

Sedentary Lifestyle, Obesity, and Aging: Implication for Prevention

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With typical physical activity and dietary habits, an average American adult will experience a BMI increase of approximately 5% each decade [1]. The life expectancy in 2012 was 79 years old [2], with BMI generally increasing starting as early as age 20 [3]. However, approximately 35% of US adults in 2012 are reported to be overweight or obese [4], accelerating these normal age-related changes in body weight leading to further weight gain. Obesity is the cause of many serious medical problems and reduces the quality of life. In older adults the effects could be exacerbated due to a decline in physical functions as a person ages. Implicitly, studies have shown that in older individuals, an increase in body weight is not simply due to increase in energy intake but significant reduction in energy expenditure due to sedentarism. Obesity in the general population is the result of sedentary lifestyle and substantial reduction in everyday physical activity [5]. Thus, it could be assumed that the combination of aging and obesity further promote sedentary lifestyles in older adults.

As a person ages, a sedentary lifestyle compounded with a lack of physical exercise causes significant decline in muscle integrity [6,7]. In fact, a lifetime of physical inactivity accelerates normal age-related changes such as loss of skeletal muscle mass, strength, and power [8], further reinforcing sedentary behavior. Sedentary individuals lose 20-40% of their muscle mass throughout their adult life [9-11]. Sedentary behavior in extended doses has been reported to be associated with metabolic syndrome [12,13], cardiovascular diseases [12,14], and psychosocial problems [15]. It has been reported [16] that an average American spends 55% of waking hours in sedentary activities.

Treatment of obesity for any age group involves healthy weight loss through healthy diet and physical activity. A moderate weight loss program could improve physical function and reduce many medical complications associated with obesity. However, due to muscle and bone loss that may be associated with significant weight loss in older adults, the goal of intervention in this population should consider improvements in muscle integrity and function as well. Furthermore, the propensity of older adults not utilizing their muscles at its maximum physical work capacity due to sedentariness may further accelerate muscle function loss in older adults. Evidently, this insufficiency is revealed when a person is injured or disabled due to improper utilization of these compromised muscles during an activity [17]. To prevent this, it is essential to minimize the compounded physiological changes from aging and sedentary behaviors.

Moderate-intensity strengthening activities in older adults may recuperate the lost strength associated with aging, even with frail elderly populations [18]. Most programs targeting older populations recommend using free weights and body weights for resistance, and engaging in low- to moderate-intensity aerobic activities such as walking, standing, and stationary cycling to improve physical function and fitness [19]. According to the American College of Sports Medicine (ACSM), moderate intensity exercise daily or vigorous exercise a few times per week are ideal activity levels for healthy and obese adults [20,21].

To reach moderate and vigorous exercise thresholds, walking, jogging, swimming, or cycling are recommended [22]. However, in older adults with age-related impaired musculoskeletal systems, intense

exercise at a vigorous level may cause more harm than benefit. This is a major obstacle for starting physical activity rehabilitation with older obese individuals, as current programs can be excessively intense for their already deteriorated muscles and may result in injury and cause further damage. As muscle injury and impairment increases, it will ultimately lead to a more sedentary lifestyle. Reduced muscle strength has also been associated with inducing earlier fatigue and increasing the risk of musculoskeletal injury in the obese individuals in general [23]. Therefore, it is important for older obese individuals to have an appropriate rehabilitation plan involving low to moderate intensity exercise with the intention of maintaining lower body muscle strength and preventing unnecessary muscle fatigue leading to injury.

We have evaluated a moderate intensity cycling protocol [24] to compare muscle activations of young and older healthy adults. After 30 minutes of continuous cycling, no evidence of localized muscle fatigue was shown in either group. This indicates moderate intensity protocols similar to this exercise appear to be a safe form of activity for individuals with compromised muscular function as it does not contribute to undesirable musculoskeletal injury. In fact, even light activity, such as walking, has been shown to reduce musculoskeletal pain in the obese and promote healthier lifestyles [25,26]. In summary, as people live longer, there will be a significant increase in the number of older people as well as older obese population. Sedentary lifestyle is a major contributor to weight gain in older adults. Increasing physical activity could improve physical function as well as reduce the body weight. However, rehabilitation and geriatrics professionals should consider the limitations in the muscle and joint functions associated with aging and recommend age-appropriate physical activity regimens.

We recommend that older obese individuals should be treated differently than other age groups and should begin with slow, moderate intensity activities. These activities will not challenge the already weakened muscles or cause unnecessary strain on the joints and may help regain some of the lost skeletal muscle mass, increase muscle strength and power, and ultimately lead to more active lifestyles.

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