Original Article

Effect of Aerobic Exercise on Quality of Life in Stable Angina

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Abstract

Circulatory diseases, including myocardial infraction (MI) and stroke, kill more people than any other disease. Cardiac rehabilitation aims to restore patients who have suffered myocardial ischaemia or infarction to optimal health through exercise based rehabilitation or comprehensive cardiac rehabilitation (e.g., smoking cessation advice, diet and counselling as well as exercise). Evidence regarding comprehensive cardiac rehabilitation consisting with major components in one set are lacking.

This study was carried out to see the effect of a comprehensive Cardiac Rehabilitation (CR) programme comprising aerobic exercise, counselling and education on quality of life among patients of stable angina.

This prospective experimental study carried out in the Department of Physical Medicine & Rehabilitation, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from May 2007 to August 2008. Eighty patients participated in the study; of which analysable data was obtained from 71 patients. Group B (control) patients were treated with counselling, education and usual drug treatment. Group A (study subjects) were given aerobic exercise in the form of brisk walking in addition to counselling and education and usual drug treatment. Each individual was observed at first visit, thereafter was assessed in succession for three more occasions at 14 days intervals each for quality of life using 'Cardiac Quality of Life Index' (QOL) that consists of 5 domains. Apart from baseline characteristics the outcome of fourth visit was compared between the groups for unveiling the difference statistically.

The highest numbers of patients were in the 41-50 years age group with male was predominating (ratio was 4:1.) The comparative study between group A and group B revealed a significant improvement in four of the five domains among group A; namely psychological well-being, physiological well-being, nutrition and worry than the control group B. No significant difference in improvement of the symptoms was evident.

Aerobic exercise programme as a component of CR has been found very effective and it should be necessary part of the treatment modality for stable angina patient in order to improve health and quality of life.

Key words : Coronary artery disease, stable angina, aerobic exercise, cardiac rehabilitation, quality of life.

Coronary artery disease (CAD) represents not only a healthcare burden by itself but also contributes to

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mortality and morbidity associated with other forms of cardiovascular disease[1]. The stress that a patient suffers physically and psychologically not only influence the physiologic function of the patient but also decline the quality of life (QOL). Lifestyle changes and medications are frequently used to treat stable angina. Invasive techniques such as angioplasty and stenting also have been used to reopen narrowed heart arteries.

Cardiac Rehabilitation (CR) is defined by the World Health Organisation (WHO) as "the sum of activities required to ensure patients the best possible physical, mental and social conditions so that they may resume and maintain as normal a place as possible in the community"[2]. Cardiac rehabilitation services are comprehensive, long-term programmes involving medical evaluation, prescribed exercise, cardiac risk factor modification, education and counselling. The programmes

are designed to limit the physiological and psychological effects of cardiac illness, reduce the risk for sudden death or re-infarction, control cardiac symptoms, reduce intake of heart related medication, stabilise or reverse the atherosclerotic process, enhance the psychological and vocational status of selected patients[2]. Benefits of cardiac rehabilitation for patients with angina are many[3]. Regular exercise reduces the frequency of anginal symptoms, increases functional capacity, and improves endothelial function[4,5]. A randomised trial compared the effects of daily exercise with those of angioplasty and stenting among patients with chronic stable angina and single-vessel coronary artery disease demonstrated better outcomes (in terms of major adverse events and improved exercise capacity) at one year in the exercise group than in the revascularisation group[6].

Chronic stable angina is the initial manifestation of coronary artery disease (CAD) in approximately half of all presenting patients. During recent years persistent or refractory angina, i.e., angina that is unresponsive to both maximal drug treatment and revascularisation techniques has become increasingly more relevant and poses a problem of great magnitude[7]. So among the cardiac patients the one with stable angina pectoris is one of the most valuable candidate to have CR because attempt should be made to reverse or at least slower pathophysiological condition in its earliest stage possible and thus to prevent its consequences which leads to other worse cardiac problems.

In Cardiac Centre of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, a good number of patients with CAD are attending daily, but most of them without participating in a CR programme. This study has been carried out to see the effect of this set of aerobic exercise in quality of life among patients with stable angina in a tertiary care setting.

Materials and Methods

This prospective study was carried out in the department of Physical Medicine and Rehabilitation, BSMMU, Dhaka Bangladesh, from May 2007 to August 2008. Eighty established cases of stable angina were recruited from outpatient of the Department of Cardiology, BSMMU. Patients of both sexes with age range of 30-65 years were included with exclusion of patients with unstable angina, associated chronic obstructive airway diseases, diabetes mellitus (DM), hepatic impairment, and, severe renal impairment.

The selected patients were randomly allocated to two groups; group A (study group) and group B (control

group). Group A was given aerobic exercise in addition to usual treatment, with counselling and education. Group B was given usual treatment with counselling and education. Counseling and education was regarding the disease and risk factors, control of risk factors (including counselling for healthy diet, weight management, smoking cessation, stress management), information about the symptoms of cardiac chest pain, orientation to emergency personnel. Aerobic exercises in the form of brisk walking 30 minutes each session for 5 sessions per week was advised. Intensity was based on the Borg numerical scale of Rate of Perceived Exertion (RPE). Patients were instructed to exercise at an RPE of 13 (somewhat hard) to 15 (hard)[8].

After informing details about the nature of the treatment and the study to the patient, written consent was taken prior to the enrollment in to the study. There was no involvement of privacy and no chance of physical or social risks.

All patients were examined initially at first visit, thereafter were assessed in 2nd, 3rd and 4th visit at 14 days interval. Each of the patient was assessed by the parameter – cardiac quality of life (QOL)[9] which is a multifaceted cardiac disease specific 20 item questions arranged in five domains : psychological well being, physical well being, symptoms, nutrition and worry. Visual analogue scale (VAS), which scores 0-10, was used to score QOL where 0 (zero) indicates best condition through 10 (ten) which indicates worst condition[10]. All the assessment was done by a third person (coinvestigator) who was not aware of the treatment provided.

Data obtained by the QOL questionnaire, and, regarding particulars of the patients, examination findings and investigation report was recorded and interpreted. After collection, the data were coded and compiled accordingly and processed by using computer based programme SPSS version13. Student's "t" test with 95% confidence interval and Chi-square test were done to see the level of significance as required. And the values were expressed mean ± standard deviation; p-value (level of significance) was calculated with 95% confidence interval.

Results

Total number of patients enrolled in the study was 80, out of which 71 (group A 37 and group B 34) patients completed the study. Majority of the respondents (50.70%) were aged between 41 and 50 years and then 33.80% were aged 51-60 and, 12.68% were aged 30-40 years. Of the patients completed study 81.69% were

male and 18.31% were female with varied occupations (Table 1).

Table 2 shows the comparison between group A (study) and B (control), at baseline and at completion of treatment.

Aerobic exercise programme resulted in a significant improvement (p-value <0.05) in four of the five domains of quality of life among the study subjects in comparison to the control group, they were: Psychological wellbeing, physiological well-being, nutrition and worry. The domain where significant improvement (p-value >0.05) was not evident was symptoms domain.

Discussion

In the domain of psychological well-being the subjects of both the groups achieved almost equal improvement may be due to effect of patient education and regular follow-up on them. Improvement to greatest extent is observed in the domain of physiological well-being in the question stem 3 (tiredness), 7 (health status), 11 (working capacity) but not in question stem 1 (strength). Statistically significant difference was revealed on each postintervention visit between the subjects received cardiac rehabilitation programme and those who didn't. Intensity and frequency of heart pain among none of the group improved significantly. Nutrition domain showed significant difference in improvement between groups (p< .05) at the last visit (V3). Marked improvement in the reduction of worry was apparent among the study subjects in comparison to their control counterparts (p<0.05).

Table 1 : Shows the Baseline Characteristics of 80 Study Patients											
Group	Age (years)	Sex M	Sex F	Weight (kg)	BP (mm Hg) SBP	BP (mm Hg) DBP	Service holder	Sedentary	Business-man	Self employed	House wife / Others
Group A (study)	46.4	30	10	65.41	129.9	84.487	10	4	12	4	8 / 2
Group B (control)	48.67	30	10	62.074	132	86.125	10	3	10	3	8 / 6

Table 2 : Comparative Treatment Response between Group A (n=37) and Group B (n=34)							
Quality of life		Group	Mean	Standard deviation	P-value	95% Confidence interval of the difference Lower	Upper
Psychological well being	V0	A	42.38	4.579	0.477	-1.413	2.993
		B	41.59	4.723			
	V3	A	32.76	4.752	0.000	-7.462	-2.436
		B	37.71	5.844			
Physical well being	V0	A	15.95	2.818	0.056	-0.030	2.157
		B	14.88	1.572			
	V3	A	9.89	2.536	0.000	-4.309	-2.260
		B	13.18	1.660			
Symptoms	V0	A	8.65	1.585	0.303	-0.300	0.950
		B	8.32	.945			
	V3	A	7.00	1.354	0.747	-0.632	0.455
		B	7.09	.866			
Nutrition	V0	A	7.73	1.446	0.349	-1.026	0.368
		B	8.06	1.496			
	V3	A	6.16	1.236	0.003	-1.949	-0.432
		B	7.35	1.921			
Worry	V0	A	14.00	1.546	0.938	-0.725	0.784
		B	13.97	1.642			
	V3	A	10.11	1.220	0.000	-2.761	-1.568
		B	12.27	1.281			

Although when comparing separately both control and study group patients showed marked improvement in all the five domains of quality of life, the comparative study between group A and group B revealed a significant improvement in four of the five domains among the study group (group A) than the control group (group B). In the symptom domain no significant difference in improvement was evident.

Other studies[11,12] reveal aerobic exercise consisting of upper limb, lower limb and trunk exercises resulted in significant cardiopulmonary fitness after 6 weeks. Dugmore *et al*[12], found that 12 months' weekly aerobic training programme revealed significant improvement in cardiorespiratory fitness, psychological profile and quality of life scores in comparison to their matched controls. These studies are in parallel of our recent study. Kennedy *et al*[13], found in their study that aerobic exercise and lifestyle modification resulted in all the 5 domains of quality of life, whereas our study resulted in significant improvement in all but symptom domains. This could be due to the fact that duration of our study was 6 weeks only but their study was of more prolonged duration-14 weeks, therefore exerted more intense effect on disease symptoms.

The present study revealed the beneficial effect of aerobic training at intensity of Borg scale 11-13 in overall quality of life of patients with stable angina and this outcome is in the line with the results presented by previous studies with stable angina by such intervention. The significance of this study is that, here the intensity of aerobic exercise was determined by individual's physiological response (perceived exertion) by Borg numerical scale. And, the intensity used here was 11-13 ('hard' to 'somewhat hard') which is equivalent to VO2 peak 40%-60% which again is equivalent to HR maximum 55%-70%.

Conclusion

A short-term comprehensive CR programme consisting of aerobic exercise, counselling and education, along with usual drug treatment on stable angina patients for a 6 weeks period is found effective. A significant improvement in quality of life occurred in 4 domains namely physiological, psychological, nutrition, worry domain but not in symptom domain. A very feasible mode of aerobic exercise was performed by brisk walking, and intensity was determined by Borg scale – a method easily detectable by patient of all status.

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