Role of Exercise in Prevention of Ischaemic Heart Disease: A Review

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Maimonides in 1189 A. D. wrote a brochure on the preservation of youth for the son of the Sultan of Egypt. He advised that one should exercise daily to the point of breathlessness. Heberden in 1772 observed that one of his patients was nearly cured after a six month period of sawing wood for half an hour every day. In the last two decades numerous reports have tried to correlate between physical activity and coronary artery disease. Epidemiological studies have shown that persons involved in more physically demanding occupations have a lower incidence of coronary artery disease than those who are more sedentary [1-2]. It has also been shown that cardiovascular functional capacity of patients with Ischaemic heart disease can be dramatically improved by physical training [3-5].

Scheuner et al[6] have observed that hearts of rats conditioned by a moderate swimming programme for eight weeks when compared with hearts of sedentary animals show greater mechanical responses to tachycardia as a result of greater coronary blood flow and oxygen delivery. There is increased actomysin and myosin adenosine triphosphatase activity. Exercise also confers partial resistance to hypoxia.

The role of physical training in humans in the primary prevention of coronary artery disease and reduction of the mortality and morbidity from this disease has not been demonstrated.

Leg muscles act as strong circulatory pump, as compared to muscles of the arms which have little role. In addition to being one of the best tranquilizers, exercise provides a reflex stimulus to opening of the collateral coronary circulation. Diaphragmatic movements during hyperventilation due to exercise aid return of blood to the heart.

In controlled studies on humans, Bonnano et al have demonstrated that exercise reduces maximal heart rate, increases treadmill exercise duration time, increases maximal oxygen consumption, minute ventilation and respiratory quotient. It reduces systolic blood pressure in both normotensives as well as hypertensives although diastolic blood pressure is unaffected. There is significant fall in fasting serum triglycerides but the effect on cholesterol in short periods of exercise is not significant. However, reports on effect of exercise on cholesterol are variable. Studies from California showed significant fall of blood cholesterol as a result of exercise over a 12-24 weeks period. Initiation of exercise in untrained students resulted in rapid fall of blood lactate which was followed by a levelling off effect after 3 weeks of training.

When obesity (overweight 20%), rapid pulse (85/min) and vital capacity (3.0 L/min in men and 2.0 L/min in women) were considered as base line data, in a 12 year follow up, Kennel et al showed that morbidity ratio as a result of coronary artery disease was 60/400 when none of these parameters were positive, 130/400 when one was positive and 322/400 when two or more were positive. Similarly the incidence of sudden death as well as fatal attacks

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in men was much higher in the sedentary individuals. However in a combined survey of men and women, the incidence of non fatal attacks and angina pectoris, was not statistically significant between the active and the inactive.

Rehabilitation of patients of acute myocardial infarction forms an important part of therapy. After the acute phase and convalescence lasting for eight weeks, gradual exercise is essential. After a total period of 12-24 weeks, when the functional classification of the subject is near 1, by New York Association criteria, he is encouraged to indulge in increasing physical exercise till at the end of 26 weeks he is able to perform physical exercise like a normal person. However it is essential that proper medical screening is done and exercise prescribed on individual basis. Where there are no contraindications, the individual should exercise to achieve 60-70% of maximal heart rate for his age.

Adams *et al* have demonstrated that most subjects trained after myocardial infarction can achieve performance levels of normal, sedentary subjects but some do not exhibit a classical training effect, probably because of residual myocardial dysfunction. Several studies[11-16] have documented that incidence of recurrent myocardial infarction is much less in subjects who have followed proper rehabilitation programmes where regular exercise constitutes an important part of the regime. In our series, 145 patients with transmural infarcts, when inducted to such a programme and followed for three years, have achieved considerable benefit. Thirty five per cent are fit for extremely strenuous duties including duties at 16000 feet, 41% are fit for moderately severe duties at any altitude upto 8000 feet and 22.5% are fit for sedentary duties in plains and 1.5% have died.

In summary therefore, it is obvious that exercise not only provides physiological benefits in the form of better cardiovascular performance, but has a beneficial effect on coronary risk factors, thereby reducing the incidence of Ischaemic heart disease, reducing morbidity and mortality and providing return to useful occupation to victims of Ischaemic heart disease.

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