Study on corrected QT interval before and after haemodialysis among patients on beta blocker therapy

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**Abstract**

**Introduction:** In recent days patients with end stage renal disease on maintenance hemodialysis is emerging. In the conventional ECG the prolonged QT interval has been associated with arrhythmogenesis in a number of cardiac disorders. It has been documented that dialysis patients exhibit sustained activation of the sympathetic nervous system and that the diseased kidney themselves are the trigger of this overactivity. The sympathetic over activity is associated with mortality and worse cardiovascular outcomes. So the study to assess the effect of beta blockers in chronic renal failure patients using QT interval is taken up.

**Materials & methods:** A cross sectional hospital based study was done on fifty adult patients on hemodialysis for more than three months at associate hospitals of Kasturba Medical College, Mangalore. Informed consent was taken from them. 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.

**Discussion:** This study demonstrates that QT interval increases significantly after hemodialysis. There was no significant differences in QT dispersion in end stage renal failure patients on beta blockers and those patients not on beta blockers in our study. However, long –term clinical trials are desperately needed to evaluate the safety and efficacy of beta blockers in chronic dialysis patients.

**Keywords:** Beta blockers, hemodialysis, QT dispersion, chronic renal failure

1. **Introduction**

In recent days patients with end stage renal disease on maintenance hemodialysis is emerging. It has got highmortality. The mechanisms responsible for increased risk of sudden deaths are not clear. But Holter monitoring in dialysis patients has revealed a high incidence of ventricular premature beats and arrhythmias during and immediately after dialysis. Hemodialysis 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. In the conventional ECG the prolonged QT interval has been associated with arrhythmogenesis in a number of cardiac disorders. It has been documented that dialysis patients exhibit sustained activation of the sympathetic nervous system and that the diseased kidney themselves are the trigger of this overactivity. The sympathetic over activity is associated with mortality and worse cardiovascular outcomes. So the study to assess the effect of beta blockers in chronic renal failure patients using QT interval is taken up.

2. **Materials & methods**

A cross sectional hospital based study was done on fifty adult patients. Informed consent was taken. Conventional sampling method was used.

**2.1 Inclusion criteria**

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

**2.2 Exclusion criteria**

Atrial fibrillation, Bundle branch blocks, Patients who are on antiarrhythmic drugs & ECG recordings without T waves. Hemodialysis is carried out using 135 Na+, 2.0K+, 1.5 Ca&È1.0 Mg² in Mm. Isotonic normal saline and heparin drug is used. Maintenance drug therapy using antihypertensives, antianginals and beta blockers are not changed.

**2.3 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.

3. **Result**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of cases</th>
<th>Percentage distribution of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Mellitus</td>
<td>26</td>
<td>52</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Beta blockers</td>
<td>31</td>
<td>62</td>
</tr>
</tbody>
</table>
The QT dispersion has been suggested to reflect regional variation in action potential duration. There were no significant differences in QT dispersion in end stage renal disease patients on beta blockers and those patients not on beta blockers.

4. Discussion
This study demonstrates that QT interval increases significantly after hemodialysis. The normal range for QT dispersion (QTcd) is 40-50 ms with a maximum of 65 ms. If the QT dispersion is greater than 65 ms the patients are at risk for serious ventricular arrhythmia or sudden death. The QT dispersion has been suggested to reflect regional variation in action potential duration. Similar to this incidence of ventricular arrhythmia among hemodialysis patients has been elevated.

An electrocardiographic marker in this population, prolonged QT dispersion has been documented that dialysis patients exhibit sustained activation of the sympathetic nervous system and that the diseased kidney themselves are the trigger of this overactivity.

Table 1 shows the percentage distribution of patient’s shows that majority of them are on beta blockers. Table 2 shows that QT intervals significantly (P<0.05) increases after haemodialysis. Table 3 shows that there are no significant differences in QT dispersion in end stage renal disease patients on beta blockers and those patients not on beta blockers.

References