

ORIGINAL ARTICLE**“FACTORS AFFECTING THE ADHERANCE OF POST CABG PATIENTS IN CARDIAC REHABILITATION-A CROSS-SECTIONAL STUDY IN KARACHI”**Muniba Khanum¹, Mahrukh², Tanveer Sikander³, Afaq shaikh⁴, Bushra Ovais⁵^{1,2,3} Dow Medical University, Karachi, Pakistan.⁴Faculty of Doctor of Physical therapy, Baqai Medical University, Karachi, Pakistan.⁵ Faculty of Doctor of Physical therapy, Abu Zafar Institute of Medical Science, Karachi, Pakistan**ABSTRACT**

Cardiovascular disease (CVD) is the principal cause of death globally. To decrease this mortality rate, a wide-ranging program from hospital discharge to highly structured and monitored exercise therapy is required. Cardiac Rehabilitation (CR) purposes to decrease risks, disability, augment emotional welfare, to implement and follow healthy behavior, thus adopting a healthy life style. This study was aimed to determine the factors that affect adherence of post coronary artery bypass grafting (CABG) patient's to Cardiac Rehabilitation. This cross-sectional study was conducted on 255 Post CABG patients with age 30 years above. Patients in Phase II and III of CR were interviewed through self-designed structured questionnaire. After taking the informed Consent during their hospital visit in eight hospitals in Karachi. Questioner was self-design structured questions with responses on Likert Scale. Patients in phase I of CR, patients in fitness program, pregnant females, Patients with disability, severe functional impairment and co-morbidities that limit CR participation were excluded. The collected data were entered in and analyze by the Statistical Package for Social Sciences version 20.0 Software (SPSS Inc., Chicago, Illinois). Frequencies and percentages were taken out for all qualitative variables and presented in tabular form. Most patients were referred for CR by the cardiologist (51.0%). A major factor that leads to non-adherence were distance to CR facilities (83.75%), fatigue (83.55%), lack of time (67.8%), lack of transport (62.7%). Other significant factors were illiteracy (42%), financial issues (63.9%), low self-efficacy (64%), low-level of physical fitness (39.6%). Adherence to Phase-II- CR was 52.2%, with no significant differences between men and women. Adherence was observed in patients who have accepted their condition (81.1%), learned to cope with the limitations (76.8%), were comfortable with exercise regime (67.4%), believed that exercise will decrease the deconditioning (74.9%) and will improve physical fitness (20.8%). Major factors were Distance to CR facilities, fatigue, lack of time, lack of transport and financial issues. Other substantial factors were depression, anxiety, helplessness, illiteracy, old age, low self-efficacy, low-level of physical fitness; greater perceived barriers were associated with low-levels of adherence. Decrease perceived benefits and increased barriers increase drop-out rates from cardiac rehabilitation.

Keywords:

Cardiovascular disorders, Cardiac Rehabilitation, Coronary Artery Bypass Grafting, Adherence.

1. INTRODUCTION

Cardiovascular diseases (CVD) are the one that affects structure and function of the heart and blood vessels. CVD causes for around one third deaths worldwide¹, with the highest figures in countries of South and East Asia². There are several methods to control or treat these diseases like lifestyle modification, medications, certain heart procedures or primary, secondary and tertiary cardiac rehabilitation programs^{3,1}. These disorders are the leading cause of mortality and morbidity in the industrialized world, accounting for almost 50% of all deaths annually. The survivors constitute an additional reservoir of cardiovascular disease morbidity. In the United States alone, over 14 million persons suffer from some form of coronary artery disease (CAD) or its complications, including congestive heart failure (CHF), angina, and arrhythmias. Of this number, approximately 1 million survivors of acute myocardial infarction (MI), as well as the more than 300,000 patients who undergo coronary bypass surgery annually, are candidates for cardiac rehabilitation.

Cardiac rehabilitation (CR) provides benefits to those who have cardiovascular diseases, heart failure, recent heart attack, heart procedures such as angioplasty and coronary artery bypass (CABG) or certain arrhythmias and implantable devices like pacemaker and defibrillator⁴. Cardiac rehab helps patients by making changes in lifestyle that reduces risk factors, improves functions of the heart and vessels, speed up recovery from heart procedures or heart attack, improve ability to perform daily living task and disease management capacity thus 2 improves quality of life^{5,6}. CR is responsible for a decrease in mortality rate by 25% in the first year of recovery.^{7,8} Cardiac rehabilitation aims to reverse limitations experienced by patients who have suffered the adverse pathophysiologic and psychological consequences of cardiac events. Cardiac rehabilitation program (CRP) involves patient assessment, exercise training, education, behavior change, psychological, physical activity and diet/nutritional counseling, weight and lipid management, blood pressure monitoring, smoking

cessation⁵. CR program involves attending 45 outpatient sessions after a month of hospital discharge, consisting of 4 phases. Phase I which is inpatient phase, Phase II is outpatient phase and Phase III and IV are maintenance phases respectively⁹⁻¹². Post-CABG cardiac rehabilitation have many benefits, the most important of these are improved exercise tolerance, enhancements in lipid and lipoprotein levels detected in patients undergoing cardiac rehabilitation exercise training and education. Exercise must be combined with dietetic and medicinal interventions for required lipid and excess weight control, decrease blood pressure and with well-designed educational, counseling, and behavioral modification programs it results in cessation of smoking in a substantial number of patients and augments measures of social and psychological functioning¹⁰. The importance of our study was the outpatient CR service, since it is this component of CR that has been most widely and extensively known to impart benefit to its participants. We selected patients who suffered from CABG surgery and measured their attendance rates at an outpatient CR program. We have studied the CR attendance rates of CABG patients and the impact on attendance of sociodemographic, medicinal, intellectual, psychological factors and topographical barriers, to determine which factors preferred and which destitute adherence to CR¹¹. Despite these, multifaceted benefits only low percentage of people who have cardiac diseases and cardiac procedures have participated in cardiac rehabilitation programs. In local setting, there are few CR centers available. Additionally, various factors that inhibit patient's attendance in CRP. We enrolled patients from Phase II till IV¹². Cardiac rehabilitation (CR): It is a secondary outpatient program designed to reduce future heart risks in people with heart diseases. Usually consist of exercise training, psychosocial counseling, physical activity and nutritional management¹³. Cardiovascular diseases (CVD): are group of disorders of heart and peripheral blood vessels¹⁴. Coronary heart disease (CHD): also known as ischemic heart disease is a disease of blood vessels supplying the heart muscles, in which narrowing of blood vessel occur due to

deposition of cholesterol on their wall¹⁵. Coronary artery bypass graft (CABG): is a type of surgery performed to overcome the blocked portion of coronary artery by inserting a vein or arterial graft to resume the blood supply of the affected area¹⁶.

1.2 Phases of cardiac rehabilitation:

Phase-1(inpatient): occurs in hospital following MI or surgical procedure like CABG, starts at day 1 up to week 1 of cardiovascular event¹⁷. Phase-2(outpatient): after 2 weeks of cardiovascular event. This delay allows myocardium to heal and monitor patient's response to new medicine regime. Participants are monitored via telemetry to determine heart rate and rhythm, blood pressure at rest and during exercise, ventilation response are noted¹⁸. Phase-3(outpatient maintenance): unsupervised continued fitness regime with regular monthly coordination with cardiac rehabilitation team. Participants are reminded to monitor their own pulse rate¹⁹.

2. METHODS

Post CABG subjects in Phase II and III of Cardiac Rehabilitation with age 30 years and above were included. Exclusion Criteria is patients in phase I of cardiac rehabilitation, those who are enrolled in primary prevention or fitness program, pregnant females, patients with disability, Patients with severe functional impairment (neurological, cognitive or joint disease), coexisting comorbidities hindering in participation at CR were excluded. It was a Cross sectional study design. Non-Probability Purposive sampling technique was used. Duration of study was 8 weeks after approval of synopsis.

Total four hospitals of Karachi having cardiology and cardiac Rehabilitation centers were included. Namely National Medical Center (NMC), Holy family hospital, Institute of Physical Medicine and Rehabilitation (IPM&R) and National Institute Cardio-Vascular Disorder (NICVD). Sample size of 255 was calculated through Open Epi version 3.0 with a hypothesized frequency of 79% (proportion of patients did not proceed to phase II cardiac rehab program), confidence limits of 5%, design effect of 1% and confidence level of 95% 24 .

A self-designed structured questionnaire was used to collect the data from subjects attending cardiac rehabilitation. Written informed consent as well as

voluntary participation in questionnaire fill up was regarded as consent. The research conforms ethical considerations. The principles of informed consent, privacy, confidentiality and anonymity were applied. All information identifying patients were removed before analysis.

2.1 QUESTIONNAIRE DESIGN: A self-structured Questioner with questions on Likert Scale was designed. It contains five sections with questions on Socio- 14 demographic, clinical characteristics, perceived benefit/barrier of cardiac rehabilitation, patient's perception on benefit/barrier and on depression/anxiety factors related to CR. First section was of Sociodemographic factors, which included patient name, age, gender, marital status, residential area, referral and occupation. The sociodemographic data was gathered directly from the patient. Second section included patient's current phase of cardiac rehab and when he joined the CRP, medications and comorbid conditions. Third section included questions on professed benefits or barriers for participation in cardiac rehabilitation by patients. Forth section included patient's perception on benefits or barriers of cardiac rehabilitation program and fifth section included patient's level of anxiety or depression during cardiac rehabilitation program.

Collected data was entered in and analyze by the Statistical Package for Social Sciences version 20.0 Software (SPSS Inc., Chicago, Illinois). Frequencies and percentages were taken out for all qualitative variables and presented in tabular form and figures.

RESULT:

According to the objective and methodology of the study 255 participants who done their Coronary Artery Bypass Grafting (CABG) recently were included in the study. Regarding their demographic characteristics, most of them (31.8%) were in between the age of 51-60 years, followed by 27.5% between the ages of 41-50 years. Male and females were almost equal in our study. Majority of them (83.5%) were married. Most of them (42.0%) were illiterate. 39.6% were educated up to lower secondary and remaining (18.4%) were more than secondary educated. Information regarding cardiac rehabilitation program were mainly (58.1%) provided either by cardiologist or by their medical team. The other source of information was family or friends. Role of social media and internet was found very low (9.8%) regarding providing information for cardiac rehabilitation program in our study participants. (Table1)

Table 1. Demographic Characteristics of Study Participants

Variables	Frequency	Percentages
30-40 years	47	18.4
41-50 years	70	27.5
51-60 years	81	31.8
61-70 years	41	16.1
Above 70 years	16	6.3
Age groups		
Female	125	49.0
Gender		
Male	130	51.0
Marital status		
Married	213	83.5
Currently un married	42	16.5
Education		
Un-educated	107	42.0
Primary educated	38	14.9
Secondary educated	63	24.7
Higher Secondary educated	17	6.7
Bachelors/Graduate	18	7.1
Masters/Post-graduate	12	4.7
Information received about cardiac rehab program		
Cardiologists	130	51.0
Medical team	18	7.1
Internet	8	3.1
Social media	17	6.7
Family	47	18.4
Friends	35	13.7

Regarding cardiac rehabilitation characteristics of the participants, 52.2% of the participants were in phase II whereas remaining 47.8% were in phase III of cardiac rehabilitation program. Most of them (40.8%) join the cardiac rehabilitation program after 10 weeks of their hospitalization. Majority of the

participants (95.7%) were taking medication whereas 4.3% were not taking the medication. Most of the participants (44.3%) were not suffering with any adverse condition whereas 28.6% were diabetics followed by COPD (respiratory illness) (12.5%) and Renal dysfunction (5.9%). (Table2)

Table 2. Cardiac Rehabilitation Characteristics of Study Participants

Variables	Frequency	Percentages
Phase of Cardiac Rehabilitation		
PHASE II	133	52.2
PHASE III	122	47.8
Join Cardiac rehabilitation program		
4-6 weeks after hospitalization	47	18.4
7-8 weeks	39	15.3
9-10 weeks	65	25.5
Above 10 weeks	104	40.8
Taking medication		
Yes	244	95.7
No	11	4.3
Comorbidities		
Renal dysfunction	15	5.9
Diabetes	73	28.6
COPD (respiratory illness)	32	12.5
Peripheral vascular disorder	2	.8
None	113	44.3
More than 1 condition	20	7.8

Study participants were asked through 23 questions regarding physical benefits and barriers to adopt cardiac rehabilitation program. According to the analysis, majority of the participants (67.4%) were either agreed or strongly agreed that they are feel comfortable with exercise. Similarly, majority of them (74.9%) agreed that exercise prevent them from further heart attacks. Majority (73%) were also agreed that it makes them feel relaxed. However, majority participants (75.2%) did not agreed that exercise gave them a sense of personal accomplishment or it provide them a chance to have contact with friends and persons and enjoyed their Company (74.1%). Similarly, majority did not agree with the statements that exercising keeps them away

from having high blood pressure (69.4%), increases level of their physical fitness (79.2%), live longer if they do exercise (80.4%), improves their functioning cardiovascular system (77.3%), physical endurance (76.9%), quality of their work (77.2%), or they remained failure to achieve goals in previous attempts to become active (52.1%). Majority of the participants disagreed or strongly disagreed with the statements that their spouse (65.5%) and family members (57.6%) did not encourage them for exercise. Majority (63.9%) agreed that cardiac rehabilitation program is expensive. Regarding barriers in cardiac rehabilitation program, majority of the study participants (77.8%) were either agreed or strongly agreed that such exercise takes too much

of their time and it made them tired (84.3%) or they felt fatigued (82.8%) and pain by these exercise (58.8%). They also think that places of cardiac rehabilitation exercise are too far away (83.6%) and the exercise facilities do not have convenient

schedules for them (74.1%). Other barriers statements for which they either strongly agreed or agreed were lack of transportation (62.7%), and lack of access to opportunities such as nearby facilities (85.9%). (Table 3)

Table 3. Distribution of Physical Benefit and Barrier in Cardiac Rehabilitation Program of Study Participant

Responses	strongly agree	agree	disagree	strongly disagree
I am comfortable with exercise.				
n(%)	87(34.1)	85(33.3)	70(27.5)	13(5.1)
Exercising takes too much of my time.				
n(%)	98(38.4)	75(29.4)	17(6.7)	65(25.5)
I will prevent heart attacks by exercising				
n(%)	100(39.2)	91(35.7)	53(20.8)	11(4.3)
Exercise tires me.				
n(%)	135(52.9)	80(31.4)	25(9.8)	15(5.9)
Exercise gives me a sense of personal accomplishment.				
n(%)	3(1.2)	60(23.5)	96(37.6)	96(37.6)
Places for me to exercise are too far away				
n(%)	146(57.3)	62(24.3)	39(15.3)	8(3.1)
Exercising makes me feel relaxed.				
n(%)	94(36.9)	92(36.1)	59(23.1)	10(3.9)
Exercising lets me have contact with friends and persons I enjoy.				
n(%)	18(7.1)	48(18.8)	89(34.9)	100(39.2)
Exercising will keep me from having high blood pressure.				
n(%)	10(3.9)	68(26.7)	98(38.4)	79(31.0)
Exercising increases my level of physical fitness.				
n(%)	3(1.2)	50(19.6)	103(40.4)	99(38.8)

I will live longer if I exercise.				
n(%)	5(2.0)	45(17.6)	90(35.3)	115(45.1)
Exercise facilities do not have convenient schedules for me				
n(%)	122(47.8)	67(26.3)	60(23.5)	6(2.4)
Exercising improves my functioning cardiovascular system.				
n(%)	4(1.6)	54(21.2)	105(41.2)	92(36.1)
I am fatigued by exercise.				
n(%)	143(56.1)	68(26.7)	28(11.0)	16(6.3)
Pain when I exercise.				
n(%)	101(39.6)	49(19.2)	58(22.7)	47(18.4)
My spouse (or significant other) doesn't encourage exercising.				
n(%)	45(17.6)	43(16.9)	85(33.3)	82(32.2)
My physical endurance is improved by exercising.				
n(%)	5(2.0)	54(21.2)	120(47.1)	76(29.8)
My family members do not encourage me to exercise.				
n(%)	68(26.7)	40(15.7)	88(34.5)	59(23.1)
Exercise improves the quality of my work.				
n(%)	3(1.2)	55(21.6)	101(39.6)	96(37.6)
Failure to achieve goals in previous attempts to become active				
n(%)	76(29.8)	46(18.0)	109(42.7)	24(9.4)
Lack of transportation.				
n(%)	137(53.7)	23(9.0)	38(14.9)	57(22.4)
Do you think Cardiac Rehabilitation Program is expensive?				
n(%)	125(49.0)	38(14.9)	57(22.4)	35(13.7)
Lack of access to opportunities such as nearby facilities.				
n(%)	182(71.4)	37(14.5)	22(8.6)	14(5.5)

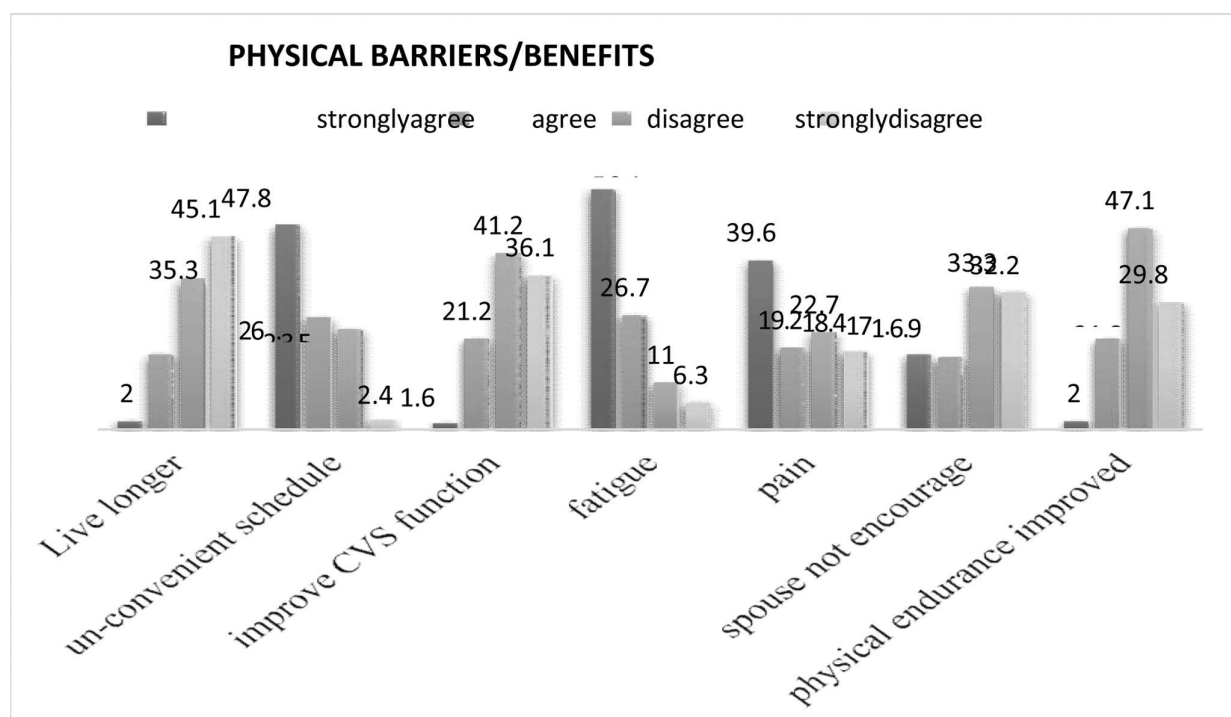


Fig. 1. Physical barriers / benifits

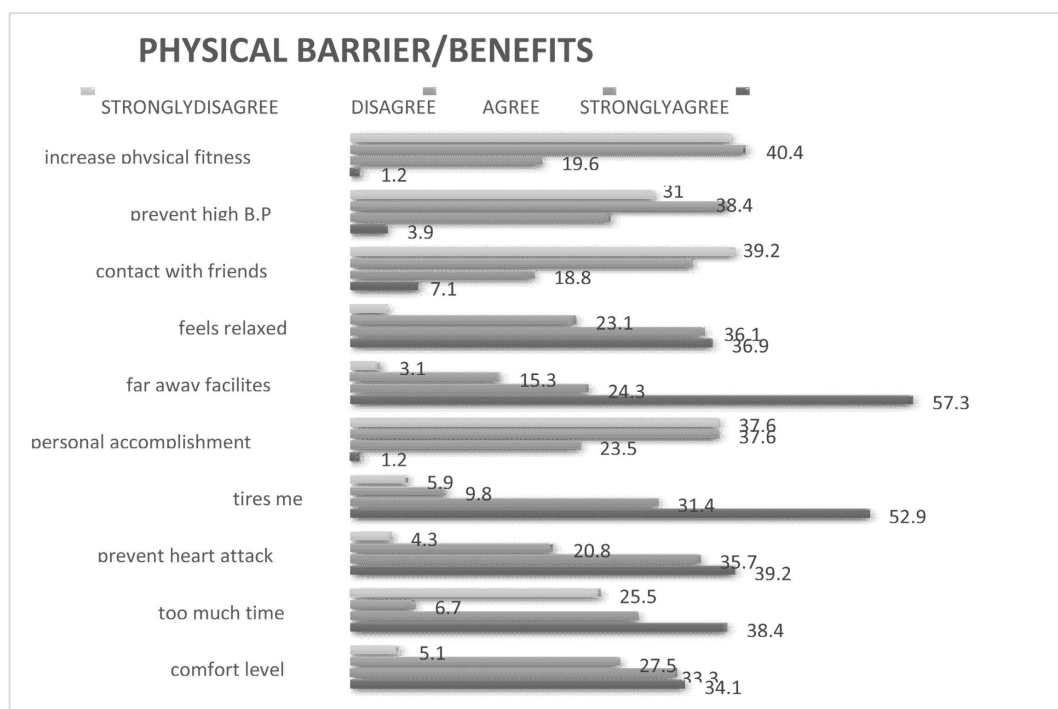
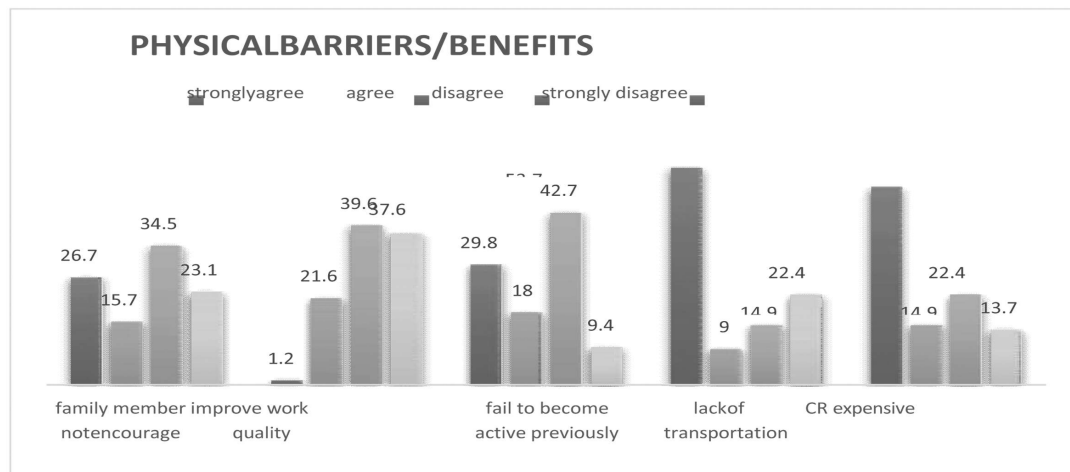


Fig. 2. Physical barriers / benifits

Fig. 2. Physical barriers / benifits**Fig. 3.** Physical barriers / benefits

The participants of the study were also asked 8 questions regarding cognitive benefits and barriers in cardiac rehabilitation program. Majority of the participants agreed or strongly agreed with the statements that dealing with the illness made them a strong person (76.1%), or they have learned a great deal from their illness (93.3%) and their illness had made life more precious to them (96.1%). However, majority of the participants were agreed or strongly

agreed with the statements that their illness control their life (64.0%), their illness limits them in everything that was important to them (65.1%) and their illness frequently makes them feel helpless (52.6%). Majority of subjects also agreed that they have learned to accept the limitations imposed by their illness (81.1%) and they can cope effectively with their illness (76.8%).(Table4)

Table 4. Distribution of Cognitive Barrier and Benefit in Cardiac Rehabilitation Program of Study Participants

Options	strongly agree	agree	disagree	strongly disagree
Dealing with my illness has made me a stronger person.				
n(%)	99(38.8)	95(37.3)	54(21.2)	7(2.7)
My illness controls my life.				
n(%)	108(42.4)	55(21.6)	73(28.6)	19(7.5)
I have learned a great deal from my illness.				
n(%)	142(55.7)	96(37.6)	16(6.3)	1(0.4)
My illness had made life more precious to me.				
n(%)	165(64.7)	80(31.4)	10(3.9)	0(0)
I have learned to accept the limitations imposed by my illness				
n(%)	124(48.6)	83(32.5)	41(16.1)	7(2.7)
My illness limits me in everything that is important to me.				
n(%)	118(46.3)	48(18.8)	76(29.8)	13(5.1)
My illness frequently makes me feel helpless.				
n(%)	64(25.1)	70(27.5)	71(27.8)	50(19.6)
I can cope effectively with my illness.				
n(%)	123(48.2)	73(28.6)	54(21.2)	5(2.0)

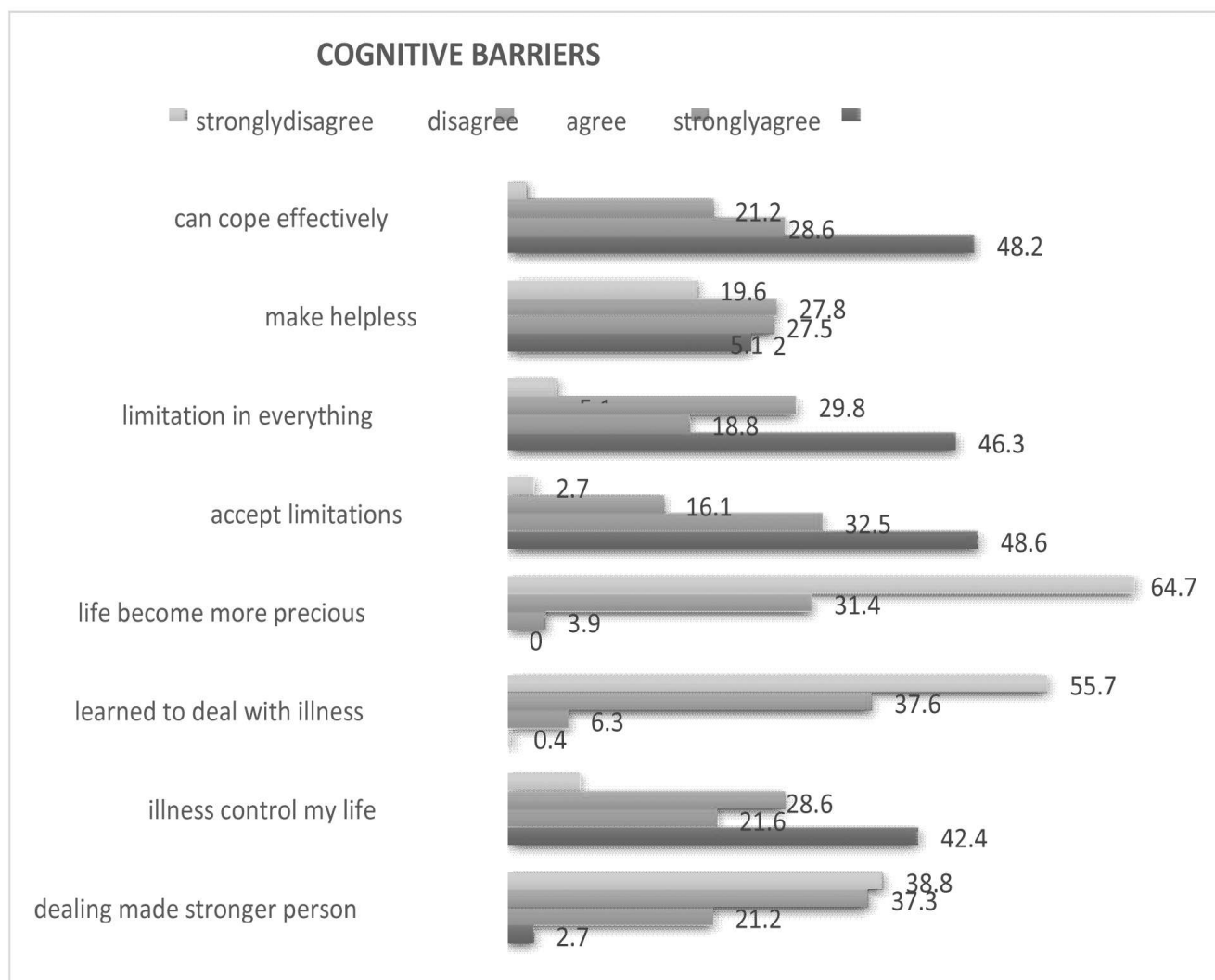


Fig. 4. Cognitive barriers

Lastly, level of anxiety or depression in cardiac rehabilitation program was also assessed through 4 item questions from the study participants. Majority of the participants (66.3%) either agreed or strongly agreed that they had Tension (feelings of tension, fatigability, startle response, feelings of restlessness, inability to relax during their exercise) and they also have Intellectual problem (difficulty in concentration during exercise, and poor memory to remember exercise) (57.6%). Similarly, majority (83.5%) were

also agreed to felt cardiopulmonary symptom (tachycardia, palpitations, pain in chest, throbbing of vessels, fainting feelings, missing beat, Pressure or constriction in chest, choking feelings, sighing and dyspnea during exercise). However, majority (58.8%) were disagree or strongly disagreed with to having somatic symptoms (felt Pains and aches, twitching, stiffness, unsteady voice, Tinnitus, blurring of vision, hot and cold flushes, feelings of weakness, pricking sensation during exercise). (Table5)

Table 5. Distribution of Anxiety or Depression Barriers in Cardiac Rehabilitation Program of Study Participants

Options	strongly agree	agree	disagree	strongly disagree
Tension- (Feelings of tension, fatigability, startle response, feelings of restlessness, inability to relax during exercise.)				
n(%)	77(30.2)	92(36.1)	51(20.0)	35(13.7)
Intellectual difficulties- (Difficulty in concentration during exercise, poor memory to remember exercise.)				
n(%)	74(29.0)	73(28.6)	45(17.6)	63(24.7)
Somatic symptoms- (Pains and aches, twitching, stiffness, unsteady voice, Tinnitus, blurring of vision, hot and cold flushes, feelings of weakness, pricking sensation.)				
n(%)	55(21.6)	50(19.6)	75(29.4)	75(29.4)
Cardiopulmonary Symptoms- (Tachycardia, palpitations, pain in chest, throbbing of vessels, fainting feelings, missing beat, Pressure or constriction in chest, choking feelings, sighing, dyspnea.)				
n(%)	100(39.2)	113(44.3)	19 (7.5)	23(9.0)

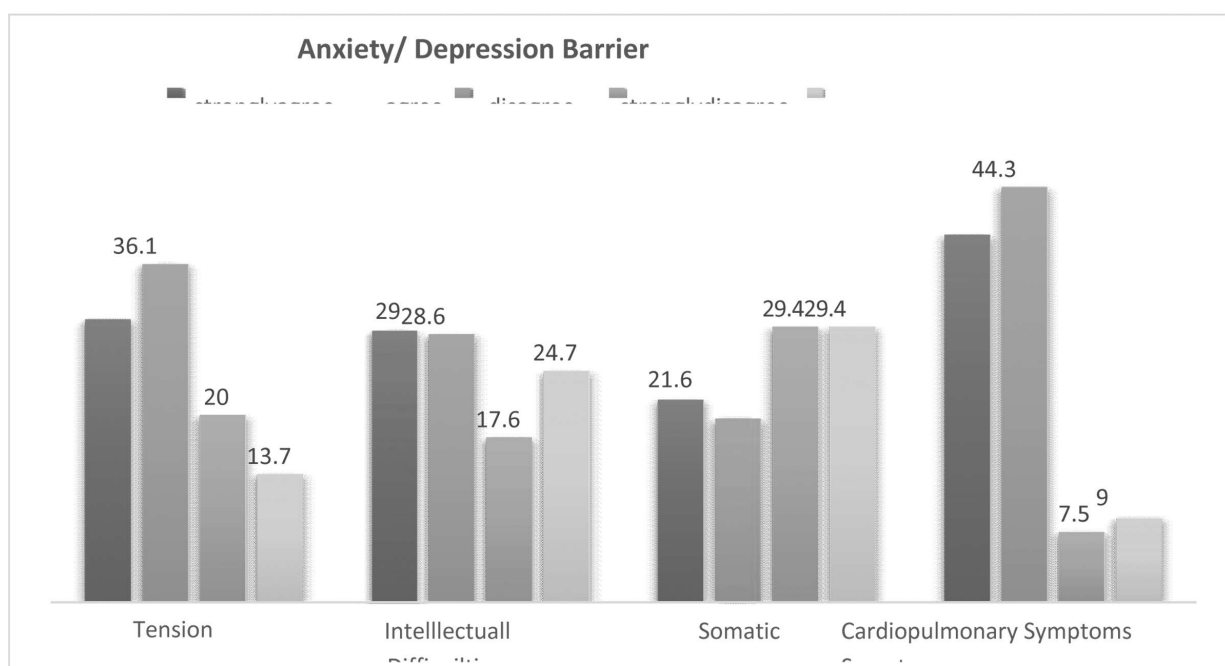
**Fig. 5.** Anxiety / Depression

Table 6: Distribution of Physical, Cognitive Barrier and Benefit and Level of Anxiety or Depression in Cardiac Rehabilitation Program of Study Participants

Variables	Frequency	Percentages
Physical Barrier in cardiac rehabilitation		
Mild	108	42.4
Moderate	147	57.6
Cognitive Barrier in cardiac rehabilitation		
Mild	24	9.4
Moderate	231	90.6
Level of anxiety or depression in cardiac rehabilitation		
Mild	97	38.0
Moderate	158	62.0

4. CONCLUSION

Major barriers to cardiac rehabilitation were unavailability of nearby rehabilitation centers, fatigue, and lack of time, transport issues, financial issues and anxiety/depression. Attempts should be made to minimize the barriers as it will increase the adherence to cardiac rehabilitation. Better adherence was seen in patients who believed in the benefits of exercise. Factors reducing participation in CRP are wide-ranging but are modifiable.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

ETHICAL APPROVAL

A prior consent was taken in writing from the all patients

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