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Evaluation ventricular arrhythmogenesis in Down syndrome patients with congenitally normal hearts

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Objective: Previously reported studies have shown that patients with Down syndrome (DS) with congenitally normal hearts (CHD) may exhibit cardiac functional abnormalities, valvular dysfunction, bradycardia, AV block and increased QT dispersion (QTd) and corrected QT dispersion (QTcd) that represent the heterogeneity of ventricular repolarization. Thus, due to increase in life expectancy in persons with DS, these persons are needed long-term follow-up in cardiovascular field. Recently, new ECG-derived indexes such as Tp-e which is the measurement of the interval between the peak and the end of the T-wave has emerged as a marker of transmural dispersion of repolarization (TDR). As Tp-e interval, Tp-e/QT ratio is also used as an index of ventricular repolarization. Prolongation of Tp-e interval and increased Tp-e/QT ratio have been found associated with malignant ventricular arrhythmias. The novel repolarization indexes Tp-e and Tp-e/QT have not been studied among these patients previously. The aim of this study was to evaluate Tp-e interval and Tp-e/QT ratio in DS patients without congenital heart defects.

Method: The standard 12-lead electrocardiograms of 134 children with Down's syndrome without congenital heart defects and 110 age-and-sex matched healthy children were assessed by a blinded specialist.

Results: Tp-e interval, Tp-e dispersion, Tp-e/QT and Tp-e/QTc ratios were found significantly higher in DS group compared to without DS group. Similarly reported study we found significantly higher QT and QTc dispersion in children with DS with congenitally normal hearts. We could not find any

	Down (n:134)	Control (n:110)	P value
Gender (M/F)	61/49	69/65	0.53
Median age (year)	6	5	0.005
Mean \pm sd age (year)	6.8 \pm 4.9	5.2 \pm 3.5	0.005
Heart rate	108 \pm 28.8	98 \pm 23.5	0.002
Tpeak-end max (ms)	73.7 \pm 24.4	64.7 \pm 23.4	0.004
Tpeak-end min (ms)	43.3 \pm 18.2	49.0 \pm 19.0	0.018
Tpeak-end dispersion (ms)	30.4 \pm 17.0	15.6 \pm 7.8	0.000
QTmax (ms)	334 \pm 32.4	328 \pm 27.9	0.14
QTmin (ms)	291 \pm 33.7	296 \pm 26.0	0.14
QT dispersion (ms)	43.4 \pm 14.7	31.9 \pm 9.4	0.000
QTcmax (ms)	397 \pm 23.1	387 \pm 24.0	0.001
QTcmin (ms)	346 \pm 25.6	361 \pm 27.6	0.000
QTc dispersion	50.8 \pm 18.2	25.4 \pm 11.4	0.000
Tpeak-end / QT	0.22 \pm 0.10	0.19 \pm 0.06	0.013
Tpeak-end / QTc	0.18 \pm 0.06	0.16 \pm 0.05	0.015

possible ventricular arrhythmias during the clinical follow up even in the absence of concomitant congenital heart disease.

Table 1 Features and electrocardiographic findings for Down syndrome (DS) patients and control subjects

association between the Tp-e interval and Tp-e/QT ratio and age in DS group. And also any correlation were not determined between P, QT and QTc dispersions and gender

Conclusions: In conclusion, our results showed that children with DS are more prone to ventricular and arrhythmias due to the prolonged durations of QT dispersions, Tp-e interval, Tp-e dispersion, Tp-e/QT and Tp-e/QTc ratios. Thus, all children with DS should be carefully assess with electrocardiography according to the