CARDIAC REHABILITATION AND EXERCISE TRAINING - CHALLENGES AND FUTURE DIRECTIONS

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ABSTRACT

Cardiac Rehabilitation (CR) is an intradisciplinary program of education and exercise established in hospital to assist individuals with heart disease in achieving optimal physical, psychological and functional status within the limits of their disease.

As CVD is a multifactorial disease, the beneficial outcomes from CR are numerous. Possible outcomes include improvement in lifestyle, redction in CVD risk factors, cost of care, disease progression, morbidity, and mortality. The prevention of subsequent coronary events and the maintenance of physical functioning in such patients are major challenges in preventive care.

Comprehensive rehabilitation offers physical training, nutritional advice, and psychological therapy as well as health education, social support and including assistance for return to work. But individual patient needs for constituent elements of the total programme vary widely.

Regular dynamic exercise as a rehabilitative measure is accepted as the major component of a cardiac rehabilitation programme.

Research and Clinical activities have reached the point where evidence, clinical practice and professional experience have recommended exercise training in CR. Non compliance in continuation of the programme should be focused and measures to make patients to continue as home based programme in INDIA should be implemented.

New models of CR need to be developed in our country. These new CR programs will need to address issues of promoting long-term adherence, improving accessibility, particularly for patients in rural community and addressing the growing need for CR in elderly. An individualized program should be developed in close collaboration with the patient's primary care and needs.

Key words : *Cardiac Rehabilitation CR, Coronary Artery By pass Craft CABG, Myocardial infarction MI, Cardio Vascular Disceases CVD*

INTRODUCTION:

Rehabilitation is understood by most of us as that process enabling, encouraging and assisting patients to make the transition from a state of illness back to a state of health, as near as possible to normal.

Cardiac Rehabilitation CR is an intradisciplinary program of education and exercise established to assist individuals with heart disease in achieving optimal physical, psychological and functional status within the limits of their disease.

Cardiac rehabilitation programmes have developed in a number of Countries over the past twenty years. Initially most programmes concentrated on patientshaving acute Myocardial infarction. Programmes have been developed more recently for patients discharged after elective procedures (coronary artery bypass graft and percutaneous transluminal coronary angioplasty) and for patients with chronic stable angina. While the over - all objectives of rehabilitation, focus to facilitate the patient's return to as near normal possible; even though the protocols followed are common to all these patient groups, the specific needs of these patients differ.

Rehabilitation therapists will appreciate the relevance of both treatment and prevention to rehabilitation in so far as they impinge as rehabilitation practice, and both are included.

Most rehabilitation programmes, whether predominantly exercise based, or predominantly psychological based, are comprehensive; include some patient education on the heart, heart disease, risk factors including life style modification during treatment and management in hospital. Rehabilitation therapists should have sound knowledge in managing these patients.

As the concept of comprehensive rehabilitation gained acceptance, revascularization of the myocardium by coronary artery bypass graft surgery or later by angioplasty became increasingly common. It is apparent that a poor functional outcome of surgery was the result of the same mixture of physical,psychological, social and economic factors [1]. So, during the '80s the indications for cardiac rehabilitation widened to include these patients. Those with stable angina,[2] following surgery for valvular heart disease [3] or after cardiac transplantation[4] were also shown to improve after rehabilitation. More recently, as evidence has accumulated cardiac rehabilitation benefits older people[5] , those with poor left ventricular

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function[6] or with a low ischemic threshold[7] . Rehabilitations should also be considered in patients known to have coronary heart disease but who are free of symptoms and in those at high risk of developing the disease. Educational counseling and behavior modification are also important aspects.

Risk factors and primary preventions includes stopping smoking [8], having a controlled lipid levels [9, 10], increasing physical activity [11, 12], controlling hypertension [13], reducing alcohol [14], altering diet and reducing mental stress. Also hormonal replacement therapy reduces the risk of coronary disease in the post – menopausal woman. [15]. An overall life style modification is necessary. By becoming more physically active and doing small bouts of exercises, must be the first step towards life style modification.

The Role of Exercises Training In Cardiac Rehabilitation

The concept of exercise training as a therapy for patients suffering from coronary heart disease was emphasized by a English Physician, William Heberden, who was the first to describe the classical picture of effort- induced angina pectoris, also recorded the case of a patient **"Who set himself the task of sawing wood every day and was nearly cured".** Irish physician William Stokes published his classic work, "The Diseases Of The Heart And Aorta" in which he wrote, "the symptoms of debility of the heart are often removable by a regulated course of gymnastics, or by pedestrian exercises."

After Stokes' death in 1878, Prolonged immobilization in bed became the mainstay of medical care for close to a century and seldom was it practiced more assiduously than after an acute myocardial infarction. The physician insisted that the heart attack survivor be nursed in bed for eight weeks or more, washed and fed, and not even allowed up to use the bedside commode. The time of hospital discharge may be often three to four months after acute event and the patient becomes severely deconditioned, weakened, demoralized, and permanently unemployable,often.

The annual meeting of the American Medical Association, held in Chicago in 1944 included a symposium on " The abuse of rest in the treatment of disease" at which for the first time physicians collectively questioned the wisdom of prolonged immobilization.

In 1952, Levine and Lown introduced their innovative "armchair treatment", in which they progressed their patients to sitting up in chair by the side of the bed a few days after admission[16].

Throughout the '50s and '60s there were number of reports on the beneficial effects of early ambulation and progressive graded activity.[17,18]

From early mobilization to a formal inpatient exercise regimen was a natural progression. Pioneers in this area were Wenger and Zohman[19] who encouraged low level self care activities to be commenced early in the coronary care unit, which was followed even after transfer to the general ward, by more strenuous activities of daily living and monitored upper and lower limb strengthening exercises.

Gottheiner of Israel was the first to embark upon a large scale post coronary **out patient** exercise training programme. Under his guidance some 1100 patients completed five years of endurance training, which included activities such as walking, jogging and cycling.[21] Over a five year period the average annual fatal recurrence rate was 0.88% compared with 4.8% per year for non-exercised patients. These results attested to the safety of supervised physical training for patients recovering from an uncomplicated myocardial infarction.

In North America, Hellerstein of Cleveland was one of the early supporters of exercise in post – coronary rehabilitation. In 1968 he described the results of a three year exercise programme involving 254 patients. In Canada, Rechinitzer and his associates from London & Ontario, first reported in 1967 on the short term benefits of a six month training programme and in 1972 published a five year follow up that compared data with results from patients treated at other hospitals in the London area[22].

A report on seven post coronary patients from the Toronto programme in the 1973, Boston Marathan [23] demonstrated that high level of fitness can be achieved by supervised training . Immediate studies in few years also focused on considerable attention on cardiac rehabilitation and did much to convince patients and public alike that most heart attack survivors could lead a full and active life[24, 25].

By the '80s, the demonstrable benefits of exercise rehabilitation training were sufficiently convincing that the various national and international heart associations were urging acceptance. In 1981 the council on Scientific Affairs of the American Heart Association recommended that "Cardiac rehabilitation should be considered one of the treatments for coronary heart disease complementary to drug therapy or surgery[26]. The following year the World Health Organization concurred, recommending "regular dynamic exercise as a rehabilitative measure is accepted as the major component of a cardiac rehabilitation programme[27]. The beneficial effects of aerobic training include improved efficiency of oxygen transport system, allowing an increase in maximal work capacity as well as greater tolerance for prolonged sub maximal physical tasks. Exercises brings about Structural and functional changes in working muscles, with enhanced ability to store and utilize carbohydrate and fat, as well as extract more oxygen from circulating blood[27].

The rate pressure product is decreased at the same sub maximal levels of effort, thereby reducing the workload on the heart muscle by doing regular exercises. For the angina sufferer, this means that a higher level of effort is possible

before the onset of symptoms. The stroke volume is increased as a result of augmentation in end diastolic volume, and enhanced myocardial contractility. In the presence of coronary artery disease, possible stabilization of atherosclerotic plaque, and/ or improvement in blood supply to heart muscle by collateralization and / or regression in plaque size, may be possible.

The following changes also occurs due to exercise. They are, restoration of self confidence, improvement in mood, and alleviation of depression, reduction in CAD risk factors, decreased body fat, lowered serum triglycerides, increased HDL-cholesterol and decreased total cholesterol / HDL- Cholesterol ratio, increased insulin sensitivity and glucose tolerance (important in Type II diabetes), enhanced fibrinolytic activity, decreased resting and exercise plasma catecholamine levels (with increased resistance to stress and increase in threshold for ventricular fibrillation[27].

The Current Trend

During1980 to 2005, there were more studies showing beneficial outcomes from CR. Possible outcomes include improvement in lifestyle, reduction of CVD risk factors, cost of care, reduction in disease progression, morbidity, and mortality. CVD is also a major cause of physical disability, particularly in the rapidly growing population of elderly persons [28, 29].

The prevention of subsequent coronary events and the maintenance of physical functioning in such patients are major challenges in preventive care. Cardiac-rehabilitation programs were first developed in the 1960s, [30,31] once the benefits of ambulation during prolonged hospitalization for coronary events had been recognized. [33]. After discharge from the hospital, the process of physical reconditioning was continued at home. The focus of these programs was almost exclusively on exercise. The hospital stay for acute coronary syndromes has now been shortened to three to five days so that deconditioning is minimal. [34]

With shorter stays, however, the opportunity to train patients about risk reduction and exercise is less. There is convincing evidence that regular exercise and modification of risk factors favorably alter the clinical course of coronary heart disease. [35,36]

The benefits of cardiac rehabilitation and secondary prevention are broad and compelling. Controlled trials of exercise after myocardial infarction, reported in the 1980s, have demonstrated reductions in overall mortality and in mortality from cardiovascular causes. [35,36]

Trials of exercise combined with nutritional counseling have demonstrated a slowing of the atherosclerotic process [37,38] and decreased rates of subsequent coronary events and hospitalization.

Home-base rehabilitation programs that are directed by physicians and coordinated by nurses have been developed as a way of expanding the delivery of secondary-prevention services [35,36].

Over the past 30 years, exercise therapy has evolved as one of the important component of CR. These programs also include nutrition counseling, smoking cessation, weight management, psychosocial counseling and metabolic risk-factor management, can be found in many hospitals and communities. The target population for CR has expanded, and includes men and women of all ages and those presenting with nonischemic CVD. Several national organizations have published extensive recommendations and guidelines for CR [39].

Challenges of CR

Even though there are numerous benefits of CR, several challenges exist that are common to most programs. These challenges include low participation rates, gender-biased referral and participation; problems with adherence, dropouts and resource management. Participation rates in CR programs by those eligible patients are less. Possible reasons may be lack of referral, distance to CR facility, lack of motivation, and patient's unwillingness to attend [40,41].

It is noted that referral rates are lower for women than men; however, it has also been reported that women are more likely to drop out of a CR program once referred [40].

The benefits of CVD risk reduction are only realized through long-term lifestyle and risk-factor management. CR dropouts and adherence continue to pose a challenge to the success of CR. Even after CR participation, adherence rates to favorable lifestyle behaviors have been reported to decline. However, good comprehensive data on adherence following completion of CR and its influence on risk-factor modification are not available [40,41].

Future directions of CR

As CR has evolved in the past 30 years, it has proven its value in the treatment of patients following MI and post CABG. In the coming years, the challenges will be no less demanding. As new target patient populations are recruited into CR programs and new models as well should be developed. Strategies for improving participation rates need to be developed, focusing on education of patients and health care providers. Extra efforts should be directed towards reducing the gender inequity. The possibility of disease regression needs to be explored in larger populations using clinically relevant practices [41].

The new CR programs will need to address issues of promoting long-term adherence, improving accessibility, particularly for patients in suburban and rural communities, and addressing the growing need for CR in an ageing population. Future CR programs will also need to be resource sparing, as current health care organizations cannot meet the demand of all eligible patients. ***For those patients living in rural areas, new communication technologies may be useful in delivering CR through telemedicine initiatives. Appropriate risk stratification will aid in health care resource management, restricting outpatient CR programs to those patients at high risk and utilizing less frequent contact for low and moderate risk patients.***

Integration with patients' family physicians and other health care providers is a potential strategy to improve adherence, as are behavior strategies aimed at patient empowerment. Other forms of contact than the traditional face-to-face session can be incorporated into CR as a method of continued follow-up and reaching those patients in nonurban areas. The growth of **telemedicine** can play a vital role from the simple use of the telephone, to the Internet and the use of personal digital assistants. Integration of these and other tools can address a number of the issues of CR [41].

CONCLUSION

Research and Clinical activities have reached the point where evidence, clinical practice, and professional experience have recommended exercise training in CR.

Cardiac rehabilitation has exclusively not been used and studied in patients at relatively low socioeconomic levels. However, the prevalence of coronary heart disease among persons at lower socioeconomic levels is increasing. Non compliance in continuation of the programme should be focused and measures to make patients to continue as home based programme in India.

An individualized program should be developed in close collaboration with the patient's primary care and needs [40].

To end, complete medical and physical fitness evaluation for middle age group targeting preventive rehabilitation should be on focus. Change in life style will prevent or slow down the development of heart disease. Regular medical check up, proper diet, supervised regular exercise, weight reduction, control of diabetes, control of high cholesterol and high blood pressure, stopping smoking and reduction in the stress may keep the heart more fit for the rest the life.

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