Benefits of Exercise in the Older Population

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KEYWORDS

• Exercise • Physical activity • Older adults • Elderly • Aerobic • Resistance
• Flexibility • Balance

KEY POINTS

- The older adult population has been on an increasing trend in the past years and is expected to continue increasing over the next 20 years.
- There are several physiologic changes associated with aging that will cause a progressive decline in function.
- Exercise activity has been well established as a preventive and treatment strategy to counteract the detrimental changes of aging.
- An appropriate exercise program should include a combination of aerobic, resistance, flexibility, and balance exercises.
- The exercise recommendations should be individually tailored to the abilities, precautions, and goals of each person.

INTRODUCTION

Older adults 65 years of age and older compose 13% of the US population according to the US Census of 2010, an increase of 15% when compared with the previous census of the year 2000. This trend is expected to continue and will result in a 20% of the total population by the year 2030 being considered old.[1,2] Physiologic changes of aging that limit function and general quality of life (QOL), occur at a faster rate as we get older.[3] Sedentary behavior also increases with age making older adults the most sedentary population, with 65% to 80% of their waking time spent sitting.[4] This lack of physical activity has negative effects on cardio-metabolic health, muscle-tendon

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health, functional fitness, physical independence, body composition, and all-cause mortality. Conversely, exercise has been well established as a preventive strategy as well as a medical intervention to counteract the detrimental effects of aging.[5]

Exercise programs in older adults should include aerobic, resistance, flexibility, and balance training. Each individual type of exercise may benefit different health-related factors, but the combination of all is essential for an effective exercise program in the older adult population.

AEROBIC/ENDURANCE

Basic Concepts

Aerobic capacity measured by maximum oxygen consumption ($V_{O_{2max}}$) shows a steady decline with age, as much as 10% per decade after 25 years of age. This decline is mainly due to decreased cardiac output that is caused by an increased peripheral circulatory resistance.[6] Other related factors, such as stroke volume, maximal heart rate, total plasma volume, and thirst sensation, also decrease with age.[7]

Aerobic exercise training (AET) refers to exercises in which the large muscles of the body move in a rhythmic manner for sustained periods of time. Examples of exercise activities with aerobic components are walking, running, stair climbing, cycling, swimming, or rowing. These types of exercises use energy through oxidative metabolism, which is the most important pathway for energy production during prolonged exercise activity.[8]

What is the Evidence?

The effects of AET can be assessed by measuring aerobic capacity, changes in heart rate and blood pressure, changes in glucose and lipid metabolism, among others. There is high-quality evidence that AET of moderate-high intensity significantly improves $V_{O_{2max}}$ in older adults.[9] The improvements observed are comparable with those that occur in younger adults, except in adults older than 75 years when the rate of improvement is less. There is also evidence that AET programs, more so in high intensity than moderate intensity, enhance glycemic control. Improvements in postprandial lipid metabolism has also been evidenced independent of dietary modification.[9] Villareal and colleagues[10] showed that an exercise program including AET as well as other forms of exercise caused significant improvements in performance testing and other frailty parameters, including $V_{O_{2max}}$ and Functional Status Questionnaire. The case is not the same for other parameters like body weight/composition and bone health, whereby the evidence shows that changes in decreased total body fat, increased fat-free mass, and increased bone mineral density have been modest.

Benefits in Chronic Disease

AET programs have well-established benefits for decreasing cardiovascular risk factors. They induce favorable adaptations to traditional risk factors, including lower heart rate at rest and during submaximal exercise, smaller increases in blood pressure, increase in glucose transporter content in muscle, improved whole-body insulin action, and a reduction in plasma lipid concentrations.[9] The beneficial effects of AET are not only related to the more traditional risk factors but also aerobic exercise interventions in older adults have shown improvements in large elastic arterial stiffness and vascular endothelial function.[6,11]

Exercise Recommendations

Initially the aerobic exercise program for an older adult should start with a low level of activity and ideally progress to moderate activity (50%–60% of pretraining $V_{O_{2max}}$).