Research Paper

Medical Science

Precipitating Factors Leading to De Compensation of Chronic Heart Failure in The Elderly Patient

DR RAVIKANT PATIL	Professor, Department Of Cardiology , Bharati Vidyapeeth deemed University Medical College and Hospital , Sangli Maharashtra 416415
DR . ASHISH MAGDUM	Associate Professor, Department Of Cardiology , Bharati Vidyapeeth deemed University Medical College and Hospital , Sangli Maharashtra 416415
DR AMIT JOSHI	Assitant Professor, Department Of Cardiology , Bharati Vidyapeeth deemed University Medical College and Hospital , Sangli Maharashtra 416415
DR ASHOK DESHPANDE	Senior Resident, Department Of Cardiology , Bharati Vidyapeeth deemed University Medical College and Hospital , Sangli Maharashtra 416415

ABSTRACT   we aim at studying the precipitating factors which leads to de compensation and the admission of the patients with CHF The distribution and importance of various factors, especially the preventable ones, that contribute to cardiac decompensation and subsequent hospital admission for heart failure are studied . Early readmission of elderly patients with heart failure is common. 27% to 47% of patients within three to six months after initial discharge got admitted . Major reason for readmissions is the failure to take medicines and dietery deficiencies . We prospectively examined the relative importance of various precipitating factors, especially the preventable ones, which led to hospital admission of patients with decompensated chronic heart failure in our cardiology department at Bharati Vidyapeeth Deemed University Medical College and Hospital Sangli.

KEYWORDS : Chronic Heart Failure , Precipitating factor , prescribed drugs ,dietery deficiencies.

Introduction

Amongst all the cardiac problems Chronic Heart Failure is the major affecting problem .It has become a public health problem . In spite of the advances in the treatment of Chronic Heart Failure ,it continues to be the major cause for the mortality. [1] Above the age of 65 the admissions for the chronic heart failure are increasing and also the deaths .[2]

The progress of the CHF is gradual leading to de compensation in the clinical scenario and ultimately leads to death. The factors which leads to precipitation of the de compensation of CHF should be taken care of for the better management of the patients . [3]-[6]

Thus we aim at studying the precipitating factors which leads to de compensation and the admission of the patients with CHF The distribution and importance of various factors, especially the preventable ones, that contribute to cardiac decompensation and subsequent hospital admission for heart failure are studied . Early readmission of elderly patients with heart failure is common. 27% to 47% of patients within three to six months after initial discharge got admitted .[5-7] Major reason for readmissions is the failure to take medicines and dietery deficiencies .[5-9] We prospectively examined the relative importance of various precipitating factors, especially the preventable ones, which led to hospital admission of patients with decompensated chronic heart failure in our cardiology department at Bharati Vidyapeeth Deemed University Medical College and Hospital Sangli.

Methods

We have studied this in Bharati Vidyapeeth University Medical College and Hospital , Sangli. This hospital is a tertiary care referral hospital with multi specialty wings.

We have evaluated elderly patients (older than 55yrs) requiring admission for the decompensate CHF. All patients were closely examined by the investigators on admission and followed up reg-

ularly on clinical basis . Admissions to the department of cardiology, as well as those to the intensive care unit at our hospital , were reviewed daily by one of the study investigators. Patients were eligible for the study if they had a previous history and diagnosis of heart failure and if the primary admitting diagnosis was congestive heart failure. All patients were enrolled during a one year period between . 01/01/2014 to 31/12/2014 The diagnosis of congestive heart failure was based on finite radiological signs in conjunction with typical symptoms (dyspnoea, peripheral oedema). Patients who were readmitted to the hospital for congestive heart failure during the study period were included only on the first admission. Overall, 156 patients were included in the study and were asked to their consent to a brief confidential interview during their hospital stay. None of the patients were refused.

Two of the study investigators reviewed all the medical records to obtain a complete history. Particular attention was paid to the initial physical examination, noting the blood pressure at that time and the laboratory and electrocardiographic findings. Plasma creatine kinase and ECG recordings were obtained at least twice during the first two hospital days. All the pre study standardised interviews were carried out by trained hospital physicians during the hospital stay. Information was obtained on sex, age, smoking habits, number and dates of previous hospital admissions for heart failure, prescribed drugs, and dietary treatment. Specifically questions were asked about the daily intake of fluids, the patient's knowledge of fluid restriction, and whether or not regular weight surveillance was undertaken. Additional questions were asked about salt and alcohol intake, intake of analgesics, and smoking habits. The patients were asked the names and doses of their prescribed drugs and whether they took them regularly. Patients who had basic information about the drug (for example: "Digoxin is for the heart, enalapril for the heart or blood pressure, fluresemide is a water pill") were regarded as "informed." Patients who reported taking their drugs only intermittently or not at all were classified as "medication non-compliant." Patients were regarded as "dietary non-compliant" (or untreated) if their daily fluid intake was equal

to or more than 2.5 litres per day, or if they regularly salted their food at the table, or both. Heavy alcohol use was defined as five or more drinks a day.

Inclusion Criteria :-
Previous history and diagnosis of CHF with de compensated heart failure.

The diagnosis of CHF was based on Framingham clinical criteria.

Exclusion Criteria : --
1   CHF and preserved left ventricular systolic function (or diastolic dysfunction),

2   Dementia or severe psychiatric illness,

3   Newly diagnosed cases of heart failure and acute coronary syndrome complicated

by heart failure.

De compensation was defined as the worsening in clinical NYHA class associated with the need for an increase in medical treatment (at minimum intravenously diuretics).

To identify the precipitating factors of de compensation , we have used clinical records and the results of all relevant investigations. On the basis of that patients were designed to one of the following subgroups:

Arrhythmia: defined atrial fibrillation or atrial flutter with rapid ventricular response, any

other supraventricular tachycardia and ventricular tachycardia,

Uncontrolled hypertension: defined as diastolic blood pressure ≥ 105 mmHg or systolic

blood pressure ≥ 180 mmHg;

Infection: patients with pulmonary infection, infective endocarditis, urinary infection or

sepsis;
Acute coronary syndrome: patients with prolonged chest pain and typical

electrocardiographic changes suggesting myocardial ischemia;

Miscellaneous: patients with CHF plus other acute disease including anemia, worsening renal function,

Inappropriate or inadequate treatment before hospital admission in a compliant patient.

We consider noncompliance when the patient stopped taking their drugs or took them intermittently. This subgroup included patients with excessive fluid or sodium intake. Noncompliant patients were considered only if they had none of the previous precipitating factors.

Results
The study sample included 156 patients. The mean age was 55 ± 12 years, only 9% were younger than 56 years old. Mean ejection fraction was 38 % ± 10%. On admission, 99% of the patients were in NYHA class III-IV. Ischemic etiology was confirmed in 49% of the patients. Potential precipitating factors for decompensate CHF were identified in 88.5% of patients. The de compensation was sudden in 35% of the cases.

Noncompliance with diet was the most commonly identified causative factor and was noted in

58 % of the patients, lack of adherence to the prescribed medications amounted to 30%. Other factors were 12% which includes infections (9%), arrhythmias (28%), acute coronary ischemia (22%), and uncontrolled hypertension (24%), miscellaneous causes were detected in

17% of the cases (progression of renal disease 60%, anemia 30%and iatrogenic factors 10%).   In hospital mortality was higher in the group with non recognizable precipitating factors .

SN	FACTOR	PERCENTAGE (No of Patients)
1	Non Compliance with diet	58 % (91)
2	Lack of adherence to medications	30 % (47)
3	Others includes Infections , Arrhythmias Acute coronary ischemia Uncontrolled hypertension Miscellaneous which includes renal disease ,anemia , iatrogenic factors	12 % (18)

The study sample included 93 men and 63 women, mean age 75.4 years, range 55 to 95. Only 53 patients (33.9%) were younger than 70 years. Chest roentgenograms and complete interviews were obtained in all cases. The clinical characteristics of the patients including the prescribed drug treatment was studied . On admission the majority of patients were in New York Heart Association class IV (55.1%) or III (33.0%); 72.6% of patients had at least one previous admission for congestive heart failure, mostly within the preceding year.

Characteristics and prescribed drug treatment in patients with decompensated heart failure

Twelve patients (7.69 %) were not being treated with any of the standard heart failure drugs. Only 86 patients (55.12%) were treated with angiotensin converting enzyme (ACE) inhibitors, in most cases with enalapril. The prescribed dose per day per patient (mean (SD)) was 8.8 (4.7) mg for enalapril, 25.6 (14.4) mg for captopril, 9.5 (1.1) mg for fosinopril, and 3.5 (1.8) mg for ramipril. The use and dosage of ACE inhibitors was not correlated with renal dysfunction. Two patients reported termination of ACE inhibitor treatment because of induced cough. Non-steroidal anti-inflammatory drug preparations were used frequently by three patients.

The precipitating factors related to de compensation of heart failure.
Cardiac ischaemia was found in 24 patients (13.4%). Cardiac arrhythmias were present in 12 patients (7.69%): sustained ventricular tachycardia in two cases; atrial fibrillation with rapid ventricular rate in nine. One patient had symptomatic bradycardia. Uncontrolled hypertension was identified in 21 patients (13.46%). In this subgroup, 11 patients were non-compliant with respect to their drug treatment. Miscellaneous causes were detected in 12 patients (7.69%). Pneumonia was present in six patients, among whom was one patient with pneumonia secondary to pulmonary artery embolism. Acute renal failure was present in two patients. Hyperthyroidism was detected in two patients, although systematic screening for this co morbid factor was not performed. Two patients showed severe deterioration of aortic valve stenosis, in one case with concomitant hyperthyroidism.

SN	Factors	No of patients	Percentage
1	Cardiac Ischemia	24	13.46
2	Cardiac arrhythmia Ventricular Tachycardia 02 Atrial Fibrillation 09 Symptomatic Bradycardia 01	12	0 7.69
3	Uncontrolled Hypertension Non compliant with drug 11	21	13.46
4	Miscellenous Pneumonia 6 Acute renal failure 2 Hyperthyroidism 2 Aortic valve stenosis 2	12	07.69

Factors related to decompensated heart failure
Forty two patients (26.92%) reported taking their drugs only intermittently or having stopped taking them altogether. There were no significant sex or subgroup differences relating to adherence to medical and dietary treatment. In three patients heavy alcohol intake was noted; these were both non-compliant with respect to drug treatment. The non-compliant patient group tended to be younger than the compliant group and to have a greater number of prescribed drugs. From the interviews we were able to estimate the daily fluid intake

quantitatively in 136 patients (87.17%). Fluid excess, with a daily intake of 2.5 litres or more, was present in 61 patients (39.10%). Only 47 patients (30.12%) were aware of the need for fluid restriction or paid attention to their daily fluid intake. Although 126 patients (80.76%) had scales at home, only 83 patients (53.20%) weighed themselves regularly.

129 patients (82.69%) reported visiting their physician at least once a month, and 141 (90.38%) recognised symptoms of worsening heart failure (dyspnoea in most cases) over a period of more than 24 hours before admission. Although 102 of these patients with worsening symptoms sought out their physician during the phase of deterioration, medical treatment was modified in only 50 of them at the time of consultation.

134 patients (85.89%) were correctly informed about their prescribed cardiac drugs. Patients showed the highest level of understanding for coumarin and frusemide. However, their knowledge was not significantly correlated with their compliance with drug treatment. Of the 22 non-compliant subjects, 20 were uninformed about at least one drug; among the 134 medically compliant subjects, 60 were uninformed about at least one prescribed drug .

Patient information about prescribed drugs

Overall, potential precipitating factors for congestive heart failure could be identified in 153 patients (98.07%). Non-compliance with diet or drug treatment was the most commonly identified factor. Among the 21 patients with uncontrolled hypertension, 11 were non-compliant with their drug treatment and were classified in the non-compliance group. Two of the 12 patients who were not being treated with digitalis, diuretics, or ACE inhibitors had no other potential causative factor for their acute decompensation and were classified as inadequately treated.

Discussion

Heart failure is a costly, debilitating and deadly condition that has reached epidemic proportions. CHF represents 8% of all hospitalizations and has been considered one of the most frequent causes of death during the last 23 years.[7]

The assessment and prevention of factors that precipitate acute decompensation in patients with chronic heart failure is an important objective in the care and management of such patients. Until now little research has been published about such precipitators. Those investigations that have been carried out are often dated [10,11]Our study showed that non-compliance with drug treatment and diet was the leading precipitating factor for hospital admission with decompensation of chronic heart failure, followed by cardiac ischaemia and inadequate medical treatment. Therefore 54.2% of admissions should be regarded as probably preventable.

Few studies that deal with precipitating factors for cardiac decompensation specifically address non-compliance with prescribed treatment regimens. In Ghali's investigation, poor compliance was identified as the most common cause of decompensation even more often than in our study (64.4% of patients overall; 42.5% medically non-compliant), followed by uncontrolled hypertension (43.6%) and cardiac arrhythmias (28.7%) in a study of 101 patients.[8] The patients evaluated in that study came mainly from a poor, working class population in Chicago, Illinois, and had a mean age of 59 years. Cardiac arrhythmia was not so strictly defined as in our study. In a smaller study with a different patient population (mean age 76 years) by Wagdil and coworkers in a district hospital in Zürich, Switzerland, non-compliance was found to be as prevalent as in our study (47% of patients overall; 25% medically non-compliant). [9] Neither study gave a quantitative estimate of daily fluid intake, a critical factor in severe heart failure. In our study one third of the patients had a fluid intake of 2.5 litres or more a day, and most patients were not informed about the need to restrict fluid intake.

Our data are limited in part by the subjective method of determining whether readmissions were preventable. Criteria for identifying preventable readmissions have not been defined. Nonetheless in our study the causative factors were classified so as not to overestimate the preventable ones.

As in Ghali's and Wagdil's studies, we assessed non-compliance by means of a standardized interview . Although this method is relatively subjective, it has already been shown that the patient's self report, obtained in a structured interview, correlates well with a pill count assessment [12] Since objective methods yield a higher incidence of non-compliance, it is unlikely that non-compliance has been overestimated in our study. Using the complete prescription claims file of a Medicaid program, Monane et al were able to show a high degree of non-compliance in an elderly study cohort of 7247 subjects with newly initiated digoxin treatment. During the 365 days of follow up these patients were without digoxin for an average of 111 days. Only 10% of the population filled enough prescriptions to have received adequate daily heart failure treatment[13]

In a recent prospective study on highly selected patients (mean age 59 years) who were referred for assessment of indications for heart transplantation, poor compliance with the drug treatment regimen was noted in only 15% of patients with acute decompensation. Here cardiac arrhythmia was the leading precipitating factors [14] In addition to the differences in the groups that were studied, these results may reflect the specialised care that was given to these patients, who were part of a special heart failure programme. All patients received comprehensive information and case management by nurses and psychologists. Physicians referring patients were kept constantly updated.

In our study, patients who were compliant tended to be older than those who were not compliant. In the study by Monane et al, age was also significantly associated with better compliance. Surprisingly, in our study the patients' knowledge about their drug treatment was not associated with better compliance. Earlier investigations in patients with chronic illnesses emphasised that increased knowledge alone was not associated with concomitant changes in health behavior Other studies— for example, of self medication programmes, have shown that intensifying patient education and increasing patient responsibility result in better compliance

We noted that prescribed treatment on admission was often suboptimal. ACE inhibitors were underused. They were mostly not used in doses sufficient to match those used in the large clinical trials and currently recommended for heart failure treatment. In a large cross sectional study of more than 4600 patients admitted to hospital for heart failure in Canada during 1992 and 1993, only slightly more than half of the patients (53%) received ACE inhibitors during their admission; such drugs were also used less often in patients aged 70 years and older. Calcium antagonists were used in about one third of our patients. It is possible that these drugs may in some cases have contributed to the clinical deterioration. Surprisingly more than 20% of the patients did not receive a diuretic. These data suggest room for improvement in the drug treatment of chronic heart failure.

As in the data of Wagdil et al, [9] ischaemia was noted in about 13% of our patients. According to the defined criteria, cardiac arrhythmias were considered to be the causative factor in cardiac decompensation in only 6% of our patients. In the studies by Ghali and Wagdil, cardiac arrhythmias were recognised more often, but the criteria for their classification as precipitating factors were not strictly defined. For example, long standing atrial fibrillation with a normal ventricular rate could have been counted as a precipitant in those investigations. In our study, chronic supraventricular arrhythmias were only regarded as causative when there was a documented rapid ventricular rate (>150/min). Observation of a close concordance between arrhythmias and heart failure does not prove a causal link. Arrhythmias may also be an effect of decompensation from another cause.

A limitation and possible bias of our study is the lack of data on ventricular function and the relative importance of diastolic and systolic function. Echocardiography was done in about half of our patients before or during their hospital admission. Because the assessment was not standardised, these data were excluded from further analysis. In the study by Vinson et al there was a trend towards more frequent readmission in patients with a lower ejection fraction.[6] We found that nearly 80% of patients had experienced dyspnoea and oedema for more than 24 hours before admission. Most patients had bathroom scales but did not weigh themselves regularly. In a recent study on 181 older adults admitted for heart failure, the average duration of

acute dyspnoea before admission was approximately 24 hours and the duration of oedema and cough was 12 to 14 day Regular weight control, improved recognition of the symptoms of heart failure, and earlier medical help could therefore result in fewer hospital admissions.

Our findings suggest that despite progressive symptoms patients often do not obtain prompt and adequate treatment. We did not contact the referring physicians to assess the patients' preadmission treatment. The importance of inadequate outpatient treatment in various populations needs to be evaluated further.

Overall, it seems that in many cases the recurrence of chronic heart failure and the need for readmission to hospital are attributable to preventable factors and not to the underlying disease. Few studies have examined the impact of multidisciplinary programs involving home care, patient education, and physician training .Bare footed cardiac assistants who is trained in the proper dosing for the patients will be great help   There is preliminary evidence that such programs can improve both the quality of treatment and the quality of life and thereby reduce the overall cost of health care in the growing number of elderly patients with congestive heart failure. Recently, Rich *et al* showed that a nurse directed multidisciplinary intervention during a follow up period of 90 days can significantly reduce the number of hospital admissions and improve the quality of life in elderly patients with heart failure .However, the effect of such programs may not be directly translatable from one country to another. Further trials and evaluation of such programs in different populations with different health care systems are therefore needed. In the light of the magnitude of non-compliance in patients with heart failure, it is difficult to understand why so little attention is paid to this problem in clinical practice and in current therapeutic trials.

In conclusion, decompensated CHF appear to be frequently associated with concomitant factors not directly related to the evolution of cardiac disease. Knowledge of potential precipitating factors may help to optimize treatment and provide guidance for patients with heart failure. The presence of potential precipitating factors should be routinely evaluated in patients presenting CHF. Many hospital admissions for decompensation of chronic heart failure in patients are preventable. Measures are necessary to improve this situation and evaluation of programs that include patient education, patient follow up, and physician training . Cardiac health care workers are needed.

References

1. Rosamond W, Flegal K, Furie K, et al. Disease and Stroke Statistics-2008 Update A Report From the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation. 2008;117:e25–e146. [PubMed]

2. Yamasaki N, Kitaoka H, Matsumura Y, et al. Heart failure in the elderly. Intern Med.2003;42:383–388. [PubMed]

3. Michalsen A, Konig G, Thimme W. Preventable causative factors leading to hospital admission with decompensate heart failure. Heart. 1998;80:437–441. [PMC free article] [PubMed]

4. Ghali JK, Kadakia S, Cooper R, et al. Precipitating factors leading to decompensation of heart failure. Arch Intern Med. 1988;148:2013–2016. [PubMed]

5. Fonarow GC, Abraham WT, Albert NM, et al. Factors identified as precipitating hospital admissions for heart failure and clinical outcomes. Findings from OPTIMIZE-HF.Arch Intern Med. 2008;168:847–854. [PubMed]

6. Feenstra J, Grobbee DE, Jonkman FAM, et al. Prevention of relapse in patients with congestive heart failure: the role of precipitating factors. Heart. 1998;80:432–436.[PMC free article] [PubMed]

7. Sosa Liprandi MI, González MA, Liprandi AS. Heart failure in Argentina [in Spanish]Medicina (B Aires) 1999;59:787–792. [PubMed]

8. Erk O. Precipitating factors for systolic and diastolic heart failure: a four-year follow up of 192 patients. Hong Kong Med J. 2004;10:97–101. [PubMed]

9. Tsuyuki RT, McKelvie RS, Arnold JM, et al. Acute precipitants of congestive heart failure exacerbations. Arch Intern Med. 2001;161:2337–2342. [PubMed]

10. Opasich C, Febo O, Riccardi G, et al. Concomitant factors of decompensation in chronic heart failure. Am J Cardiol. 1996;78:354–357. [PubMed]

11. Formiga F, Chivite D, Manito N, et al. Hospitalization due to acute heart failure. Role of the precipitating factors. Int J Cardiol. 2007;120:237–241. [PubMed]

12. Stewart S, McIntyre K, Capewell S, et al. Heart failure in a cold climate. Seasonal variation in heart failure-related morbidity and mortality. J Am Coll Cardiol. 2002;39:760–766. [PubMed]

13. Fleming DM. The contribution of influenza to combined acute respiratory infections, hospital admissions, and deaths in winter. Commun Dis Public Health. 2000;3:32–38. [PubMed]

14. Unverferth DV, Magorien RD, Lewis RP, et al. The role of subendocardial ischemia in perpetuating myocardial failure in patients with nonischemic congestive cardiomyopathy. Am Heart J. 1983;105(1):176–179.