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Comparison Of The Severity Of CAD Between Two Groups Fqrs And Non Fqrs Group

[1]Dr. Tanvir Ahmed,
Junior Consultant, Department of Cardiology, BIRDEM General Hospital, Dhaka, Bangladesh.
[2]Dr. Afroza Sultana,
Assistant Professor, Department of Obstetrics and Gynecology, Ad-din Sakina Women's Medical College (ASMC), Jashore, Bangladesh.

Abstract
Background: *Only A Small Proportion Of Patients Referred For Coronary Angiography With Suspected Coronary Artery Disease (Cad) Have The Diagnosis Of Obstructive Cad Confirmed By The Exam. Therefore, Further Risk Stratification Strategies Are Needed. Fragmented Qrs (Fqrs) Complex Is An Ecg Parameter That Has Recently Been Introduced And Investigated. Fqrs Is Thought To Be Caused By Ventricular Conduction Impairment Due To Ventricular Infarction Or Ischemia.*
Objectives: *The Aim Of The Study Was To Evaluate The Comparison Of The Severity Of Cad Between Two Groups Fqrs And Non Fqrs Group.*
Methods: *This Observational Study Was Conducted In The National Institute Of Cardiovascular Diseases Between June 2015 To May 2016. A Total 100 Patients Were Categorized Into Two Groups According To The Presence Or Absence Of Fqrs. Group I Comprised 50 Patients With Fqrs And Group Il Consisted Of 50 Patients Without Fors On Ecg. Patients With Bundle Branch Block, Ckd, Cld, With Valvular Or Congenital Heart Disease Were Excluded From The Study.*
Results: *Patients Demographics Were The Same In Both Groups. The Mean Gensini Score Was 17.7 ± 14.6 For Patients In The Fqrs Group And 7.8 ± 13.4 For Patients In The Non-Fqrs Group. This Difference Was Statistically Significant (P=0.001). Mean Vascular Scores Were Higher In Fqrs Group Patients Than In Non-Fqrs Group Patients (1.5 ± 0.7 Vs 1.0 ± 0.6) With Statistically Significant Difference (P = 0.001).*
Conclusion: *The Qrs Is An Indicator Of Early-Stage Myocardial Injury Prior To The Development Of Fibrosis And Scarring And Can Be Used For Risk Stratification In Patients Undergoing First-Time Diagnostic Coronary Angiography.*
Keywords: *Coronary Artery Disease (Cad), Fragmented Qrs (Fqrs).*

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I. INTRODUCTION

Fragmented QRS (fQRS), first reported by Das et al. was defined as help predict the prognosis of patients with coronary artery disease (CAD). [1] The presence of fQRS on an electrocardiogram (ECG) is defined as the presence of a wavy RSR pattern in the QRS complexes, or the typical notched R or S waves without branch block. [2] One possible explanation for QRS complex fragmentation is disruption of ventricular conduction due to myocardial infarction, scarring or ischemia. Moreover, the presence of her fQRS complex on her ECG in patients with acute myocardial infarction (AMI) is associated with adverse cardiac events. [3] Several studies have shown an association between fQRS and underlying structural heart disease and poor prognosis. [4] Additionally, studies have shown an association between the presence of fQRS and increased morbidity and mortality, including sudden cardiac death and recurrent cardiac events. [5]

Fragmented QRS complex (fQRS) is an easy-to evaluate electrocardiographic finding. It is defined as a QRS with a duration <120 ms, with notched R or S waves, without accompanying typical bundle branch block or additional wave such as RSR' pattern in two contiguous leads in one of the major coronary artery territories in the original QRS complex [6]. The presence of fQRS on electrocardiography (ECG) is a sign of delay in ventricular conduction, associated with myocardial scarring, ischemia, and fibrosis [7]. fQRS is an independent predictor of impaired myocardial perfusion, left ventricular dilatation and reduced ejection fraction in patients with ischemic heart disease, and is highly correlated with adverse events, arrhythmias, and mortality in patients with coronary artery disease (CAD) [8].

Coronary angiography is the best method for detecting the presence and severity of CAD and for determining coronary anatomy in patients with suspected coronary artery disease [6]. However, this is an invasive

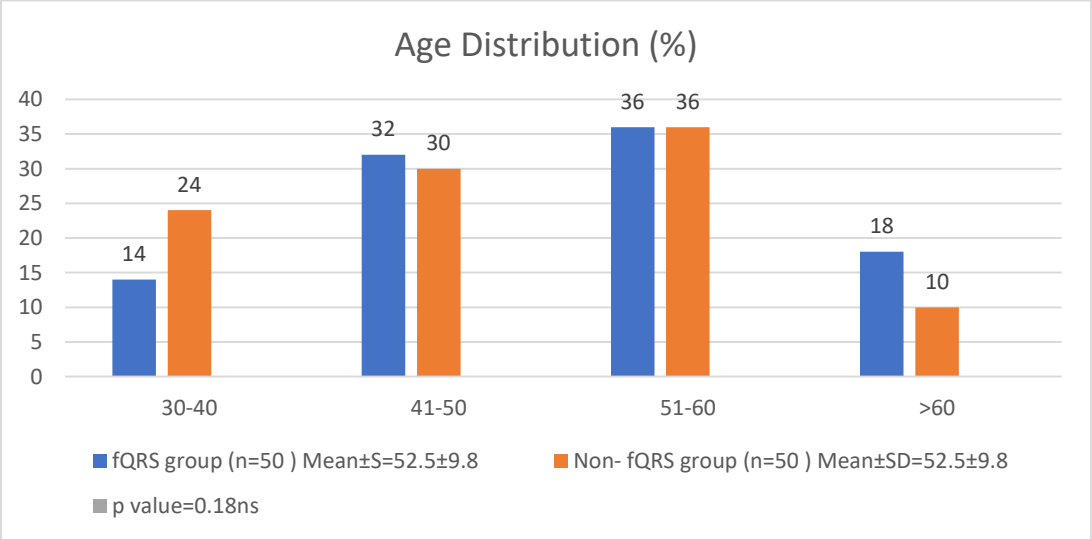
procedure that is not without complications and should be performed wisely. Of patients referred for coronary angiography for suspected CAD, coronary angiography only confirms the diagnosis of obstructive CAD in only a minority of patients [9], requiring better risk stratification strategies is suggested. The importance of fQRS in patients without known vascular disease and apparent myocardial fibrosis is unknown. The purpose of this study was to evaluate the fQRS complex in recorded ECG and angiographically detected CAD, stenotic CAD, and CAD severity in patients without known vascular diseases undergoing first diagnostic coronary angiography.

Fragmented QRS (fQRS) is defined as an extra spike within the QRS complex. In patients with coronary artery disease (CAD), fQRS is associated with myocardial scarring detected by single-photon emission tomography and was a predictor of cardiac events. [10] fQRS was also a predictor of mortality and arrhythmic events in patients with compromised left ventricular function. The utility of fQRS for detecting myocardial scarring and identifying high-risk patients has been extended to various cardiac diseases such as acute coronary syndrome, Brugada syndrome and acquired long QT syndrome. [11]

II. METHODOLOGY

This is a cross sectional observational study. This study was carried out on 100 patients the find out about the population including male and female patients in the Department of cardiology, National Institute of Cardiovascular Diseases, Dhaka, Bangladesh. The duration of the period from June 2015 to May 2016. After collection, the data were checked and cleaned, followed by editing, compiling, coding and categorizing according to the objectives and variable to detect errors and to maintain consistency, relevancy and quality control. The choice of treatment was made by the patient after a full discussion with the multidisciplinary team consisting of Transfusionists. The data for this study about had been accumulated from patients' medical information. Statistical evaluation of the results used to be got via the use of a window-based computer software program devised with Statistical Packages for Social Sciences (SPSS-24).

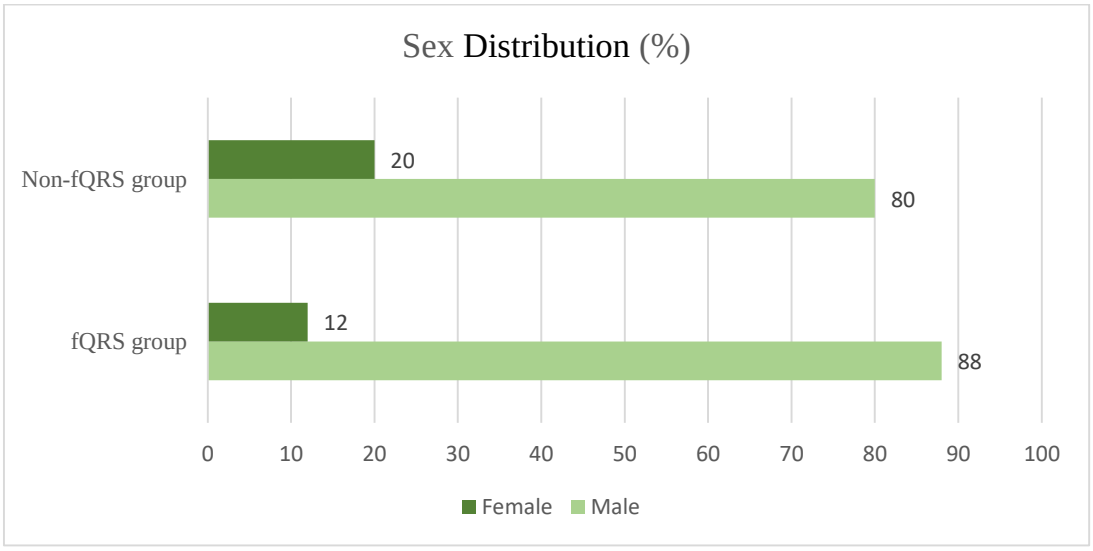
III. RESULTS



ns = Not significant (p>0.05), p value reached from unpaired student t test.

Figure I: Age distribution of the study patients (n=100).

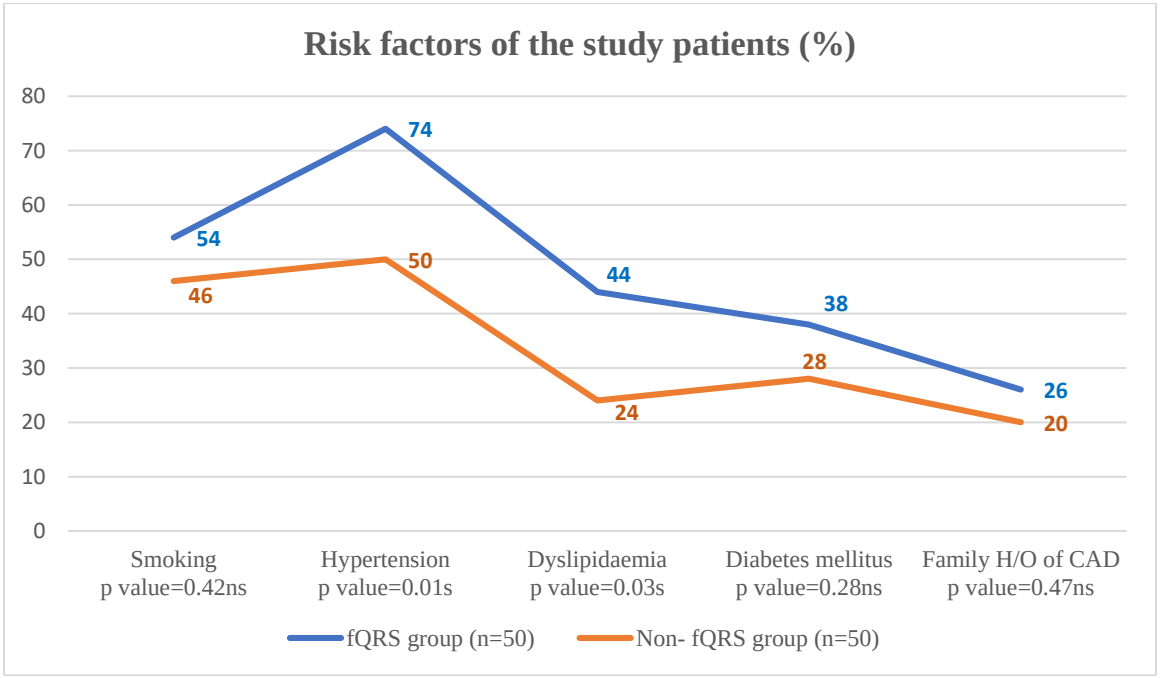
Figure I shows that total number of 100 patients were studied. It was found that among the fQRS patients, highest percentage was in the range of 51-60 years (36%). Almost in the same direction among the non-fQRS patients (36%) was in the age group of 51-60 years with no statistical significance (P value 0.18).



P value reached from Chi Square (x^2) test.

Figure II: Sex distribution among the study patients. (n= 100)

This study was conducted in 100 patients. In fQRS group, 44 (88%) patients were male and 6 (12%) patients were female. In non-fQRS group, 40 (80%) patients were male and 10 (20%) were female. Male patients were predominant in both groups. Male female ratio was 5.25:1. No significant association (p=0.28) was found between two groups in terms of sex distribution, p value reached from Chi Square (x^2) test.



P value reached from Chi Square test, s = significant (p<0.05), ns = Not significant (p>0.05)

Figure III: Risk factors of the study patients (n=100)

The studied patients, highest percentage had history of hypertension (74%) followed by smoking (54%), dyslipidaemia (44%), diabetes mellitus (38%) and family history of CAD (26%) in the fQRS group. Smoking, hypertension, dyslipidaemia, diabetes mellitus and family history of CAD were greater among the fQRS group patients than those of the non-fQRS group patients. It was observed that only hypertension and dyslipidaemia were significantly higher in fQRS group than non-fQRS group patients (p<0.05).

Table I: Comparison of severity of CAD between diabetic & non-diabetic patients (n=100)

Severity of CAD	DM Gensini score	Non-DM Gensini score	P value
	Mean±SD	Mean±SD	Mean±SD
fQRS	17.73±11.71	11.97±845	0.01[s]
Non-fQRS	17.83±13.88	17.61±12.55	0.54[ns]

The table shows that fQRS diabetic patients Gensini score was significantly (p=0.01) higher than non-diabetic patients (17.73±11.71 vs. 11.97±8.45). Non- fORS diabetic patients Gensini score was almost identical with non-diabetic patients (p=0.54).

Table II: fQRS among IHD subsets (n=100).

Biochemical parameters	fQRS group (n=50)		Non- fQRS group (n=50)		P value
	n	%	n	%	
Anteroseptal MI	8	16.0	17	34.0	0.04[s]
Anterior MI	2	4.0	10	20.0	0.01[s]
Extensive anterior MI	6	12.0	1	2.0	0.04[s]
Inferior MI	32	54.0	19	38.0	0.009[s]
NSTEMI	1	2.0	2	4.0	1.00[s]
CSA	1	2.0	1	2.0	1.00[s]

P value reached from Chi Square (x^2) test and Fisher's Exact test, s = significant (p<0.05), ns = Not significant (p>0.05)

Anteroseptal infarction had significantly (p=0.04) more in non-fQRS group than fQRS group patients (34% vs. 16%). Anterior infarction had also significantly (p=0.01) more in non-fQRS group than fQRS group patients (20% vs. 4%). Extensive anterior infarction had significantly (p=0.04) higher in fQRS group than Inferior infarction had significantly non-fQRS group patients (12% vs. 2%). (p=0.009) higher in fORS group than non-fQRS group patients (64% vs. 38%). The rest infarctions like as NSTEMI and CSA were identical in n both groups.

Table III: Comparison of mean percent of ejection fraction between two groups (n=100)

Ejection Fraction (percent)	DM Gensini score		Non-DM Gensini score		Total (n=100)		P value
	Number	%	Number	%	Number	%	
< 50	30	60.0	10	20.0	40	40.0	
≥50	20	40.0	40	80.0	60	60.0	
Mean±SD	45.5±9.4		57.8±6.5		52.6±8.6		1.001[s]
Range	(30-60)		(42-74)		(30-74)		

P value reached from unpaired student t test, s = significant (p<0.05)

Table V shows that the mean percent of ejection fraction was 52.6±8.6. It was 47.5±9.4 for the patients with fQRS group and 57.8±6.5 for the patients of non-fQRS group and the mean difference was statistically significant (p=0.001).

Table IV: Comparison number of vessel involvement between two groups (n=100)

Biochemical parameters	fQRS group (n=50)		Non- fQRS group (n=50)		P value
	n	%	n	%	
1	1	2.0	7	14.0	0.04[s]
2	28	56.0	39	78.0	0.02[s]
3	15	30.0	1	2.0	0.001[s]
4	6	12.0	3	6.0	0.31[s]

P value reached from Chi Square (x^2) test and Fisher's Exact test, s = significant (p<0.05), ns = Not significant (p>0.05)

The above table shows the number of vessels involvement of the study patients. It was found that among fQRS group patients, highest percentage had1 vessel 56% followed by 2 vessels 30%, 12% patient had 3 vessels

and 2% patients had no vessel involvement. On the other hand, among non-fQRS group patients, highest percentage had 1 vessel 78% followed by no vessel 14%, 2% had 2

vessels and 6% patient had 3 vessels involvement. No vessel involvement found significant in both groups (p>0.05). No vessel involved patients had Significantly more in non-fQRS group patients than fQRS patients (p=0.04). Single vessel involved patients had significantly more in non-fQRS group patients than fQRS patients (p=0.02). Double vessel involved patients had significantly more in fORS aroup patients than non-fQRS patients (p=0.001). Triple vessel involved patients had insignificantly more in fQRS group patients than non-fQRS patients (p=0.31).

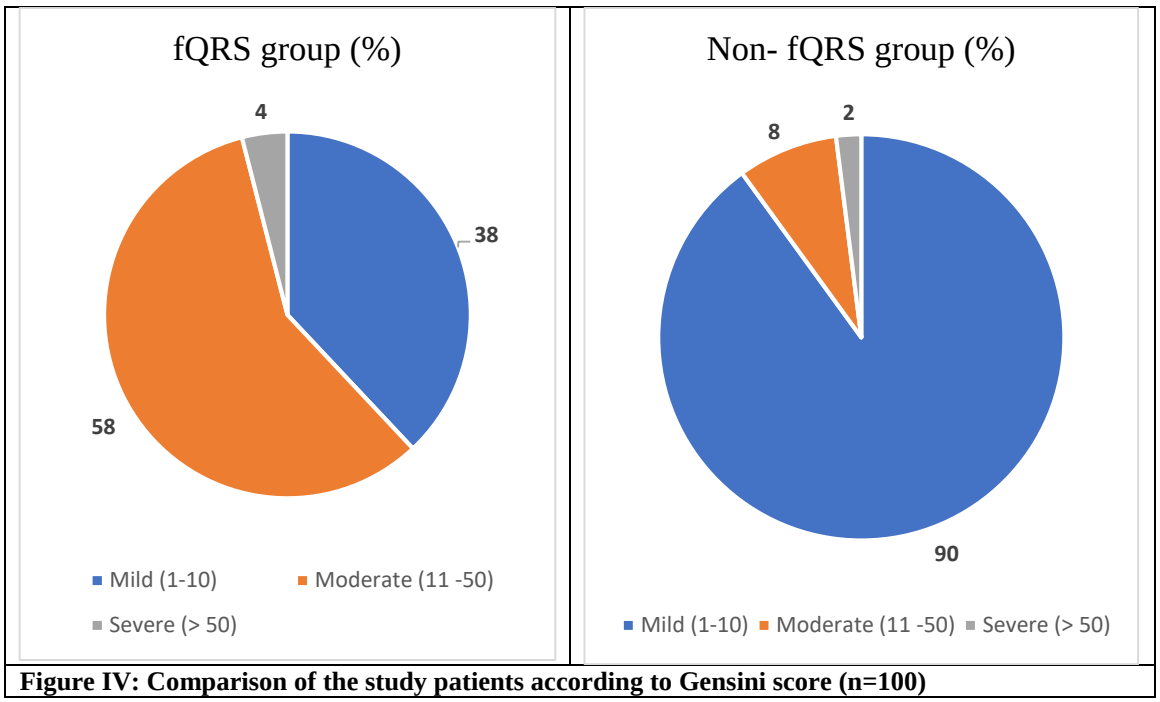


Figure IV: Comparison of the study patients according to Gensini score (n=100)

P value reached from Chi Square test and Fisher's Exact test, s = significant (p<0.05)

The above table shows the severity of CAD in both groups of patients by Gensini score. The table shows that mild Gensini score was found in 38% patients in fQRS group and 90% patients in non-fQRS group with statistically significant difference (p=0.001). Moderate Gensini score was found in 58% and 8% patients in fQRS group and non-fQRS group respectively with significant difference (p=0.001). Severe Gensini score was found in 4% patients in fQRS group and 2% patients in non-fQRS group with statistically insignificant difference (p=1.00).

Table V: Comparison between fQRS and non-fORS patients by severity of CAD (n=100)

Gensini score	fQRS group (n=50)		Non- fQRS group (n=50)		P value
	n	%	n	%	
Gensini score	17.7±14.6		7.8±13.4		0.001[s]
	(1-84)		(1-80)		
Involved no. of vessels	1.5±0.7		1.0±0.6		1.00[s]
	(0-3)		(0-3)		

P value reached from unpaired student t test, s = significant (p<0.05)

The above table shows severity of CAD among the study patients. The mean Gensini score was found 17.7±14.6 in fORS group patients and 7.8±13.4 in non-fQRS group patients. The difference was statistically significant (p=0.001). The mean vessel score was greater in fQRS group patients than non-fQRS group patients (1.5±0.7 vs 1.0±0.6) with statistically significant difference (p=0.001).

IV. DISCUSSION

This observational study was performed to investigate the association between fORS on 12-lead ECG and the severity of coronary artery disease detected by coronary angiography. A total of 100 patients with ischemic heart disease admitted to the cardiology department starting with NICVD were studied using exclusion criteria.

Patients were divided into two groups based on fragmented QRS, of which 50 patients (group I) and 50 patients (group II). The mean age of fQRS patients was 52.5±9.8 years and that of non-fORS patients was 49.8±10.5 years. The study revealed that the mean age difference between the two groups (p=0.18) was not statistically significant. The maximum number of patients in both groups ranged from 51 to 60. The mean age in both groups was 51.1 ± 10.2 years, and the medical history ranged from 30 to 81 years. Berna and Murat (2010) showed that the mean age of patients with fQRS in the study population was 60.9 ± 13.02 years and that of those without fORS was 61.05 ± 12.84 years.

Male patients were overwhelmingly prevalent in this study. In the fQRS group, 44 (88%) patients were male and 6 (12%) were female. In the non-fQRS group, 40 (80%) patients were male and 10 (20%) were female. Both groups were predominantly male. The male to female ratio was 5.25. A similar male predominance was found in almost all studies of IHD. Berna and Murat showed in their study that 12.5% were female in the fQRS group and 27.8% were female in the non-fQRS group. Another study showed that 9.5% were female in his study, which is comparable to this study. [12]

fQRS is a sign of myocardial scarring and a predictor of adverse outcomes in patients with acute coronary syndromes, CAD, structural heart diseases and arrhythmogenic syndromes. [13,14] However, the predictive value of fQRS in terms of risk stratification is not well characterized in the following areas: An asymptomatic patient has myocardial scarring and undergoes initial coronary angiography for suspected CAD. This finding parallels a recently published study that examined the incidence and prognostic value of fQRS in 10,904 middle-aged subjects with and without known cardiac disease. [15] The investigators found a 19.7% incidence of fQRS not associated with increased mortality. The relevance of fQRS in these patients remains a challenge, as they have no known cardiac disease.

In this study, the fORS group had the highest prevalence of a history of hypertension (74%), followed by smoking (54%), dyslipidemia (44%), diabetes mellitus (38%), and family history of CAD continued (26%). Smoking, hypertension, dyslipidemia, diabetes mellitus and familial coronary artery disease were more common in patients in the fQRS group than in the non-fORS group. Only hypertension and dyslipidemia were observed to be significantly higher in fQRS group patients than in non-fQRS group patients (p>0.05).

Extensive anterior infarction was significantly higher in fORS patients (p=0.04), depending on the location of the MI (12% vs. 2%). The reduction in infarct rate was significantly higher in patients in the fQRS group than in patients in the non-fQRS group (p=0.009) (64% vs. 38%). NSTEMI and rest of CSA were similar in both groups. In our study, Gr. was associated with more low-grade infarcts than our research. [12] Left ventricular ejection fraction showed that the average percentage of ejection fraction was 52.6 ± 8.6. The mean difference was statistically significant, 47.5 ± 9.4 in patients in the fQRS group and 57.8 ± 6.5 in patients in the non-fQRS group (p = 0.001).

Coronary angiography is widely used and is the gold standard for detecting CAD. Despite advances in techniques for performing coronary angiography, complications associated with invasive procedures remain a challenge. [16] Moreover, most patients undergoing coronary angiography exhibit normal angiography or non-occlusive CAD. [17] Therefore, further risk stratification is required. Strategies are needed, especially in patients undergoing early diagnostic coronary angiography.

Based on the number of vessels involved, patients in the fQRS group had the highest percentage of patients with one vessel (56%), followed by two vessels (30%), and 12% of patients with three vessels. In contrast, patients in the non-fQRS group had the highest percentage of vessels (78%), followed by no vessels in the non-fQRS group compared to fQRS patients (p=0.02). One double vessel occurred in 14% of patients, three vessels in 6% of patients, and one vessel in 2% of patients. In the non-fQRS group, none of the affected patients' vessels were significantly more frequently affected than in her fQRS group (p = 0.04). Patients with single-vessel lesions were more common in her fQRS group than in the non-fQRS group (p = 0.001). Patients with triple vessel lesions were slightly more common in the fQRS group than in the non-fQRS group (p=0.31). Similar findings were found, showing that multivascular involvement was greater in the fQRS group than in the non-fQRS group. [18]

Limitation of the study

Although the result of this study supports the hypothesis, there were some limitations which might affect the result. Non-homogeneous sample (all types of IHD patients such as CSA, UA, NSTEMI & MI were included in the study). There was No follow-up.

V. CONCLUSION

fQRS is a simple, easy detectable ECG parameter and it can be used for risk stratification in patients without evidence of vascular diseases or myocardial fibrosis and scar undergoing diagnostic coronary angiography. The presence of fQRS is associated with myocardial ischemia in patients with intermediate coronary stenosis. Therefore, incorporating this simple ECG parameter into clinical decision making may help justify

further invasive or noninvasive tests of the functional significance of any intermediate grade coronary artery disease.

VI. RECOMMENDATION

Electrocardiogram is a widely used noninvasive tool. It is a variable tool for evaluation of CAD. fQRS is an important ECG finding where its presence is very useful for identification of severe CAD. Increased awareness among physicians about fQRS may help for management of CAD patients.

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