Effects of COVID-19 infection on ECG parameters in outpatients

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Objective: Covid-19 infection has been declared as a pandemic disease by the World Health Organization (WHO) and has been associated with increased morbidity and mortality. More than 400 million people diagnosed with the disease has been reported until February 2022 [1]. Covid-19 infection mostly progresses with lung involvement and pneumonia, however, its effects on the cardiovascular system are also well-known. Studies have reported that Covid 19 infection can trigger cardiac events such as acute myocardial damage, acute myocarditis, acute coronary syndrome (ACS), ventricular arrhythmias, cardiogenic shock, and cardiac arrest [2]. Electrocardiogram (ECG) is an important tool to diagnose cardiac involvement. QTc interval, QT dispersion, Tp-e interval, Tp-e/QTc ratio are defined as ventricular repolarization parameters and these parameters are associated with increased risk of ventricular arrhythmia [3,4]. In our study, we aimed to evaluate to predict ventricular arrhythmia by ECG in Covid-19 patients.

Methods: Our study is a single-center, cross-sectional study. Patients diagnosed with Covid-19 in our center between July and October 2020 were included. 408 patients with positive SARS-CoV2 PCR test were detected and the ECGs of the patients were recorded at admission and 15 days after symptomatic recovery. After the exclusion criteria, remained 91 patients were analyzed. Conduction parameters (PR and QRS durations) and repolarization parameters (QTc interval, QT dispersion, Tp-e interval and Tp-e/QTc ratio) were evaluated in 12-lead ECG recordings.

Results: Ninety-one patients with Covid-19 infection were included. The group were consisted of 47 male (52%) and 44 female (48%). The mean age was 50.4 years. As a result of the statistical analysis, no significant difference was observed between the groups in terms of PR interval (142.2±21.4 ms vs. 140.1±19.0 ms; p=0.312). QRS duration was found significantly higher during active infection (91.4±12.2 ms vs. 88.8±10.9 ms; p=0.022). The mean QTc duration was detected longer in the first ECG, but no statistically significant difference was observed between the two groups (426.1±23.6 ms vs. 422.5±26.2 ms; p=0.237). QT dispersion (35.2±7.3 ms vs. 27.7±7.8 ms; p<0.001), Tp-e interval (86.7±10.1 ms vs. 76.1±9.9 ms; p<0.001) and Tp-e/QTc ratio (0.204±0.026 vs 0.180±0.025; p<0.001) were found significantly higher during active infection

Conclusion: In our study, QRS complex, QT dispersion, Tp-e interval, Tp-e/QTc ratio were significantly higher during active infection. We considered these parameters as a contributor of the increased mortality by inducing ventricular arrhythmia and sudden death in Covid-19 patients during active infection.

Table 1: Baseline characteristics and laboratory findings of the study population.

Covid 19 (n=91)	
Age, years	50,4±12,9
Gender (male)	47 (%51,6)
Hypertension	26 (%28)
Diatebes mellitus	10 (%11)
Hyperlipidemia	5 (%5)
Leukocyte (x10³/mm3)	5,9±2,2
Neutrophil (x10³/mm3)	3,8±1,8
Lymphocyte (x10³/mm3)	1,4±0,6
Platelet (x10³/mm3)	218±64
Hemoglobin (g/dL)	13,6±1,2
CRP (mg/L)	33,3 (0-5)
Creatinine (mg/dL)	0,79±0,1
Troponin (ng/ml)	0,086 (<0,014)

Table 2: ECG parameters at admission and after symptomatic recovery

ECG Parameters	At admission	After symptomatic recovery	P Value
PR Interval (ms)	142,2±21,4	140,1±19,0	0,312
QRS Complex (ms)	91,4±12,1	88,8±10,9	0,022
QTc Interval (ms)	426,1±23,6	422,5±26,2	0,237
QT Dispersion (ms)	35,2±7,3	27,7±7,8	<0,001
Tp-e Interval (ms)	86,7±10,1	76,1±9,9	<0,001
Tp-e / QTc ratio	0,204±0,026	0,180±0,025	<0,001

Flow Chart of the Study

408 patients diagnosed with Covid-19 were evaluated

192 patients on hydroxychloroquine and/or azithromycin were excluded

216 patients were detected

-53 patients had prior heart disease,
-39 patients had severe chronic disease,
-5 patients had malignancy,
-27 patients on antiarrhythmic drugs,
-1 patient had Brugada Syndrome

91 patients were analysed