Electrocardiographic Abnormalities in Heart Failure Patients at a Teaching Hospital in Kumasi, Ghana

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Abstract

The resting 12-lead Electrocardiogram (ECG) is very useful in the diagnosis, prognosis and treatment of heart failure. There are limited data on the prevalence of ECG abnormalities in heart failure in Ghana. This retrospective study was therefore designed to determine the prevalence of ECG abnormalities among heart failure patients attending a cardiac clinic at the Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana. Medical records of 398 patients diagnosed with heart failure were selected from the cardiac clinic, using simple random sampling. The demographic, clinical and chest X-ray characteristics of the patients were examined. The 12-lead resting ECGs were obtained from 394 of the patients. The ECGs were abnormal in 93% (n=367) of the patients. The main ECG abnormalities included: left ventricular hypertrophy (43.7%), left axis deviation (39.6%), left bundle branch block (19.2%), and left atrial enlargement (25.6%). Arrhythmias seen included: ventricular extrasystoles (11.2%), atrial fibrillation (9.9%), complete heart block (5.3%), and ventricular tachycardia (3.6%).

In conclusion, our study has shown that ECG abnormalities are very common among heart failure patients attending cardiac clinic in Kumasi, Ghana.

Keywords. Arrhythmia; Atrial fibrillation; Non-sustained ventricular tachycardia; Atrial flutter; Heart failure

Introduction

The resting 12-lead Electrocardiogram (ECG) is widely available in the developed world. The ECG is a non-invasive and relatively easy bedside test to perform. It is mostly used cardiovascular diagnostic test, and it is performed by cardiologists and other physicians who are not cardiologists. However, the ECG is largely unavailable in many healthcare facilities in sub-Saharan African.

The ECG is an essential test in the evaluation of patients with heart failure. The European Society of Cardiology and the National Institute for Clinical Excellence of UK recommend the use of the ECG in the diagnosis of patients with suspected heart failure [1,2].

The ECG is very useful in the diagnosis and prognosis of heart failure. It also provides important information for decisions about treatment of heart failure. The ECG may identify the aetiology of the heart failure. It may also determine the precipitating factor of the heart failure in patients presenting with acute heart failure.

The ECG shows the heart rate and the rhythm, electrical conduction and chamber enlargement. Studies have shown that heart failure is very unlikely (likelihood <2%) if patients present acutely and the ECG is completely normal [3-9]. In patients with a non-acute presentation, a normal ECG has a somewhat lower negative predictive value (likelihood, 10-14%) [4-6,9].

There are limited data on the prevalence of ECG abnormalities in heart failure in Ghana. This study was therefore designed to determine the prevalence of ECG abnormalities among heart failure patients attending a cardiac clinic at the KATH, Kumasi, Ghana.

Materials and Methods

This was a retrospective study carried out at the cardiac clinic of Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana. Ethical approval was obtained from the appropriate ethical committee. Medical records of 398 patients diagnosed with heart failure were selected from the cardiac clinic, using simple random sampling. The demographic, clinical, chest X-ray and 12-lead resting Electrocardiographic (ECG) characteristics of the patients were examined. Heart failure was diagnosed, using the modified Framingham criteria for the diagnosis of heart failure [10-12].

Major criteria included

Paroxysmal nocturnal dyspnoea, raised jugular venous pressure, clinical cardiomegaly, basal crepitations, S3 gallop, clinical acute pulmonary oedema, pulmonary upper lobe blood diversion on chest X-ray (or pulmonary oedema on chest X-ray).

Minor criteria included

Tachycardia, orthopnoea, exertional dyspnoea, nocturnal cough, hepatomegaly, pleural effusion, diuretic use.

Heart failure was diagnosed if the patient had two major and one minor or one major and two minor criteria. Resting 12-lead ECGs were obtained from 394 of the heart failure patients. The ECGs were examined for the heart rate, the rhythm, electrical conduction, chamber enlargement, arrhythmias, and other abnormalities. Left ventricular hypertrophy was diagnosed using Scott’s criteria (Table 1) [13].

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The prevalence of atrial fibrillation in our study was 8.9%. Higher prevalence rates have been reported by earlier studies [9,22,23]. A study in Kano, Nigeria found a prevalence rate of atrial fibrillation among heart failure patients as 19% [23]. Another study in South-West Nigeria reported a prevalence rate of 20.7% [24]. Khan et al. found a higher prevalence rate (27%) of atrial fibrillation and atrial flutter among heart failure patients in a multi-centre study [9]. Identification of atrial fibrillation in heart failure is very important because current guidelines recommend that these patients should receive anticoagulants, unless contraindicated [1].

The prevalence rate of left bundle branch block in our study was 19.3%; this is higher than the prevalence rate reported in Kano, Nigeria [23]. Studies have shown that left bundle branch block is associated with an increased risk of cardiovascular mortality [23,25-27]. The ECG has an important role in guiding therapy. Besides patients with atrial fibrillation who might require anticoagulant treatment, several treatment modalities are now available for patients with heart failure depending on certain ECG abnormalities present [1,28,29]. For
The electrocardiogram in identifying heart failure due to left ventricular systolic dysfunction. BMJ 312: 222.


Table 3: Other ECG abnormalities seen in the patients.

<table>
<thead>
<tr>
<th>ECG Abnormality</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left ventricular hypertrophy</td>
<td>43.70</td>
</tr>
<tr>
<td>Right ventricular hypertrophy</td>
<td>6.70</td>
</tr>
<tr>
<td>Left atrial enlargement</td>
<td>25.60</td>
</tr>
<tr>
<td>Right atrial enlargement</td>
<td>10.50</td>
</tr>
<tr>
<td>Biastral enlargement</td>
<td>6.70</td>
</tr>
<tr>
<td>Left axis deviation</td>
<td>39.60</td>
</tr>
<tr>
<td>Right axis deviation</td>
<td>7</td>
</tr>
</tbody>
</table>


