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Original Research Article

Weight monitoring as an indicator of re-hospitalization in patients with heart failure

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ABSTRACT

Background: Predicting the development of acute decompensated heart failure (ADHF) in chronic heart failure patients remains a challenge. Standard management of HF involves patient weight monitoring as it is generally accepted that body weight increase, reflecting fluid retention, may be of value in heralding imminent decompensation. Aim of the study was to evaluate body weight increment as an indicator of re-hospitalization in patients with heart failure.
Methods: Fifty seven patients with principal diagnosis of heart failure, who got re-hospitalised due to decompensation as evidenced by deterioration of symptoms with increase in body weight, were analysed and compared with the parameters at last discharge with an attempt to look for the association between increase in weight and clinical deterioration.
Results: Mean age of patients examined was 58.5 years. 54.4% of the patients were male. Mean weight of patients on re-hospitalization was 52.2 kg as compared to 48.8 kg at last discharge ($p<0.05$). 57.9% and 42.1% of patients presented in NYHA class IV & III respectively on re-hospitalization whereas all patients were discharged previously in NYHA class II status. Pearson chi-square test of association showed a significant deterioration of functional status (NYHA) in those having increase in weight ≥3kg as compared to <3 kg ($p<0.05$).
Conclusions: A simple weight monitoring of heart failure patients can alert patients and their clinicians in early stages of decompensation preventing re-hospitalization.

Keywords: Acute decompensated heart failure, Rehospitalisation, Weight monitoring

INTRODUCTION

Despite advances in medical therapy, heart failure (HF) continues to contribute a substantial burden of morbidity, mortality and economic cost. Re-admission rates in heart failure patients is up to 40% within 3 months.[1] Non-compliance to self-care activities, including daily measurement of weight, is associated with worsened outcomes.[2] There is also lack of randomized studies which address whether telemonitoring of daily weight is useful in the follow-up of patients previously hospitalized for HF. The current study is aimed at evaluating home based weight monitoring is an indicator of rehospitalization in recently hospitalised patients with heart failure.

METHODS

A total of 57 patients with heart failure of any cause (ejection fraction ≤45%) who got re-hospitalized for decompensation were enrolled for the study. Patients with associated serious conditions with a life expectancy of <12 months, unstable angina pectoris or myocardial infarction within the previous 2 months with left

ventricular dysfunction, advanced kidney disease were excluded.

Study design

Patients with heart failure who had been treated were discharged with an instruction to follow standard heart failure therapy and self-care as indicated. At discharge, all parameters including NYHA functional class, echocardiographic parameters like left ventricular dimensions, ejection fraction, mitral regurgitation and body weight were documented as baseline.

They were instructed to measure their body weight at home twice weekly using simple weighing machine and to report immediately in case of any change in symptom status or increase in body weight more than two kilogram in three days. In follow-up re-hospitalization, all parameters were again documented and compared with the same taken at the time of last discharge. Weight of patients were taken at the time of last discharge and on re-admission in standing posture after excluding all confounding factors using standardized weighing machine.

Major cardiovascular events were defined as evidence of heart failure decompensation diagnosed at an unscheduled hospital visit requiring augmentation of diuretic therapy and hospital admission or death. Mean of the variables was calculated by two sample t test. Significance (p value) among the variables was analysed by Z test and Pearson Chi square test using SPSS software.

RESULTS

57 patients who got re-hospitalised due to decompensation of heart failure were analyzed and compared with the parameters at last discharge with an attempt to look for the association between increase in weight and clinical deterioration. Baseline characteristics of patients are shown in Table 1.

Table 1: Baseline characteristics of all patients (n=57).

Variables	Number	Percentage (%)
Age, years, mean	58.5	
Male	31	54.4
Hypertension	17	29.82
Diabetes	16	28.10
Ischemic Heart Disease	20	35.10
Sinus rhythm	50	87.7
Atrial fibrillation	7	12.3

Mean weight of patients on re-hospitalization was 52.2 kg whereas at last discharge it was 48.8 kg ($p<0.05$). (Table 2). On re-hospitalization, 57.9% of patients presented in NYHA class IV and 42.1% of patients in class III whereas all patients were discharged previously in NYHA class II status (Table 2).

Table 2: Comparison of patients on last discharge and re-hospitalization.

Variables	At last discharge	On re-hospitali-zation	P value
Weight, Kg, mean	48.8	52.2	<0.05
Symptoms (%)			
NYHA IV	0	57.9	<0.05
NYHA III	0	42.1	<0.05
NYHA II	100	0	<0.05
Echocardiography			
LVID (D), mm, mean	58.11	58.19	0.934
LVID (S), mm, mean	50.23	50.49	0.815
Mitral regurgitation (%)			
Severe	21.10	33.30	0.140
Moderate	52.60	57.90	0.572
Mild	26.30	8.80	0.013
Ejection Fraction, mean	30.26	29.65	0.638

Mean left ventricular end diastolic diameter at last discharge and on re-admission were 58.11mm and 58.19mm respectively ($p=0.934$). Similarly, mean LV end systolic diameter were 50.23mm and 50.49mm respectively ($p=0.815$) (Table 2). Grading of mitral regurgitation at last and on re-admission was not statistically significant (Table 2). Mean left ventricular ejection fraction at last discharge was 30.26% whereas it was 29.65% on re-hospitalization ($p=0.638$) (Table 2).

Table 3: Distribution of functional class on the basis of change in weight on he-hospitalization.

Change in weight	NYHA III	NYHA IV	Total
<3 Kg	20	3	23
≥3 Kg	4	30	34
			P value
Pearson Chi square (with continuity correction)		31.820	<0.05

In addition to deterioration of symptoms in patients who had increase in weight, there was a significant association between amounts of weight change and change in patients' status. Pearson chi-square test of association showed a significant deterioration of functional status (NYHA class), on re-hospitalization, in those having increase in weight ≥3kg as compared to <3 kg (Table 3).

Similarly, Pearson chi-square test of association showed a significant deterioration of mitral regurgitation on re-

hospitalization, in those having increase in weight ≥3kg as compared to <3 kg (Table 4).

Table 4: Distribution of mitral regurgitation in echocardiography on the basis of change in weight on re-hospitalization.

Change in weight	Mitral regurgitation			Total
	Mild	Moderate	Severe	
<3 Kg	5	15	3	23
≥3 Kg	0	18	16	34
				P value
Pearson Chi square	12.511			0.002

DISCUSSION

Majority of heart failure hospitalizations are related to acute congestive exacerbations of chronic heart failure. Patients at risk for heart failure hospitalization have chronically elevated filling pressures and further accumulation of volume results in increase in pressure that ultimately lead to hospitalization.[3] In the present study, there was significant increase in body weight on re-hospitalization with sign and symptoms of heart failure decompensation (NYHA III/IV), as compared to body weight at last discharge ($p<0.05$).

Rapid weight gain is a relatively specific predictor of heart failure decompensation.[4] In present study also, it was seen that increase in weight was associated with heart failure decompensation as evidenced by deterioration in functional status (NYHA class) and echocardiographic parameter (mitral regurgitation) thereby causing re-hospitalization. It was also seen that there was a significant association between amounts of weight change and change in patients' status. These results indirectly shows that monitoring of patients at home, particularly body weight, may have significant impacts so far as decompensation is concerned.

Because changes in filling pressures are often apparent several weeks before symptoms worsen, home monitoring may facilitate disease management by allowing providers to intervene early to prevent heart failure decompensation.

Moreover, the primary corrective intervention available of heart failure care is adjustment of diuretic therapy, Therefore, availability of an accurate and responsive measure of volume status is critical.[5] All these measures may have significant impact on patients' outcome because repeated hospitalizations for heart failure decompensation are associated with increase in all-cause mortality.[6,7]

Meta-analysis by Inglis et al suggest that telemonitoring is associated with statistically significant reductions in heart failure hospitalizations.[8] Phillips et al showed a 25% reduction in the rates of all-cause hospital readmission and a statistically non-significant trend toward reduced mortality.[9] Similarly, Rich et al demonstrated simultaneous improvements in quality of life, readmission rates and medical costs with a multidisciplinary, nursing-led heart failure disease management intervention.

Limitations

The present study was conducted enrolling a small number of patients over a short period of time. Moreover, no control group was taken in the study for comparison that did not have clinical deterioration and weight gain. Furthermore, although changes in body weight might be associated with hospitalization for heart failure, weight gain may not occur in patients with acute decompensated heart failure. Also, lack of association of body weight with decompensation can be because of offset of weight gain from fluid by weight loss from cachexia and minimal weight gain because of diminished appetite. Therefore, a larger study, with enrollment of more number of patients with well-designed control group, will give a more accurate result.

CONCLUSION

The result of the present study can be viewed as a support of the statement that weight monitoring is an indicator of heart failure decompensation and thereby major cardiovascular events. It represents a basic clinical research that generates evidence for surveillance of weights in heart failure patients.

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