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ORIGINAL RESEARCH

To study the relationship between QTc dispersion and the severity of coronary atherosclerotic artery disease as detected by the SYNTAX score in acute STEMI

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Abstract

Background: Worldwide, heart problems are the leading cause of death.

Aim and objective: To research the connection between the SYNTAX score and QTc dispersion for the severity of acute STEMI-diagnosed coronary atherosclerotic artery disease.

Material and methods: 55 patients are included in the current study. During the study period, all people who went to acute ST-elevation myocardial infarction in the emergency, medicine, or Cardiology OPD were assessed. Acute STEMI was identified in patients using WHO criteria.

Results: The patient age varied from 49 to 70 patients were 27.3% of women and 72.7% of men, with a mean age of and standard deviations of 10.55 and 55.09, respectively. The average CKMB and Syntax scores were respectively 53.8729.64 and 11.8510.24. Forty (80%) of the individuals tested positive for troponin I, and the average syntax score was compared to QTc dispersion. Subjects with QTc dispersion 60 and >60 had mean syntax scores of 1.79 2.35 and 14.65 9.82, respectively. Using the t test, it was discovered that the syntax score was statistically significant when compared to QTc dispersion at p0.01. Amid score and QTc were found to have a notable positive connection (r = 0.698, p0.01) according to Pearson correlation analysis.

Conclusions: According to the results of our investigation, corrected significant correlation exists between QT dispersion and the SYNTAX score-measured severity of coronary artery disease.

Keywords: acute MI, QTc dispersion, and SYNTAX score, CHD.

Introduction

Cardiovascular illness is the most fatal globally. Cardiac arrest in developing nations accounts for 80% of the contribution. India, which has the second-largest population in the world, bears around a quarter of the burden of CHD worldwide.[1] By 2025, 12.5% of the population will be above the age of 65, from the current old population of 7%.[2] In individuals the most severe type of MI, ACS (acute coronary syndrome), proportion of STEMI ranges from 29% to 47%. The likelihood of a STEMI recurrence is declining due to advancements in diagnosis and treatment, but the risk of death and sequelae is still substantial.[3] Medical fatalities have increased in European Union countries from 4% to 12%, and patients with STEMI have a 10% one-year fatality rate. After a STEMI, patients have

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extremely high readmission rates (about 15.4%), with recurrent ischemia accounting for 26.6% of those re-admissions.[6] The potential of developing short- or long-haul entanglements is considered when analyzing STEMI patients, and these conditions carries bad prognosis than earlier coronary risk factors.[7] Global MI treatment guidelines show that advanced age, the development of diabetes, decreased ventricular capacity, heart failure, treatment strategy, and the kind of clinic the patient receives care in are conditions linked to poorer outcomes.[11] For stratification of the chances of death and complications following MI, Brogan,[12] has provided a number of models that take into account factors like troponin levels and coronary angiography data. In centres and low-income countries, the examination of these indicators is typically not offered in internal medicine and cardiology services. Since it has been employed for fifteen years.[8]QT dispersion in standard ECG is regarded as one of the greatest approaches to improve dangerous cardiac arrhythmias. It depends on how widely and long the repolarization has spread in the surrounding cardiac regions. To comprehend the heterogeneity of the ventricular repolarization, the QT interval range may be employed with 12-lead electrocardiography (ECG),[9] QT dispersion is most frequently determined. When compared to the painless conditions, the anginal episode had essentially larger QT dispersion. However, little to no information regarding the relationship to gauge the complexity of the coronary artery lesion, a connection between the SYNTAX score and QTc dispersion. The current study aims to establish a relationship between QTc dispersion and the severity of acute STEMI-related coronary atherosclerotic artery disease as assessed by the SYNTAX score.

Methodology

55 patients are included in the current study. During the study period, all patients who underwent to Medical treatment for ST-elevation myocardial infarction in the emergency department, or Cardiology OPD were assessed. According to WHO guidelines, acute STEMI was identified in the patients.

Inclusion Criteria

1. All the patients with an age > 18 years diagnosed with acute STEMI
2. Typical clinical presentation [chest pain, sweating, dyspnea]
3. For chest leads or the two leads, ST segment elevation is 2 mV. After that for the limbs.
4. Heart enzymes that are positive (CK-MB, troponin T/I)

Exclusion Criteria

1. Known cases of old MI include atrial flutter or fibrillation, wandering pacemakers, bundle branch blocks, ventricular tachycardia, complex VPCs, and A V blocks distorting T waves.
2. Drugs like amiodarone and digitalis that may shorten the QT interval.
3. Patients with imbalanced electrolytes, post-PCI state, and post-CABG status, CVA, cardiomyopathy, or valvular heart disease
4. All those who did not give consent for angiography.

Ethical Clearance

According to the Institutional Review Board for Ethical Clearance of Teerthanker Mahaveer Medical College and Research Centre and the 2000 revision to the 1975 Helsinki Declaration, the study protocol for all operations is clear. Before the trial began, all patients were required to complete a written consent form.

Echocardiography

- RWMA and RWTA in various segments, localizing the culprit vessel.

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- Ejection fraction by Modified Simpson Formula

Measurement and Normal Value of QTc,[10]

- The QT interval is a variable and is inversely related to the HR.
- It shortens with tachycardia and lengthens with bradycardia.
- To correct this problem of variation of QT interval, the calculated QT interval is converted into the QT duration at HR of 60/min, called QTc.
- The value of the QTc corresponds to the QT duration at a HR of 60/min.

STATISTICAL ANALYSIS: SPSS version 24 utilised to collect and examine the data. Using a statistical analysis, the data were factorial ANOVA for each assessment point. A student A t-test and an ANOVA were used to compare the two groups significance threshold of p 0.05 was established. Syntax score and QTc were correlated using a Pearson correlation test.

Results

Table 1: Gender and age distribution among the study subjects

Variables	N	%
Gender		
Male	40	72.7
Female	15	27.3
Age		
35-40	8	14.55
41-50	7	12.73
51-60	28	50.91
>60	12	21.82
Total	55	100

Males and females comprised 72.7% and 27.3% of the subjects, respectively, indicating male dominance. 51 to 60 years represented the largest percentage of subjects (50.91%), then people above 60 years (21.82%), as shown in [Table 1].

Table 2: Cardiac profile among the study subjects

Variables	N	%
Chest Pain		
Absent	6	10.1
Present	49	89.9
QTc		
<60	12	21.82
>60	43	78.2
LVEF		
30-40%	15	27.27
41-50%	14	25.45
>50%	26	47.27
RWMA		
Present	55	100

[Table 2] show the cardiac profile among the study subjects. Chest pain was present in 89.9% (49) of the subjects. QTc dispersion >60 was reported among 78.2% of the subjects. LVEF

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30–40%, 41–50%, and >50% were revealed among 27.27%, 25.45%, and 47.27% of the subjects, respectively. RWMA was present among all the subjects.

Table 3: Troponin I, CKMB, and Syntax Scores among the Study Subjects

Variables	Value
Troponin I, Positive, N (%)	40 (80%)
CKMB (Mean±SD)	53.87±29.64
Syntax Score (mean±SD)	11.85±10.24

In our study, the mean CKMB and Syntax scores were 53.87±29.64 and 11.85±10.24, respectively. Troponin I was found to be positive among 40 (80%) subjects

Table 4: Comparison of the mean syntax score according to QTc

QTc	Syntax Score		t test	p value
	Mean	SD		
<60	1.79	2.35	20.01	<0.01*
>60	14.65	9.82		

[Table 4] show the comparison of the mean syntax score according to QTc dispersion. The mean syntax score was 1.79±2.35 and 14.65±9.82 among subjects having QTc dispersion <60 and >60, respectively. When the syntax score was compared according to QTc dispersion using the t test, it was found to be at p 0.01, statistically significant.

Table 5: Correlation between Syntax Score and QTc

Variables	Value
r (Pearson Correlation)	0.698
p value	<0.01*

According to Pearson correlation analysis, a noteworthy positive relationship was found between amod score and QTc ($r = 0.698$, $p<0.01$).

Discussion

A condition known as CAD defines the emergence of ischemia of the heart muscle as a result of occlusion of arteries of the heart. Acute when a portion of artery isoccluded and when the heart is stopped,myocardial infarction occurs, hypoxia and ultimately necrosis of the cells of the heart. Unless there is some collateral flow from the nearby blood vessels, the blood supply to the heart muscle is cut off when the coronary blood arteries get clogged. Muscle areas with very little or no blood flow are thought to have infarctions because they are unable to continue functioning. Male dominance was evident from the fact that males made up 72.7% of the subjects and females made up 27.3%. In our study, those between the ages of 51 and 60 had the highest percentage of subjects (50.91%), followed by >60 years (21.82%).In their study, Hatem Helmy et al,[11,12] found similar male dominance. The study's participants were 53.9 + 12.1 years old on average. In their study, Mostafa MM13 discovered a comparable distribution of males and females as well as ages. In the current investigation, 78.2% of the participants reported having QTc dispersion greater than 60. A little less than in our study, 68% of the individuals had QTc dispersion >60, according to Hatem Helmy et al. This variation may be brought on by variations in the study population and study region. Relationship between Syntax Score and QTc: Subjects with QTc dispersion 60 and >60, respectively, had mean Syntax Scores of 1.79 2.35 and 14.65 9.82, with a statistically significant difference of p0.01. The amid score and QTc were revealed to have a strong positive relationship via Pearson correlation analysis. In their study, Mostafa MM et al. discovered a notable positive relationship between syntax score and QTc. The Syntax score and QT dispersion were found to be significantly correlated, according to Hatem Helmy et

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al.[1] The current research agreed with Sharafat et al,[14] who investigated the connection between elevated myocardial infarction with acute ST (STEMI) and the degree of coronary artery involvement in people QT dispersion. Employing the vessel score, the Friesinger score, and the Leaman score are three separate coronary angiographic scores. —they assessed the seriousness of the coronary angiography. The vascular score, QT dispersion, and coronary angiography all showed strong positive connection strength ratings for Friesinger and Leamanan. In individuals without a myocardial infarction history, QT dispersion decreases 1 month following active PTCA, according to research by Choi et al.[15] This shows that PTCA is beneficial in treating myocardial ischemia brought on by homogeneous repolarization. In single cardiovascular disease, Tikiz et al,[16] looked into the relationship between the position of and QT dispersion the sick coronary lesion or artery. They discovered that single-vessel condition patients had greater QT dispersion at rest, which sharply rose with activity. This finding supports the hypothesis that localised ischemia severity, rather than the severity would have a stronger effect on inducible QT dispersion in cases of coronary artery disease. According to Stierle et al,[17] patients with three different coronary artery vascular disorders exhibit differences in QT dispersion and the seriousness of their MI. They asserted that, in contrast to those with coronary arteries that are healthy, those with coronary artery disease showed an increase in QT dispersion during the peak of ischemia tension. Yilmaz et al, found a correlation between the degree of QTc dispersion and QTc dispersion ratios and frequency about coronary artery disease using the Gensini score.[18] They found a Greater QT dispersion is correlated with wider, more severe coronary artery disease. Polychronis (1999),[19] investigated the impact on QTc dispersion during spontaneous anginal recurrences caused by ischemia. Patients with a history of myocardial infarction and developed coronary artery disease during spontaneous angina have been demonstrated to have considerably higher QT dispersion. The QT dispersion was also substantially greater during the anginal incident in comparison to the painless conditions.

Strengths and limitations of the study: Due to the tiny sample size and the current study was conducted in only one place are its main drawbacks. In order to provide more reliable results, additional research must be conducted using a bigger sample size and in partnership with a number of referral institutions that offer intensive cardiovascular facilities.

Conclusion

The current study's findings indicate that there is a substantial relationship between the syntax score and QTc dispersion, which can be used in myocardial infarction patients with acute ST elevation, is another quick, easy, and low-cost method that gauges coronary artery disease severity. In order to begin preventive measures as soon as possible, everyone who has coronary artery disease are admitted should have their QTc dispersion routinely evaluated. Additionally, all patients should have coronary angiography.

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