



ORIGINAL RESEARCH PAPER

Medicine

ETIOLOGIES AND RISK FACTORS OF ACUTE LEFT VENTRICULAR FAILURE WITH SPECIAL REFERENCE TO TRIBAL POPULATION: A SADAR HOSPITAL BASED STUDY

KEY WORDS: Left ventricular failure, risk factors, Tribal, screening.

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ABSTRACT

Background: Due to demographic transition & stressful sedentary life style the acute left ventricular failure (LVF) is increasing. **Objective:** To find out etiologies of acute LVF in study population, to estimate the proportion of patients had predefined risk factors of acute LVF along with comparison between tribal & non-tribal subgroups. **Materials and Methods:** A descriptive cross-sectional study was conducted for one year among 74 randomly selected patients aged ≥18 years & treated for acute LVF in the In-Patient-Department (IPD) and/or Out-patient-department (OPD) of General Medicine, Deben Mahato District hospital, Purulia, West Bengal. Patients with diastolic heart failure or isolated right ventricular dysfunction were excluded. Data were collected once in a week for a period of 6 months. For each week, the day for data collection was chosen randomly & on each day two patients from OPD & one from IPD were included randomly in such a fashion that 50% of them were tribal. Information collected by interview, clinical examination including anthropometry, laboratory and imaging tests were summarized & analyzed. **Results:** Ischaemic Heart Disease (IHD) & Hypertension were revealed to be two most common causes of acute LVF. Severe anaemia accounted for a considerable proportion of cases of acute LVF, specially in the tribal group. Obesity, smoking, hyperlipidemia, Diabetes mellitus, hypertension (treated), IHD, alcoholism etc. were found to be common risk factors of acute LVF. **Conclusions:** The results of this study had concurrence with most of other studies. Screening for causes and risk factors of LVF is the need of the hour along with nutritional interventions & lifestyle modification, specially among tribal subgroup.

INTRODUCTION

Heart failure is a complex clinical syndrome that results from structural or functional impairment of ventricular filling or ejection of blood, which in turn leads to the cardinal clinical symptoms of dyspnoea and fatigue and signs of heart failure, namely oedema and rales.¹ Worldwide, the incidence of heart failure is variable but increases with advancing age.² Heart failure is now a major global health problem, with a prevalence of more than 26 million annual cases worldwide.^{3,4} The prevalence is increasing in many countries due to aging societies, increased prevalence of risk factors, and better survival from other cardiovascular diseases.^{5,6} However, the survival rate of HF remains poor, and the health burden from this condition is increasing globally.⁷⁻¹³ In this study we have planned to analyse the etiologies and risk factors of acute LVF i.e. heart failure presenting suddenly with features of left ventricular systolic dysfunction. The aetiologies of acute LVF are: 1) Ischaemic heart disease, 2) Hypertension, 3) Valvular heart disease (mitral, aortic, tricuspid), 4) Alcohol and drugs (chemotherapy – trastuzumab, imatinib), 5) Hyperdynamic circulation (anaemia, thyrotoxicosis, Paget's disease), 6) Arrhythmias (Atrial fibrillation, bradycardia (complete heart block, the sick sinus syndrome)), 7) Congenital heart disease (ASD, VSD), 8) Cardiomyopathy (dilated), 9) Cardiomyopathy (undilated): hypertrophic, restrictive (amyloidosis, sarcoidosis), 10) Pericardial disease (constrictive pericarditis, pericardial effusion), 11) Infections e.g. Chagas' disease, myocarditis.² Risk factors indirectly responsible for acute LVF are – 1) Old age, 2) Hypercholesterolaemia, 3) Diabetes mellitus, 4) Obesity, 5) Controlled Hypertension, 6) Infection, 7) Negative inotropic or positive chronotropic drugs, 8) Smoking, 9) Alcohol, 10) Strong family history of Coronary artery disease.^{1,2}

The prevalence of different etiologies & risk factors e.g. Ischaemic heart disease, hypertension, diabetes mellitus, hypercholesterolaemia, obesity has increased considerably in the past few decades increasing the incidence & prevalence of acute LVF. This has also increased the total medical cost. Therefore studies involving demographic and

clinical profiles, diagnostic & therapeutic approaches in routine practice, and the degree of adherence to clinical guidelines regarding pharmacological & non-pharmacological treatments are required.¹⁰ In this study we have planned to analyze the etiologies and risk factors of acute LVF in patients presenting to the General Medicine department of a district hospital in West Bengal and to compare the etiologies & risk factors of acute LVF among tribal & non-tribal subgroups of population.

OBJECTIVES:

Aim of this study was to estimate the prevalence of different etiologies and risk factors of acute LVF in the study population, which would help us to take necessary steps to decrease the incidence of acute LVF in the study population. Specific objectives of the study were- 1) To describe the pattern and magnitude of different etiologies of acute LVF in study population. 2) To assess the proportion of patients having predefined risk factors of acute LVF 3) To compare the proportions of different etiologies and prespecified risk factors of acute LVF in tribal and non-tribal subgroups of study population.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted for one year from November 2017 to October 2018 among 74 randomly selected patients aged ≥18 years and treated for acute LVF in the In-Patient- Department (IPD) and/or Out-patient-department (OPD) of General Medicine, Deben Mahato District hospital, Purulia, West Bengal. The study was done after obtaining approval of the Ethics Committee of Bankura Sammilani Medical College and Hospital, Bankura, West Bengal. Written informed consent was taken from all participants of the study. Patients with diastolic heart failure or isolated right ventricular dysfunction were excluded from the study. Data were collected once in a week for a period of one year. Eligible patients attending the OPD (held once in a week) of the concerned unit under which the proposed study was carried out or admitted through it as well as those admitted via Emergency department were considered for the

study. Selection of participants was done in such way that 50% of them belonged to the tribal population. Consecutive patients were approached to select one tribal and one non-tribal in a day or in consecutive OPD days. If the number of patients in any group became more than one per data collection day, then one from each group out of total patients attended or admitted on that day were selected via a simple random sampling technique so that two participants per day can be included in the study. Information collected by interview, clinical examination including anthropometry, laboratory and imaging/radiological tests were summarized and analyzed.¹⁴⁻¹⁸ Data were entered in MICROSOFT EXCEL software and analysis was done with the help of statistical software, namely SPSS and STATISTICA for windows.

RESULTS:

In study subjects most common age group was found to be ≥60 years (49 subjects, 66.22%). 13 subjects (17.57% of total) were in the 40-59 years age group, and 12 subjects (16.21% of total) were <40 years old.

Table 1: Distribution of participants according to age group and ethnicity (n=74)

Ethnicity	Age groups			Total No. (%)	Chi-square, df, p
	<40 years No. (%)	40-59 years No. (%)	≥60 years No. (%)		
Tribal	08 (10.81%)	7 (9.46%)	22 (29.73%)	37 (50%)	1.51, 1, 0.219
Non-tribal	04 (5.40%)	6 (8.11%)	27 (36.49%)	37 (50%)	
Total	12 (16.21%)	13 (17.57%)	49 (66.22%)	74 (100%)	----

Table-1 reflects that there was no difference between the tribal and nontribal groups in regard to the distribution of participants belonging to different age categories. Overall, age of the participants was 57.81±15.58 with median of 61.5 and a range of 18-83 years. Average age of the non-tribal group was found to be higher (61.46±5.95 vs 54.16±16.59 years), without any significant difference in between (Mann Whitney U=513.5, p=0.063). Similarly, the men were seemed elderly than the women (59.89±15.47 vs 55.84±17.54 years) without having any significant difference across the gender (Mann Whitney U=632.50, p=0.576).

Among the study subjects, 36 patients (48.65%) were male and 38 patients (51.35%) were female.

Table 2: Distribution of participants as per gender and ethnicity (n=74)

Ethnicity	Gender		Total No. (%)	Chi-square, df, p
	Male No. (%)	Female No. (%)		
Tribal	17 (22.97)	20 (27.03)	37(50)	0.22, 1, 0.642
Non-tribal	19 (25.68)	18(24.32)	37(50)	
Total	36(48.65)	38(51.35)	74(100)	-----

Above table indicates that the both the groups were akin to each other in respect of the distribution of gender between them.

Proportion of patients in each BMI category

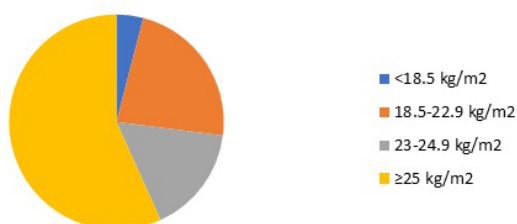


Fig 1: BMI category of study subjects

The study revealed that there was no significant difference between the tribal and non-tribal groups of participants in regard to the BMI category. However, both the groups had higher proportion of obese individuals (56.76% each) as per BMI classification for Asian populations.

Table 3: Distribution of participants according to their life style and ethnicity (n=74)

Ethnicity	Lifestyle		Total No. (%)	Chi-square, df, p	OR (95% CI)
	Sedentary No. (%)	Non-sedentary No. (%)			
Tribal	04(5.41)	33(44.59)	37(50)	31.71, 1, 0.000	0.04 (0.01-0.16)
Non-tribal	28(37.84)	09(12.16)	37(50)		
Total	32(43.24)	42(56.76)	74(100)	-----	-----

Table-3 depicts an important finding of the study. It reflects that there was a statistically significant difference across the groups. Higher proportion of tribal participants was reportedly leading a non-sedentary life style compared to their counterpart.

Analysis reveals that there was no statistically significant difference between the tribal and non-tribal participants in regard to their tobacco using habits.

There was higher proportion of tribal participants who were addicted to alcohol (27.03% vs 10.81%) but the difference was without any statistical significance.

Table 4: Distribution of participants according to their family history of IHD and ethnicity (n=74)

Ethnicity	Family H/O IHD		Total No. (%)	Chi-square, p
	Present No. (%)	Absent No. (%)		
Tribal	08(10.81)	29(39.19)	37(50)	0.35, 0.552
Non-tribal	06(8.11)	31(41.89)	37(50)	
Total	14(18.92)	60(81.08)	74(100)	-----

The above table shows that the groups were comparable in respect of the proportion of participants having ischaemic heart disease in their family.

Higher proportion of tribal participant was found to be anemic compared to their non-tribal counterpart (29.73%vs 21.62%). However, the difference wasn't found to be statistically significant.

Analysis further revealed that the tribal and non-tribal participants were similar to each other in respect to the serum lipid profile.

Both the tribal and non-tribal groups were similar in regard to the distribution of individuals suffering from IHD and hypertension (HTN) across the groups.

Higher proportion of non-tribal study subjects reported to be suffering from Diabetes mellitus (37.84% vs 21.62%) without any statistically significant difference in between.

Dilated Cardiomyopathy, valvular heart disease, COPD and CKD were other etiologies of acute LVF among the study population but there were no statistically significant differences between the tribal and non-tribal groups with regards to the distribution of these etiologies among the study subjects.

Result analysis showed that most common etiology of acute LVF among the study subjects was ischaemic heart disease (44.59%) and the second most common etiology was hypertension (33.78%).

Regarding the aetiology of LVF, there was no significant

difference between the groups.

Assessment of risk factors of acute LVF revealed that obesity (42 patients, 56.76%), dyslipidaemia (35 patients, 47.30%), smoking (34 patients, 45.95%), sedentary lifestyle (32 patients, 43.24%), diabetes mellitus (22 patients, 29.73%), and IHD (19 patients, 25.68%) were important risk factors of acute LVF in the study subjects. Other risk factors were alcohol abuse (14 patients, 18.92%), family H/O IHD (14 patients, 18.92%), hypertension (11 patients, 14.86%), CKD (10 patients, 13.51%), COPD (7 patients, 9.46%) and anaemia (7 patients, 9.46%).

Distribution of risk factors of acute LVF

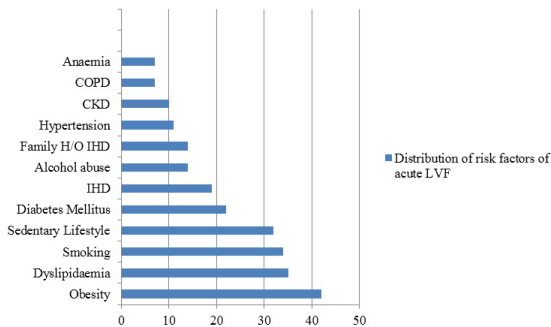


Fig 2: Distribution of different risk factors among study subjects

DISCUSSION

We in this hospital based study tried to assess etiologies and risk factors of acute left ventricular failure among patients attending Deben Mahato Sadar Hospital, Purulia with special reference to tribal population. Total 74 acute LVF patients were recruited after obtaining written informed consent and the etiologies and risk factors of acute LVF in them were assessed. The patients were recruited in such a fashion that 50% of them were tribal (as per Backward Classes Welfare Department, Government of West Bengal's list of scheduled tribes). The etiologies and risk factors of acute LVF among the tribal and non-tribal subgroup were compared.

Demographic characteristics: Among the study subjects most common age group was found to be ≥60 years (49 subjects, 66.22%). 13 subjects (17.57% of total) were in the 40-59 years age group, and 12 subjects (16.21% of total) were <40 years old. Among the study subjects, 36 patients (48.65%) were male and 38 patients (51.35%) were female. Analysis of occupation of the patients with acute LVF revealed that 32 patients (43.24% of total) had sedentary lifestyle and among them 28 patients (87.5% of patients having sedentary lifestyle) were non-tribal. Sedentary lifestyle was more common among the non-tribal group (75.68% of the non-tribal persons had sedentary lifestyle) compared to the tribal group (10.81% of the tribal persons had sedentary lifestyle). In the study “Clinical characteristics and outcome of acute heart failure in Korea: Results from the Korean Acute Heart Failure Registry (KorAHF)” by Sang Eun Lee, Hae-Young Lee et al, result analysis revealed that mean age was 68.5±14.5 years and 53.2% were male; which is similar to our study. Almost all studies worldwide has revealed increased incidence of acute heart failure with advancing age.^{2,5,6}

Anthropometry in study subjects: Analysis of Body Mass Index (as per BMI category for Asian-Indians) showed that majority of patients were obese. The distribution of patients in each BMI category was- underweight (BMI<18.5 kg/m²): 3(4.05%), normal (BMI 18.5-22.9 kg/m²): 17(22.97%), overweight (BMI 23-24.9 kg/m²): 12(16.22%), and obese (BMI ≥25 kg/m²): 42(56.76%). There was no significant difference between tribal and non-tribal subgroups with respect to BMI categories. Different studies suggest that prevalence of risk factors of heart failure such as diabetes, myocardial infarction and ischaemic heart disease has increased in the past few

decades, although the survival outcomes from these diseases have also improved.³³⁻³⁵ Obesity is a documented risk factor for diabetes mellitus, dyslipidaemia and ischaemic heart disease^{1,2} and in our study ischaemic heart disease was the commonest cause of acute LVF. Therefore increased proportion of obese subjects in our study corroborate with other studies.⁴⁷⁻⁵¹

Etiologies of Acute LVF in study subjects: Assessment of etiologies of acute LVF revealed that most common etiology of acute LVF among the study subjects was ischaemic heart disease (33patients: 44.59%) and the second most common etiology was hypertension (25 patients: 33.78%). Severe anaemia (12 patients: 16.22%) accounted for a considerable proportion of cases of acute LVF, especially in the tribal group. Other etiologies of acute LVF found in the study population were Dilated Cardiomyopathies (2 patients: 2.70%), and Valvular heart Disease (2 patients: 2.70%). In this study 52 patients (70.27% of total) had ischaemic heart disease. The proportions of ischaemic heart disease among the tribal and non-tribal subgroups (70.27% in each case) were equal. IHD was the etiology of acute LVF in 33 patients (44.59%) and risk factor in 19 patients (25.68%). In the study “Clinical characteristics and outcome of acute heart failure in Korea: Results from the Korean Acute Heart Failure Registry (KorAHF)” by Sang Eun Lee, Hae-Young Lee et al, ischaemia was the most frequent etiology (37.6%) and aggravating factor (26.3%); similar to our study. In the Framingham Heart Study cohort, hypertension antedated the development of congestive heart failure (CHF) in 91% of cases and was associated with a two- to three-fold risk of development of CHF after adjusting for age and other risk factors. Hypertension also had a high population attributable risk (the percentage of heart failure cases that can be attributed to hypertension) for CHF, viz. 39% in men and 59% in women in the Framingham study.^{19-21,46} In contrast, hypertension was found to be the primary factor in only 17% of hospitalized heart failure patients.⁴⁶ In a study by Ranjith N, Verho NK, et al on patient characteristics on admission and gender-specific risk factor prevalence of acute myocardial infarction in a young South African Indian-based population hypertension was more prevalent in young women with MI than in men: 38% and 19%, respectively.⁴⁴ In our hospital based study, among the recruited patients 36 (48.65%) were hypertensive. The proportions of hypertensive patients among the tribal and non-tribal subgroups were equal. Hypertension was the etiology in 25(33.78%) patients. Among the study subjects 19 patients (25.68%) were anaemic. Severe anaemia was the etiology of acute LVF in 12 patients (16.22% of total). Comparison of etiologies of acute LVF between tribal and non-tribal subgroups showed that severe anaemia was more common among tribal patients and hypertension was more common among non-tribal patients, but the differences were not statistically significant. Among the tribal group 9 patients (24.32% of tribal patients) and among non-tribal group 3 patients (8.11% of non-tribal patients) had severe anaemia causing acute LVF. In the tribal group 9 patients (24.32% of tribal patients) and in the non-tribal group 16 patients (43.24% of non-tribal patients) had hypertension as etiology of their acute LVF.

Risk factors of Acute LVF in study subjects: Assessment of risk factors of acute LVF revealed that obesity (42 patients, 56.76%), dyslipidaemia (35 patients, 47.30%), smoking (34 patients, 45.95%), sedentary lifestyle (32 patients, 43.24%), diabetes mellitus (22 patients, 29.73%), and IHD (19 patients, 25.68%) were important risk factors of acute LVF in the study subjects. Other risk factors were alcohol abuse (14 patients, 18.92%), family H/O IHD (14 patients, 18.92%), hypertension (11 patients, 14.86%), CKD (10 patients, 13.51%), COPD (7 patients, 9.46%) and anaemia (7patients, 9.46%). In the study “Acute myocardial infarction in a young South African Indian-based population: patient characteristics on admission and gender-specific risk factor prevalence” conducted in South

Africa by Ranjith N, Verho NK, et al, the most prevalent risk factors were previous smoking (74%), and hypertriglyceridaemia (54%).⁴⁴ Similarly, another study “Gender differences in clinical characteristics and outcome of acute heart failure (AHF) in sub-Saharan Africa: results of the THESUS-HF study” by Ogah O.S., Davison B.A., Sliwa K. et al Cigarette smoking and high blood pressure were important risk factors.^{41,42} Framingham investigators analyzed 14 years of follow-up data to demonstrate increased risk of coronary heart disease morbidity with rising baseline blood pressure.¹⁹⁻²⁵ In the study “Clinical characteristics and outcome of acute heart failure in Korea: Results from the Korean Acute Heart Failure Registry (KorAHF)” by Sang Eun Lee, Hae-Young Lee et al, ischaemia was the most frequent etiology (37.6%) and aggravating factor (26.3%) of acute heart failure.³² Thus the results of our study had concurrence with most of other studies. Comparison of risk factors between tribal and non-tribal subgroups showed that sedentary lifestyle, diabetes mellitus, and CKD were more common among non-tribal subgroup, whereas alcohol abuse, and dyslipidaemia were more common among tribal subgroup. But only increased prevalence of sedentary lifestyle among non-tribal subgroup was statistically significant.

Limitations of the study: 1. The study was performed under the time constraint of 1 year, and 74 patients were recruited. Though the sample size was calculated based on a scientific formula but due to reason of feasibility the sample size was calculated to lower side. 2. All the study subjects were acute LVF patients. Therefore the suspected risk factors could not be established after due comparison with control. 3. Coronary angiography could not be performed in some of the cases, where it was required to identify and/or confirm coronary artery disease, due to lack of infrastructure in the district hospital. Therefore more studies with more number of patients and with comparison group, are necessary to confirm the findings of the study and to establish the risk factors of acute LVF, in the study population.

CONCLUSIONS:

The study affirmed that in regard to the risk factors as well as the causes of acute left ventricular failure the tribal population gained parity with the non-tribal section. Screening for causes and risk factors of LVF is the need of the hour. The role of prevention is getting priority in Cardiology. Although few etiologies of acute LVF in the study population, identified from this study, but the risk factors, which seemed not to be less important, could not be established in a reliable manner due to lack of comparison. A further large scale study may be carried out for establishing the putative risk factors after due comparison with the comparison group. The result of that study may be utilised for making strategy to prevent acute LVF in the community level by grassroot health workers and to make decision regarding the therapeutic modalities for this group of patients.

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