

Original article

## Study of correlation between clinical and electrocardiographic features in congestive heart failure cases

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### Abstract:

**Introduction:** Congestive Heart Failure (CHF) is an abnormality of myocardial function responsible for failure of the heart to pump blood at a rate commensurate with the requirements of the metabolizing tissue. It is a condition in which heart fails to maintain an output sufficient for the needs of the body and the cellular respiration becomes impaired.

**Material and methods:** Study was performed in 50 patients of congestive heart failure admitted in a Govt. General Hospital in MICU & Wards. In our study, 16 Patients were male and 34 were female. Study was approved by Institutional Ethics Committee.

**Results:** In the present study, P wave were absent in 14(28%) patients with atrial fibrillation, 14(28%) patients had abnormal P wave. In the present study, according to Sokolow and Lyon criteria<sup>61</sup> (S in VI + R in V5 or V6) was more than 35mm , 8 patients had evidence of LVH on ECG. In the present study LBBB was in 10% and RBBB was in 4% patients. In the present study 1(2%) patients was in second degree heart block and 2(4%) patients in third degree heart block. Nicholas et al (1979)<sup>73</sup> mentioned that, second and third degree heart block in 3(11.5%) patients in CHF.

**Conclusion:** Dyspnoea was invariably present in all patients and majority of patients had severe dyspnoea (NYHA class III & IV) . Left axis deviation, LVH, Bundle branch block, CHB, AF, ST-T Changes, Q wave abnormalities were common ECG abnormalities.

**Keywords:** Congestive heart failure, electrocardiography

### Introduction:

Congestive Heart Failure (CHF) is an abnormality of myocardial function responsible for failure of the heart to pump blood at a rate commensurate with the requirements of the metabolizing tissue.<sup>1</sup>It is a condition in which heart fails to maintain an output sufficient for the needs of the body and the cellular respiration becomes impaired .<sup>2</sup>There is structural or functional alterations of the heart lead to secondary phenomenon such as exertional dyspnea and circulatory congestion. This is followed by an often slow progression, with changes such as chamber enlargement,

hypertrophy, impairment of ejection phase indices leading to the clinical manifestations that are apparent by history and physical examination. Systolic LV dysfunction reflects a decrease in normal emptying capacity (EF of 45% or less) that is usually associated with a compensatory increase in diastolic volume.<sup>3</sup>Diastolic ventricular dysfunction present when the filling of one or both ventricles is impaired, while the emptying capacity is normal.<sup>4</sup>

### Material and methods:

Study was performed in 50 patients of congestive heart failure admitted in a Govt. General Hospital

in MICU & Wards. In our study, 16 Patients were-  
 male and 34 were female. Study was approved by\_  
 Institutional Ethics Committee.

**Inclusion criteria:**

Framingham criteria were used for diagnosis of  
 congestive heart failure.

**Framingham Criteria for diagnosis of CCF:-<sup>35</sup>**

**Major criteria:**

- Paroxysmal nocturnal dyspnea
- Neck vein distention
- Rales
- Cardiomegaly
- Acute pulmonary oedema
- S3 gallop
- Increased venous pressure (> 16 cm H2O)
- Positive hepatojugular reflux

**Minor criteria:**

- Extremity oedema

Night cough

Dyspnea on exertion

Hepatomegaly

Pleural effusion

Vital capacity reduced by one third from normal

Tachycardia (> 120 ppm)

**Major or Minor**

Weight loss (> 4.5 kg over 5 days treatment)

To establish a clinical diagnosis of congestive heart  
 failure by these criteria, at least one major and two  
 minor criteria are required.

**Procedure:**

After selection of patients, detailed history was  
 obtained from each patient. Each patient was  
 specifically asked about PND, Neck vein  
 distension, dyspnea, night cough, swelling over  
 feet, palpitations, chest pain etc.

**Results:**

**Table 1) Symptomatology of CHF :-**

Symptoms	No. of patients	Percentage (%)
Dyspnea	50	100%
Palpitations	24	48%
Orthopnea	50	100%
Syncope	9	18%
Swelling of foot	28	56%
Chest pai	28	52
Cough	9	18%
Fever	-	-
Asymptomatic	-	-

Test applied: Xz = 33.0; 0.04; 33.0; 11.29; 0.36; 0.04; 11.29 respect.

P = 0.000; 0.842; 0.000; 0.0008; 0.5498; 0.842; 0.0008 respect.

Significant in dyspnea, orthonea, syncope, and night cough.

**Table 2) Radiological features in CHF:**

<b>Radiological features</b>	<b>No. of patients</b>	<b>Percentage</b>
Pulmonary congestion	50	100%
Pleural effusion	8	16%
Cardiomegaly	24	48%
Combined	5	10%

**Table 3) Framingham criteria for CHF:-**

Framingham Criteria	No.	Percentage
<b>Major criteria</b>		
<b>PND</b>	<b>50</b>	<b>100%</b>
Neck vein distension	50	100%
Rales	50	100%
Cardiomegaly	24	48%
Acute pulm.odema	26	52%
S3 gallop	16	32%
Increased venous pressure	50	100%
Positive hepatjugular reflex	50	100%
<b>Minor criteria</b>		
Extremity oedema	28	56%
Night cough	9	18%
Dyspnea on exertion	50	100%
Hepatomegaly	16	32%

Pleural effusion	8	16%
VC <1/3 of normal	19	38%
Tachycardia (> 120 bpm)	20	40%
<b>Major or minor criteria</b>		
Weight loss > 4.5 kg over 5 days treatment	50	100%

**Table 4) ECG Abnormalities in CHF:-**

ECG Features	N o.	Percentage
<b>AXIS</b>		
Left axis deviation	10	20%
Right axis deviation	7	14%
normal axis	33	66%
ST T changes	32	64%
T Wave inversion	19	38%
Q wave abnormality	26	52%
<b>QRS duration</b>		
< 0.09 msec	36	72%
0.09 to 0.10 msec	13	26%
> 0.10 msec	1	2%
LVH ( S in VI + R in V5/V6 > 35 mm)	8	16%

**Discussion:**

For evaluation of heart failure, history, physical examination, chest radiograph, electrocardiogram and echocardiogram is essential. Heart failure is a preventable

disease, primarily through the control of blood pressure and other vascular risk factors. The guidelines for the evaluation and management of CHF were published recently by the American College of Cardiology and the

American Heart Association and defined four stages of heart failure.<sup>5,6,7</sup>

In the present study, 50 patients of CHF were studied out of which 68% were females and 32% were males. As reported in other studies

named below, in the present study CHF was more common in middle and elderly age group. It increases with age in total study and patients are randomly selected.

Study	Location	Incidence rate whole population	Incidence rate in older age groups
Eriksson et al (1989) <sup>47</sup>	Sweden		10/1000 (61-47)
Remesetal(1992) <sup>47</sup>	Eastern Finland	1-4/1000	8/1000(>65yrs)
Hoetal(1993) <sup>47</sup>	Framingham, USA	2/1000	
Rodeheffer et al (1993) <sup>47</sup>	Rochester, USA	1/1000(>75 yrs)	16/1000(>65 yrs)
Lowicetal(1999) <sup>47</sup>	London ,UK	1/1000	12/1000(>65 yrs)

In the present study out of 50 patients, 29(58%) had history of IHD, 19(38%) patients had history of valvular heart disease, 16(32%) were hypertensive, 11(22%) patients were diabetes mellitus, 20(40%) patients were dilated cardiomyopathy and 5(10%) patients were hypertrophic cardiomyopathy.

Initially Hypertension was most common cause of CHF, 30% in men and 20% in women. In the subsequent year follow up, ischemic heart disease became increasingly prevalent for the development of CHF, increased from 22% in the 1950s to almost 70% in the 1970s. During this period, hypertension and valvular heart disease declined dramatically due to use of antihypertensives treatment.

In the present study, dyspnea and Orthopnea were present in all 50 patients. Dyspnea was class II in 5 (10% ) , class III in 27(54%) patients and class IV in 18%(36%) of patients. Palpitations (48%), swelling of foot

(56%), cough (18%), syncope (18%) and chest pain (52%). Goodwin et al (1961)<sup>8</sup> In their study have shown that dyspnea was almost invariable , being usually confined to effort but sometimes paroxysmal in nature. Cardiac pain occurred in a small number of cases. There were swelling of foot (edema), raised JVP. Atrial fibrillation occurred in about one third of the cases.

In the present study, normal range of QRS axis was from -30° to 90° Left axis deviation was seen in 10(20%) Patients and right axis deviation was seen in 7(14%) of patients. Roberts et al (1987)<sup>9</sup> have reported left axis deviation in 43% and right axis deviation in 7% of patients. In the present study, PR interval ranged from 0.12 to 0.16 seconds with mean of 0.14 + 0.03 seconds. 1(2%) patient had IInd degree AV block and 2(4%) patients had third degree AV blocks are poor prognostic markers in CHF and progress over time with increasing fibrosis and myocytes hypertrophy.

In the present study, P wave were absent in 14(28%) patients with atrial fibrillation, 14(28%) patients had abnormal P wave. In the presence study, according to Sokolow and Lyon criteria<sup>61</sup> (S in VI + R in V5 or V6) was more than 35mm , 8 patients had evidence of LVH on ECG. In the present study LBBB was in 10% and RBBB was in 4% patients. In the present study 1(2%) patients was in second degree heart block and 2(4%) patients in third degree heart block. Nicholas et al

(1979)<sup>73</sup> mentioned that, second and third degree heart block in 3(11.5%) patients in CHF.

**Conclusion:**

Dyspnoea was invariably present in all patients and majority of patients had severe dyspnoea (NYHA class III & IV) . Left axis deviation, LVH, Bundle branch block, CHB, AF, ST-T Changes, Q wave abnormalities were common ECG abnormalities.

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