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Impact of Glycated Haemoglobin Level on Severity of Coronary Artery Disease in Non-Diabetic Patients

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Abstract

Background: Diabetes Mellitus (DM) is a major and well established risk factor for macrovascular diseases. Glycated haemoglobin (HbA1c) was more strongly associated with the risks of Atherosclerotic Coronary Vascular Disease (ASCVD).

Aim of the Study: This study was designed to assess the relationship between the level of HbA1c and the severity of Coronary Artery Disease (CAD) which was assessed by Gensini score and Syntax score among non-diabetic patients who were referred to elective coronary angiography.

Patient and Methods: A total number of 104 non diabetic patients who were referred to elective coronary angiography at Maadi Military Hospital within the period from June 2015 to June 2016 were included in this study. All patients were subjected to history taking, full clinical examination, venous samples were withdrawn for glycated haemoglobin, haemoglobin, serum creatinine, high density lipoprotien, low density lipoprotien, total cholesterol, triglycerides, and creatinine clearance was calculated. Electrocardiogram was done, and coronary angiography was recorded, and Syntax and Gensini scores were calculated.

Result: In high risk group, male gender represented 52.1% (n=25) of the patients, and most of this group were old age with mean age ± SD (56.83±7.18) years, and they were over weighted with mean body mass index ± SD (29.02±5.07), and hypertensive patients represented 50.0% (n=24) of this group and smokers represented 18.8% (n=9). In low risk group, male gender represented 55.4% (n=3 1) of the patients, and most of this group were old age with mean age ± SD (55.02± 7.64) years, and they were over weighted with mean body mass index ± SD (29.29±4.14), and hypertensive patients represented 58.9% (n=33) and smokers represented 37.5% of this group (n=21).

There was a high statistically significant difference between the two groups as regard right coronary artery lesion, left circumflex artery lesion, Gensini score and Syntax score as $p<0.001$, and there was a statistically significant difference between the two groups as regard left main lesion as $p<0.05$, and there was a positive correlation between HbA1c with Gensini score and Syntax score as $r=0.74$ and 0,77 respectively.

The accuracy of Gensini score equals 85% by 81.2% sensitivity and 83.9% specificity at cut off predictive value <59 to discriminate between the two groups. The accuracy of Syntax score equals 88% by 87,5% sensitivity and 91.1% specificity at cut off predictive value <12 to discriminate between the two groups.

Conclusion and Recommendation: There was a positive correlation between level of glycated haemoglobin and severity of coronary artery disease which was assessed by Syntax score and Gensini score in non-diabetics who were referred to elective coronary angiography, and after this study we recommend to use HbA1c as a complimentary parameter to traditional risk factors to predict the severity of CAD.

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Abbreviations:

CAD	: Coronary Artery Disease.
HTN	: Hypertension.
DM	: Diabetes Mellitus.
TC	: Total Cholesterol.
TG	: Triglycerides.
LDL	: Low Density Lipoprotiens.
HDL	: High Desity Lipoprotein.
IHD	: Ischemic Heart Disease.
HbA1c	: Glycated Haemoglobin.
ASCVD	: Atherosclerotic Coronary Vascular Disease.
LM	: Left Main.
LAD	: Left Anterior Descending artery.
RCA	: Right Coronary Artery.
LCX	: Left Cicumflex Artery.
BMI	: Body Mass Index.
PH	: Past History.
FH	: Family History.
AF	: Atrial Fibrillation.
HT	: Hight.
WT	: Weight.
ECG	: Electro Cardiogram.
Inve T	: Inverted T wave.
St Dep	: ST egment depression.
St Elev	: ST sement elevation.
Path Q	: Pathological Q.
LBBB	: Left Bundle Branch Block.
RBBB	: Right Bundle Branch Block.

Key Words: *Glycated haemoglobin – Syntax score – Gensini score – Coronary artery disease – Non-diabetic.*

Introduction

DIABETES Mellitus (DM) is a major and well established risk factor for macro-vascular diseases such as Atherosclerotic Cardiovascular Diseases (ASCVD) and micro-vascular diseases such as neural, renal and retinal diseases **[1]**. Currently, glycated haemoglobin (HbA1 c) show its advantages over fasting blood glucose such as low intra-individual variability and being capable of evaluating the long-term blood glucose control **[2]**, and it is a parameter of average blood glucose levels over 12 weeks **[3,4]**. HbA1c was more strongly associated with the risks of ASCVD and mortality from any causes **[5,6]**. In non-diabetics, HbA1c level has a linear incremental association with CVD **[7]**.

Coronary angiography is an important tool for the quantification of CAD burden in both clinical practice and scientific investigation **[8]**. Researchers have attempted to define angiographic CAD burden using quantitative scoring systems. Historically, this was performed by designation of a single-, double-, triple-vessel and left main disease classification, with luminal stenosis of either ›_50 or ›_70% used to define significance. However, this simple scoring system was limited in its ability to stratify patients with different levels of disease risk **[9]**.

Gensini score is a scoring system which allocates a numerical value for the degree of stenosis in a coronary artery, and a multiplication factor that depends on which coronary artery is involved, and where the stenosis is located in the coronary artery **[10]**.

Syntax score is the sum of the points assigned to each individual lesion identified in the coronary tree with >50% diameter narrowing in vessels >1.5mm diameter. The coronary tree is divided into 16 segments according to the American Heart Association (AHA) classification. Further characterization of the lesions adds points. For example, a total occlusion duration >3 months, a blunt stump, a bridging collateral image, the first segment visible beyond the total occlusion, and a side branch >1.5 diameter all receive one point. For trifurcations, one diseased segment gets three points **[11]**.

Many studies confirm that the application of the Syntax score in interventional cardiology is apparently relevant. The use of this scoring system to grade patients with coronary artery disease and to further guide for revascularization should be encouraged **[12]**. New scientific research has shown Syntax [synergy between pci with taxus and CABG] score to be an essential decision-making tool in interventional cardiology **[13]**. In several recently published studies, PCI was suggested to be a more appropriate revascularization procedure in patients with a lower Syntax score, but in patients with a high score, revascularization with CABG would probably be a better choice **[14]**.

In this study we aimed to assess the relationship between HbA1c and coronary lesion which was calculated by Syntax and Gensini scores in non-diabetic patients who referred to elective coronary angiography.

Subjects and Methods

The study population included 104 non diabetic patients who were referred to elective coronary angiography at Maadi Military Hospital within the period from June 2015 to June 2016.

Exclusion criteria:

1- Patients with acute coronary syndrome.

2- Normal coronary angiography.

3- Patients known to be diabetics.

4- Patients with renal impairement.

5- Anemiac patients.

All patients were subjected to full history taking, full clinical examination, description of personal characteristics (gender, age and BMI), risk factors assessment including HTN and smoking, venous samples were withdrawn for glycated haemoglobin, haemoglobin, serum creatinine, high density lipoprotien, low density lipoprotien, total cholesterol, triglycerides, creatinine clearance was calculated. Electrocardiogram was done, and coronary angiography was recorded, and Syntax and Gensini scores were calculated.

Study population:

According to HbA1c, the study population of the patients was divided into two groups (Table 1):

Group (A) : High risk for DM (HbA1c 5.7-6.4) (n=48/104) which represented 46.2% of the patients.

Group (B): Low risk for DM (HbA1c <5.7) (n= 56/104) which represented 53.8% of the patients.

Table (1): Study groups according to HbA1c.

HbA1c	N	%
Low risk (4-5.6)	56	53.8
High (5.7-6.4)	48	46.2
Total	104	100.0

Results

Table (2): Comparison between the demographic data of the study groups.

	HbA1c				
	Low risk (HbA1c <5.7)		High risk (HbA1 c= 5.7-6.4)		*p*-value
	N	%	N	%	
Gender:	31	55.4	25	52.1	0.73
Male	25	44.6	23	47.9	0.73
Female					
Age (years):					
Mean ± SD	55±7.6		56.8±7.1		0.21
BMI (kg/m ^{2}):					
Mean ± SD	29.2±4.1		29.02±5		0.77
HTN	33	58.9	24	50	0.36
Smoking	21	37.5	9	18.8	0.035*
P.H of IHD	13	23	8	16.7	0.70
F.H of IHD	16	28.6	9	18.8	0.24

ECG changes among the study groups:

Table (3): ECG changes among the study groups.

ECG	HbA1c							
	Low		High		Total		Chi-square	
	N	%	N	%	N	%	χ^2	*p*-value
Normal	33	58.9	25	52.1	58	55.8	0.491	0.483
Inve T	15	26.8	17	35.4	32	30.8	0.904	0.342
St dep	2	3.6	1	2.1	3	2.9	0.204	0.651
St elev	1	1.8	0	0.0	1	1.0	0.865	0.352
Path q	9	16.1	9	18.8	18	17.3	0.130	0.719
LBBB	1	1.8	3	6.3	4	3.8	1.393	0.238
RBBB	4	7.1	2	4.2	6	5.8	0.421	0.516
AF	1	1.8	1	2.1	2	1.9	0.012	0.912

ECG : Electrocardiogram.
Inve T : Inverted T wave.
St Dep : ST segment depression.
St Elev : ST segment elevation.
Path Q : Pathological Q.
LBBB : Left Bundle Branch Block.
RBBB : Right Bundle Branch Block.
AF : Atrial Fibrillation.

Laboratory investigations:

Table (4): Laboratory investigations among the study groups.

	HbA1c			
	Low	High	*t*-test	
	Mean ± SD	Mean ± SD	*t*	*p*-value
Hb	14.47±0.76	14.76±0.84	1.794	0.076
Cr	0.91±0.19	1.09±0.19	4.861	<0.001**
CR.CL	114.23± 19.69	95.10± 16.46	5.322	<0.001**
TGs	139.45±55.87	141.46±48.75	0.194	0.847
LDL	128.26±28.88	116.42±32.74	1.960	0.053
HDL	37.48±6.63	36.69±6.34	0.618	0.53 8
TC	196.16±29.40	184.94±35.86	1.754	0.082

Table (5): Correlation between HbA1c and laboratory investigations.

	HBA1c	
	r	*p*-value
Hb	0.189	0.054
Cr	0.515	<0.001 **
CR.CL	–0.532	<0.001 **
TGs	0.014	0.891
LDL	–0.162	0.100
HDL	–0.025	0.799
TC	–0.131	0.187

TC : Total Cholesterol.
TG : Triglycerides.
LDL : Low Density Lipoproteins.
HDL : High Density Lipoprotein.
Cr : Creatinine.
CR.CL : Creatinine Clearance.
Hb : Haemoglobin.

Coronary angiography results and affected arteries:

Table (6): Result of coronary angiography and affected arteries.

	HBA 1 c							
	Low		High		Total		Chi-square	
	N	%	N	%	N	%	χ^2	*p*-value
RCA:								
No	37	66.1	14	29.2	51	49.0	14.086	<0.001**
Yes	19	33.9	34	70.8	53	51.0		
LCX:								
No	33	58.9	11	22.9	44	42.3	13.733	<0.001**
Yes	23	41.1	37	77.1	60	57.7		
LAD:								
No	16	28.6	7	14.6	23	22.1	2.936	0.087
Yes	40	71.4	41	85.4	81	77.9		
LM:								
No	56	100.0	44	91.7	100	96.2	4.853	0.028*
Yes	0	0.0	4	8.3	4	3.8		

Gensini score:

Gensini score ranged from 4 to 111 with mean ± SD 40.34±24.28 in low risk group versus 76.35 ± 23.44 in high risk group, and there was a positive correlation between HbA1c with Gensini score as r=0.74 and p<0.001 Fig. (1).

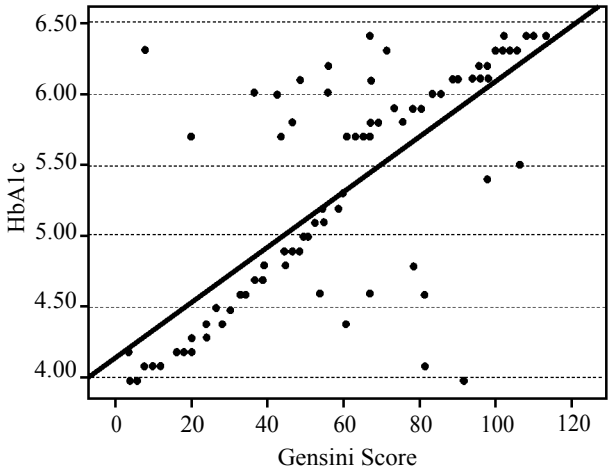

Fig. (1): Correlation between HbA1c and Gensini score.

Syntax score:

Syntax score ranged from 1 to 38.5 with mean ± SD 7.80±5.43 in low risk group versus 19.08± 8.34 in high risk group, and there was a positive correlation between HbA1c with Syntax score as r=0.77 and p<0.001 Fig. (2).

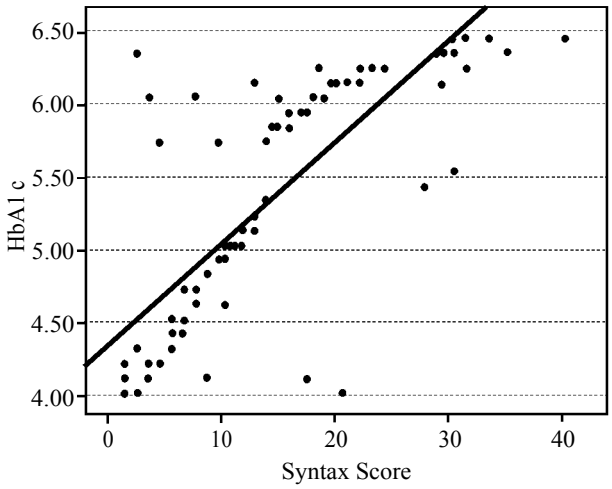

Fig. (2): Correlation between HbA1c and Syntax score.

Accuracy of Gensini score between the study groups:

Receiver Operating Characteristic (ROC) analysis:

Table (7): ROC curve between the two groups as regard GS.

Cut off	Sensitivity	Specifity	PPV	NPV	Accuracy
>59*	81.2	83.9	81.2	83.9	0.852

The results derived from the ROC curve showed that the accuracy of Gensini score equals 85% by 81.2% sensitivity and 83.9% specificity, at a cut off predictive value <59, to discriminate between the two study groups Fig. (3).

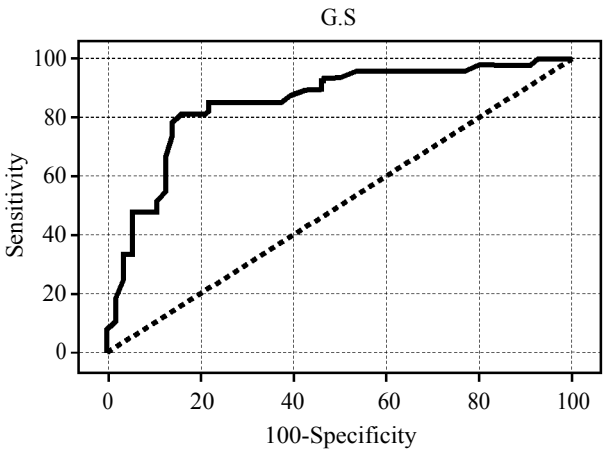

Fig. (3): Accuracy of GS between the study groups.

Accuracy of Syntax score between the study groups:

Receiver Operating Characteristic (ROC) analysis:

Table (8): ROC curve between the two groups as regard SS.

Cut off	Sensitivity	Specifity	PPV	NPV	Accuracy
>12*	87.5	91.1	89.4	89.5	0.889

The results derived from the ROC curve showed that the accuracy of Syntax score equals 88% by 87.5% sensitivity and 91.1% specificity, at a cut off predictive value <12, to discriminate between the two study groups Fig. (4).

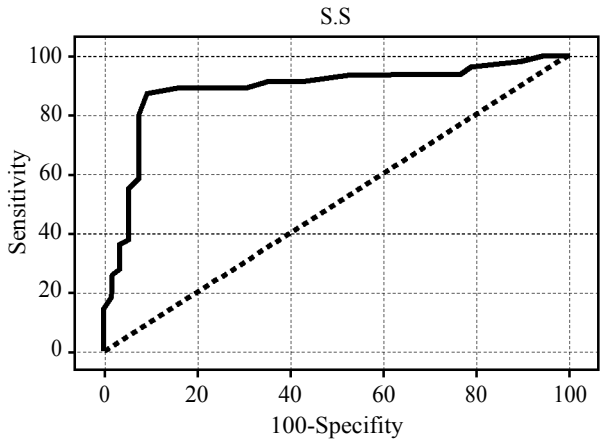

Fig. (4): Accuracy of SS between the study groups.

Discussion

This study was done to detect the relationship between HbA1c and severity of CAD which was assessed by Syntax and Gensini scores after elective coronary angiography in non-diabetic patients. From this study, we concluded that a positive correlation existed between the level of HbA1c and the severity of CAD which was assessed by Syntax score and Gensini score in non-diabetics

after elective coronary angiography (*r*-values were 0.77 and 0.74, and $p<0.001$). The study population of the patients was divided into two groups according to HbA1c in the form of high risk and low risk.

In a study done by Nabutaka et al., **[15]**, a 577 non diabetic patient who underwent their first coronary angiography and had their HbA1 c levels measured. The complexity of the coronary artery lesions was evaluated using the Syntax score (SX-score). In our study, we agreed with the previous study in dividing the non-diabetic patients according to HbA1 c, there was a high statistically significant difference between the groups as regard Syntax score ($p<0.001$), and there was a positive correlation between HbA1c and Syntax score ($r=0.77$) ($p<0.001$), and we also divided Syntax score into three sub groups (1-22,23-32 and ›_33), but we disagreed as our study included less number of patients, and divided into only two groups according to their HbA1C (not four groups). We added Gensini score which provided a detailed assessment of CAD and does not ignore even very trivial lesions in coronary arteries.

In a study done by Bornali et al., **[16]**, a 346 non-diabetic patient with proven CAD on angiography, were divided into four groups according to HbA1c levels, and severity of CAD was assessed using Syntax score and the number of coronary vessels diseased. In our study, we agreed with the previous study in dividing the non-diabetic patients according to HbA1 c, assessing the severity of CAD by Syntax score, there was a high statistically significant difference between the groups as regard Syntax score ($p<0.001$), and there was a positive correlation between HbA 1 c with Syntax score ($r=0.77$) ($p<0.001$). Age, gender, hypertension and dyslipidemia did not show significant difference among quartiles, however smoking was found to show significant difference among the groups ($p>0.05$), but we disagreed as our study was divided into only two groups according to their HbA1C (not four groups), we added Gensini score to Syntax score and we assessed the percentage of each coronary vessel in the two groups not only the number of affected arteries.

In a study done by Fumie et al., **[17]**, the patients were stratified into five groups (HbA1c levels with ‹_5.0,5.1-5.4, 5.5-6.4, and ›_6.5% and with anti-diabetic medication) and followed-up prospectively for 7 years (2002-2009). In our study, we disagreed as we had only two groups according to HbA1c, less number of patients, no follow-up for years. We did not include diabetic patients, and we did coronary angiography to asses coronary lesion by Syntax and Gensini scores which were in positive correlation with HbA1c ($r=0.77$ and 0.74 respectively), and we did not assess neurological relation with HbA1c, but we agreed with it as it also had a positive correlation between CVD and HbA1c and groups division according to HbA1c.

In a study done by Monica et al., **[18]**, non-diabetic patients undergoing coronary angiography were included. Additionally carotid intima-media thickness (C-IMT) was evaluated during hospitalization in a consecutive cohort of patients, where 1.703 consecutive patients were included and divided into three groups according to HbA1c (<5.5%, 5.5%-5.79%, ›_5.8%), and HbA1c was significantly associated with C-IMT and carotid plaques prevalence. In our study, we disagreed as we had only two groups according to HbA1c, we had less number of the patients, we did not assess carotid intima-media thickness. We had no statistically significant difference between the groups as regard age, HTN, lipid profile and past history of IHD, and we did not assess the relation between HbA 1 c and the medical treatment of the ischemic patients, but we agreed with it as it also had a positive correlation between CVD and HbA1c.

In a study done by Anping et al., **[19]**, 573 participants were enrolled. All participants performed coronary angiography to figure out the numbers of coronary artery stenosis in terms of none-stenosis (<50% stenosis), single and multiple vessels stenoses (›_50% stenosis). All participants were divided into sub-groups according to two categories in terms of severity of clinical presentation (stable angina, unstable angina, or acute myocardial infarction), and the number of coronary artery stenosis (none, single, and multiple vessels). As compared to stable angina sub group, HbA 1 c levels were gradually increased in unstable angina and acute myocardial infarction groups. Similar trend was identified in another category in terms of higher HbA1c level corresponding to more vessels stenoses. In our study, we disagreed as we did not include ACS but we did elective coronary angiography, we assessed coronary lesion by Syntax and Gensini scores not only according to the number of affected coronary artery and we divided the patients according to HbA 1 c not according to clinical presentation nor the number of affected coronary artery, but we agreed with it as it also had a positive correlation between CVD and HbA1c.

In a study done by Khawet et al., **[20]**, they reported that increasing levels of HbA 1 c is associated with all-cause and cardio vascular mortality.

In our study, we assessed the relation between HbA1c and the severity of CAD but the previous study assessed the reflection of HbA1c on cardiovascular events and mortality, and suggested a role of HbA1c assessment in risk stratification and prediction among individuals without DM.

In a study done by Ayhan et al., [21], showed that HbA1c levels correlated with Gensini score in young coronary atherosclerotic patients (<40 years old) in both diabetic and non-diabetics. In our study, we included only the non-diabetics and we included the young and old patients but we also showed that HbA1c levels correlated positively with Gensini score.

In a study done by Eeg-Olofsson et al., [22], who aimed at analyzing the association between HbA1c and CVD in patients with type 2 diabetes in the Swedish National Diabetes Registry (NDR). This observational study included 18,334 patients (age 30-79 years, previous CVD in 18%, baseline HbA1c 5.0-10.9%) who were followed for 6 years (mean 5.6 years) from1997/1998 until 2003. Adjusted 6-year event rates increased with higher baseline or updated mean HbA1c with no J-shaped risk curves, in all patients and also when subgrouping by shorter (mean 3 years) or longer (mean 14 years) diabetes duration, by presence or absence of previous CVD, or by treatment with Oral Hypoglycemic Agents (OHAs) or insulin. In our study, we disagreed as we didn't include such a large number of patients nor diabetic patients, no follow-up for years, we were specifically targeting the CAD severity rather than the prevalence, the level of HbA 1 c measured was a single reading at time of presentation not a mean value over years, and we divided them according to HbA1c, but the previous study divided them according to diabetes duration, previous CVD or treatment with either insulin or oral hypoglycemic agents, and they had 18% of patients had a past history of IHD, and we had 20% of our patients but we agreed in net result as they showed that risk reductions of 20% for CAD and 16% for CVD (p<0.001) were found in patients with a baseline mean HbA1c level of 6.5%, compared to those with a mean level of 7.5%, and our study showed there was a positive correlation between severity of CAD by Syntax and Gensini scores with HbA1c (r-values were 0.77 and 0.74 respectively) (p<0.001).

Study in the Sanjay Gandhi Post Graduate Institute of Medical Sciences Lucknow, India Polska et al., [23] showed that HbA1c in non-diabetic patients is an independent predictor of coronary artery disease and its severity. The number of non-diabetic patients was 1141, and with CAD was 905. Elevated HbA1c was also strongly correlated with disease severity and higher Syntax score, and could be utilized as an independent predictor of CAD, and its severity even in non-diabetic subjects. Comparing this study to our study, they included 905 and we included 104, and the other most important thing that they defined significant of CAD as >50% diameter in any vessel >1.5mm by the use of Syntax score, which is an angiographic tool grading the complexity of coronary artery disease and obtain evidence based guidelines for selecting the optimal technique of revascularization not for assessing severity of CAD as Gensini score. In our study, we estimated the severity of CAD in greater details by using the Gensini score in addition to Syntax score, this provides a detailed assessment of CAD and does not ignore even very trivial lesions in coronary arteries. Many other studies have used this scoring system to establish a correlation between the severity of CAD and other factors such as serum sodium level [24] and impaired glucose tolerance [25]. In the Study in the Sanjay Gandhi Postgraduate Institute of Medical Sciences Lucknow they divided the patients into four groups according to HbA1c (HbA1c <5.5, HbA1c 5.5-5.8, HbA1c 5.8-6.1, HbA1c >6.1). In our study the study population was stratified into high risk group (HbA1c 5.7-6.4%) and a low risk group (HbA1c <5.7%) but we agreed with it as it also had a positive correlation between CVD and HbA1c.

In a study done by Ravipati et al., [26], coronary angiography was performed for 152 men and 163 women with DM (mean age 55±8 years) because of chest pain. The mean HbA1c level was 6.66 ± 0.58% in 132 patients with zero vessel CAD, 8.00±0.84% in 40 patients with one vessel CAD, 8.83± 1.45% in 76 patients with two vessels CAD, and 10.40±2.28% in 67 patients with three or four vessels CAD. There was a significant increasing trend of HbA1 c levels over the increasing number of vessels with CAD (p<0.0001). In our study, we were more detailed regarding assessment of the CAD using the Gensini and SYNTAX scores. And there is 33 patients with three vessels CAD, 31 patients with two vessels CAD and 40 patients with one vessel CAD, and all patients included in our study were non-diabetic, and we divided the patients according to HbA 1 c into two groups, and we had similar results as there was a high statistically significant difference between the two groups as regard Syntax and Gensini scores as p<0.001 and there was a positive correlation between HbA1c with Syntax score (r=0.77) (p<0.001).

In a study done by Santos et al., [27], who investigated 16 data sets (nine for total cardiovascular events and seven for death) from five papers with 44,158 patients (44% men) over 404,899 patient-years of follow-up. There were 1,366 cardiovascular deaths (3.1%; 3.37/1,000 person/year) and 2,142 cardiovascular events (4.9%; 5.29/1,000 person/year). The overall meta-analytic coefficients were 0.720 (95% CI 0.307-1.133) and 0.757 (95% CI 0.382-1.132) for cardiac death and events respectively. Compared with the baseline value of 4.27%, HbA1c level of 5% was associated with a relative risk for cardiovascular death of 1.13 (95% CI 1.05-1.21), a 6% value with 1.34 (95% CI 1.13-1.58), and a 7% HbA1cwith relative risk 1.58 (95% CI 1.22-2.06). Results for total cardiovascular events were similar. Thus, HbA 1 c was significantly associated with cardiovascular events and death in persons without diabetes.

In a study done by Rivera et al., [28], to assess the association between increasing levels of HbA 1 c in a symptomatic individuals without DM and coronary plaque characteristics. The final study population consisted of 906 individuals without DM. Un adjusted analysis showed a positive association between increasing levels of HbA1c and the number of coronary segments (p<0.001) and with mixed coronary plaques (p<0.0001). The association persisted even when traditional risk factors were taken into account. In our study, we disagreed as we included a fewer number of patients (104 patients). They were indicated for coronary angiography and we do not do Multi-Detector Computed Tomography (MDCT). We did not demonstrate the complexity of the atherosclerotic plaques, but we assessed the severity of the coronary lesion by Syntax and Gensini scores, and there was a high statistically significant difference between the groups as regard Syntax and Gensini scores (p<0.001), but we agreed with the previous study as it showed a high significant association between increasing levels of HbA1c and the number of coronary segments (p<0.001). The study also showed a high significant association between increasing levels of HbA1c and mixed coronary plaques (p<0.0001) in non-diabetics.

The study done by Loeblein et al., [29], showed the data of 140 consecutive patients who underwent CABG to study the association between cardiovascular risk factors [age, BMI, total cholesterol, HDL, LDL, TGs, Hb1Ac, hypertension, positive family history for CVD and history of smoking] and Syntax score with BNP level. There was no association between Syntax score and cardiovascular risk factors and there was also no association between Syntax and BNP. In our study, we found a significant positive correlation between the level of HbA1c and Syntax scores (r=0.77).

Finally, there is a positive correlation between HBA1c with Syntax score supported by the result of Nabutaka [15] and Bornali [16] as r-value=0.77 (p<0.001) and also with Gensini score supported by the result of Ayhan [21] as r=0.74 (p<0.001). There are a lot of studies searched in the HbA1c in non-diabetic patients and adverse outcome, but our study and little other studies searched in HbA1 c and severity of the CAD by using both Syntax and Gensini scores in non-diabetics.

Conclusion and Recommendation:

From this study, we concluded that there was a positive correlation between level of HbA1 c and severity of CAD which assessed by Syntax and Gensini scores in non-diabetics, and HbA1c can be used as complimentary parameter to traditional risk factors to predict the severity of CAD.

Limitations:

- Small number of patients.
- No comparison with diabetic patients.
- No exclusion of the age, dyslipidemia nor hypertension.
- We used a single measurement of HbA1c. Hence, we can not evaluate the effects of changes in this parameter over long term.

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علاقة الهيموجلوبين السكرى بدرجة ضيق الشرايين التاجية للقلب فى المرضى الذين لايعانون من مرض السكرى

يعتبر مرض السكرى من آهم عوامل الخطورة لحدوث تصلب الشرايين التاجية للقلب، فاظهرت كثير من الآبحاث وجود علاقة طردية بين الهيموجلوبين السكرى وآمراض القلب بخاصة قصور الشرايين التاجية للقلب، وحديثا آظهرت الآبحاث آن هذه العلاقة الطردية موجودة آيضا فى المرضى الذين لا يعانون من السكرى.

تعتبر قسطرة القلب من آهم الوسائل لتحديد درجة القصور فى الشرايين التاجية للقلب، وتوجد عدة حسابات لتحديد نسبة القصور فى الشرايين التاجية للقلب، وتم إستعمال إثنان منها فى هذه الدراسة وهما Gensini وSyntax.

وتمت هذه الدراسة فى مستشفى المعادى العسكرى على مائة وآربعة مريض من الذين قاموا بإجراء قسطرة تشخيصية على الشرايين التاجية للقلب ولا يعانون من مرض السكرى ولا من آزمات قلبية حادة.

والهدف من هذه الدراسة هو تحديد مدى العلاقة بين الهيموجلوبين السكرى ومدى قصور الشرايين التاجية للقلب بإستعمال حسابات Gensini وSyntax فى المرضى الذين يقومون بإجراء قسطرة تشخيصية على الشرايين التاجية للقلب ولا يعانون من مرض السكرى ولا من آزمات قلبية حادة.

تم عمل الآتى للمرضى:

- التاريخ المرضى بالكامل.
- الفحص الطبى العام والفحص الخاص بالقلب.
- تحديد عوامل الخطورة مثل التدخين وإرتفاع ضغط الدم.
- عمل رسم قلب كهربى.
- قسطرة تشخيصية على الشرايين التاجية للقلب.
- عمل حسابات Gensini وSyntax.
- قياس الهيموجلوبين السكرى وكرياتينين فى الدم وصورة دم كاملة ونسبة الدهون بالدم.
- متابعة العلامات الحيوية للمريض أثناء وبعد القسطرة التشخيصية للشرايين التاجية للقلب.

الاستنتاج: تبين من هذه الدراسة وجود علاقة طردية بين الهيموجلوبين السكرى وقصور الشرايين التاجية للقلب بإستعمال حسابات Gensini وSyntax فى المرضى الذين يقومون بإجراء قسطرة تشخيصية على الشرايين التاجية للقلب ولا يعانون من مرض السكرى ولا من آزمات قلبية حادة، ولذلك بعد هذه الدراسة ينصح بإعتبار الهيموجلوبين السكرى من ضمن عوامل الخطورة للإصابة بقصور الشرايين التاجية للقلب.