

*The relation between red cell
distribution width(RDW) and
coronary artery calcium score(CACS)
in diabetic patients undergoing
coronary CT angiography.*

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Master degree of cardiology*

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List of Contents

Title	Page No.
List of tables	6
List of figures	8
List of abbreviations	9
English Summary	12
Limitations	14
Recommendations	14
Conclusion	15
Introduction	16
Aim of the Work	19
The Review :-	
the 1 st chapter: Calcium Score In Coronary CT Angiography in diabetic patients	21
the 2 nd chapter: Red Blood Cell Distribution Width (RDW) and Atherosclerosis	35
Patients and Methods	49
Results	63
Discussion	110

Title	Page No.
References	122
Master Sheet	141
Arabic Summary	143

List of Tables

Table No.	Title	Page No.
1	Physiological determinants of increased RDW	40
2	agataston score to assess calcium score and 0severity	54
3	Distribution of age and sex among the study population	64
4	Risk factors distribution among the study population	65
5	Laboratory data results among the study population	67
6	Distribution of CT coronary data among the study population	68
7	Relation between hypertension and other study variables in the group of diabetics	70
8	Relation between hypertension and other study variables in the group of non-diabetics	71
9	Relation between smoking and other study variables in the group of diabetics	73
10	Relation between smoking and other study variables in the group of non-diabetics	75
11	Relation between diabetes and other study variables	77
12	Relation between the number of affected vessels and other study variables in the group of diabetics	79
13	Relation between the number of affected vessels and other study variables in the group of non-diabetic	81
14	Relation between the Percent of lumen stenosis and other study variables in the group of diabetics	85
15	Relation between percent of lumen stenosis and other study variables in the group of non-diabetics	87
16	Relation between calcium score and other study variables in the group of diabetics	90

Table No.	Title	Page No.
17	Relation between calcium score and other study variables in the group of non-diabetics	94
18	Correlations between RDW(CV) and RDW(SD) and CT coronary data	96
19	Relation between RDW (CV),RDW(SD) and other study variables in the group of diabetics	100
20	Relation between RDW (CV),RDW(SD) and other study variables in the group of non-diabetics	102
21	Independent predictors for high calcium score more than 100	105
22	Independent predictors for high calcium score more than 400	106
23	Independent predictors for presence of vessel disease	106
24	Detect positive and negative predictive value, sensitivity, specificity, area under the curve and diagnostic accuracy for the rock curve of high calcium score (> 100)	107
25	Detect positive and negative predictive value, sensitivity, specificity, area under the curve and diagnostic accuracy for the rock curve of high calcium score (>400)	107

List of Figures

1	Relationship between anisocytosis and red blood cell distribution width(RDW)	40
2	RDW(SD)&RDW(CV)	56
3	Chart showing gender distribution among study population	64
4	Chart showing risk factors distribution among study population	66
5	The relation between RDW CV and Calcium Score	96
6	The relation between RDW CV and number of affected	97
7	The relation between RDW CV and Percentage of lumen	97
8	The relation between RDW SD and Calcium Score	98
9	The relation between RDW SD and number of affected Vessels	98
10	The relation between RDW SD and Percentage of lumen stenosis	99
11	Rock curve of RDW SD to predict high calcium score (> 100)	108
12	Rock curve of RDW CV to predict high calcium score (> 100)	108
13	Rock curve of RDW CV to predict high calcium score (> 400)	109
14	Rock curve of RDW SD to predict high calcium score (> 400)	109

List of Abbreviations

Abb.	Full term
ABP	Arterial blood pressure
ACC	American College of Cardiology
ACS	Acute coronary syndrome
AHA	American Heart Association
ASCVD	Atherosclerotic Cardiovascular Disease
AUC	Area under the curve
BMI	Body Mass Index
BNP	Brain natriuretic peptides
CABG	Coronary artery bypass graft
CAC	Coronary artery calcification
CACS	Coronary artery calcium score
CAD	Coronary artery disease
CBC	Complete blood count
CCTA	Coronary computed tomography angiography
CHE	Cholesterol esterase
CHOD	Cholesterol oxidase
CI	Confidence Interval
CRP	C-Reactive protein
CTA	Computed tomographic angiography
CV	Coefficient of variation
CV	Cardiovascular
CVD	Cardiovascular disease
DBP	Diastolic blood pressure
DLP	Dyslipidemia

Abb.	Full term
DM	Diabetes mellitus
ECG	Electrocardiogram
EDTA	Ethylene diaminetetraacetic Acid
ESR	Erythrocyte sedimentation rate
FRS	The Framingham risk score
HB	Hemoglobin
HBAIC	Glycosylated hemoglobin
HDL-C	High density lipoproteins cholesterol
HTN	Hypertension
IL-6	Interleukin 6
JVP	Jagular Venus pressure
KCN	Potassium cyanide
LDL-C	Low density lipoproteins cholesterol
MACE	Major adverse cardiac event
MCH	Mean corpuscular hemoglobin
MCHC	Mean corpuscular hemoglobin concentration
MCV	Mean corpuscular volume
MDCT	Multi-detector CT
MESA	The Multi-Ethnic Study of Atherosclerosis
mg/Dl	Milligram per desi liter
MI	Myocardial infarction
mmol/L	Mille mole per liter
mm/hour	Millimeters per hour
MSCT	Multi-slice CT
NCEP	The National Cholesterol Education Program
NPV	Negative predictive value

Abb.	Full term
OCPs	Obstructive coronary plaques
OR	Odds ratio
PCI	Percutaneous coronary intervention
POD	Peroxidase
PPV	Positive predictive value
RBC	Red blood cell
RCRI	The revised cardiac risk index
RDW	Red cell distribution width
RDW-CV	Red cell distribution width coefficient of variation
RDW-SD	Red cell distribution width standard deviation
ROC curve	Receiver operating characteristic
RPM	Round per minute
SBP	Systolic blood pressure
SCORE	The European Systematic Coronary Risk Evaluation
S. creatinine	Serum creatinine
SD	Standard deviation
Serum CV	Serum calcium
SI	Smoking Index
TG	Triglycerides
VLDL lipoproteins	Very low density lipoproteins

SUMMARY

Cardiovascular disease is the main cause of morbidity and mortality throughout the world.

During the last century, cardiovascular events have grown rapidly from a relatively minor disease to a leading cause of morbidity and mortality.

Although, risk factors of cardiovascular disease were over ruled and controlled, and therefore mortalities of cardiovascular diseases were significantly declined over the last 50 years, it has been revealed that the process of declining is slowed down by emerging of several risk factors such as obesity and impaired lifestyle.

Recently, computed tomographic angiography (CTA) of coronary arteries has been recognized as a dependable imaging modality to exclude CAD, noninvasively. On the other hand, CT is currently the imaging modality of choice to find and measure the calcified plaques of coronary arteries, aortic valve and aorta plaques.

Coronary artery calcification (CAC) is a well-established marker of the total burden of coronary atherosclerosis.

Large prospective studies have revealed that higher CAC scores are associated with increased risk of CAD related events and considering CAC score as a CAD risk factor could improve cardiovascular risk stratification.

However, the total amount of calcification can be an appreciated marker of the total plaque burden. This burden can be quantified using Agatston score system.

CAC scoring is most useful in asymptomatic patients at intermediate risk of disease. The National Institute for Health and Clinical Excellence have suggested that the patients with suspected cardiac chest pain without definite CAD in whom the estimated likelihood of CAD is 10–29% (low to intermediate risk) should be presented for CAC scoring.

Red cell distribution width(RDW) is a measure of the variability in circulating erythrocyte size that is often used in the differential diagnosis of anemia Recently, the increased red cell distribution width (RDW) was found to be associated with a poor prognosis and increased mortality rate in several cardiovascular diseases such as stable coronary artery disease heart failure and peripheral arterial disease and also with poor TIMI flow following primary percutaneous coronary intervention and poor outcome of trans catheter aortic valve implantation. The RDW is also elevated in some subclinical states of atherosclerosis.

This study was done To assess the relation between red cell distribution width (RDW) and coronary artery calcium score (CACS) in diabetic patients undergoing coronary CT angiography.

The study population included 60 patients , divided into 2 groups diabetics and non-diabetics each group was 30 patients.

All patients were subjected to full history taking, clinical examination, Multi-slice CT coronary and laboratory investigations including Serum Calcium level, Complete blood count (CBC) Including red cell distribution width(RDW), Erythrocyte sedimentation rate (ESR) and Lipid Profile.

Our study found that higher RDW(SD) was associated with higher calcium score, percent of lumen stenosis and number of affected vessels(the CT data)

LIMITATIONS:-

First, elevated RDW levels are observed in many clinical settings such as hemolysis, increased red cell destruction after blood transfusion, and in the setting of ineffective red cell production such as that of iron, vitamin B12, or folate deficiency. RDW is also increased in clinical states such as pregnancy, thrombotic thrombocytopenic purpura, and inflammatory bowel diseases.(That's why Systemic inflammatory disease, Any Hematological disorder, Pregnancy and Poor general condition were considered as exclusion criteria).

Only Hb levels & ESR were measured in this study, and other factors including iron, vitamin B12, and folate were not measured. there were no pregnant, no inflammatory bowel diseases, no thrombotic thrombocytopenic purpura, and no malnourished patients.

Second, single center study.

Third, small sample size.

Fourth, in our study we found only 2 patients with more than 2 coronary arteries affected and this was one of the biggest limitations in our study affecting the results.

RECOMMENDATIONS:-

Multi-center study with large number of patients is needed for better assessment of the relation between RDW & CACS in patients undergoing MSCT coronary angiography.

CONCLUSION:-

A greater baseline RDW(SD) value was independently associated with the presence of and a greater coronary complexity of CAD & higher calcium score.

In our study:-

1. We found that the independent predictors of high ca score more than 100 are total serum calcium and RDW (SD).
2. We found that the independent predictors of high Calcium score more than 400 are ionized calcium and systolic blood pressure(SBP).
3. We found that the independent predictor of presence of vessel disease is diabetes mellitus(DM).
4. Cut off value of RDW to predict high calcium score (more than 100) was RDW(CV) more than 13.45 & RDW(SD) more than 44.45.
5. Cut off value of RDW to predict high calcium score (more than 400) was RDW(SD) more than 45.1.