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A STUDY OF GLYCOSYLATED HEMOGLOBIN IN ACUTE CORONARY SYNDROME- A CASE SERIES STUDY CONDUCTED IN BAGALKOT DISTRICT, KARNATAKA.

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Abstract

Background

HbA1c has been identified as an independent predictor of all-cause and cardiovascular disease mortality in population-based studies involving diabetes and nondiabetic cohorts. [1 2 3 4] Every 1% increase in HbA1c is linked to a 30% increase in all-cause mortality and a 40% increase in CVD mortality among those with diabetes. [5]

Methods

A case series study of 62 patients admitted in S. Nijalingappa Medical College and HSK Hospital, Bagalkot district, Karnataka, who were diagnosed with Acute Coronary Syndrome in the form of STEMI(ST segment elevation myocardial infarction), NSTEMI(Non ST segment elevation myocardial infarction), USA(Unstable angina), were included and laboratory parameters like complete blood count, HBA1C and cardiac panel were done.

Results

Total of 62 patients with Acute Coronary Syndrome were included in our study, out of which majority of them are in the age group of 60-80years (58.1%) with male preponderance (62.9%), three month blood sugar value (HBA1C) of >6.5 were 72.6% of the patients, STEMI patients were predominant (66.1%) and in patients of HBA1C of >6.5, triple vessel disease (TVD) were more prevalent in the study population.

Keywords

Acute coronary syndrome, HBA1C

INTRODUCTION:

HbA1c has been identified as an independent predictor of all-cause and cardiovascular disease mortality in population-based studies involving diabetes and nondiabetic cohorts. [1 2 3 4] Every 1% increase in HbA1c is linked to a 30% increase in all-cause mortality and a 40% increase in CVD mortality among those with diabetes. [5]

A significant proportion of patients admitted with high risk non-ST elevation acute coronary syndrome had previously undetected diabetes or prediabetes as assessed by HbA1C or FBS after

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admission [6] HbA1C could be used to risk stratify non-diabetic patients for CAD and its severity, independent of established cardiovascular risk markers.

Hyperglycemia on admission appears to be a predictor of short-term death in patients admitted with acute myocardial infarction, but it's uncertain if it can predict long-term mortality with the same precision. [7] The importance of HbA1C in DM diagnosis and therapeutic decision-making has been proven. However, the role of HbA1C levels in the early and late stages of ACS has yet to be determined. [8]

Aim :

a) To study the blood levels of HbA1C in patients of ACS at time of admission.

b) To compare the relationship between severity of disease and HbA1C.

Methodology:

A. DESIGN OF THE STUDY:

Study design: Case series study

Sample size and its calculation: Reference article- A Study of the relation of HbA1c levels in acute coronary syndrome and its complications.

Journal name- Journal Of Medical Science And Clinical Research

Journal date- 2019

Author- Ashraf B.K. *et al*.

From the above study NSTEMI is taken as factor and p value is 63.3% for 12% error and for 95% confidence level.

By using "OpenEpi version-2" software we got sample size 62.

by using formula:

$$n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$$

Inclusion criteria

All patients admitted to the hospital with Acute Coronary Syndrome diagnosed in the form of STEMI(ST segment elevation myocardial infarction), NSTEMI(Non ST segment elevation myocardial infarction), USA(Unstable angina).

Exclusion criteria

1) Haemoglobinopathies
2) Hemolytic anemia
3) Sepsis
4) Not willing for participation in the study

B. PARAMETERS STUDIED AND TECHNIQUES TO BE EMPLOYED:

Ethical clearance for the our study obtained from the Institute's Ethics Committee (Human Studies). Patients with acute coronary syndrome admitted in HSK HOSPITAL were recruited, based on the inclusion/exclusion criteria as already mentioned.

Collection of samples

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Blood samples will be drawn from the antecubital vein following light application of a tourniquet. Biochemical parameters will be estimated in the 5 ml blood sample drawn from all study subjects. Blood investigations like complete blood count and HbA1C will be done.

During the study period, the following parameters will be estimated:

- Complete blood count
- HbA1C
- Cardiac Panel

Statistical Analysis

Qualitative data represented in the form of frequency and percentage. Association between variables were assessed with Chi Square test.

Quantitative data represented using mean & Sd. ANOVA was used to compare the mean difference between groups.

A P value of <0.05 was considered statistically significant.

IBM SPSS Version 28 for windows was used to do statistical analysis.

Results:

Table 1: Descriptive analysis of age distribution in the study population (N=62)

Age	No of Cases	Percent
< 40	3	4.8
40-59	23	37.1
60-79	36	58.1
Total	62	100.0

Among the study population, 3 (4.8%) participants were aged <40 years, 23 (37.1%) participants were aged 40 to 59 years and 36 (58.1%) participants were aged 60 to 79 years. (Table 1 & figure 1)

Figure 1: Bar chart of age distribution in the study population (N=62)

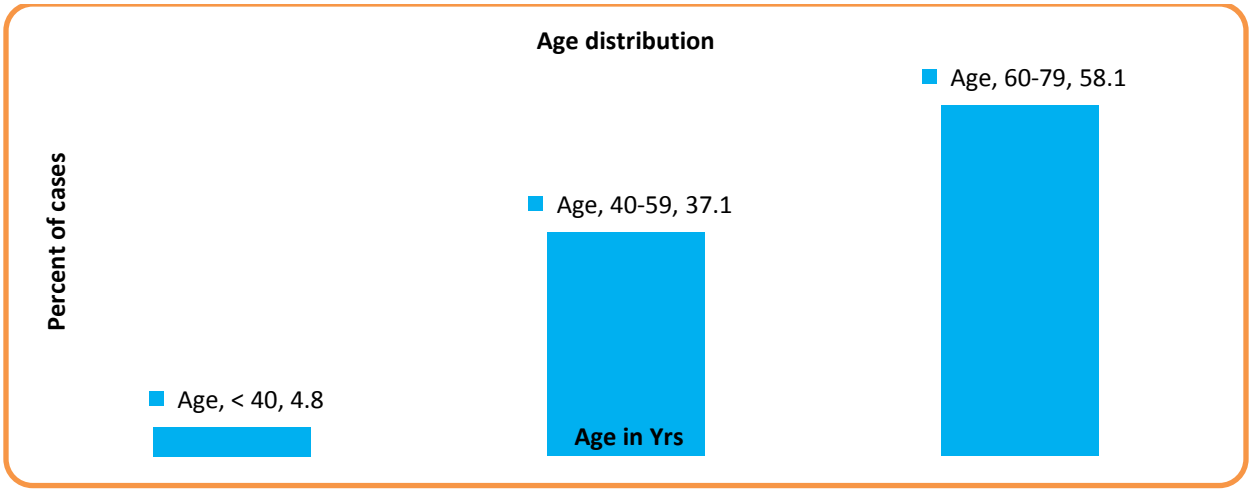

Table 2: Descriptive analysis of gender in the study population (N=62)

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Gender	No of Cases	Percent
Male	39	62.9
Female	23	37.1
Total	62	100.0

Among the study population, 39 (62.9%) participants were male and 23 (37.1%) were female. (Table 2 & figure 2)

Figure 2: Chart of gender in the study population (=62)

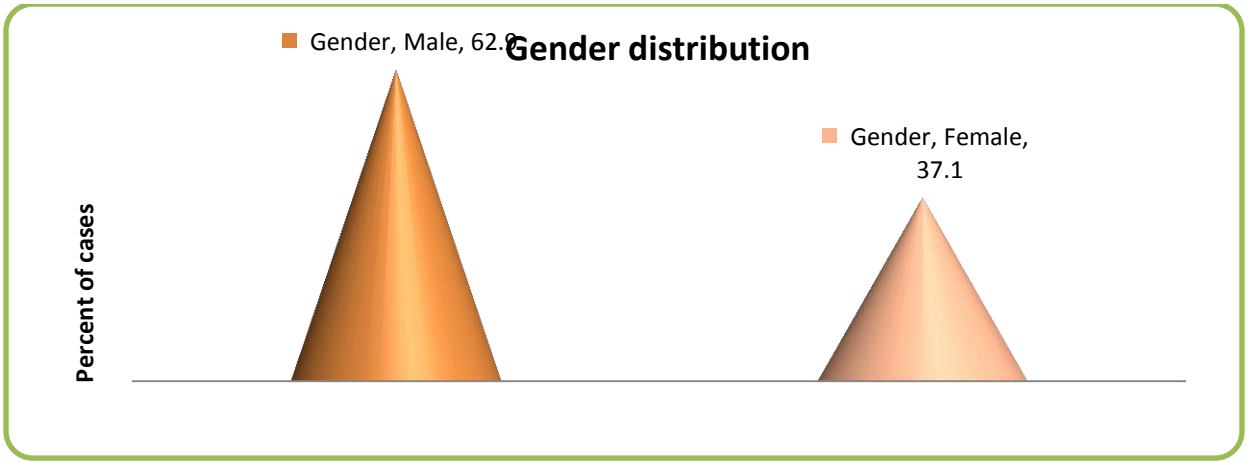

Table 3: Descriptive analysis of Hba1c in the study population (N=62)

HbA1c	No of Cases	Percent
< 6.5	17	27.4
> 6.5	45	72.6
Total	62	100.0

Among the study population, 17 (27.4%) participants had hba1c <6.5 and 45 (72.6%) participants had hba1c >6.5. (Table 3 & figure 3)

Figure 3: Pie chart of Hba1c in the study population (N=62)

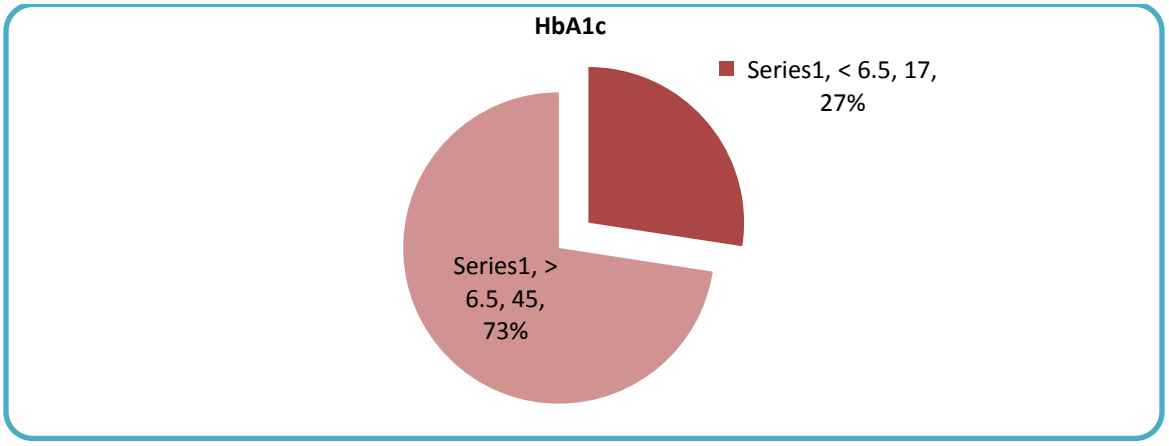

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Table 4: Descriptive analysis of ACS in the study population (N=62)

ACS	No of Cases	Percent
NSTEMI	19	30.6
STEMI	41	66.1
USA	2	3.2
Total	62	100.0

Among the study population, 19 (30.6%) participants were NSTEMI, 41 (66.1%) participants were STEMI and 2 (3.2%) participants were USA. (Table 4 & figure 4)

Figure 4: Pie chart of ACS in the study population (N=62)

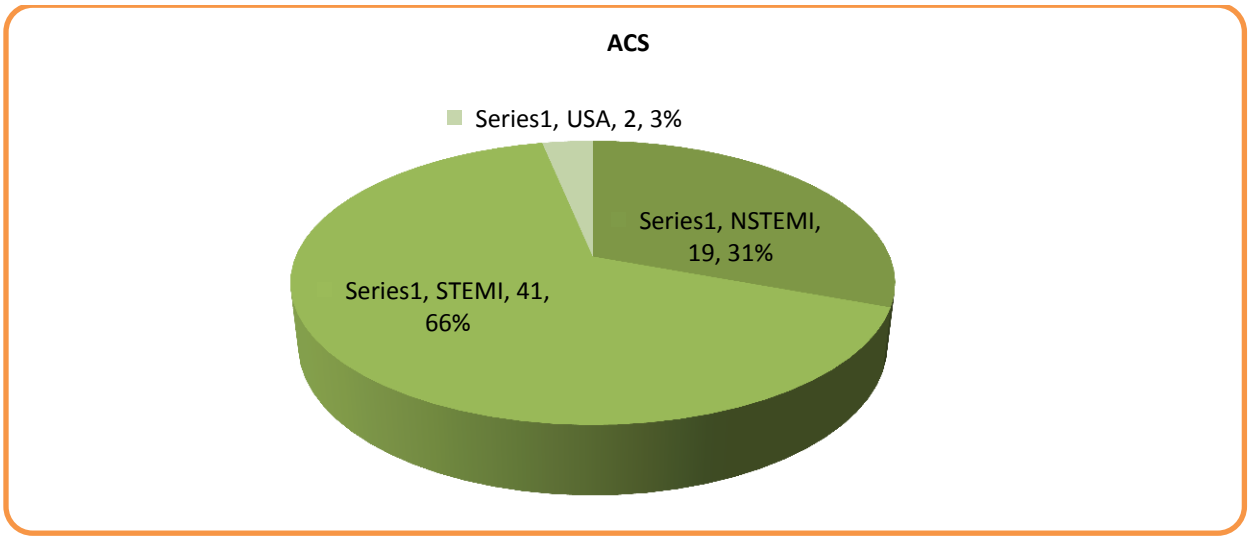

Table 5: Descriptive analysis of severity in the study population (N=62)

Severity	No of Cases	Percent
DVD	21	33.9
SVD	20	32.3
TVD	21	33.9
Total	62	100.0

Among the study population, 21 (33.9%) participants had severity of DVD, 20 (32.2%) participants had severity of SVD and 21 (33.9%) participants had severity of TVD. (Table 5 & figure 5)

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Figure 5: Bar chart of severity in the study population (N=62)

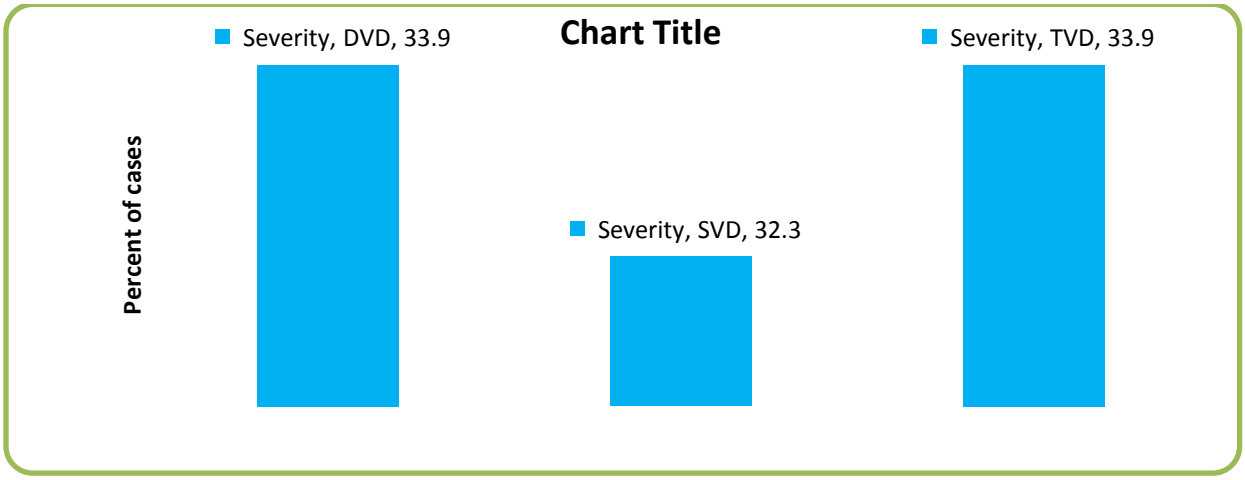

Table 6: Comparison of ACS between gender (N=62)

ACS	Male	Female
NSTEMI	8	11
STEMI	31	10
USA	0	2
Total	39	23
Chi Square test P<0.008, HS		

The difference in ACS between gender was found to be significant with a P- value of 0.008. (Table 6 & figure 6)

Figure 6: Clustered bar chart of comparison of ACS between gender (N=62)

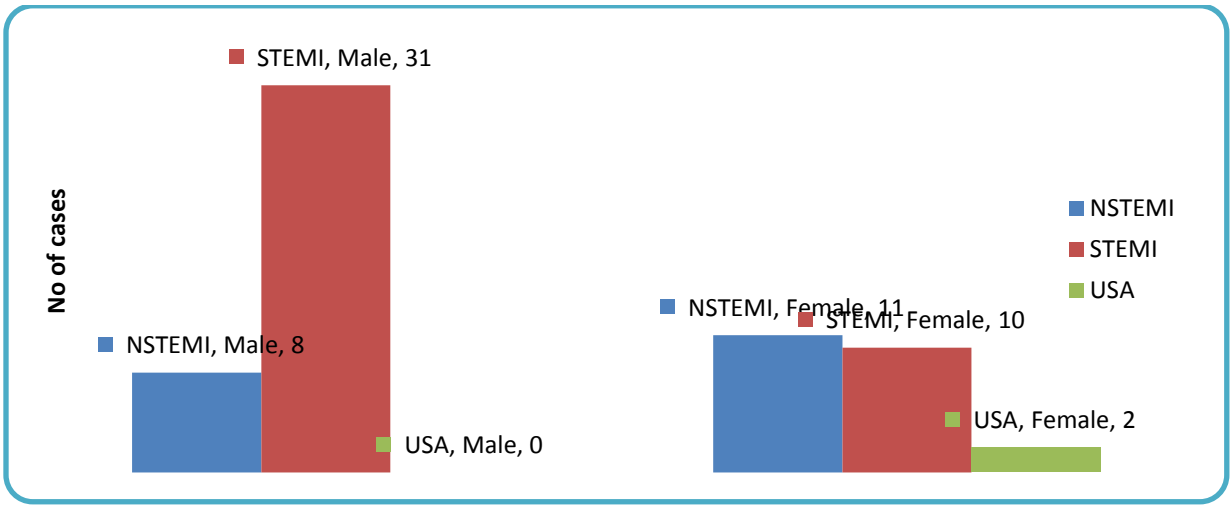

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Table 7: Comparison of ACS between hba1c (N=62)

ACS	HbA1C			
	< 6.5		> 6.5	
	N	%	N	%
NSTEMI	1	6	18	40
STEMI	15	88	26	58
USA	1	6	1	2
Total	17	100	45	100
Chi Square test P<0.01, Sig				

The difference in ACS between Hba1c was found to be significant with a P- value of <0.001. (Table 7 & figure 7)

Figure 7: Clustered bar chart of comparison of ACS between hba1c (N=62)

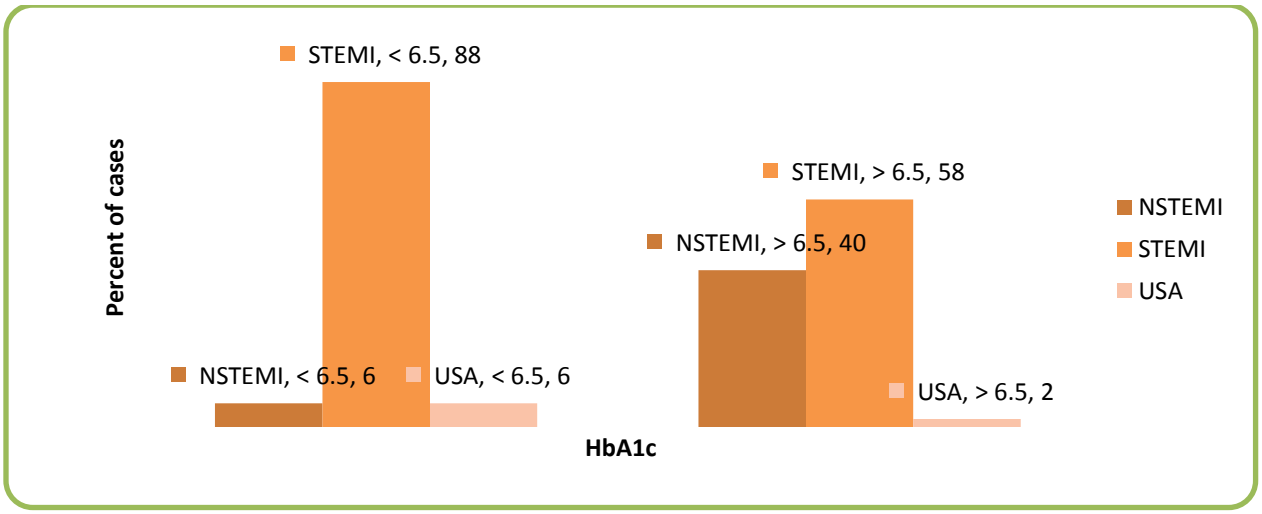

Table 8: Comparison of severity between hba1c (N=62)

Severity	HbA1C			
	< 6.5		> 6.5	
	N	%	N	%
DVD (double vessel ds)	5	29	16	36
SVD (single vessel ds)	10	59	10	22
TVD (triple vessel ds)	2	12	19	42
Total	17	100	45	100
Chi Square test P<0.01, Sig				

The difference in severity between Hba1c was found to be significant with a P- value of <0.01. (Table 8 & figure 8)

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Figure 8: Clustered bar chart of severity between hba1c (N=62)

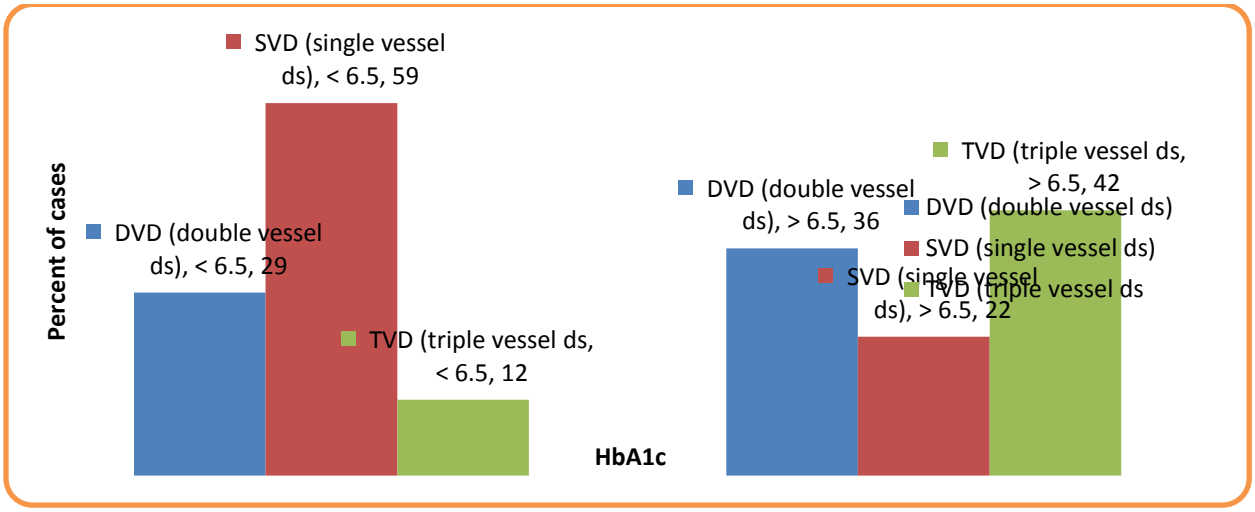

Table 9: Comparison of mean hb across severity

Severity	N	Mean Hb	Std. Deviation	ANOVA
DVD	21	12.42	2.25	P<0.02, Sig
SVD	20	14.24	2.61	
TVD	21	12.66	1.94	

The Mean Hb with severity of DVD was 12.42, it was 14.24 in SVD and it was 12.66 in TVD, the mean difference of Hb in severity of DVD, SVD and TVD was statistically significant (P value <0.02). (Table 9 & figure 9)

Figure 9: Chart of comparison of mean hb across severity

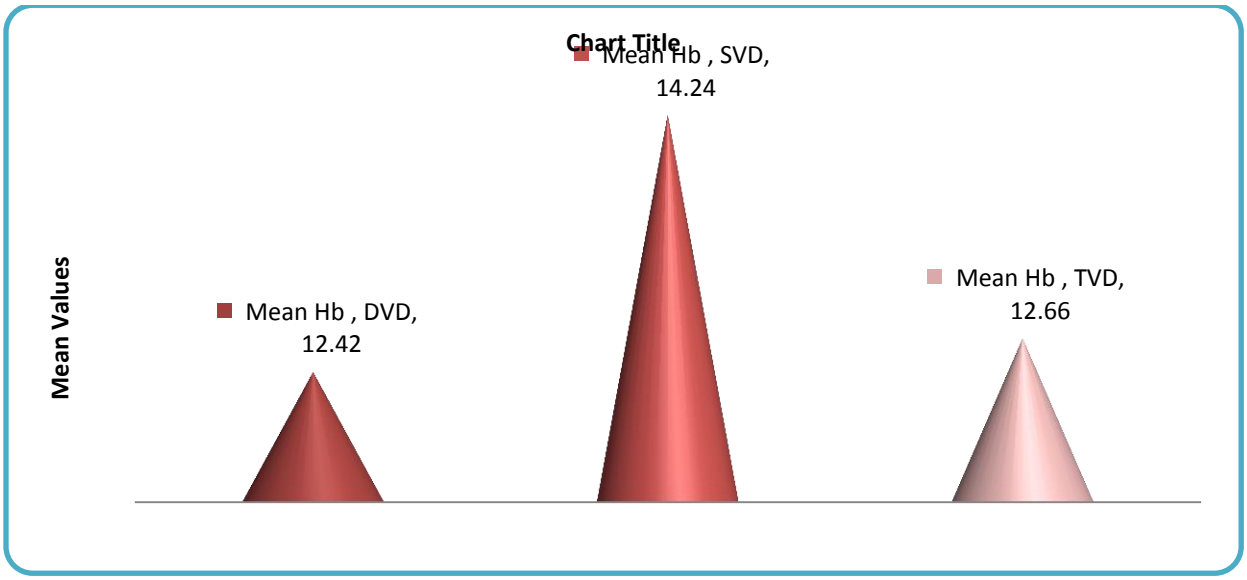

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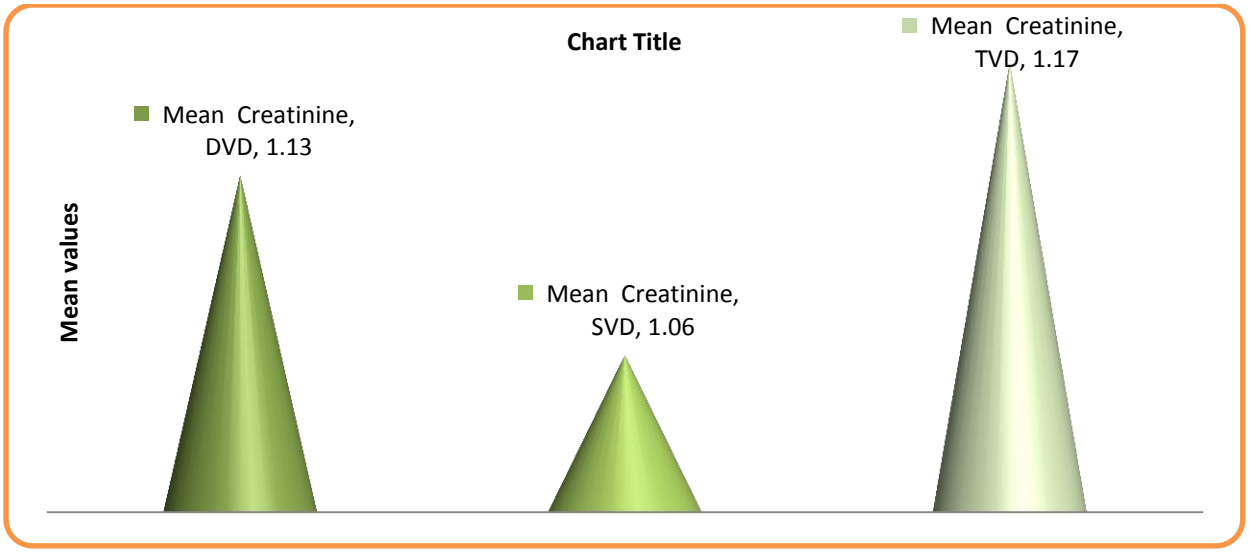
Table 10: Comparison of mean creatinine across severity

Severity	N	Mean Creatinine	Std. Deviation	ANOVA
DVD	21	1.13	0.35	0.603, Not Sig
SVD	20	1.06	0.28	
TVD	21	1.17	0.42	

The mean creatinine with severity of DVD was 1.13, it was 1.06 in SVD and it was 1.17 in TVD, the mean difference of creatinine in severity of DVD, SVD and TVD was statistically not significant (P value 0.603). (Table 10 & figure 10)

Figure 10: Chart of mean creatinine across severity



SUMMARY:

- Age group of 60-80years were more in study population (58.1%)
- Male patients were predominant (62.9%)
- HBA1C >6.5 were of 72.6%
- STEMI were 66.1%
- DVD and TVD were more prevalent 33.9% each
- HBA1C of <6.5, SVD was more prevalent
- HBA1C of >6.5, TVD was more prevalent in the study population.

DISCUSSION:

- Diabetic persons have an increased risk of coronary artery disease. HbA1C is a simple diagnostic of long-term glycemic control since it accurately reflects plasma glucose concentrations over 8–12 weeks. Following ACS, abnormal glucose metabolism is linked to an increased risk of mortality and sequelae.

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- In this study we concluded that HbA1c is associated with the prognosis of patients with acute coronary syndrome. Raised HbA1C level (> 6.5) was found in 45 out of 62 patients with acute coronary syndrome.
- STEMI ACS was more common in the study population, and it was also more common in both genders.
- When comparing diabetic and non-diabetic populations, the presence of STEMI and NSTEMI forms of ACS was higher in the diabetes population.
- Patients with diabetes mellitus had greater levels of TVD and DVD. While, in the non-diabetic population, SVD and DVD were higher.
- The mean Hb was higher with SVD followed by TVD and DVD in the study population. While, the mean creatinine was higher with TVD followed by DVD and SVD.
- Sheetal D Vora et al., [8]conducted a study on 100 patients in which STEMI type of ACS was common in both gender and also it was identified as higher in the study population. Also, STEMI type was common in the diabetes population.

Drawbacks-

In this study, the sample size in each group was not very large, and we believe that a greater sample size and a comparison design would help to clarify the value of HbA1C in ACS.

CONCLUSION

- STEMI ACS was shown to be more prevalent in both men and women in the study group.
- When diabetic and non-diabetic populations were compared, the presence of STEMI and NSTEMI forms of ACS was found to be greater in the diabetic group.
- Diabetes mellitus patients had higher levels of TVD and DVD. SVD and DVD were higher in the non-diabetic population.
- In the study population, SVD had the highest mean Hb, followed by TVD and DVD.
- The mean Hb was higher with SVD followed by TVD and DVD in the study population.

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