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ROLE OF DIABETES, HYPERTENSION, WAIST HIP RATIO, SMOKING AND ANKLE BRACHIAL INDEX IN PREDICTION OF SEVERITY OF CORONARY ARTERY DISEASE BY SYNTAX SCORE .

Cardiology

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ABSTRACT

INTRODUCTION : The Syntax score is a comprehensive, angiographic tool in grading the complexity of coronary artery disease (CAD).
MATERIALS AND METHOD: Hospital based observational study was conducted in patients with coronary artery disease presenting to the KING GEORGE HOSPITAL, Visakhapatnam during study period between August 2017 to July 2018.
RESULTS : SYNTAX scores of patients with diabetes mellitus 30.85 ± 14.93 vs 15.91 ± 12.14 in non-diabetics , hypertensives 24.32 ±15.20 vs 16.03 ± 13.13 in non-hypertensives , smokers 27 ± 17.08 vs 17.86 ±12.59 in non-smokers . The mean SYNTAX score of patients with normal Ankle Brachial Index i.e, 16.31 ± 13.49 vs 28.97 ±13.96 in abnormal .
CONCLUSION : The present study concludes that Diabetes, hypertension, smoking, Ankle brachial index are having greater association with severity of atherosclerosis by SYNTAX score except for Waist Hip ratio.

KEYWORDS

Syntax Score , Coronary Artery Disease (cad) ,visakhapatnam

INTRODUCTION

Coronary artery disease (CAD) is one of the leading causes of morbidity and mortality in India. Nowadays there is an increasing incidence and prevalence of associated risk factors like Diabetes Mellitus (DM), Hypertension (HTN), smoking, obesity and dyslipidaemia and hence the severity, complexity of the coronary lesion. [1]In the setting of above coronary risk factors there is high burden of the atherosclerosis in the peripheral arteries too, which is also an index of coronary atherosclerotic burden and has been considered as a CAD equivalent. [2]The importance of the association between diabetes and CHD can be illustrated by findings from the Framingham Heart Study and the Multiple Risk Factor Intervention Trial (MRFIT)and also from the recent CONFIRM registry and ACCORDtrials.TAMI trial provided data that diabetic patients had a significantly higher incidence of multivessel disease.[3,4]In the Tandolapril Cardiac Evaluation (TRACE) study,a database analysis showed an increase in mortality around 23% compared to patients without abdominal obesity.[5]The CONFIRM registry clearly demonstrated that diabetic patients had a higher prevalence, extent, and severity of CAD compared with matched non-diabetics.[6] Numerous epidemiological studies have shown that the presence of HTN increases the risk of CHD, not only in at risk populations but also in the general population. The prevalence of CHD is closely related to the BP level, especially systolic BP. [7]ABI is an indicator of atherosclerosis at other vascular sites and can serve as a prognostic marker for cardiovascular events and functional impairment even in the absence of symptoms of PAD. [8]The ABI has also been called the ankle-arm index, the ankle-brachial blood pressure index, the ankle-arm ratio or the Winsor Index. The term ABI was recommended by the recent American Heart Association (AHA) Proceedings on Atherosclerotic Peripheral Vascular Disease on the basis of its current widespread use in contemporary literature.[9,10]. Therefore, ABI measurement is widely recommended for PAD screening. ABI of < 0.9 indicates PAD, is a strong predictor of cardiovascular events like myocardial infarction, stroke and death.[11]Waist–hip ratio (i.e. the waist circumference divided by the hip circumference) was suggested as an additional measure of body fat distribution and was associated with an increased risk of myocardial infarction.[12,13]Arterial stiffness plays a key role in the pathophysiology of CVD and is recognized as an independent risk factor for CVD.[14]The Syntax score is a comprehensive, angiographic tool in grading the complexity of coronary artery disease (CAD).[15]

MATERIALS AND METHODS

STUDY DESIGN: Hospital based observational study.
STUDY PATIENTS : Patients with coronary artery disease presenting to the KING GEORGE HOSPITAL, Visakhapatnam.
STUDY PERIOD: August 2017 to July 2018.

SAMPLE SIZE :
Calculated based on the 7 % prevalence of Coronary Artery disease in Urban population in India . Taking proportion as 7 % with 95% confidence interval and 5% permissible error (Absolute Precision).

$n = Z^2P(1-P)/d^2$
$= (1.96)^2 * 0.07 * 0.93/(0.05)^2 = 101$.

The minimum sample to be considered is 101 , in the present study 192 study subjects were included. INCLUSION CRITERIA :Coronary artery disease patients including STEMI, Unstable Angina, NSTEMI and chronic stable angina patients as per ACC/AHA criteria. EXCLUSION CRITERIA :Dilated cardiomyopathy, ischemic cardiomyopathy, valvular heart disease and Chronic kidney disease patients with coronary artery disease were excluded from the study.

PROCEDURE:
The suitable defined patients are screened for diabetes, hypertension, history of smoking, ankle brachial index, W/H ratio and syntax score of coronary angiographic lesions by Computer Assisted Syntax Score Calculator are calculated and analysed the data for its association. Ankle Brachial Index Cutoff is 0.9 .The systolic pressures are measured in the order of right arm, right PT, right DP, left PT, left DP, left arm, right arm. According the Asian population standards, abnormal waist hip ratio is taken as ≥ 0.88 in males and ≥ 0.81 in female. Patients with high blood sugars on admission who were not a known diabetic were further evaluated for Hba1c and who met the criteria above defined for diabetes were included in those study. The suitable defined patients were interrogated for the history of smoking and patients were excluded from the study who quit smoking for more than 3 years.

All data collected was tabulated and analysed statistically with SPSS software version 17.Unpaired t test was used when variables are normally distributed and Mann Whitney U test and Chi square were used for non-normally distributed variables

RESULTS:

A total of 192 study participants were included .Mean age of presentation was 53.53 ± 10.01 years with range of 24-75 years and the maximum number of patients belong to the age group of 51-60 years of age.135 male patients (70%) and 57 female patients (30%) were present. The prevalence of the Coronary Artery disease is more

common in males when compared to females.

Table 1 : showing relation between SYNTAX score and diabetes

	Diabetes status	Mean	SD	P-value
	Diabetes	30.858	14.9364	<0.01*
	No Diabetes	15.912	12.1498	
Female	No Diabetes	14.03	9.52	<0.01*
	Diabetes	33.95	11.85	
Male	No Diabetes	16.64	13	<0.01*
	Diabetes	29.34	16.14	

* Significant

Diabetes was seen in 35% (n = 67) of the patients and it is 38.6% (n = 22) among females and 33.3% (n = 45) among males.SYNTAX scores of patients with diabetes mellitus , compared to their counterparts were significantly higher and also in both the genders . (p < 0.01).Patients with diabetes had more complex coronary artery disease when compared to patients without diabetes , DVD (14.06% vs 12.5 %) and TVD (13.2 % vs 9.8 %)which was statistically significant.(P value <0.01)

Table 2 : showing relation between SYNTAX score and Hyper tension

	HTN Status	Mean	SD	P-value
	HTN	24.322	15.2068	<0.01*
	No HTN	16.034	13.1343	
Female	No HTN	15.83	12.44	<0.01*
	HTN	25.15	14.29	
Male	No HTN	16.11	13.52	<0.01*
	HTN	23.96	15.66	

* Significant

Over all HTN was seen in 61 % (n = 118) of the patients and among them males and females were 70% (n = 82) and 30% (n = 36).SYNTAX scores of patients with HTN , compared to their counterparts were significantly higher and also in both the genders. (p < 0.01).Patients with HTN had more complex coronary artery disease when compared to patients without HTN with more prevalence of DVD (7.29% vs 19.27%) and TVD (5.2 % vs 17.7 %) among hypertensive which was statistically significant (P value <0.01).

Table 3 : Showing relation between SYNTAX score and Smokers

	Smokers	N	Mean	SD	P-value
	Yes	67	27.224	17.0839	<0.05*
	No	125	17.86	12.5999	
Female	No	34	18.15	11.65	<0.05*
	Yes	23	27	16.3	
Male	No	91	17.75	13	<0.01*
	Yes	44	27.34	17.76	

* Significant

SYNTAX scores of patients who were smokers , compared to their counterparts were significantly higher and also in both the genders. (p< 0.01). In the present study, smokers comprise 32.5% (n = 67), of the study population and among them, 40% (n = 23) is seen among females and 60% (n = 44) seen among males. Patients who were smokers had more complex coronary artery disease when compared to patients without smoking with more widespread distribution of the disease among smokers which was statistically significant (p value 0.01).

Table 4 : Showing relation between SYNTAX score and W/H ratio

	W/H ratio	N	Mean	SD	P-value
	Abnormal	183	21.247	14.6391	0.638
	Normal	9	18.95	20.9078	
Female	Normal	0	-	-	
	Abnormal	57	21.72	14.27	
Male	Normal	9	16.06	18.15	0.41
	Abnormal	126	21.22	15.1	

In the present study, abnormal W/H ratio was observed in 95% (n = 183) of the patients and among them females and males were 31% (n = 57) and 69% (n = 126)respectively. Patients with abnormal W/H ratio though had higher mean of SYNTAX scores when compared with their counter parts, it was not statistically significant. (p = 0.638).

Table 5 : Showing relation between SYNTAX score and ABI (Ankle Brachial Index)

	ABI	N	Mean	SD	P-value
	Normal	119	16.315	13.4929	<0.01*
	Abnormal	73	28.973	13.965	
Female	Normal	30	16.43	13.36	<0.01*
	Abnormal	27	27.59	13.09	
Male	Normal	76	16.28	14.43	<0.01*
	Abnormal	59	26.81	14.42	

* Significant

In the present study, abnormal ABI was observed in 44% (n = 86) of patients among them 68% (n = 59) and 32 % (n = 27) were males and females respectively. SYNTAX scores of patients with abnormal ABI , compared to their counterparts were significantly higher and also in both the genders. (p <0.01).

DISCUSSION :

Bhattacharya et al in their study including 102 patients showed significantly higher SYNTAX scores in diabetic population. (p = 0.003).[16]Mukund Srinivasan et al with the total study patients of 290 , showed that diabetes is associated with higher syntax scores when compared with their counterparts (p = 0.004).[17]In FREEDOM trial studying syntax score of diabetic patients, Syntax Scores (SS) were measured in all stenosis ≥50%,clearly suggesting diabetes is associated with increased atherogenicity and complexity of the disease.[18] Avishek et al in his study showed that patients with diabetes had higher mean syntax score when compared with non diabetics and is more significant when associated with a higher BMI.(p = < 0.001).[19]Mukund Srinivasan et al with the total study patients of 290 , showed that HTN is not independently associated with higher syntax scores when compared with their counterparts (p = 0.616).[17]Bhattacharya et al showed the impact of Hypertension on the syntax score, The p value between the groups for hypertension found to be not significant. indicating that the hypertension is not a predictor of angiographic severity of CAD.[16]

El kersh et al their study the mean and SD of SX score was 20 ± 7.2 in hypertensive patients vs. a median result of 10 and IQR of (10, 15) in Non-hypertensive patients (p =0.003).[20]Avishek et al More than 71% of the study population were smoker and had a median syntax score of 17.00 ± 11.65 compared to non-smokers who had median syntax score of 14.80 ± 11.97 and the difference is not found to be statistically significant (p value = 0.3106).[19]Mukund Srinivasan et al with the total study patients of 290 , showed that smoking is not independently associated with higher syntax scores when compared with their counterparts (p = 0.229).[17]El kersh et al in their study in relation to smoking, the mean and SD of SX score was 20.1 ± 7.3 in smokers vs. 15 (10, 21.5) as median and IQR in non-smokers (p = 0.006).[20]Avishek et al in this study, the average syntax score in the four BMI groups were 15.7, 12.97, 16.14 and 16.55 respectively, which suggest that the severity and complexity of CAD significantly increases above BMI of 25 kg/m2.[19] Bhattacharya et al in their study showed with the increasing syntax score the percentage of people with obesity increased, but the p value between the groups for obesity found to be not significant p=0.213, indicating that the obesity is not a predictor of angiographic severity of CAD. [16]In the study by el kersch et al, There was a weak positive correlation between BMI and SX score, r(50) = 0.182, p = 0.091.[20]Nobutaka Ikeda et al in their analysis, low ABI (< 0.9) had significantly higher Syntax score than patients with normal ABI ≥ 0.9 (p< 0.0001). Naoto Hashizume et alin their 1486 case grouped into Low ABI, borderline ABI, normal ABI to be 200, 201 and 1067 respectively. The SYNTAX score was significantly higher in patients with low ABI group (13.9±9.8 vs. 13±29.6 vs. 11.8±8.1, p=0.010). In addition, multivariate logistic regression analyses in all patients revealed that ABI value was independent negative predictor (ABI per 0.1 decrease, OR were 0.870, 95%CI 0.788-0.961, p=0.006) of coronary artery lesion complexity (the SYNTAX score≥22). [21]A study in Taiwan by Chang et indicated that from atherosclerotic risk factors, diabetes, hypertension and smoking were significantly higher in abnormal ABI patients.[22]

CONCLUSION :

The present study concludes that Diabetes, hypertension, smoking, Ankle brachial index are having greater association with severity of atherosclerotic disease by SYNTAX score except for Waist Hip ratio.

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