Participation of Elderly in Cardiac Rehabilitation

Exercise Considerations for the Elderly

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Definition

Aging is a normal biological process which can be affected by many conditions such as inactivity or the environment. In order to better understand this phenomenon, it is important to look at two different ways to categorize age. Chronological age can be divided into young, middle (45-64 years old) and old age (65+ years). According to definitions universally used by gerontologists in North America, old age can be further classified as “young old” (65-74 years), “old” (75-84 years), “old old” (85-99 years) and “oldest old” (100+ years). Biological age is assessed by variables such as maximal oxygen uptake, aerobic fitness, muscular strength, and flexibility. Therefore, someone who is 65 years of age may have a biological age of 45 based on their fitness and health status, illustrating the importance of regular exercise, and more broadly, health promotion, when looking at the association between chronological versus biological age.

Scope

Between 2001 and 2006 in Canada, the population over 65 grew by 11.5%, meaning that 13.7% of Canadians were 65 or older. It is expected that the number of seniors in the Canadian population will nearly double in the next 25 years. Furthermore, the life expectancy of Canadians is increasing considerably and stands at 82.5 years for women and 77.7 years for men.

The prevalence of chronic disease and functional impairment increases with age. In 2001, 40.5% of the elderly in Canada reported at least one disability, chronic disease or mobility impairment. Of these, mobility problems affected nearly 8 out of 10 seniors. A decline in general health status and reduced mobility negatively impacts an older individual’s ability to carry out activities of daily living (ADL) such as bathing, dressing, and preparing food. Many elderly Canadians reported having disabilities which required help and/or restricted their ADL. Not surprisingly, the rate of physical activity decreases with increasing age. Canada’s Physical Activity Guide to Healthy Active Living for Older Adults states that about 60% of older adults are inactive and thus are unable to benefit from regular exercise and subsequently have difficulty with ADL.

Considerations

Cardiovascular and muscular fitness can greatly contribute to the maintenance of or an increase in quality of life (QOL) in the elderly. In the old-aged, regular participation in fitness may enhance QOL beyond just ADL. In the very old-aged, fitness may help to maintain functional independence. Of greater concern to older individuals are the age-related changes pertaining to the musculoskeletal system rather than those changes seen in cardiovascular and pulmonary function. Loss of musculoskeletal fitness is of great importance to the elderly with respect to their ability to maintain functional...
independence. In fact, for the elderly population, many ADL require only one or more musculoskeletal components. Loss of muscle strength, the result of inactivity, often leads to serious and life-threatening injuries.

Orthopedic Concerns

By the age of 90, as much as 32% of women and 17% of men will have sustained a hip fracture, and between 12% and 20% of this group will die of related complications. Bone mass decreases by approximately 10% from peak bone mass by age 65, and by 20% at age 80. In women, this loss is higher, amounting to approximately 15-20% by age 65 and 30% by age 80. Men tend to lose bone mass by about 1% per year after the age of 50, whereas women begin to lose bone mass in their 30s, with a 2-3% decline per year after menopause.

Inadequate calcium intake, inactivity, and decreased bone mass may lead to the development of osteoporosis, a significant risk factor for morbidity and mortality in the elderly. Admissions for vertebral and hip fractures rise 10-fold between 65 and 90 years. One percent of persons over 90 years are hospitalized annually due to fractures. A major concern with osteoporotic fractures is the associated loss of independence. Six months after a hip fracture, many older persons still require assistance with ADL. Furthermore, research has found the lifetime risk of hip fracture (1 in 6) is much greater than the lifetime risk of breast cancer (1 in 9), and is associated with a higher mortality.

Research has demonstrated that regular exercise may be one of the most important methods of preventing osteoporosis, which encompasses both osteoporotic fractures and falls. Studies have shown that physical activity can increase bone mass, density, and strength in elderly populations. Moreover, both past and current physical activity protect against hip fracture, reducing the risk by up to 50%. Among the elderly, appropriate exercise modalities include brisk walking, climbing up and down stairs, dancing, and resistance training.

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Musculoskeletal Concerns

A primary musculoskeletal concern with respect to limited mobility and disability in the elderly is arthritis. The most common forms of arthritis are rheumatoid arthritis, characterized by inflammation of the joint and surrounding membrane, and osteoarthritis (OA), a degenerative joint disease. Of the two, OA is more common in older individuals, affecting 85% of all people in the United States and most Canadians over the age of 70 years. Osteoarthritis is associated with a slow and gradual deterioration of the joint, which may lead to the destruction of the joint and need for surgical repair.

The impact from disability due to OA is substantial. The risk for disability – defined as needing help walking or climbing stairs – attributed to OA of the knee is as great as that attributed to cardiovascular disease and greater than that due to any other medical condition in elderly persons. The presence of knee OA, even in the absence of symptoms, increases the risk for dependence on others in performing ADL.

Exercise is recommended for elderly persons with OA to help preserve muscle strength and joint mobility, improve functional capacity, relieve pain and stiffness, and prevent further deformity. Exercise prescriptions need to be developed on the basis of the functional status of the individual; however, optimal exercise programs have yet to be established. Someone who is limited to few or no duties of usual self-care should initially consider non-weight bearing modalities such as cycling on a recumbent or upright stationary bike, water exercises, and eventually walking. Someone who is able to perform their ADL despite discomfort or limited range of motion may consider an exercise program similar to that of a healthy person, such as walking or strength training.

Another musculoskeletal concern for the older individual is sarcopenia, which is characterized by the gradual loss of skeletal muscle mass and strength. Muscular strength begins to decline around age 40, with an accelerated decline after the age of 60. For each decade of life after the age of 25, 3-5% of muscle mass is lost. Studies have shown that the prevalence of sarcopenia increases with age and occurs in 40% of males and females over the age of 80. Simple chores such as taking out the garbage or making the bed can become extremely taxing. Loss of muscle mass has been associated with changes in lifestyle, use of task modification strategies (i.e., cooking fewer meals), and a decrease in QOL. Strength training is advisable for the elderly, as significant strength gains are possible. Several studies have demonstrated strength gains to be associated with muscle hypertrophy and muscle protein turnover. Additional improvements can be seen in balance, flexibility, and functional capacity such as stair-climbing abilities and walking speed.

Exercise Prescription

According to the American College of Sports Medicine’s (ACSM) Guidelines for Exercise Testing and Prescription, general principles of exercise prescription apply to adults of all ages. These principles include using appropriate exercise modes, intensity, duration, frequency, and progression of physical activity. Particularly important components of the exercise prescription for the elderly include cardiovascular fitness, resistance training, and flexibility.
Cardiovascular Fitness
The elderly should be encouraged, whenever possible, to meet the population-wide physical activity recommendation of at least 30 minutes of moderate-intensity exercise on most and preferably all days of the week. By participating in activities such as brisk walking, gardening, yard work, housework, and climbing stairs, this goal can be achieved. 19 For those who meet this standard, additional benefits may occur by performing exercises of longer duration and moderate intensity or by replacing moderate-intensity exercise with higher-intensity exercise. 19 Vigorous exercise can be performed at least 2 to 3 days per week, alternating days with no exercise or low-intensity exercise. It is recommended that individuals over the age of 65 consider an exercise mode that does not impose excessive orthopedic stress (e.g., walking, aquatic exercise, stationary bike) and is accessible, convenient, and enjoyable. 19 Exercise intensity guidelines set for adults generally apply to active elderly persons. Inactive elderly persons should start low and individually progress according to tolerance and preference (e.g., starting an exercise program at <40% heart rate reserve is not uncommon). 19 When prescribing exercise, a measured peak heart rate is preferred to an age-predicted heart rate due to underlying coronary artery disease. Exercise duration should also be increased before increasing intensity.

Resistance Training
Elderly persons should be encouraged to supplement cardiovascular training with resistance training exercises. Muscular fitness may allow daily activities to be completed with less effort, thus extending functional independence. 1,6,10,19 It is recommended that individuals over the age of 65 begin the first 8 weeks with little resistance. One set of 8 to 10 multi-jointed exercises that include all major muscle groups should be performed, and a set should include 15 repetitions done at a RPE of 12 to 13. 19 The number of repetitions should be increased before increasing the resistance. 19

Flexibility
An adequate range of motion of all body parts is important to maintain a sufficient level of musculoskeletal function, balance, and agility in the elderly. 19 Standardized exercise prescription pertaining to flexibility has yet to be identified as it has been for cardiovascular and musculoskeletal fitness. However, by maintaining acceptable levels of flexibility, improvements and contributions to an individual’s ability to perform ADL and reductions in injury potential (i.e., low back problems, falls) may be seen. 19 Furthermore, a complete flexibility program may counteract some of the usual declines in flexibility the elderly may experience and may improve balance and agility. 19 Flexibility exercises should be prescribed for every major joint in the body (e.g., hip, back, shoulder, knee, and neck) and be performed at least 2 to 3 days per week. 19

Conclusion
There is undeniable evidence that participation in a regular physical activity or exercise program is safe and has many physiological benefits for elderly individuals. Improvements in gait, balance, overall functional capacity, and bone health are seen with aerobic and resistance training. It is, therefore, important for healthcare and exercise professionals to encourage the elderly to participate in a variety of activities to achieve these health benefits.

References: