Review

Sport Program in Older Adults

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The effects of aging become noticeable usually around the age of 30 years, after the maturity is reached at age 20 to 25 years. The age-related physical and physiological changes vary from one person to another and from one body system to another within the same person, and generally these changes cause decline of organ function.

One of the reason of these negative physiological and physical changes is physical inactivity. It is recommended being physically active living and doing exercise to delay aging effects, to prevent developing or worsening of chronic diseases, and to improve quality of life. Because of these properties, exercise can be accepted as a medicine. Exercise and medical prescriptions are quite similar. When prescribing exercise, its' action (aerobic, strength, flexibility), dose (function of intensity, and duration), therapeutic goal (frequency), and half-life (length of time for recovery from an exercise session) should be taken into consideration.

Aging is a period which is encountered diverse and multiple health problems and can be characterized by a decreased ability to adapt to and to recover from physiologic displacing stimuli. Therefore, before the planning of exercise, (a) subjective data (complaints, symptoms, recent experience related with exercise, demand, medicines used), and (b) objective data (information collected during physical examination and laboratory studies, e.g., aerobic, endurance, strength, flexibility, neuromuscular, and functional performance tests) are collected. Using information from the subjective and objective data-gathering steps, a list of specific problems is generated (c). Then overall management plan including exercise programming is formulated (d) and a schedule for follow-up reassessment is developed (e).

The main factor which is taken care when selecting and getting objective data is the safety, and the effect of the tests on the older adults. The older adults' exercise and test responses may be different even though they are the same age. Additionally, test response can be affected by individual's condition, loss of physical and physiological capacity, chronic disease, and sometimes it is very difficult which factor is responsible from this situation. Finally, latent or asymptomatic diseases can be triggered by the exercise tests. Therefore, medical control is necessary before the tests and exercise in older adults, submaximal tests are preferred, and usually medical supervision is required during the tests according to the medical recordings and the test results.

After discerning the older adult's problem (s), the following tests which are the most appropriate and the best characterized the exercise capacity can be selected: treadmill or cycling with modified Bruce, Naughton, Balke or Ware protocols to measure the a*erobic capacity*; 6-minute or 12 minute walk tests to measure *endurance*; dynamometer, isokinetic equipment, free weights and 1RM or 4-8RM to measure muscle strength; one-leg balance and tandem walk tests to measure neuromuscular condition, chair sit-and-reach, and back scratch tests by using tape measure or goniometer, and flexometer to measure flexibility, and functional performance tests such as chair stand, biceps curl, and up-and-go to measure ability doing physical activities of daily living.

The main purpose of the exercise in the older adults, is living healthy, and in good quality. The exercise program which will be formulated after getting subjective and objective data, and also listed the problems should include aerobic, strength, flexibility components, and the goals of the program should be to increase balance and coordination, improve

independency on the daily living activity. The program should also be bare, sustainable, and acceptable by the client. Additionally, socioeconomic position and facilities of the older adult, nutritional status, clothes and shoes weared, environment conditions such as temperature, humidity, altitude, and ground should be taken into consideration. It is very important the compliance of the older adult and to continue the exercise program regularly. Thus the gain provided by the exercise can be conserved and is not lost. Therefore, the exercise experience of the older adult and his demands and requests are asked and the client should be informed about the content of the program and the importance of continuity.

Exercise training properties such as; type, intensity, frequency, and duration should be taken into consideration when giving the exercise prescription. Because there is decline in balance, cognition, organ function, muscle mass and strength, repairment process after injury, working capacity, propriception, coordination, visual, and auditory function, and also most of the older adults have chronic diseases which affect exercise capacity.

Low intensity and short duration during initial phase of programming exercise should be necessary. Then, the intensity is increased according to the client's response. Adaptation period may be choosen as two or three weeks. Warm-up and cool-down periods should be as long as 10-15 minutes. Periodic evaluation and motivation of the older adult is important to compliance the program.

The muscles which will be strengthened are determined according to the muscle test results, and the most used muscles in the daily living activities are selected. Free weight, isokinetic equipment, and theraband may be used as a load. Initial intensity can be 13-14 Rating of Perceived Exertion (RPE) or 30-50% of 1RM or multiple RM (4-8 repetition), and is increased progressively. Progression is arranged through increasing repetition, number of sets, and/or intensity according to the client's response. Daily training session is 20-60 minute, and frequency is 2-3 days in a week. When the training intensity is low, the rest period between the sets may be in short duration (70% 1RM intensity, 2-3 minute), however if the training intensity is high, the rest period between the sets should be longer (90% 1RM intensity, 4-5 minute).

Physical activities such as walking, cycling, and swimming which use large muscle groups are suitable as aerobic activities, and may be 3-5 days/weekly. Daily training session begins with 5-15 minute, and may be increased to 60 minutes, the training intensity should be low or moderate. There are several methods of determining the training heart rate, such as RPE, maximum heart rate, maximum heart rate reserve, and metabolic equivalent (METs) or VO_2. Initial training intensity may be low (10-11 of RPE, 35-54% of maximum heart rate, 20-39% of maximum heart rate reserve, 2-3.9 of MET) or moderate (12-13 of RPE, 55-69% of maximum heart rate, 40-59% of maximum heart rate reserve, 3.2-4.7 of MET) according the client's situation, and is progressed gradually. Intensity or daily training duration (preferable) is increased in every week or in every two week.

The soft tissues which will be stretched are determined according to the flexibility test results. Static stretching may be done after all strength and aerobic activities, as well as after completing four to five repetitions per muscle group of a particular exercise. Holding time is 10-30s and the frequency is 3-5 days/weekly. Low intensity and long-duration stretching is extremely important in creating elastic changes in the muscular system. It is suggested that a longer-duration stretch (60s holding time) may be beneficial to overcome the collagen deposition and muscle stiffness associated with aging. A stretch should never be performed in a ballistic or "bouncing" motion. Additionally, older adult engaging in stretching should attempt to minimize potential muscular strain by keeping the back as straight as possible because of possible osteoporosis.

Simulated daily living activities such as balance on one leg, ascending and descending stairs, tandem/semi-tandem walking, sitting and standing, walking up and down and the techniques to prevent falling, improve neuromuscular coordination and decrease the risk of dependency. These type of activities are performed in 8-10 repetitions or given 1-3 minute for each of activity and the frequency is 3-5 days/weekly.

Security and preventing injury have the primary requirement in the training program of older adults. Reaching training intensity is not necessary, especially in aerobic training, in the frail older adults. It is advisable not doing cervical circumduction movements, isometric and static strengthening exercises.

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