Original Research Article

PHASE II CARDIAC REHABILITATION PROGRAM-BARRIERS TO FOLLOW UP AND PARTICIPATION: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background and objective: Cardiac Rehabilitation is an effective tool for the care of patients with heart disease. The objective of the present study was to identify the barriers to follow up and participation in phase 2 cardiac rehabilitation in post CABG subjects.

Material and Methods: A total of two eighty eight (288) subjects both male and female were included the study. The demographic data of each subject was recorded and they were administered with Zung Self Rating Depression Scale, Exercision Benefit Barrier Scale, Cardiac Depression Scale, Herth Hope Index, Life Orientation Scale, Perceived Stress Scale, Enrichd Social Support Scale.

Results: The result of the present study was analyzed for rate of referral, gender, distance, socio-economic status, education, smoking history, age, body mass index, six minute walk test, and hemodynamic changes like systolic blood pressure, diastolic blood pressure, heart rate reserve, resting heart rate. Raw data was subjected to statistical analysis using Likelihood analyses x^2 analyses and t-tests, gender difference in the variable of interest were tested. The results were compared dividing the subjects to attending & non attending group. Comparison of attending and non-attending patients with different characteristics, percentage of non-attending showed significant difference in transportation, inconvenient location (p=0.0001), expense (p=0.0030), illiteracy (p=0.0021) no one recommended it and age(p=0.0236) . There was no significant difference in gender.

Conclusion: Depression, distance, socio-economic status, education, and age were the major barriers for not attending the cardiac rehabilitation phase II program. In addition, perception of individual concerning benefits and barriers to participate in exercise, dislike towards the exercise, poor life orientation and quality of life in the subject were also factors for not attending the cardiac rehabilitation phase II program.

KEY WORDS: Phase II Cardiac rehabilitation, coronary artery bypass grafting, Exercise benefit/barrier scale, Perceived stress scale, Enriched social support instrument, Revised life orientation scale, Zungself rating depression scale, Herth hope index, Cardiac depression scale.

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INTRODUCTION

Cardiovascular disease is the leading cause of death worldwide, more people die annually from cardiovascular disorders than from any other cause [1]. According to World Health Organization, cardiovascular disease is said to be either an acute or chronic cardiac disability that results from a reduction (or arrest) of blood supply to the myocardium with associated coronary arterial disease [2]. The Global Burden of Disease study in particular classified ischemic heart disease as the leading cause of global

mortality, accounting for 1.4 million deaths in the developed world and 5.7 million deaths in developing regions [3]. Thus, India suffers a huge loss of productivity due to the escalating prevalence of Coronary Heart Disease [4].

Coronary artery disease is basically a lesion formation in the vessels or chambers of heart. These lesions hamper the circulation of blood flow into or through or from heart, depending on the site of lesion. The most prevalent Coronary Artery which gets affected in Coronary Artery Diseases (CAD) is the Aorta and the disease being atherosclerosis [5]. Surgical, pharmacological interventions are available for cardiovascular diseases nowadays. Pharmacological interventions like anti-thromobotic drugs, antihypertensive drugs, heparin, beta blockers, calcium channel blockers, adrenaline, nitroglycerine, diuretics, cardiac glycosides, ACE inhibitors can also be used to reduce the risk or complication of cardiovascular diease [6,7]. Surgical interventions for cardiovascular diseases include percutaneous transluminal coronary angioplasty and coronary artery bypass graft for coronary revascularization. In 0recent years off pump Coronary Artery Bypass Grafting has emerged as an effective surgical technique and is beneficial in most high risk population. It is been performed most frequently as it avoids the effects of cardioplegic arrest, may also accentuate renal damage and neurological changes like stroke [8].

In the year 1952, Levine and Lown demonstrated that patients with acute coronary disease when mobilized to activity at early stage showed a reduction in complications and mortality. Cardiac Rehabilitation plays an important role in stabilizing the emotional and psychological state of an individual thus increasing confidence and self-esteem. Cardiac Rehabilitation is a structured program involving a progressive physical activity either in a rehabilitation setting or home program to assist individuals with heart diseases in achieving optimal physical, psychological and functional status [9].

According to American College of Sports Medicine (ACSM), cardiac rehabilitation program is divided into four phases. Phase I is called as the Inpatient phase this phase begins in the hospital just after an acute cardiac event ranging from 0 to 2weeks, this phase aims at providing a suitable medical care, early mobilization of patients through activity so as to prevent various complications of bed rest. Phase II which is called as the Sub acute Phase or Conditioning Phase or Initial Outpatient Phase and also called as transitional phase, which begins soon after hospitalization and usually lasts from 2 to 12 weeks this phase partly depends on risk stratification, this phase increases the functional capacity through individualized exercise program and also educates the patient about life style modification, red flags of heart disease, information regarding medications. Phase III which is called as the Training Phase / Intensive Rehabilitation extended from 3 months to 6 months. Phase IV is called as the Maintenance Phase / Prevention Program which continues from 6 months onwards [10].

Cardiac rehabilitation is effective in decreasing the mortality (1-3years) by approximately 20% [11-13] Even though the efficacy of cardiac rehabilitation is high the referral rates are low [14-15]. The reason behind the poor rates of referral is insufficient patient enrolment and participation, which hinders the potential impact on the effectiveness of interventions [16-17]. The reason is still unclear but few studies suggest that females, elderly, low income show low referral rates [18-20]. Many studies have shown that the awareness about rehabilitation program mainly the phase II cardiac rehabilitation is more widespread in the Western countries than in India, that is one of the reason why we find poor participation of patients [21]. Hence, the objective of the study was to quantitatively investigate the potential barriers to phase 2 cardiac rehabilitation follow-up and participation by evaluating various variables that make the participation rate in the phase II remain low, using a prospective analytic strategy, so that we can develop alternate approaches like telephone, or any other means to remove the potential barriers like no referral, or to inform about importance of exercise after coronary artery bypass graft.

MATERIALS AND METHODS

Subjects: A total of 300 subjects were screened for the study. The subjects included for the study

group were all the patients who underwent coronary artery bypass graft surgery in KLE Hospital, Belagavi, Karnataka, India. Subjects were excluded if they were subjected as high risk patients as per ACSM stratification, any musculoskeletal or neurological conditions that may impair walking or physical activity, severe conditions like unstable angina, dissecting aneurysm, uncontrolled hypertension, acute illness embolus, phlebitis, gastro-intestinal disease etc are the red flags from the cardiac surgeon/cardiologist/physician.

Study Design: This study was an Observational Study of Cross-sectional type with convenience sampling and a sample size of 288 subjects who were admitted in KLE Hospital Belagavi, Karnataka, India.
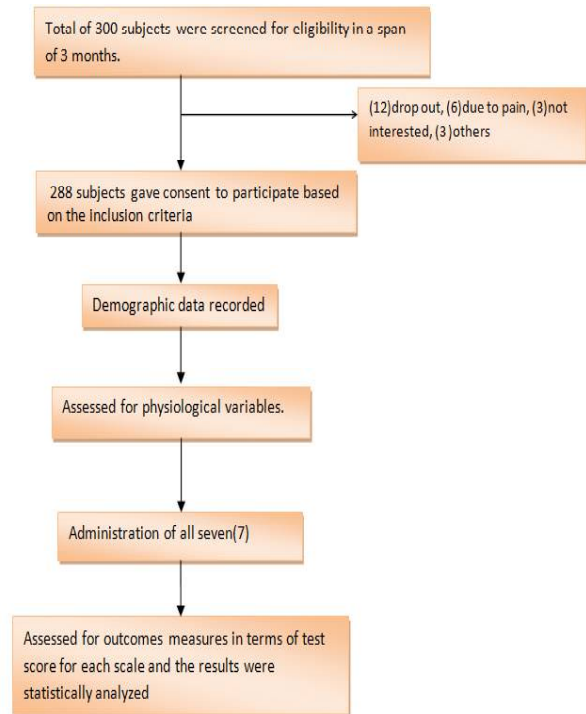
Procedure: An approval for the study was obtained from the KLE'S Institutional Ethical Board, KLE University, Karnataka, India, prior to the commencement of the study. The purpose of the study was explained and a written informed consent was obtained from all the study subjects. All the subjects were screened based on the inclusion and exclusion criteria prior to the enrollment into the study. Demographic data including age, gender, marital status, address, education, socio-economic status, insurance coverage, occupation, body mass index, Scales pertaining to psycho-social and exercise benefits and barriers scale was administered before the day of discharge. Each subject was contacted through phone calls to observe their follow up. The data was collected over a period of three months. Statistical analysis was done and the conclusions were tabulated.

Tools: Zung self rating depression scale, Cardiac depression scale, Perceived stress scale, Exercise Benefit Barrier Scale, ENRICHED Social Support Instrument, Revised Life Orientation Scale, Herth Hope Index.

Statistical Analysis: Data was analyzed using SPSS Windows version 16.0. Descriptive statistics including numbers, proportions, mean and standard deviations, were used to analyze the data. Chi-Square test and ANOVA were used to compare mean of all groups. Karl Pearson's correlation coefficient was used to find the strength of association between numerical variables (i.e. demographic variables, physiological variables, and the outcome measures).

Fig 1: Flow chart of subjects recruitment process for the study.

RESULTS

The study population was divided into attending and not attending. The result was analyzed for, age, gender, body mass index, education, socioeconomic status, address, hemodynamic changes like systolic blood pressure, diastolic blood pressure, heart rate reserve, resting heart rate, six minute walk test (Table no 1, 3 & 4). Cardiac Rehabilitation Phase II Program participation rates were attending (24.39%) and not attending (75.61%). The p values of the variables used in the present study are as follows, Depression in Zung scale, p=0.1787 and Cardiac depression scale, p=0.1991, Social support p=0.2783, Quality of life p=0.6892,

Table 1: Demographic profile of the subjects under study.

Variables		Attending	Not attending	Total (n)	%	P value
Age	Males	43 (43.36yrs)	148 (56.18yrs)	191	-	0.0236
	Females	24 (50.96yrs)	70 (55.92yrs)	94	-	
Gender	Males	40 (21.51)	146 (78.49)	186	65.26	-
	Females	27 (27.27)	72 (72.73)	99	34.74	
BMI		67 (24.14±3.07)	218 (24.38±9.01)	-	-	0.8283

stress score, p=0.0791, hope outcome of future, p=0.6061 and total Barrier score p=0.1965 in EBBS (with p=<0.05). The Strongest predictor was the inconvenient location 34.40%, expense (23.85%), Transportation difficulty (17.43%) and

Table 2: Comparison of marital status and place of living in men and women in both attending and not attending groups under study.

Variable	Attending	Not attending	Total n (285)	Total %
Marital Status				
Male				
Married	41(95.34%)	136(91.891%)	191	67.01%
Unmarried	2(4.651%)	9(6.081%)		
Widower	0	3(2.027%)		
Female				
Married	19(79.166%)	54(77.14%)	94	32.98%
Unmarried	3(12.5%)	5(7.142%)		
Widow	2(8.33%)	11(15.7142)		
Place of living				
Far Place Male	18(14.75%)	114(93.44%)	122	15.43%
Female	11(19.65%)	45(80.35%)	56	
Near Place Male	23(39.65%)	35(60.34%)	58	44.31%
Female	16(53.33%)	14(46.66%)	30	

Table 3: Comparison of Socioeconomic Scale and Literacy rate among attending and non attending groups in the study.

SES	Attending	%	Not attending	%	Total	%
Lower class	10	13.16	66	86.84	76	26.67
Lower middle class	0	0	19	100	19	6.67
Middle class	30	25.21	89	74.79	119	41.75
Upper class	14	31.82	30	68.18	44	15.44
Upper middle class	13	48.15	14	51.85	27	9.47
Education						
Illiterates	2	5.41	35	94.59	37	12.98
Primary	16	20.78	61	79.22	77	27.02
Secondary	11	21.57	40	78.43	51	17.89
PUC	8	24.24	25	75.76	33	11.58
Degree	16	27.12	43	72.88	59	20.7
PG	14	50	14	50	28	9.82

Table 4: Comparison of physiological variables scores among attending and not attending groups.

VARIABLE	GROUP	n	Mean±SD	t value	p value
Systolic Blood Pressure	Attending	67	121.94±12.03	1.5226	0.129
	Not attending	218	119.72±9.90		
Diastolic Blood Pressure	Attending	67	78.72±9.31	0.0104	0.9917
	Not attending	218	78.70±10.19		
HRR	Attending	67	84.06±13.83	-0.5415	0.5886
	Not attending	218	85.12±14.06		
RHR	Attending	67	82.72±12.91	0.9457	0.3451
	Not attending	218	81.22±10.08		
6 MWD	Attending	67	2.53±0.66	1.0152	0.3109
	Not attending	218	2.44±0.67		

no referral (10.55%). The measuring tools used in this study were Zung self rating depression scale, Cardiac depression scale, Perceived stress scale, Exercise benefit barrier scale, Herth hope index, Revised life orientation scale, ENRICHD social support scale, among which zung self rating depression scale, cardiac depression scale, showed statistical significance with p $\leq$ 0.05 (Table no 5).

Table 5: Comparison of the Zung Self Rating Depression Scale, Cardiac Depression Scale, Perceived Stress Scale, Benefit Score, Barrier Score, ENRICHD Social Support Scale, Revised Life Orientation Test, Herth Hope Index Scalescores among theattending and not attending groups.

VARIABLE	GROUP	n	Mean±SD	t value	p value
ZUNG scale	Attending	67	46.68±10.48	1.3481	0.1787
	Not attending	218	48.70±11.47		
Cardiac Depression Scale	Attending	67	90.78±26.68	-1.2872	0.1991
	Not attending	218	95.00±22.47		
Perceived Stress Scale	Attending	67	23.46±5.86	1.7625	0.0791
	Not attending	218	22.06±5.65		
Benefit Score	Attending	67	84.70±14.53	1.3577	0.1756
	Not attending	218	82.28±12.18		
Barriers score	Attending	67	34.96±10.98	0.0772	0.9385
	Not attending	218	34.86±8.36		
Total score	Attending	67	117.91±15.60	1.2947	0.1965
	Not attending	218	115.09±15.61		
ESSI	Attending	67	20.84±5.05	1.0862	0.2783
	Not attending	218	19.45±10.06		
LOT-R	Attending	67	14.04±3.55	0.4004	0.6892
	Not attending	218	13.79±4.74		
Herth Hope Index	Attending	67	33.43±5.27	0.5163	0.6061
	Not attending	218	33.0±6.21		

Table 6: Barriers for phase 2 cardiac rehabilitation follow up.

Barriers	Number of subjects not attending	Percentage
Inconvenient Location	75	34.40%
Expense	52	23.85%
Transportation Difficulty	38	17.43%
No one recommended it	23	10.55%
Not Interested	11	5.04%
Do not like exercise	10	4.50%
Not enough time with family	3	1.37%
Too sick	3	1.37%
Do not feel it useful	3	1.37%
Other health problems	3	1.37%
Frightened of exercise	0	0

DISCUSSION

The present study aimed to identify the barriers for participation and follow up in cardiac rehabilitation phase II. The study undertaken included a total of three hundred (300) subjects

of which two hundred and eighty five (285) were screened and fifteen (15) dropouts, the reasons were inconvenient location, transportation difficulty from home to cardiac rehabilitation centre, financial issues, not enough time with family etc. Although many studies have been done in the western countries about the barriers to the follow up and participation, only a few have been done in India. So the present study attempts to identify the barrier for follow up and participation in cardiac rehabilitation phase II.

Old age is one of the main barriers to enrolment in cardiac rehabilitation. A study demonstrated that cardiac patients with mean age of 70.3years did not proceed to phase II cardiac rehabilitation program, the reasons being physical unfit, degenerative diseases or other co-morbidities [22]. The result of the present study suggested that the mean age of coronary artery bypass graft subjects who were attending cardiac rehabilitation program was 47.16 years and mean age of those subjects not attending cardiac rehabilitation was 56.05 years demonstrating significant difference between the mean ages in both the groups.

A cross-sectional study investigated gender difference and suggested that reasons for not attending the cardiac rehabilitation program in both men and women were early return to work, financial burden and hospital readmission and transportation issues. When compared to both the genders, hospital readmission was significant cause for not completing cardiac rehabilitation when compared to men (6% and 5%) respectively. The author also demonstrated that key difference in the study was age difference related to the gender, as men tended to be more younger than the women, and not nearing the retirement age [23]. Similarly the present study demonstrated that mean age of men attending the cardiac rehabilitation program was 43.36 years and mean age of women was 50.96 years. Other literature search conducted by Jackson. L, et al, suggested that the probability of referral and participation in cardiac rehabilitation programs was lower for women as compared to men [24-27]. Married female patients, old age, obesity, disease severity, other co-morbidities, role resumptions, led to reduced adherence to cardiac rehabilitation program in

women as compared to men [28]. The results of present study demonstrated that 77.14% of married women among total women subjects who disagreed to attend cardiac rehabilitation program due to role resumptions and not having enough time for family, and 91.891% of married men among total men subjects disagreed to attend cardiac rehabilitation program may be due to family responsibilities, work conflict, time insufficiency. A prospective longitudinal study over a period of six months by Grace, et al. demonstrated that gender was significantly associated with anxiety. Compared to men, women were 1.431 times more likely to have scores indicative of an anxiety disorder at the time of hospitalization which may affect the referral to cardiac rehabilitation program [29]. However, the present study demonstrated that subjects attending cardiac rehabilitation program were 1.4 times stressed than not attending group.

The present study demonstrated that illiteracy acts as a major barrier for not attending cardiac rehabilitation program. Among the subjects who are not attending cardiac rehabilitation program percentage of illiterate subjects were higher 94.59% (F>M) as compared to post graduate subjects 50% (M>F). Other study by Grace, et al. demonstrated that there was also a significant gender difference in the level of education where men were more highly educated than women and the attendance rates were more in men than women [29]. Similarly the present study showed the same result indicating that women do not attend cardiac rehabilitation program due to lesser qualification or lack of awareness.

In the present study there was significant difference between the socioeconomic classes among the study subjects. Using Modified Kuppuswamy scale subjects belonging to middle class had higher attendance rate as compared to lower class and upper class subjects. On the contrary studies have suggested that higher socioeconomic status were positive predictor for participation due to knowledge about the benefits of exercise or higher qualification [30-32]. A prospective longitudinal study demonstrated that there was significant genders difference in family income where men

had significantly higher annual income when compared to women. The author also suggested that family income was the only socio-demographic variable which was significantly predictive of attending cardiac rehabilitation, and has been shown to be a strong indicator of socioeconomic status [33]. However the present study did record the family income since it was assumed that income in the middle class subjects is lower as compared to upper class subjects.

Studies have also suggested that farther the distance from home to cardiac rehabilitation centre stronger is the association with low participation and enrolment rates [29]. In the present study, 161 (83.85%) subjects who lived at distances beyond 12km disagreed to attend cardiac rehabilitation program due to transportation difficulty, inconvenient location, financial issues and lack of physician's endorsement. Among subjects living within the radius of 12km, 57 (61.29%) subjects disagreed to attend cardiac rehabilitation program due to financial issues, lack of physician's endorsement, not enough time for family, other health problems, not interested, do not like exercise, too sick and do not feel useful. A study done by Grace et al, concluded that inconvenient location and transportation difficulties were main reasons for not attending cardiac rehabilitation program [29]. Noriko E, et al, suggested that reasons for dropouts from cardiac rehabilitation program were far distance from home to hospital was 5.5% which was highly significant. Therefore, transportation difficulty with inconvenient location may be main reasons leading to non-adherence to the cardiac rehabilitation program [34].

The referrals to cardiac rehabilitation varied widely across studies from as low as 10-30% [34,35] to as high as more than 60 % [36,37] and with cardiologists being one of the health providers who most often refer the patients for cardiac rehabilitation program. In the present study forty two (42) subjects were not referred to cardiac rehabilitation program. Similar to above study by Grace et al. demonstrated that the major reason for subjects not attending cardiac rehabilitation program was that no one has recommended it. A significant gender difference in referral by the physician was seen, relative to women, men were 1.187 times more likely to be referred to a cardiac rehabilitation by a physician or cardiologist due to resumption of role and not enough time for family [29]. Gender differences are found to impact cardiac rehabilitation participation with women having poorer participation rates than men. Barriers to women's participation included lack of financial resources, transportation difficulties and lack of social or emotional support [38]. However the present study demonstrated that there were low rates of recommendation (10.55%) as there is lack of awareness about the benefits of cardiac rehabilitation program.

In the present study it was found that subjects who are more depressed did not agree to attend cardiac rehabilitation program. A study done by J. Hughues, et al, demonstrated that subjects with higher score of depression on International Classification of Diseases-9 codes were more likely attending cardiac rehabilitation program 4.3 times to those without depression; completing 25-36 sessions of cardiac rehabilitation program compared subjects without depression [39]. The difference may be likely because of individual perceptual differences. A study done by E. Casey, et al demonstrated that patients with higher levels of depressive symptoms using Beck Depression Inventory scores were 2.2 times less likely to complete cardiac rehabilitation program compared to patients without depression [40]. The present study demonstrated that lower the depression scores on Zung self rating depression scale and Cardiac depression scale higher is the attendance rate.

Higher the exercise benefit score with lower barrier score predicts the patient attending the cardiac rehabilitation programme [41]. However, in the present study the mean exercise benefit score demonstrated by the subjects attending cardiac rehabilitation program was 84.70 which may be due to previous knowledge about benefits of exercise, liking towards the exercise, although the mean exercise barrier score was 34.96 of subjects who were not attending cardiac rehabilitation program may be due to dislike for exercise, financial constraints and insufficient time for family.

It has been observed that relative to men, women were 1.431 times more likely to have scores indicative of an anxiety disorder at the time of hospitalization [29]. Another study demonstrated that subjects attending cardiac rehabilitation program, have shown higher mental health component scores on mental component of SF-36 [42]. Contrary, present study demonstrated that higher the stress perceived by the subject higher the attendance rate. However when compared to attending and not attending groups using perceived stress scale, it did not show any statistical significance.

Lack of social support leads to the poor outcome of cardiac rehabilitation program [42-43]. Another study by Sherry L. Grace, et al, suggested that, spouse support, support from children and family support show a positive effect of cardiac rehabilitation participation [29], similar to the present study.

Schiener and Carver stated that optimism was a stable form of personality characteristic and individual level of optimism influences his/her behavior which has consequences on quality of life [45]. The present study administered revised life orientation scale for finding out how many individuals were optimistic. Greater self efficacy was significantly predictive of cardiac rehabilitation participation in the subject. However, the present study demonstrated similar results with respondent rates being low which is statistically insignificant. There are few large randomized controlled trials of such design that have investigated the beneficial effect of cardiac rehabilitation program on quality of life [46-48]. Stahle et al found that, in elderly patients with recent acute coronary events, quality of life was more improved with cardiac rehabilitation program than without it. This result was supported by Dugmore et al, who reported higher quality of life scores and psychological profiles in those who underwent cardiac rehabilitation program than in those who did not. It may be inferred that the reasons for the improvement in quality of life by cardiac rehabilitation program is multifactorial. The positive impact of aerobic training on physical fitness and exercise capacity has been well reported. Both the gain in physical functioning and the psychological support provided by

rehabilitation specialists and family members are likely contributing factors [50].

To conclude, the present study has demonstrated that the significant barriers for cardiac rehabilitation program phase II participation and follow up were inconvenient location, transportation difficulty, financial issues, no recommendations for cardiac rehabilitation program, not interested in exercise, do not like in exercise, not enough time with family, too sick, do not find exercise useful and other health co-morbidities like unable or pain during walking or travelling to cardiac rehabilitation centers, mental health issues, etc.In our present some variables did not show any statistically significant difference such as smoking history, body mass index, systolic blood pressure, diastolic blood pressure, resting heart rate, heart rate reserve, six minute walk test which may be due to onetime recording.

CONCLUSION

The present study concluded that inconvenient location, transportation difficulty, expense, no recommendation to cardiac rehabilitation, socio-economic status, education, and age were the major barriers for not attending cardiac rehabilitation phase II program, after coronary artery bypass graft. In addition, the results also showed that perception of individual concerning benefits and barriers to participate in exercise, dislike towards exercise, poor life orientation and quality of life in subjects after coronary artery bypass graft were also risk factors for not attending cardiac rehabilitation phase II program.

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Conflicts of interest: Declared

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