



### RESEARCH ARTICLE

#### CORRELATION BETWEEN HBA1C LEVEL AND EPICARDIAL FAT THICKNESS IN ACUTE CORONARY SYNDROME PATIENT”

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#### Abstract

**Background :** Epicardial fat thickness and HBA1C level are useful independent indicator for metabolic syndrome and type 2 diabetes mellitus respectively<sup>10,9</sup>. studies on the correlation between HBA1C level and epicardial fat thickness in coronary artery disease are limited .Hence we aim to evaluate the correlation of HBA1C and epicardial fat thickness in acute coronary syndrome.

**Objective :** The Target of this work was to investigate correlation link between HBA1C and epicardial fat thickness in acute coronary syndrome.

**Methodology :** 123 patient of coronary artery syndrome .Electrocardiogram (ECG), Epicardial fat pad thickness was measured using transthoracic echocardiogram and glycosylated haemoglobin (HBA1C),fasting blood glucose (FBG) and fasting total cholesterol were documented . waist circumference (WC) ,Hip circumference (HC) were measured ,And Body mass index (BMI) and waist hip ratio (WHR)were calculated .

**Results :** Total of 123 patient who fulfilled the criteria were taken into this studies. # - as these are normally distributed attributes, hence Pearson's “r” value has been used interpret correlation. All other attributes have used Spearman's correlation, the correlation between HBA1C level and epicardial fat thickness spearman's correlation ‘r’ correlation analysis was performed .as shown in table 1 , (r value 0.402) with p value <0,001 shows strong relationship

**Conclusion :** In acute coronary syndrome , HBA1C level were high with increasing epicardial fat thickness .This suggestive of epicardial thickness moderate correlation between HBA1C level.

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#### Introduction:-

Metabolic syndrome is a disorder with many metabolic abnormalities with increase in diabetes and cardiovascular risk<sup>3</sup>.

The major abnormalities in metabolic syndrome are obesity, hypertriglyceridemia, hyperglycemia and hypertension<sup>16</sup>. Epicardial adipose tissue is having more sensitive and specific for coronary artery disease<sup>4</sup>. Cardiovascular risk of obesity is epicardial adipose tissue<sup>1</sup>.

Type 2 diabetes mellitus is increasing risk factor for coronary artery disease<sup>3</sup>. Defect in improper utilization of insulin by tissues in type 2 diabetes mellitus, stimulate other sources for energy production leads to fat deposition in viscera. HBA1C level is one of the novel biomarker of type 2 diabetes mellitus.

Hence correlating between HBA1C and epicardial fat deposit in acute coronary syndrome

### Material And Methods:-

A cross sectional study was conducted from march 2021 to march 2022 on patient who is admitted in cardiology department in bapuji hospital, JJMMC, davangere. approval was taken from research ethical committee of JJMMC. A signed informed consent was taken from all the participants.

The study included sample size of 123 participants of aged 40 - 85 years, 123 patients with coronary artery disease admitted in cardiac ICU.

Patient included were presenting with acute coronary syndrome confirmed with ECG and echocardiogram with above age of 40, both male and female.

Patient excluded from research were those with Patients with chronic kidney disease, Known case of hypothyroidism, Patient with decompensated liver disease., Refusal to participate

Detailed history of presenting symptoms – chest pain, palpitation, sweating. Past history of diabetes mellitus, hypertension, coronary artery disease and family history of coronary artery disease. Personal history regarding smoking, alcohol, diet, sedentary life style was taken from all the patient and clinical examination was performed including blood pressure, waist circumference (WC), weight, height, Waist / Hip Ratio and body mass index (BMI) are measured. Obesity was classified according to (WHO) World Health Organisation criteria participants were subjected to the following investigations. Complete Blood Count, Fasting Blood Sugar, Fasting total cholesterol, A standard 12 lead resting electrocardiogram was taken for, Each subject underwent detailed transthoracic two-dimensional echocardiography with the subjects in left lateral decubitus position in the Department of Cardiology, BAPUJI hospital attached to J.J.M. MEDICAL COLLEGE

Epicardial fat pad thickness which is the echo free space between the outer layer of myocardial wall and the visceral layer of the pericardium was measured on the free wall of the right ventricle from both parasternal long and short axis views at mid ventricle during end diastole. The maximum values at each site were measured and the average value was consider.

### Definition Of Diabetics, Hypertension And Dyslipidemia

DIABETES was defined according to American diabetes association criteria<sup>20</sup>. hypertension according to joint national committee<sup>21</sup> and dyslipidemia was diagnosed according to update of national cholesterol education program guidelines<sup>19</sup>.

### Statistical Approaches

Sample size

The standard normal deviate for  $\alpha = Z\alpha = 1.9600$

The standard normal deviate for  $\beta = Z\beta = 0.8416$

$C = 0.5 * \ln[(1+r)/(1-r)] = 0.2554$

Total sample size =  $N = [(Z\alpha + Z\beta)/C]^2 + 3 = 123$

The data collected will be entered in to excel sheet and analyzed. Data will be represented using descriptive and correlation statistics namely pearson's (r) and spearman's for normally distributed attributes and others respectively, percentage wherever applicable. Appropriate Parametric and non parametric tests will be used. 'p' value of <0.05 and will be considered for statistical significance

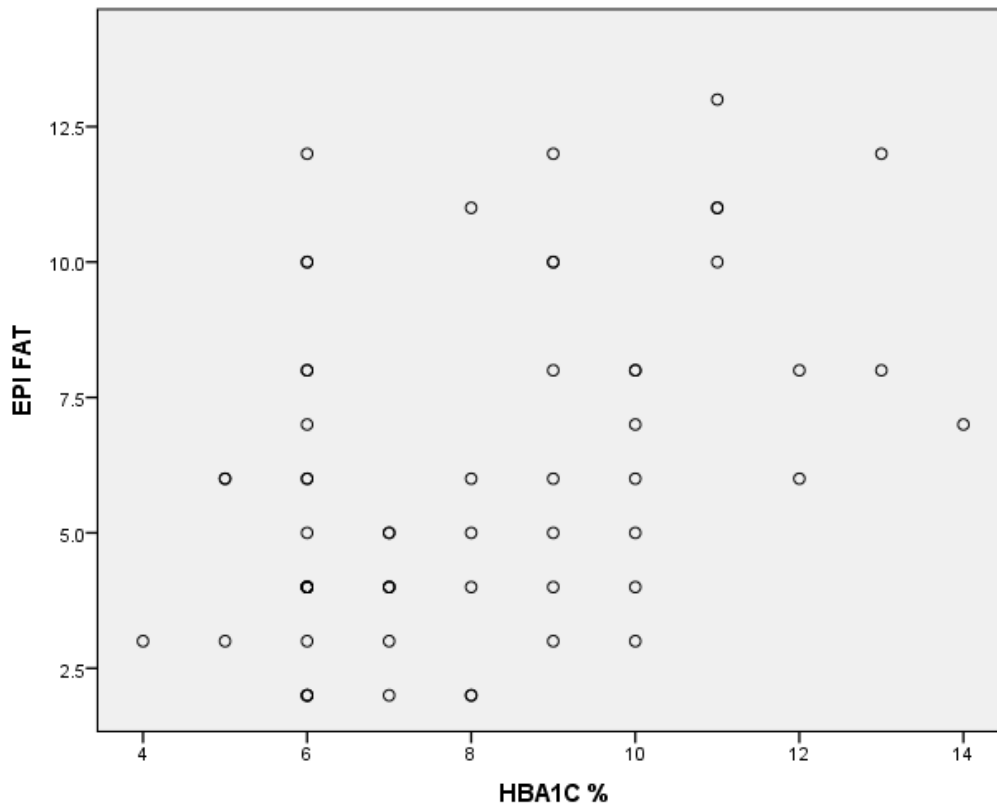
**Results:-**

Total of 123 patient who fulfilled the criteria were taken into this studies .table 1 display the characteristics of the participants . # marked in table were normally distributed attributes ,hence pearsons ‘r’ values has been used to interpret correlation of epicardial fat thickness , age ( r value -0.140) , cholesterol (r value 0.313) ,LDL(r value0.140) had low positive correlation . all other attributes have used spearman’s correlation . to determine the correlation between HBA1C level and epicardial fat thickness spearman’s correlation ‘r’ correlation analysis was performed .as shown in table 1 , (r value 0.402) with p value <0,001 shows strong relationship

**Table 1:-** Epicardial thickness correlation with various attributes (n=123).

Attributes	r value	p value
Age	-0.140 <sup>#</sup>	0.285
BMI	-.139	0.289
WHR	0.038	0.774
FBS	0.486	<0.05
HbA1C	0.402	<b>0.001</b>
Cholesterol	0.313 <sup>#</sup>	<b>0.015</b>
LDL	0.140 <sup>#</sup>	0.285
TG	0.342	<b>0.007</b>
HDL	-0.072	0.587
VLDL	0.277	<b>0.032</b>

# - as these are normally distributed attributes, hence Pearson’s “r” value has been used interpret correlation. All other attributes have used Spearman’s correlation



**Correlation of Epicardial fat with HbA1C**

**Discussion:-**

In our study , the result showed a significant increase in epicardial thickness with HBA1C in acute coronary syndrome . Epicardial fat( EF ) deposition of adipose tissue between visceral pericardium and myocardium<sup>7</sup> . it relates many pathophysiology of other visceral fat deposite .epicardial adipose tissue is subjected to maladaptive

adipocytes deposition in biology of obesity of cardiac organ . adiponectin is less in coronary artery disease and beneficial parcrine effect is distorted in metabolic syndrome . Chronic caloric excess in the face of reduced energy expenditure causes increased visceral fat mass<sup>15,18</sup> . Most studies<sup>3,4</sup> described a higher amount of EF in individuals with metabolic syndrome (MS) is noticed . It has across different clinical characteristics and prevalence of MS. Epicardial fat is moderately associated with HBA1C levels<sup>7</sup> and with the prevalence of diabetes mellitus<sup>17</sup>. There is 3 to 5 fold increase in the risk for type 2 diabetes mellitus in patients with metabolic syndrome<sup>11</sup>. Insulin resistance onset cause marked increase in hyperglycemia<sup>7</sup> . insulin resistance cause lipolysis<sup>9</sup> , decrease intake of glucose in cardiac cells and free fatty acids are taken inside cells and deposition take place<sup>12</sup> . insulin resistance in diabetes mellitus type 2 cause downregulation of leptin , which regulate the energy balance by suppressing hunger which in turn decrease fat mass in adipocytes . glucose production from liver and kidney is reduced . insulin is reduced due to low glucose and impairment set to develop . cause hyperglycemia in type 2 diabetes mellitus<sup>12</sup> . Increased level of glucose cause increase free fatty acid and deposition in visceral organ such as one of the organ is cardiac, which inturn cause increase demand and decreased supply result in acute coronary syndrome<sup>11,12</sup> .

### Conclusions:-

In acute coronary syndrome , epicardial thickness was significantly high with HBA1C level .This suggestive of epicardial thickness moderate correlation between HBA1C level.

### Conflict Of Interest:

None.

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