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Impact of chronic heart failure on 6 minute walk distance and quality of life

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ABSTRACT

Background and Aims

Exercise intolerance, poor prognosis, and poor quality of life are the hallmarks of chronic heart failure. Quality of life and physiological well-being has been demonstrated to deteriorate more seriously in patients with chronic heart failure. Hence, this study aimed to find relationship of Six Minute walk distance and Quality of Life with the severity (ejection fraction) of Heart failure.

Methods and Results

50 patients aged 45-75 years with chronic heart failure (ejection fraction less than 40% belonging to NYHA class II-III) were included in the study. They were asked to fill the Minnesota Living with Heart Failure Questionnaire after which subjects performed 6 minute walk test as per American Thoracic Society guidelines. Spearman's rank order correlation coefficient test revealed a weak positive correlation between ejection fraction and 6 MWD($r= 0.22$, $p=0.124$) and a weak negative correlation between ejection fraction and QOL ($r= -0.23$, $p=0.11$) which was statistically not significant.

Conclusion

There is no relationship of 6 minute walk distance and quality of life with the severity (ejection fraction) in patients with chronic heart failure.

Keywords: Chronic heart failure, 6 Minute walk test, Quality of Life

INTRODUCTION

Heart failure is a burgeoning problem worldwide, with more than 20 million people affected. In terms of incidence, prevalence, morbidity, and mortality, the epidemiologic magnitude of congestive heart failure is staggering. Its prevalence follows an exponential pattern, rising

with age, and affects 6–10% of people over the age of 65[1]. Despite many recent advances in the evaluation and management of heart failure, it has a poor prognosis. Community-based studies indicate that 30–40% of patients die within 1year of diagnosis and 60–70% die within 5 years, mainly from worsening heart failure [1-2].

Traditionally, patients with heart failure are advised to rest and avoid exercise because of concerns that their condition would further deteriorate [3]. Despite recent improvement in survival related to newer therapies, therapeutic goals of heart failure is limited to maintaining and stabilizing the patient's limited functional abilities and, to ameliorate symptoms, improve their comfort for the remaining duration of life [4]. It has also been known for several decades that exercise capacity, expressed as exercise time or workload achieved, plays an important role in risk stratification of patients with heart disease [5]. Recent work in this field has shown that exercise capacity can be objectively assessed by maximal and sub maximal tests. However, since most activities of daily living are performed at sub-maximal levels of exertion, 6 Minute Walk Test (6MWT) may better reflect the functional exercise level for daily physical activities [6]. While it is known that VO_2 max is a valid measure of functional capacity for patients with heart failure, it is difficult for most physical therapists to acquire this information in the clinical set-up [5]. 6MWT being simple and time saving is therefore deemed suitable and practical in such cases [7].

In congestive heart failure, the apparent severity of patient's symptoms may fluctuate widely according to mood and morale, although the patient's cardiac function may be unchanged. This variability suggests that symptoms are an unrealistic guide to the degree of physical limitation; yet clinicians often assess the severity of cardiac impairment largely on the basis of a clinical history [8].

Apart from the common etiological factors of heart failure there are many other related or associated conditions like depression, environment, access to health care etc which has an effect on well being of a patient [4]. Terje A et al; has found depressed mood to be significantly related to increased mortality risk among heart failure patients [9]. Quality of life is a major goal in the context of preventive and therapeutic cardiology. Hence Quality of life becomes an important parameter that cannot be overlooked in these patients. The instruments used to assess quality of life are either general health surveys or questionnaires designed for use with specific diseases. The Minnesota Living with Heart Failure Questionnaire (MLWHFQ) is a specific

questionnaire that was developed by Rector et al; in 1987 for evaluating the quality of life of patients with heart failure [10].

Most heart failure patients are restricted on their activity levels on the basis of their ejection fraction values. For physiotherapists who manage a rehabilitation programme after a near fatal cardiac episode, it is very important to have a complete insight on various physical and psychological components of disease process which affects the patient's lifestyle. It provides a basis for planning a complete rehabilitation of patient. There is a paucity of data available on heart failure patients in Indian population. Furthermore, no study has been done to find the relationship of 6 minute walk distance and quality of life with the disease severity reflected by ejection fraction. Hence, this study aimed to find relationship of 6MWD and QOL with the severity (ejection fraction) in patients with heart failure.

MATERIALS AND METHODS

After seeking ethical clearance from Institutional Ethics Committee, 50 patients with Chronic Heart Failure (CHF) aged 45-75 years with ejection fraction less than 40% belonging to NYHA class II-III, clinically stable for more than 3 months before study entrance were recruited from Cardiology Out-patient department of a tertiary care hospital. Informed consent was obtained and subjects were screened using Health history questionnaire. Patients with any cardiac event one month prior to the study, uncontrolled hypertension, uncontrolled diabetes, unstable angina, recent myocardial infarction, arrhythmias, acute or chronic respiratory infection, neurological conditions and other medical conditions were excluded. Subjects were selected by convenience during the outpatient department follow up timings. The Minnesota Living with Heart Failure Questionnaire was translated in local languages (i.e. Hindi and Marathi) and its content validity was obtained through a panel of experts. Subjects were asked to fill the validated questionnaire and final score was documented. After filling the questionnaire, subjects were instructed to undergo 6 MWT according to ATS guidelines [6]. They were asked to walk as far as possible for six minutes, but not to run or jog. They walked back and forth along a straight flat corridor of thirty

meters demarcated by cones. They were permitted to slow down, to stop, and rest as necessary and were allowed to lean against the wall for resting and resume walking as soon as they were able to do so. Encouragement was given every minute using standard ATS phrases in an even tone. Subjects were asked to report symptoms like chest pain, intolerable dyspnoea, dizziness, leg cramps which were additional test termination criteria. Pulse rate, respiratory rate, blood pressure, and Rate of Perceived Exertion using modified Borg scale was recorded before and after the test until they recovered to basal levels. Numbers of laps walked were recorded and 6 minute walk distance (6MWD) was calculated as follows: 6 MWD= (Number of lap's \times 30) meters. Ejection fraction of the patient was noted down from recent 2D-echocardiography report.

6MWD and QOL score were correlated with the ejection fraction of chronic heart failure patients. Spearman's rank order correlation coefficient test was used to find the correlation between 6 Minute walk distance and Ejection fraction and also between Quality of Life score and ejection fraction. Also 6MWD and QOL score was compared between subjects belonging to NYHA Class II & III using student's t test.

RESULTS

Data was analyzed using Statistical package for the Social Sciences (SPSS) 16 software. Data was not normally distributed. Out of 50 subjects, 66% were males and 34% were females with a mean age of 56.28 ± 7.8 yrs. The mean Left ventricular ejection fraction was $33.12 \pm 7.45\%$. 72% belonged to NYHA class II while the remaining 28% were in NYHA class III. The causes of chronic heart failure were ischemic heart disease (74%) and dilated cardiomyopathy (26%). 92% of them claimed to be having an active lifestyle and were independent in their Activities of Daily Living whereas the remaining 8% belonged to the sedentary group.

The mean 6 MWD was 253.92 ± 72.72 m (range 60- 378 m). Only 14 patients could cover a distance greater than 300 m. Four patients required a rest pause and three patients terminated the test before completion of 6 minutes. There was a weak positive correlation between ejection fraction and 6 MWD ($r= 0.22$, $p=0.124$). Patients with NYHA Class III walked lower distance (198.07 ± 73.13 m)

compared to patients having NYHA II (275.64 ± 60.71 m) which was statistically significant ($p < 0.000$).

The mean QOL score was found to be 30.18 ± 16.20 (range 3-72). There were almost 64.28% of patients having poor QOL and 35.71% with moderate QOL in NYHA Class III compared to only 5.55% with poor QOL, 61.11% with moderate QOL and 33.33% with good QOL in patients with NYHA Class II. There was a weak negative correlation between ejection fraction and QOL ($r= -0.23$, $p=0.11$) which was statistically not significant. When QOL was compared between NYHA classes, there was a statistically significant difference in score (46.21 ± 12.72) of patients with NYHA Class III compared to patients belonging to NYHA II where QOL was found to be 23.94 ± 12.83 ($p < 0.000$).

DISCUSSION

In this study, we prospectively investigated the 6MWT and QOL in patients with stable chronic Heart Failure. 6MWD was found to be lower in patients with heart failure compared to age & gender matched normals. The mean distance ambulated during 6 minute walk test was 253.92 ± 72.72 m. Patients with heart failure generally have reduced exercise capacity, and two of the main symptoms in heart failure are exercise intolerance and generalized fatigue [11]. This makes it difficult for these patients to participate in exercise and many times, deters them from doing so for fear of exacerbating symptoms. This leads the patient into a vicious cycle of progressive decline in function and deconditioning due to lack of exercise [7]. Heart failure patients have reported affection of both physical functioning and psychological factors. In the present study, four patients required a rest pause and three patients terminated the test before completion of 6 minutes indicating poor functional status in those patients.

6MWD showed a weak positive correlation with ejection fraction. Previous studies suggest the reduction in exercise capacity experienced by patients with heart failure may be more significantly influenced by factors other than poor ventricular function. Studies have demonstrated abnormalities of skeletal muscle blood flow, metabolism and structure, all of these findings to be related to impaired performance [3]. Similar

findings were noted by C. Zugck et al; in a study which found no clinically relevant relationship between 6 MWT and left ventricular ejection fraction, right ventricular ejection fraction, cardiac index, cardiac filling pressures. The study concluded that the distance ambulated during the 6 MWT contained information that is complementary to haemodynamic parameters such as left ventricular ejection fraction and cardiac index [12]. Marco Guazzi in his study also did not find any correlation between 6MWT distance and LVEF [13]. Recently more emphasis has been placed on the role of peripheral factors as the cause of exercise intolerance in CHF. Skeletal muscle abnormalities in the form of muscle atrophy, poor skeletal muscle blood flow, impaired metabolism could have resulted in poor exercise capacity in these patients. Reduction in endothelium derived relaxing factor, salt retention and increases in various vasoconstrictive neurohormones, such as endothelin, norepinephrine, renin, angiotensin II and vasopressin reduces vasodilatory capacity of blood vessels impairing the flow [3]. 6MWD also depends on multiple psycho physiological health factors like age, sex, and anthropometric measurements like height, weight, Body Mass Index which should have been taken into consideration when interpreting the results of single measurement to determine the functional status [6].

Factors like muscle strength, postural balance, reaction time, mood and general health also have an influence on 6MWD. Low 6 minute walk distance can also be a result of poor nutritional and socio-economic status [6]. Since the patients enrolled in the study were those of low socio-economic strata taking treatment from tertiary medical hospitals, it could have influenced their walk distance

In present study, 72% of subjects achieved a distance of ≤ 300 m. Lower levels of functional capacity (a distance < 300 m during 6MWT) have proven to be predictive of mortality (total or cardiovascular) and morbidity (hospitalization for worsening heart failure) both in patients with asymptomatic left ventricular systolic dysfunction and in those with mild-moderate and advanced heart failure. Studies have found that patients covering a distance of ≤ 300 m had poor prognosis [8, 14].

Mean Quality of life score was found to be 30.18 ± 16.20 which indicated moderate affection of

Quality of life [15]. When compared between NYHA class, those with Class III showed higher affection of QOL compared to Class II patients. Patients with heart failure experience various physical and emotional symptoms such as dyspnea, fatigue, edema, sleeping difficulties, depression, and chest pain [16]. These symptoms limit patients' daily physical and social activities and result in poor QOL[17]. Studies have shown poor financial status due to loss of their jobs or increase in medical expenses could negatively influence QOL [18]. Patients believed that their health status, psychological factors, economic status, social factors, spirituality, and health-related behaviors affected their QOL. This finding is consistent with the result of a prior study of patients with left ventricular dysfunction [19].

As reported by Meyer (2003) poor quality of life may have a negative effect on compliance to medical treatment and behavioral regimens and thus result in further impairment of exercise tolerance, prognosis, and quality of life [20].

Furthermore QOL score showed a weak negative correlation with Ejection fraction. This was consistent with similar findings reported by other researchers which showed no significant relationship between ejection fraction and quality of life [21].

Quality of life reflects how the patient perceives his disease and the changes brought about by it in his day to day activities. Quality of life depends on various life domains like the physical characteristics, his mental state, social support and his understanding of the disease process. The financial background and the education level of the subjects, also has an additive effect on the outcome of the quality of life measure. Patients having poor left ventricular function were limited in their day-to day activities which caused lot of mental fatigue and agony to patients. These data are in accord with the findings of some recent studies showing that a large proportion of patients with CHF suffer from depression [22]. This study is consistent with the notion that depressed CHF patients may perceive their quality of life to be lower and to underestimate their functional status [23]. Hawthorne MH showed that heart failure patients experience significant mood disruption that appears to be greater than that reported by other cardiac patients; mood disruption is also related to reports of poor quality of life [24].

Majority of the patients in this study belonged to the uneducated low socioeconomic strata. Since they were compromised on most of the above mentioned life domains, it may have had an effect on the QOL index. Also QOL index is a subjective measure and could possibly vary from time to time with respect to the mood of the patient.

Studies which have evaluated the QOL in heart failure have shown that, it is not only affected by symptom and disease severity but also by a complex interaction of physical, social and psychological factors. These include personal coping strategies, social isolation, a fear of dying, a lack of information about the disease and its treatment, exclusion from management planning, anxiety, depression and insomnia. Addressing these generic concerns can improve both the QOL and the prognosis [25].

Present study had few limitations having small sample size. Motivation levels, personality traits differ in patients and can influence both 6MWD and QOL which were not studied. Since the sample was randomly selected from a single tertiary hospital, the results of the study can't be generalized to the population. Study has relatively small sample size and included only CHF patients in NYHA functional class II or III with stable heart failure, who were able to perform a symptom limited exercise test, and eventually take part in a physical training group. Therefore the results cannot be generalized to all CHF patients.

This study has a scope for further research wherein objective assessment of the patients physical activity level, age, sex, socio economic status, educational background, anxiety level,

nutrition level, anthropometric measures could be taken into consideration while finding an association of 6 minute walk distance and quality of life with the severity of heart failure patients.

CONCLUSION

This study gives us a measure of the severity of patient's health status in terms of functional variables like 6MWD and QOL. There is a weak relationship of 6 minute walk distance and quality of life with the severity in patients with chronic heart failure. Reported exercise tolerance was found to be unrelated to ejection fraction; this finding underscores the importance of psychosocial interventions in improving care outcomes for patients with heart failure. Ejection fraction should not be the only criteria while deciding the safety and goals of cardiac rehabilitation. Ejection fraction values and 6 MWD & QOL will be complementary to each other when planning a rehabilitation programme. Since rehabilitation is a holistic approach, the nutritional, occupational and anxiety levels should also be considered; this will ensure quality care

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