

## Original Research Article

# Prevalence of electrocardiographic abnormalities in heart failure patients attending Gujarat Adani institute of medical science, Kutch, Gujarat, India: a retrospective study

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### ABSTRACT

**Background:** The ECG is a non-invasive and comparatively simple bedside test to perform. It is mostly utilized cardiovascular diagnostic test, and it is performed by cardiologists and other physicians who are not cardiologists. The ECG is an essential test in the evaluation of patients with heart failure. The aim was to establish the prevalence of electrocardiogram (ECG) abnormalities with heart failure patients attending department of medicine, Gujarat Adani Institute of medical science, Bhuj, Kutch, Gujarat, India.

**Methods:** It was a retrospective study carried out department of medicine, Gujarat Adani Institute of medical science, Bhuj, Kutch, Gujarat, India. Simple random sampling technique was applied for medical records of 400 patients diagnosed with heart failure. The demographic, clinical, chest X-ray and 12-lead resting electrocardiographic (ECG) data of the patients were examined. Heart failure was diagnosed, by the modified Framingham criteria for the diagnosis of heart failure. Analysis was done using SPSS version 15 (SPSS Inc. Chicago, IL, USA) level of confidence interval and p value was set at 95% and 5% respectively.

**Results:** The ECGs were abnormal in 92 % of the patients, and normal in 8% of the patients. The main ECG abnormalities included: left ventricular hypertrophy (42.9%), left axis deviation (39.8%), left bundle branch block (19.4%), and left atrial enlargement (25.80%). Arrhythmias seen included: ventricular extrasystoles (11.8%), atrial fibrillation (9.1%), complete heart block (5.7), and ventricular tachycardia (3.9%).

**Conclusions:** ECG abnormalities are very frequent with heart failure patients in Bhuj, Kutch, Gujarat, India. The ECG is very helpful not merely in the analysis and etiology of heart failure but also it assists in recognizing significant complications of heart failure that might manipulate the option of treatment.

**Keywords:** Arrhythmias, ECG, Heart failure, Kutch, Left ventricular hypertrophy

### INTRODUCTION

The resting 12-lead electrocardiogram (ECG) is widely accessible in the developed world. The ECG is a non-invasive and comparatively simple bedside test to perform. It is mostly utilized cardiovascular diagnostic test, and it is performed by cardiologists and other physicians who are not cardiologists. 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.<sup>1,2</sup>

The ECG is very helpful in the diagnosis and prognosis of heart failure. It also gives significant information for management about treatment of heart failure. The ECG may recognize the etiology of the heart failure. It may

also conclude the provoking factor of the heart failure in patients came with acute heart failure. The ECG describes the heart rate and the rhythm, electrical conduction and chamber enlargement. Past studies have presented that if patients present acutely and the ECG is completely normal heart failure is very not likely occur.<sup>3-9</sup> In patients with a non-acute presentation, a normal ECG has a somewhat lower negative predictive value.<sup>4-6</sup>

There are inadequate data on the prevalence of ECG abnormalities in heart failure in Kutch district Gujarat. Present study was undertaken to establish the prevalence of ECG abnormalities with heart failure patients Attending Department of Medicine, Gujarat Adani Institute of medical science, Bhuj, Kutch, Gujarat, India.

## METHODS

It was a retrospective study carried out Department of Medicine, Gujarat Adani Institute of medical science, Bhuj, Kutch, Gujarat, India. Ethical approval was taken from the institutional ethical committee and written informed consent was taken from all the participants. Before the commencement of the study, the examiner was standardized and calibrated in the Department of Medicine by a senior Faculty member (Professor and Head) to ensure uniform interpretation, understanding and application of the codes and criteria for the diseases to be observed and recorded and to ensure consistent examination. Simple random sampling technique was applied for medical records of 400 patients diagnosed with heart failure. The demographic, clinical, chest X-ray and 12-lead resting electrocardiographic (ECG) data of the patients were examined. Heart failure was diagnosed, by the modified Framingham criteria for the diagnosis of heart failure.<sup>10-12</sup>

### Major criteria included

Raised jugular venous pressure, clinical cardiomegaly, basal crepitations, paroxysmal nocturnal dyspnoea S3 gallop, pulmonary upper lobe blood diversion on chest X-ray, clinical acute pulmonary oedema.

### Minor criteria included

Tachycardia, orthopnoea, exertional dyspnoea, nocturnal cough, hepatomegaly diuretic use. Heart failure was considered if the patient had two major and one minor or one major and two minor criteria. Resting 12-lead ECGs were obtained from 389 of the heart failure patients. Left ventricular hypertrophy was diagnosed by Scott's criteria.<sup>13</sup>

### Statistical analysis

The data was coded and entered into Microsoft Excel spreadsheet. Analysis was done using SPSS version 15 (SPSS Inc. Chicago, IL, USA) Windows software program. Measure of central tendency using mean was

calculated, and measure of spread using standard deviation and range were also calculated. Level of confidence interval and p-value was set at 95% and 5% respectively.

## RESULTS

Four hundred heart failure patients were examined. ECGs were obtained from 389 patients. The ECGs were abnormal in 92 % of the patients, and normal in 8% of the patients. The heart rate of the patients ranged from 27-198 beats/minute with the mean ( $\pm$  standard deviation) heart rate of 85.0 ( $\pm$  28) beats/minute. The QRS duration ranged from 61-193 milliseconds with the mean ( $\pm$ standard deviation) QRS duration of 98.9 (27.9) milliseconds.

Table 1 illustrates the prevalence of arrhythmia and other ECG abnormalities observed in the heart failure patients. The main ECG abnormalities included: left ventricular hypertrophy (42.9%), left axis deviation (39.8%), left bundle branch block (19.4%), and left atrial enlargement (25.80%). Arrhythmias seen included: ventricular extrasystoles (11.8%), atrial fibrillation (9.1%), complete heart block (5.7), and ventricular tachycardia (3.9%).

**Table 1: ECG abnormalities observed in the patients.**

ECG Abnormality	Percent
Left ventricular hypertrophy	42.9
Right ventricular hypertrophy	5.9
Left atrial enlargement	25.80
Right atrial enlargement	11.20
Left axis deviation	39.8
Biatrial enlargement	7.1
Right axis deviation	6.8

## DISCUSSION

Present study found out that 92% of the ECGs studied were abnormal, and only 8% of the ECGs were normal. Current results were comparable with findings reported by Khan et al who establish only <2% normal ECGs out of 9315 ECGs of heart failure patients.<sup>9</sup> Present study has evidently revealed that ECG abnormalities are extremely prevalent among patients with heart failure in Bhuj, Kutch, Gujarat, India. Different studies have also found out that ECG abnormalities are not only frequent in heart failure patients, but also in patients having elevated risks for cardiovascular disease.<sup>14-16</sup> ECG left ventricular hypertrophy has been documented as a risk factor for cardiovascular disease and cardiac death for some time.<sup>17-19</sup> In the current study the most common ECG abnormality was LVH which was observed in 42.9 % of the heart failure patients. This was in contrast with earlier study.<sup>15</sup>

The prevalence of atrial fibrillation in our study was 9.1% which was lower than the findings reported by studies.<sup>22</sup>

<sup>23</sup> A study in South-West Nigeria reported a prevalence rate of 20.7%.<sup>24</sup> Recognition of atrial fibrillation in heart failure is very significant since current guidelines advocate that these patients should obtain anticoagulants, except contraindicated.

Our study finds prevalence rate of left bundle branch block 19.4%; which is higher than findings reported by Kano.<sup>23</sup> Various studies have concluded that left bundle branch block is related with an elevated risk of cardiovascular mortality.<sup>25-27</sup> The ECG has a vital role in advising therapy. QRS duration of  $\geq 120$  ms in a patient with heart failure necessitates the need for assessment for device therapy, counting implantable defibrillators and cardiac resynchronization therapy.

## CONCLUSION

ECG abnormalities are very frequent with heart failure patients in Bhuj, Kutch, Gujarat, India. The ECG is very helpful not merely in the analysis and etiology of heart failure but also it assists in recognizing significant complications of heart failure that might manipulate the option of treatment.

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