

Resting ECG Abnormalities in Patients on Maintenance Hemodialysis – A Clinical Study

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Keywords : ECG, maintenance, hemodialysis

Date of Submission: 31 -07-2017

Date of acceptance: 23-08-2017

I. Objective

To assess resting electrocardiographic abnormalities in patients on maintenance hemodialysis

II. Patients And Methods

This cross sectional observational study was done at our centre where patients below poverty line are given hemodialysis free of cost using F6 polysulfone dialyser with surface area of 1.2m². Patients are given twice or thrice weekly dialysis along with twice weekly erythropoietin injections.

Inclusion criteria

Those patients who are on hemodialysis for > 6 months

Those patients who have given consent to participate in the study

Exclusion criteria

Those patients of < 6 months duration of dialysis

Patients known to have H/o CAD or intervention to cardiac problem 12 LEAD ECG was taken in all patients using Bionet CardioCare Digital ECG machine before initiation of mid week HD session

ECGs were analyzed by single cardiologist who is blinded by the clinical data of patients.

III. Results

Total 120 patients were included in this study. Mean age of the study group was 44.7±12.3 years. Men were 88 and women were 32 in number. Mean duration of dialysis is 27.4±25.9 months. At least one ECG abnormality was observed in 87(72.5%) patients. Number of patients with diabetes mellitus was 61(50.8%) and those with hypertension was 79(65.8%). Majority of the patients (101) had permanent vascular access (84.1%) and only 11 patients had Jugular catheter (9.1%). Rhythm abnormalities were seen in 32 patients (26.6%) and the remaining 88 patients (73.4%) had normal Sinus Rhythm during study.

Only one patient had sinus arrhythmia and 25 patients had sinus tachycardia. Six patients had ventricular ectopic beats. Mean heartrate in the study group was 90.7±15 seconds. Mean PR interval was 149.75±31.8 millisecc and mean QRS duration was 95.43±19.20 millisecc, Mean QTc interval was 431.9±27.3 millisecc. Prolonged PR interval was observed in 12 patients and a prolonged QTc was noted in 16 patients (table 1). Factors influencing prolonged QTc and prolonged PR interval could not be studied.

Table 1: Patients with abnormal heart rate or intervals

Sinus tachycardia	25 (20.8%)
VPCs	6 (5%)
Prolonged PR interval	12 (10%)
Prolonged QRS duration	12 (10%)
Prolonged QTc interval	16 (13.3%)

On resting ECG, most common abnormality found was left ventricular hypertrophy (50%) and T wave changes (34%). Left atrial enlargement was observed in 22.5% and ST segment changes were seen in 23%. LBBB was least common, noted in only 2.5% of study population (table 2).

Table 2: Abnormal findings on ECG

Left ventricular hypertrophy	50 (41.6%)
Left atrial enlargement	27 (22.5%)
RBBB	7 (5.8%)
LBBB	3 (2.5%)
ST segment changes	28 (23.3%)
T wave changes	41 (34.16%)
Abnormal q waves	6 (5%)
Poor r wave progression	14 (11.6%)

IV. Discussion

It is well reported that patients with chronic kidney disease show significant ECG changes with a high incidence of ventricular and supraventricular arrhythmias(7).In our observational study, a high prevalence of single resting ECG abnormalities was noted (72%).This is in concordance with the existing literature (3).Most common ECG abnormality was LVH, which is similar to the findings reported by Shafi etal in 120 patients from Pakistan. This is slightly higher than the incidence noted by Bignotto etal in 124 Brazilian patients. (3,4) Mean age of our group was 44.7 years similar to the observation by Shafi etal, unlike the higher age group in Bignotto etal study.RBBB, LBBBwere found to more in the studies dine by Shafi etal and Bignottoetal compared to the present study.ST segment changes were of similar prevalence in our study and study by Shafi etal (Table 5). In our study, mean heart rate ranged from 75-115 beats/min.

Mean PR interval was 149.75+31.8ms,mean QRS was 95.43+19.2ms and mean QTc was 431.9+27.3ms.Regarding rhythm abnormalities, sinus rhythm was present in 49 patients and an abnormal rhythm was noted in 71 patients.sinus tachycardia was observed in 20.8%, a prolonged PR interval and QRS duration in 10% of the study population and prolonged QTc was observed in 13.3% of the patients.This is in contrast to the study done by Bignotto etal where in approximatly half of the dialysis population studied had prolonged QTc.Prolonged QTc is reported to be very common in patients on hemodialysis and the factors associated with the same were found to be abnormallevels of serum calcium, phosphorus, potassium,ferritin, uric acid and BNP(9-11).

Table 5 : Comparison of ECG findings in the studies available .

	Shafi et al	Bignotto study	Present study
Total no of patients	124	179	120
Mean Age	49.9±13.8	58.5+14.7	44.7±12.3
ECG abnormalities	78.4%	79/179	72.5%
LVH	40.8%	36.31%	41.6%
LAE	17.6%		22.5%
RBBB	12.8%	10.05%	5.8%
LBBB	9.6%	15.08%	2.5%
ST segment changes	23.4%	3.35%	23.3%
Q waves	27.2%		5%
Prolonged QT interval		49.1%	13.3%

V. Observations

In our study, the most common ECG abnormality was found to be LVH.It was also observed that ECG abnormalities were found in 72% of the dialysis population studied.

Limitations

Small study population

Single resting ECG was taken

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*Manjusha Yadla. "Resting ECG Abnormalities in Patients on Maintenance Hemodialysis – A Clinical Study." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 16.8 (2017): 62-64