Factors Affecting the Severity of Coronary Artery Disease using SYNTAX Score in a South Indian Rural Center: A Retrospective Study

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ABSTRACT

Introduction: SYNTAX Score (SS) is the most comprehensive anatomical characterization of Coronary Artery Disease (CAD). With significant population of diabetics and hypertensive patients in India, the vulnerability to a possible coronary artery disease catastrophe increases many folds.

Material and methods: In this retrospective study, SS of 957 patients that underwent coronary angiography was calculated. The patients were then classified on bases of age, gender, and comorbidities like diabetes and hypertension.

Results: The results suggest that amongst the groups, diabetics had statistically significant higher Syntax score than their non-diabetic counterparts, with $p<0.05$.

Conclusion: When Syntax Score was calculated and when variables like age, gender, presence of hypertension, diabetes were checked with the SS, diabetics were shown to be having significantly higher SS than the non-diabetics.

Keywords: SYNTAX Score, Revascularization, Coronary Artery Disease, India data

INTRODUCTION

Coronary angiography is the gold standard to characterize coronary vessel anatomy. It is used diagnostically and also helps in opting strategy for revascularization. SYNTAX score (SS) is an angiographic grading tool to detect the complexity of the coronary artery disease (CAD). The SYNTAX angiographic grading tool was published in 2005. The SS was developed by the research group at the Thoraxcenter, Erasmus Medical Center in the Netherlands, headed by senior investigator Prof. Patrick Serruys.[1,2]

SS is based on the anatomical characteristics of coronary artery disease, recommended by practice guidelines to decide between percutaneous coronary intervention (PCI) with drug-eluting stent or coronary artery bypass graft (CABG) surgery in patients with unprotected left main coronary artery stenosis or three-vessel disease.[3] Depending on several angiographic characteristics, the lesion is given a corresponding point value. Scores of individual lesions are summed to derive the final score. This score is typically categorized in a tripartite fashion as determined in the SYNTAX trial (low: 0 to 22, intermediate: 23 to 32, high: >32)[4,5]

SYNTAX Score is dependent on the anatomical features of abnormal vessels and characteristics of the lesion such as, the total number of lesions, bifurcation or trifurcation lesions, thrombus formation, calcification, total occlusion, aorto-ostial stenosis; however clinical variables are not taken into account.[6,7] The patients with low SYNTAX score had low rates of MI or death whereas those having highest tertile of score had the worst clinical outcomes. India has a diaspora which represents the optimum requirements for vascular injury to occur. Age related changes, disease like diabetes, hypertension contribute to changes in the vasculature. This change leads to disease such as CAD. In general population prevalence of CAD is reported to be 1.6% to 4.1%. The prevalence of CAD in diabetic population ranges from 9.5% to as high as 55% which is high and severe.[8] Use of a risk score in specific group which are at high risk may give valuable data as to how we choose the specified therapy in them. This classification of choice of treatment in the risk groups is entirely a different study. This study however addresses whether there is any such difference in the SS amongst the risk groups or to assess which risk group is the first among equals.

MATERIAL AND METHODS

This study was a Retrospective one involving 957 patients. Approval from the institutional ethical committee was obtained. All subjects (>18 years of age) irrespective of gender presenting with coronary artery disease (CAD) and in whom angiography was done were included in the study. Data from files having the minimum required data as per the proforma was taken.

The hospital records of the patients with coronary artery disease who visited the tertiary care centre in South India, during the period from July 2017 to April 2019 were reviewed. Data was collected by a technical assistant from the Medical Record Department from the files of all the patients who underwent angiography during the said period. Patient demographics of gender and age, co morbidities like diabetes mellitus, hypertension were noted. Data analysis was done on blinded excel sheet (excluding the patients' names and any other identifiers). Patient's confidentiality was maintained throughout the

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Group Statistics					
Sex		**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Syntax score	Male	525	14.49	9.648	.421
	Female	166	14.61	9.525	.739

Table-1: Gender distribution

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
SYNTAX score	Equal variances assumed	.824	.364	-.146	689	.884	-.125	.857	-1.807	1.557
	Equal variances not assumed			-.147	280.148	.883	-.125	.851	-1.800	1.550

Table-2:

Group Statistics					
DM		**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
SYNTAX score	No DM	417	13.81	9.650	.473
	DM	233	15.69	9.438	.618

Table-3: Diabetic and Non-diabetic population

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
SYNTAX score	Equal variances assumed	2.460	.117	-2.393	648	.017	-1.874	.783	-3.412	-.336
	Equal variances not assumed			-2.408	489.132	.016	-1.874	.778	-3.403	-.345

Table-4:

HTN		N	Mean	Std. Deviation	Std. Error Mean
SYNTAX score	No HTN	341	14.50	10.223	.554
	HTN	308	14.50	8.948	.510

Table-5: HTN and Non HTN Population

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
SYNTAX score	Equal variances assumed	.096	.757	.010	647	.992	.008	.758	-1.480	1.495
	Equal variances not assumed			.010	646.374	.992	.008	.753	-1.470	1.486

Table-6:

data collection process. Statistical analysis was done using SPSS.

RESULTS

Total 957 subjects irrespective of age and gender presenting with CAD and in whom coronary angiogram was done were included in the study. Baseline data (gender) of 691 patients was available. From 691 patients 166 were female and 525 were male as depicted in Figure No. 1. Patients were of age ranging from 22 to 100. Average age was 56. Diabetes data for 650 was available. 417 patients were non diabetic and 233 patients were diabetic as shown in figure no 2. Hypertension data of 649 patients was available, from these 341 patients were not having hypertension where 308 patients were having hypertension as shown in figure 3. Data Analysis done is depicted in table number 1, 2 3, 4, 5 and 6. The results suggest amongst the groups namely age, gender, hypertension and diabetes, the diabetic group had higher SS (p<0.05) than the non-diabetics. Other parameters, although showed numerical difference, there was no statistical significance.

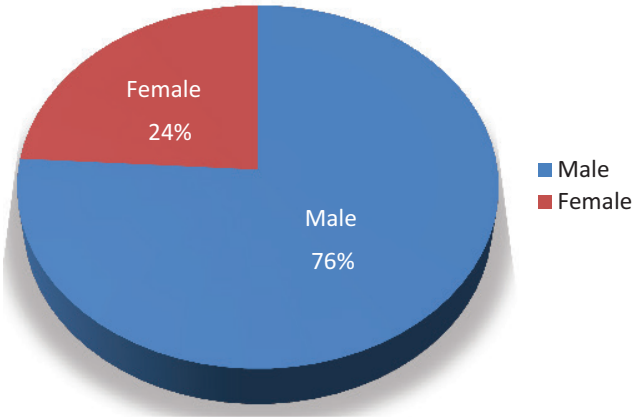

Figure-1: Gender distribution in the data

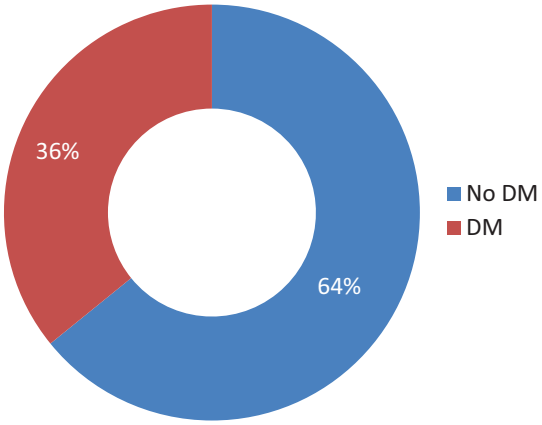

Figure-2: Diabetic and non-diabetic population

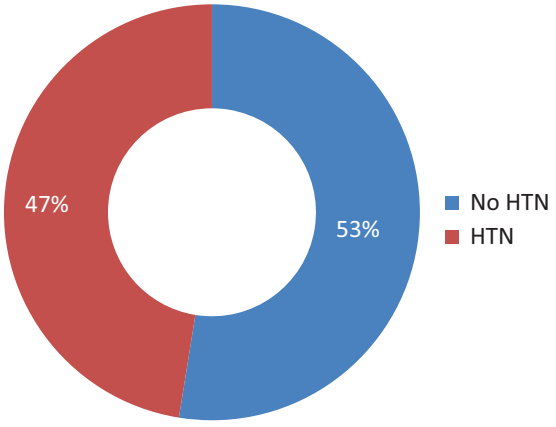

Figure-3: HTN and Non HTN population

DISCUSSION

There is more than enough of evidence that the prevalence of coronary artery disease (CAD) in diabetic population is high compared to the non-diabetics. It is also found that patients with diabetes mellitus have a greater extent of coronary atherosclerosis and higher plaque burden, compared to non-diabetics. Coronary artery revascularization in patients with DM poses a challenge because diabetes has been found to increase the risk of adverse outcomes after coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI).[9] In patients with diabetes mellitus, coronary artery disease tends to be more diffuse, complex, and associated with increased morbidity and mortality from cardiovascular disease, as compared with non-diabetic patients.[10]

Some studies found that, SS, which measures severity and extent of coronary disease, number and location of lesions, number of vessels, type of occlusion, percentage of stenosis, involvement of thrombus or calcification, duration of occlusion and predict long-term clinical outcomes in patients with diabetics and coronary disease which cannot be validated in this study as it was not part of the protocol for this retrospective study[11]

When comparing all clinical and angiographic factors, it turns out that the SS, in addition to age, gender, smoking, diabetes and acute coronary syndromes, can be one of the predictors of cardiac mortality and major adverse cardiac events in patients undergoing multi-vessel and, specifically, unprotected left main PCI[7]. A SS of >34 also identifies a subgroup of patients with a particularly high risk of cardiac death independent of age, gender, acute coronary syndrome, ejection fraction, Euro score and degree of revascularization.[2]

There was indeed a positive relation found statistically in this study between the complexities of CAD which was considered by the severity of SS in diabetic as compared to other risk groups.

Joseph Chicha et. al. reported difference in severity of coronary artery disease in men and women. Women were more likely to have normal coronary arteries then in age matched men.[12] Other studies have also reported that age matched women, comparatively have lower burden of obstructive and non obstructive CAD.[13,14,15,16]

The data from this study does not find any statistical difference in gender implying that women or men both had equal burden of CAD. This is very significant finding and maybe specific to the population of India. A study done to evaluate increasing number of women undergoing angiography found that typical angina was more prevalent in young women and

acute coronary syndrome was as common in young (<55 years) as in elderly (>55 years) women.[17] This points out to the fact that more data with regards to gender relation and CAD is needed in the country. Our finding indirectly support this finding, as gender did not show statistical influence among higher or lower SS, meaning women are equally prone to severity of the coronary artery disease as men.

CONCLUSION

The study profiles a sub-group of south Indian people seeking angiography for suspected CAD. When Syntax Score was calculated and when variables like age, gender, presence of hypertension, diabetes were checked with the SS, diabetics were shown to be having significantly higher SS than the non-diabetics. Interestingly, SS of men did not show statistical difference when compared with SS of women. This points out to the interesting point that women in South India, do not probably get gender advantage as seen in previous global studies. Further studies (both, prospective and retrospective) conducted on a pan-India basis are recommended to confirm or refute the study findings.

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