

Commentary

# Effects of Ageing in Physical Fitness

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## Abstract

Ageing is a natural and inevitable process with degenerative changes in most of the physical, physiological and psychological functions. Furthermore, the ageing process has an impact on the physical of elderly people. Thus, the aim of this study is to provide to readers of information about effects of ageing and changes in physical fitness as one of the major causes of chronic diseases of ageing people. In addition, the association between physical fitness and physical activity in elderly shows health benefits in this population. In conclusion, the evolution of aging is essentially understood as a gradual accumulation of damage which produces the functional declination of any organism.

Keywords: Immune system; Organism; Physical fitness; Elderly

#### Introduction

Now-a-days, the clinical and medical context often uses elderly when referring to people over the age of 65 [1]. Ageing is a natural and inevitable process [2] associated with lack of adjustment in the immune system, "immunosenescence" [3-5]. There are cellular and molecular variations due to the ageing process produce an increase of infections and immune disorders [6]. Thus, chronic diseases are also related to the ageing process with a high incidence in the elderly population [7]. Interactions of external environmental variables and genetic factors are essential for the understanding of chronic diseases too [8].

Cellular and molecular variations due to the ageing process produce an increase of infections and immune disorders [6]. The increase of diseases and chronic inflammations associated with the ageing process is determined by senescent phenotype [9]. The tissue-residing senescent cells tend to accumulate and might produce a negative response in the secretory phenotype with pro-inflammatory characteristics. In addition, senescent cells abound in pathologies related to ageing such as degenerative or inflammatory disorders [10]. Senescent cells are triggered by telomere attrition related to tissues and ageing [10,11] or in response to diverse stress conditions [10,12] and the accumulation of DNA damage [12].

### **Physical Fitness**

The main characteristic of ageing is a gradual and inevitable deterioration of physical capacities and degenerative diseases [13], commonly seen in the elderly [14]. Ageing process cause the decrease of physiological reserves, commonly known as homeostenosis [15].

The ageing process consists of two types of influences: negative (acceleration of ageing effects) or positive (delay of ageing effects). Therefore, knowledge of physical fitness evolution during the ageing process is necessary to guarantee a better understanding of elderly people and reduce their consequences [4]. Disability, somatic diseases and depression are common characteristics that appear in the ageing process without any connection between them [16].

The evolution of aging is essentially understood as a gradual accumulation of damage which produces the functional declination of any organism [17]. In addition, about 100.000 people die every day in the world due to age related causes [18].

According to the physical activity, is a very important component of physical fitness and improves the mobility [19], physical fitness [20] and muscular work capacity of elderly [21]. Moreover, a regular physical activity produces a reduction in inflammation and chronic diseases [22]. According to physical fitness in elderly, strength and aerobic capacity, the second shows a decrease of VO2 over the age of 60 which is due to a reduction in maximum cardiac output and arterial-venous oxygen difference reduction [23]. Furthermore, the aerobic capacity starts to decrease after the age of 40 with a loss of 30% after the age of 65 [24]. On the other hand, there is a reduction in maximal oxygen uptake of 0.5%–1.0% per year [25] and this has an influence on the physical fitness of healthy and sick elderly [26].

However, the loss of muscular strength ranges between 12%-14% per decade in people over the age of 50 [27]. Lower body strength is often more affected than upper body strength [28,29]. Regarding to the balance in elderly is usually poor and is considered as a risk of falls in elderly [30]. The balance, specially the dynamic balance, is related to body posture decreases with the ageing process [31]. Finally, the flexibility decreases with age but the reduction is irregular, being in women always higher than in men [32]. Thus, it is necessary a high intensity of physical exercise under the supervision of a fitness specialist to improve the strength in this population [33,34]. According to the same authors, a muscle-strengthening activity for an elderly person should have a frequency of a minimum of two days a week with 8-10 exercises involving most muscle groups. Flexibility and balance exercises might be performed for a minimum of two days per week.

# **Conflict of Interest**

The authors declare no conflict of interests.

## References

- Teymoortash A, Halmos GB, Silver CE, Strojan P, Haigentz M, et al. (2014) On the need for comprehensive assessment of impact of comorbidity in elderly patients with head and neck cancer. Eur Arch Otorhinolaryngol 271: 2597-2600.
- 2. Amarya S, Singh K, Sabharwal M (2014) Health consequences of obesity in the elderly. J Clin Gerontology & Geriatrics 5: 63-67.
- Carbonell-Baeza A, Aparicio V, Delgado-Fernández M (2009) Involución de la condición física por el envejecimiento. Apunts Med Esport 44: 98-103.
- Aparicio V, Carbonell-Baeza A, Delgado-Fernández M (2010) Health benefits of physical activity in older people. Rev Int Med Cienc Act Fís Deporte 10: 556-576.
- 5. Castillo-Garzon MJ, Ruiz JR, Ortega FB, Gutierrez A (2006) Anti-aging therapy through fitness enhancement. Clin Interv Aging 1: 213-220.
- 6. Senchina DS, Kohut ML (2007) Immunological outcomes of exercise in older adults. Clin Interv Aging 2: 3-16.
- Hui L (2015) Aging and chronic disease as independent causative factors for death and a programmed onset for chronic disease. Arch Gerontol Geriatr 60: 178-182.
- Hackett TL, Stefanowicz D, Aminuddin F, Sin DD, Connett JE, et al. (2011) Effect of gene environment interactions on lung function and cardiovascular disease in COPD. Int J Chronic Obstr Pulm Dis 6: 277-787.
- 9. Trifunovic A, Ventura N (2014) Mitochondria and metabolic control of the aging process. Exp Gerontol 56: 1-2.
- 10. de Grey AD (2003) An engineer's approach to the development of real anti aging medicine. Sci Aging Knowl Environ 2003: VP1.
- 11. Ovadya Y, Krizhanovsky V (2014) Senescent cells: SASPected drivers of age-related pathologies. Biogerontology 15: 627-642.
- 12. Hemann MT, Strong MA, Hao LY, Greider CW (2001) The shortest telomere, not average telomere length, is critical for cell viability and chromosome stability. Cell 107: 67-77.
- Parrinello S, Samper E, Krtolica A, Goldstein J, Melov S, et al. (2003) Oxygen sensitivity severely limits the replicative lifespan of murine fibroblasts. Nat Cell Biol 5: 741-747.
- 14. Nelson ME, Rejeski WJ, Blair SN, Duncan PW, Judge JO, et al. (2007) Physical activity and public health in older adults - Recommendation from the American college of sports medicine and the American heart association. Circulation 116: 1094-1105.
- 15. Castillo-Rodriguez A, Chinchilla-Minguet JL (2014) Cardiovascular program to improve physical fitness in those over 60 years old pilot study. Clin Interv Aging 9: 1269-1275.
- Bentrem DJ, Cohen ME, Hynes DM, Ko CY, Bilimoria KY (2009) Identification of specific quality improvement opportunities for the elderly undergoing gastrointestinal surgery. Arch Surg 144: 1013-1020.

- Verhaak PFM, Dekker JH, de Waal MWM, van Marwijk HWJ, Comijs HC (2014) Depression, disability and somatic diseases among elderly. J Affect Disord 167: 187-191.
- Lopez-Otin C, Blasco MA, Partridge L, Serrano M, Kroemer G (2013) The hallmarks of aging. Cell 153: 1194-1217.
- Liu CJ, Latham NK (2009) Progressive resistance strength training for improving physical function in older adults. Cochrane Database Syst Rev.
- Chodzko-Zajko WJ, Proctor DN, Singh MAF, Minson CT, Nigg CR, et al. (2009) Exercise and physical activity for older adults. Med Sci Sports Exerc 41: 1510-1530.
- Ruiz-Montero PJ, Castillo-Rodriguez A, Mikalački M, Cokorilo N, Korovljev D (2013) Anthropometric measures in adult and elderly Serbian women to physical and educational program of Pilates and Aerobic. International Journal of Morphology 31: 1263-1268.
- 22. Handschin C, Spiegelman BM (2008) The role of exercise and PGC1 alpha in inflammation and chronic disease. Nature 454: 463-469.
- 23. de Grey ADNJ (2007) Life span extension research and public debate: Societal considerations. Studies in Ethics Law and Technology 1: 5.
- 24. Weiss EP, Spina RJ, Holloszy JO, Ehsani AA (2006) Gender differences in the decline in aerobic capacity and its physiological determinants during the later decades of life. J Appl Physiol 101: 938-944.
- 25. Kostić R, Pantelić S, Uzunović S, Djuraskovic R (2011) A comparative analysis of the indicators of the functional fitness of the elderly. Facta Univ Ser Phys Educ Sport 9: 161-171.
- 26. Martin PE, Morgan DW (1992) Biomechanical considerations for economical walking and running. Med Sci Sports Exerc 24: 467-474.
- 27. Fleg JL, Morrell CH, Bos AG, Brant LJ, Talbot LA, et al. (2005) Accelerated longitudinal decline of aerobic capacity in healthy older adults. Circulation 112: 674-682.
- 28. Hurley BF, Roth SM (2000) Strength training in the elderly-Effects on risk factors for age-related diseases. Sports Med 30: 249-268.
- Candow DG, Chilibeck PD (2005) Differences in size, strength, and power of upper and lower body muscle groups in young and older men. J Gerontol Ser A-Biol Sci Med Sci 60: 148-156.
- Howe TE, Rochester L, Jackson A, Banks PMH, Blair VA (2007) Exercise for improving balance in older people. Cochrane Database Syst Rev 4: CD004963.
- Madhavan S, Burkart S, Baggett G, Nelson K, Teckenburg T, et al. (2009) Influence of age on neuromuscular control during a dynamic weightbearing task. J Aging Phys Act 17: 327-343.
- 32. Araujo C (2008) Flexibility assessment: normative values for flexitest from 5 to 91 years of age. Arq Bras Cardiol 90: 257-263.
- 33. Landers KA, Hunter GR, Wetzstein CJ, Bamman MM, Weinsier RL (2001) The interrelationship among muscle mass, strength, and the ability to perform physical tasks of daily living in younger and older women. J Gerontol A Biol Sci Med Sci 56: B443-B448.
- Franklin B, Whaley M, Howley E (2000) ACSM's Guidelines for exercise testing and prescription. Philadelphia: Lippincott Williams & Wilkins (6th edn). pp: 137-164.