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**A STUDY OF CORRECTED QT DISPERSION BEFORE AND AFTER HAEMODIALYSIS  
IN ISCHEMIC HEART DISEASE PATIENTS**

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**Abstract:**

**Introduction:** Patients with end stage renal disease on maintenance hemodialysis have high mortality<sup>(1)</sup>. The mechanisms responsible for increased risk of sudden deaths is not clear. Haemodialysis patients have a wide variety of ECG abnormalities and in certain instances hemodialysis itself seems to be a cause of ECG changes and different kind of arrhythmias<sup>(4)</sup>. So the study to assess the effect of hemodialysis on QT interval in patients with end stage renal failure is taken up.

**Materials & methods:** A cross sectional hospital based study was done on fifty adult chronic renal failure patients with end stage renal disease on haemodialysis for more than three months at associate hospitals of Kasturba Medical College, Mangalore

Twelve-lead electrocardiographs were performed at 10mm/mv and 25mm/s using software based digital ECG recorder (Schiller Healthcare India Pvt Ltd.) 10 minutes before and 10 min after a single hemodialysis session. The automatic QT interval was obtained. Statistical analysis was done using Students t-test and chi-square test. P value of  $\leq 0.05$  was considered significant.

**Discussion:** This study demonstrates that QT interval increases significantly after hemodialysis. We also found out that the prolongation of QT, QT<sub>C</sub> and QT<sub>C</sub> dispersion are higher in the presence of ischemic heart disease.

**Key words:** End stage renal disease hemodialysis QT<sub>C</sub> dispersion ischemic heart disease.

**Introduction:** Patients with end stage renal disease on maintenance hemodialysis have high mortality<sup>(1)</sup>. The mechanisms responsible for increased risk of sudden deaths is not clear. But Holter monitoring in dialysis patients has

revealed a high incidence of ventricular premature beats and arrhythmias during and immediately after dialysis<sup>(2,3)</sup>. Haemodialysis patients have a wide variety of ECG abnormalities and in certain instances hemodialysis itself seems to be a cause of ECG changes and different kind of arrhythmias.<sup>(4)</sup> In the conventional ECG the prolonged QT interval has been associated with arrhythmogenesis in a number of cardiac disorders. Recent studies have indicated that interlead variability of the QT interval in the surface ECG reflects better the regional recovery time. So the study to assess the effect of hemodialysis on QT interval in patients with end stage renal failure is taken up.

**Materials & Methods:** A cross sectional hospital based study was done on fifty patients. Conventional sampling method is used.

**Inclusion criteria:** Adult patients in chronic renal failure with end stage renal disease on haemodialysis for more than three months at associate hospitals of Kasturba Medical College, Mangalore.

**Exclusion criteria:** Atrial fibrillation, Bundle branch blocks, Patients who are on antiarrhythmic drugs & ECG recordings without T waves.

Haemodialysis is carried out using bicarbonate dialysate containing (in MM) 135 Na<sup>+</sup>, 2.0 K<sup>+</sup>, 1.5 Ca<sup>+</sup> & 1.0 Mg<sup>+2</sup> in Mm. Isotonic normal saline and heparin drug is used. Maintenance drug therapy using antihypertensives, antianginals and beta blockers are not changed.

**Electrocardiographs:** Twelve-lead electrocardiographs were performed at 10mm/mv and 25mm/s using software based digital ECG recorder (Schiller Healthcare India Pvt Ltd.) 10 minutes before and 10 min after a single hemodialysis session. The automatic QT interval was obtained. Statistical analysis was done using Student's t-test and chi-square test.

P value of ≤0.05 was considered significant.

**Result:**

**Table I: Percentage distribution of patients.**

Condition	Number of cases	Percentage distribution of cases
Diabetes Mellitus	26	52
Coronary artery disease	6	12
Beta blockers	31	62

**Table II: QT values before and after hemodialysis.**

Parameters	Before dialysis(millisecond)	After dialysis(millisecond)	P value
QT	371.92 ±32.72	387.50 ±36.400	<0.001***
QT <sub>c</sub>	423.28 ±37.46	437.58 ±43.095	<0.001***
QT <sub>cd</sub>	49.58 ± 16.13	67.24 ±19.064	<0.001***

Values in mean ± std

\*\*\*highly significant

**Table 111: QT values in Ischemic heart disease patients:**

parameters	With symptoms(milli seconds)	Without symptoms (milli seconds)	t	p
QT(before)	459.17±34.16	418.39 ±35.49	2.65	0.011 **
QT(after)	472.83 ±34.56	432.78 ±42.19	2.22	0.031**
QT <sub>c</sub> (before)	383.33 ±35.23	370.36 ±32.49	2.16	0.036 **
QT <sub>c</sub> (after)	406.17± 37.78	384.95 ±35.90	2.12	0.038 **
QT <sub>cd</sub> (before)	383.33 ±35.23	370.36 ±32.49	2.16	0.036 **
QT <sub>cd</sub> (after)	406.17 ±37.78	384.95 ±35.90	2.12	0.038**

Table I shows the percentage distribution of diabetes, hypertensive and beta blocker using patients on haemodialysis. Majority of them are beta blocker users followed by diabetes and hypertension. Table II demonstrates that QT interval increases significantly ( $P < 0.05$ ) after hemodialysis. Table III shows that the prolongation of QT, QT<sub>c</sub> and QT<sub>C</sub> dispersion are higher ( $P < 0.05$ ) in the presence of ischemic heart disease.

**Discussion:** The normal range for QT dispersion (QT<sub>cd</sub>) is 40- 50 ms with a maximum of 65 ms. If the QT dispersion is greater than 65ms the patients are at risk for serious ventricular arrhythmia or sudden death.<sup>(5)</sup> The QT dispersion has been suggested to reflect regional variation in action potential duration.<sup>(6, 7)</sup> Similar to this incidence of ventricular arrhythmia among hemodialysis patients has been elevated in study carried out by Sforzini et al.<sup>(8)</sup> In our study, we also found out that the prolongation of QT, QT<sub>c</sub> and QT<sub>C</sub> dispersion are higher in the presence of ischemic heart disease. Similarly, QT<sub>C</sub> dispersion was increased further after hemodialysis in the study of House m et al and Cupisti et al,<sup>(9, 10)</sup> The cause of the increase in QT<sub>C</sub> dispersion is linked to the higher occurrence of arrhythmias.

Electrocardiographic markers in this population, prolonged QT dispersion has been linked with an increased risk of sudden death after hemodialysis. If the results of QT dispersion could be correlated with mortality rates of patients on renal replacement therapy then this study would be of great importance.

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