correlation with severity of coronary artery disease and waist circumference. FRS and metabolic syndrome had critical contribution as score and risk factors with presence of and severity of CAD. To conclude it was suggested to incorporate FRS and components of metabolic syndrome for better management and risk stratification of coronary artery disease at large.

Keywords: Coronary, Framingham, Syndrome, Risk, Disease, Metabolic Syndrome

INTRODUCTION

Metabolic syndrome is a group of simultaneous conditions that expanding your risk of heart disease, stroke, and type 2 diabetes. These conditions include increased blood pressure, high glucose level, and abundance muscle versus fat around the abdomen or triglyceride levels.[1]

Metabolic syndrome is a exhaustive set of metabolic hazard variables of cardiovascular events including insulin obstruction, focal stoutness, diabetes mellitus, and hyperlipidemia, it is important to anticipate the danger of cardiovascular infection in these patients. In addition, restricted information are accessible assessing the prescient estimation of FRS in identifying the danger of CVD in patients with metabolic syndrome, and its replication appears to be necessary due to differences in the nature of CVD risk factors in various populaces.[2]

The Framingham risk score (FRS) is a streamlined and regular clinical tool for appraisal of the hazard level of coronary artery disease (CAD) just as for distinguishing people who were possibility for chance variables alteration. This tool comprises of different coronary risk parts including sexual orientation, age, systolic blood pressure, smoking, and lipid profile state.

AIM AND OBJECTIVES

AIM

To explore the association between Metabolic syndrome (MetS) and Framingham Risk Score (FRS) in coronary artery disease patients.

OBJECTIVES

To study the demographic, biochemical, obesity indices and angiographic profile (severity of CAD) of patients with coronary artery disease clinical features of patients with CAD. To study FRS in cases of CAD and compare severity of CAD in patients with Metabolic syndrome and non-Metabolic syndrome. To find relation between Metabolic syndrome and coronary artery disease risk factor (Age, gender, hypertension, and diabetes mellitus).

REVIEW OF LITERATURE

The Framingham risk score (FRS)

Framingham risk score, the most pertinent strategy for foreseeing a person"s possibility of creating cardiovascular disease (CVD). Since this risk score give a sign of the reasonable advantages of anticipation, it very well may be adequately helpful for both the patient and for the clinicians in choosing whether way of life alteration and preventive clinical treatment, and for persistent instruction, by recognizing people at expanded hazard for future cardiovascular occasions. In any case, regardless of the pertinence of this apparatus, it is feeble to assess some key variables, which impacted by dietary and metabolic examples alteration. Undoubtedly, it stayed obscure whether

the FRS is a decent indicator of metabolic unsettling influences basic ischemic coronary illness. Besides, the FRS has been appeared to overestimate coronary desease hazard in Europeans and hence its recalibration in exceptional populaces is suggested.[3]

Mets and FRS

Metabolic syndrome was less compelling at forecasting CHD than the FRS, which is reliable with the 2 ongoing US reports demonstrating the syndrome to be less prescient of CHD then the FRS. In the ongoing report of the National Heart, Lung, and Blood Institute and American Heart Association meeting procedures, examination of the Framingham information demonstrated that no preferred position is picked up in chance evaluation by adding the segments of Mets to the FRS. It isn't amazing that the FRS is a superior indicator of CHD. Forecast models dependent on Mets alone do exclude a few settled hazard factors for CHD, for example, serum overall cholesterol level and smoking status.

MATERIAL AND METHODS

Type of study

This was prospective, observational cohort study done in patient undergoing coronary angiogram (CAG) for evaluation of Coronary artery disease (CAD).

Total Patients enrolled

A total Nine hundred and seventy one patients undergoing coronary angiogram were included in present study.

Study Duration

This study was conducted over a period of 18 months (1st October 2016 to 31st March 2018)

Study setting: This study was carried out in ward patients undergoing CAG at Krishna Hospital and Medical Research Centre, Karad. in wards and ICU of Medicine and Cardiology.

Age ≤ 40 years and >75 years, Valvular heart disease, Cardiomyopathies, Congenital heart diseases, Chronic kidney disease and Hepatic dysfunction.

Patients were screened for the presence of metabolic syndrome according to IDF 2005 guidelines. All patients enrolled underwent detailed clinical examination and examination. A person is to be defined as having metabolic syndrome, according to IDF 2005 guidelines, he/she must have: [5,6]

Central obesity: waist circumference ≥90 cm for men and for ≥80 cm for women. Hypertriglyceridemia ≥150 mg/dl or any specific treatment and lower HDL cholesterol <40mg / dl in men and <50mg / dl in women.

Hypertension: blood pressure mm 130 mm Hg systolic, d 85 mm Hg diastolic or medication or fasting blood sugar ≥100 mg / dL or on pre-diagnosed type 2 diabetes mellitus or treatment.

Above mentioned values of waist circumference are specifically modified for South Asian population. Different values have been proposed for other ethnic groups.[5,6]

Patients complying with the above criteria have been participated in this study. Written and notified consent was obtained from the patients. A detailed case history was taken with special reference to the symptoms, past history of type 2 Diabetes Mellitus, hypertension, dyslipidaemia, smoking, alcohol consumption and tobacco chewing.

A physical examination was done including waist circumference, hip circumference, height and weight as per cardiovascular survey methods. Patient was asked to stand erect and breathe quietly. Measurement was carried out at the conclusion of usual depletion with tape snug around the body but not constricting. This measurement was according to the WHO guidelines. Hip circumference was measured at the widest portion of the buttocks, position of patient being same as that for measuring hip circumference. Waist to Hip ratio was calculated as: W:HR[7]

OBSERVATION AND RESULTS

Demographic profile and frequency distribution of age in study population. Present prospective observational study conduct a number of 971 patients, undergoing coronary angiogram (CAG) over period of 18 months. Of them 586 (60.35%) patients were males and 385 (39.64%) patients were females, predominated by male gender („p"<0.001). Total 203 (20.90%) patients were in age group between 41-50 years, of them 121 (59.6%) patients were males and 65 (40.39%) were females. Total 336 (34.60%) were in age group between 51-60 years, of them 189 (56.25%) patients were males and 147 (43.75%) were females. The distribution of patients according to gender showed that majority of patients were male 586 (60.35%) and females were 385 (39.64%). In study population there was no statistical significance among age group in both genders (χ2=6.4535;DF=3;„p"=0.0915).

Table 1: Demographic profile and frequency distribution of age of study population

Gender	Age group (years) 41-50 (n=203)		51-60 (n=336)		61-70 (n=339)		71-80 (n=93)		Total (n=971)	
		%		%		%		%		%
Male (n=586)	121	59.60	189	56.25	221	62.24	65	69.89	586	60.35
Female (n=385)	82	40.39	147	43.75	128	37.75	28	30.10	385	39.64

Total (n=971)	203	20.90	336	34.60	339	34.91	93	9.57	971	100

Prevalence of type 2 Diabetes mellitus in study population

Of total 971 patients undergoing coronary angiogram, 359 (36.97%) patients had a past history of type 2 Diabetes mellitus; of them 214 (59.61%) patients were males and 145 (40.38%) patients were females. Total 69 (19.22%) patients were in age group between 41-50 years, of them 49 (40.49%) patients were males and 20 (24.39%) patients were females. Total 119 (33.14%) patients were in age group between 51-60 years, of them 49 (25.92%) patients were males and 70 (47.91%) patients were females. Total 127 (35.37%) patients were in age group between 61-70 years, of them 82 (37.10%) patients were male and 45(35.43%) patients were females. Total 44 (12.25%) patients were in age group between 71-80 years of them 34 (52.30%) patients were males and 10 (35.71%) patients were females. Type 2 DM was predominantly present in age group 71-80yrs in male subjects undergoing CAG($\chi2=17.023$;DF=3;p=0.00071). Type 2 DM was predominantly present age in group 71-80yrs in female subjects undergoing CAG ($\chi2=12.74$;DF=3; p=0.00521).

Table 2: Prevalence of type 2 Diabetes mellitus in study population

	Age group(years) 41-50		51-60		61-70		71-80		Total	
Male (n=214)	(n=121)	%	(n=189)	%	(n=221)	%	(n=65)	%		%
	49	40.49	49	25.92	82	37.10	34	52.30	214	59.61
Female (n=145)	41-50 (n=82)		51-60 (n=147)		61-70 (n=128)		71-80 (n=28)		Total	
		%		%		%		%		%
	20	24.39	70	47.61	45	35.15	10	35.71	145	40.38
Total	69	19.22	119	33.14	127	35.37	44	12.25	359	100

Prevalence of hypertension in study population

A total 971 patients undergoing coronary angiogram, 318 (32.74%) patients had past history of hypertension, of them 172 (29.35%) patients were males and 146 (37.92%) patients were females. Total 77 (24.21%) patients were in age

group between 41-50 years, of them 40 (33.05%) patients were males and 37 (45.12%) patients were females. Total 90 (28.30%) patients were in age group between 51-60 years, of them 43 (22.75%) patients were males and 47 (31.97%) patients were females. Total 105 (33.01%) patients were in age group between 61-70 years, of them 58 (26.24%) patients were male and 47(36.71%) patients were females. Total 46 (14.46%) patients were in age group between 71-80 years, of them 31 (14.02%) patients were males and 15 (53.57%) patients were females. Hypertension was more prevalent in male age group 71- 80yrs (Chi sq.=16.439;DF=3;p<0.0009).Hypertension was more prevalent in female age group 51-60years. ($\chi2=7.007$;DF=3;„p"=0.7163).

Table 3: Prevalence of hypertension in study population

	Age group(years) 41-50		51-60		61-70		61-70		Total	
	(n=121)	%	(n=189)	%	(n=221)	%	(n=221)	%		%
Male (n=172)	40	33.05	43	22.75	58	26.24	31	14.02	172	29.35
	Age group(years) 41-50		51-60		61-70		71-80		Total	
	(n=82)	%	(n=147)	%	(n=128)	%	(n=28)	%		%
Female (n=146)	37	45.12	47	31.97	47	36.71	15	53.57	146	37.92
Total (n=318)	77	24.21	90	28.30	105	33.01	46	14.46	318	99.99

Consumption of tobacco as a contributing factor for coronary artery disease in the study population

Of total 971 patients, undergoing coronary angiogram, 241 (24.81%) patients had habit of tobacco consumption. Of them 223 (38.05 %) patients were males and 18 (4.67 %) patients were females. Total 53 (21.99%) patients were in age group between 41-50 years; of them all 50 (41.32%) patients were males and 3 (3.65%) were females. Total 81 (33.60%) patients were in age group between 51-60 years; of them all 73 (38.62%) patients were males and 8 (5.44%) were females. Total 73 (30.29%) patients were in age group between 61-70 years had; of them 73 (33.03%). Total 34 (14.10%) patients were in age group between 71-80 years; of them all 27 (41.53%) patients were males and 7 (20.58%). Of total 971 patients, undergoing coronary angiogram, total of 730 (75.18%) patients were non tobacco consumers. Tobacco consumption as a risk factor was predominantly present in male in age group 71-80 years in study population ($\chi 2 = 0.8908$;DF=3; „p"=0.8277). Tobacco consumption as a risk factor was predominantly present in female in age group 71-80 years in study population ($\chi 2=26.264$; DF=3; „p" <0.0001).

Table 4: Tobacco consumption as a risk factor for CAD in study population

Gender	Age group(years) 41-50 (n=121)		51-60 (n=189)		61-70 (n=221)		71-80 (n=65)		Total	
		%		%		%		%		%
Male (n=223)	50	41.32	73	38.62	73	33.03	27	41.53	223	38.05
	Age group (years) 41-50 (n=82)		51-60 (n=147)		61-70 (n=128)		71-80 (n=28)		Total	
		%		%		%		%		%
Female (n=18)	3	3.65	8	5.44	0	0	7	25	18	4.67
Total (n=241)	53	21.99	81	33.60	73	30.29	34	14.10	241	100

Demographic profile and frequency distribution of age according to Framingham risk score

Total 971 patients undergoing angiogram 203 (20.50%) patients were in age group of 41-50yrs,of them 121 (12.46%) were males of them 35 (28.9%) were at mild risk 51(42.2%) were at moderate risk and 35 (28.9%) were at high risk and 82 (8.4%) were females of them 46 (56.09%) were at mild risk,16 (19.51%) were at moderate risk and 20 (24.39%) were at high risk.336 (34.77%) patients were in age group of 51-60 yrs Of them 189 (19.46%) were males of them 36 (19.04%) were at mild risk 73(38.62%) were at moderate risk and 80 (42.32%) were at high risk and 147 (15.31%) were females of them 49 (33.33%) were at mild risk and 69(46.93%) were at moderate risk and 29(19.72%) were at high risk. 339 (36.94%) patients were in age group of 61-70yrs Of them 221 (22.76%) were males of them 31 (14.02%) were at mild risk 46(20.81%) were at moderate risk and 135 (61.08%) were at high risk and 128 (13.18%) were females of them 17 (13.28%) were at mild risk,70 (54.68%) were at moderate risk and 40 (31.25%) were at high risk.93 (9.57%) patients were in age group of 71-80 years Of them 65 (6.69%) were males of them 9 (9.67%) were at mild risk 6 (6.45%) were at moderate risk and 50 (53.76%) were at high risk and 28 (2.88%) were females of them 10 (10.75%) were at mild risk,3 (32.25%) were at moderate risk and 15 (16.12%) were at high risk. ($\chi 2=195.10$; DF=14;p<0.0001)

Table 6: Demographic profile and frequency distribution of age and severity of FRS risk score

Age (years)	group	Framingham risk score Less than ≤10	%	10 -20	%	>20	%	Total	%
41-50 (n=121)	M	35	28.9	51	42.2	35	28.9	121	12.46
41-50 (n=82)	F	46	56.09	16	19.51	20	24.39	82	8.4
51-60 (n=189)	M	36	19.04	73	38.62	80	42.32	189	19.46
51-60 (n=147)	F	49	33.33	69	46.93	29	19.72	147	15.31
61-70 (n=221)	M	31	14.02	46	20.81	135	61.08	221	22.76
61-70 (n=128)	F	17	13.28	70	54.68	40	31.25	128	13.18
71-80	M								

(n=65)		9	9.67	6	6.45	50	53.76	65	6.69
71-80	F								
(n=28)		10	10.75	3	32.25	15	16.12	28	2.88
Total									
(n=971)		233	23.99	334	34.39	404	41.60	971	100

DISCUSSION

The current study was a prospective and observational study involving a total of 971 patients who had undergone coronary angiogram (CAG) for the 18-month CAD assessment.

In present study 359 (36.97%) patients had a past history of type 2 Diabetes mellitus of them 214 (36.51% of total males) patients were males and 145 (37.66% of total females) patients were females. The mean for fasting blood sugar level was 134.72 (+50.76) mg/dl. Zarich S. et al observed that the diabetes mellitus was present in 23% of their study population, less than present study, which was less than our study while Khanna R. et al observed a 36% cases had diabetes which was similar to our study results.[8,9]

Of total 318 (32.74%) patients had past history of hypertension, of them 172 (54.08%) patients were males and 146 (45.91%) patients were females. While another study by Khanna R. et al had observed that 64% cases had hypertension which was more than present study findings.[8]

Dada et al quoted that 28.82% patients were smokers which was comparable with present study.[4] Santos et al quoted that In their study 50% patients were smokers which was more than present study.[11] Bansal et al observed in their study 12.5% patients were smokers which was less than our present study.[12] Huang et al observed in their study that 23.5% patients had history of smoking which was comparable with present study.[13]

Yousefzadeh et al found to have that mean waist circumference of 93.06±10.99 which was relatively more than present study.[14]

Santos et al observed that in their study 43.5% patients had type 2 diabetes mellitus which was relatively more than our study.[10] Bansal et al quoted that 14.2% patients had type 2 diabetes mellitus whis was less than present study.[12] Huang et al quoted that 2.4% patients had type 2 diabetes mellitus which was much less than present study.[13]

CONCLUSION

Metabolic syndrome and the FRS are the two different parameters for evaluating the risk of cardiovascular disease, which include different parameters like waist circumference (Metabolic syndrome), and smoking, age and gender in (FRS). In present study about half of population had significant abnormality on coronary angiogram. About, one-third of population had Framingham risk score (FRS) between 10-20 and two-third of population had Framingham risk score more than 20. About half of the population had metabolic syndrome. Amongst abnormal coronary angiogram about 50% of patients had single vessel disease. The FRS has a strong association with the extent of coronary artery disease and the waist circumference. The development of metabolic syndrome was positively associated with the frequency of coronary artery disease. There is no significant difference of presence of CAD amongst patients with metabolic syndrome and without metabolic syndrome. FRS and metabolic syndrome had critical contribution as score and risk factors with presence of and severity of CAD. To conclude it was suggested to incorporate FRS and components of metabolic syndrome for better management and risk stratification of CAD at large.

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