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THE ROLE OF PHYSICAL ACTIVITY IN PROMOTING HEALTHY AGING

Shivaraja Kumar M. P.

Research Scholar,

Gulbarga University Kalaburgi, Karnataka.

N. G. KANNUR

Director,

Dept. of Physical Education, Gulbarga University, Kalaburgi,

Karnataka.

ABSTRACT

Evidence suggests that regular physical activity is safe for both healthy and frail older adults. It can reduce the risk of major metabolic and cardiovascular diseases, obesity, falls, cognitive decline, osteoporosis, and muscle weakness. Activities can range from low-intensity walking to more strenuous sports and resistance training. Maintaining independence and preventing disease in older populations are two major benefits of regular physical activity, which has made active aging a fundamental strategy for living longer and better lives. The significance of encouraging mobility throughout life is emphasized in this research as a dependable means of maintaining wellbeing as people age. Societies may foster healthier people that maintain their independence for longer by including physical activity into daily routines and portraying it as a lifetime habit rather than a treatment for old age. In addition to improving people's quality of life, this strategy lessens the overall financial strain of healthcare. For people who are severely deconditioned, functionally constrained, or have long-term illnesses that impair their capacity to do physical tasks, the initial level of physical activity intensity and duration should be minimal. Additionally, the activities' progression has to be customized to each person's tolerance and preferences. An individual's chances of starting and sticking to a regular exercise and/or physical activity program will rise if behavioral change principles are incorporated into the planning and implementation of these programs. In this paper we will discuss. The Role of Physical Activity in Promoting Healthy Aging.

Keywords:

Healthy Aging, Physical Activity, Cardiovascular Diseases, Muscle Weakness, Strength, Mobility, And Mental Acuity, Exercise, Cognitive Health, Increases Longevity, Energy Expenditure

INTRODUCTION

Seniors who engage in regular physical activity maintain their strength, mobility, and mental acuity. Exercise is a vital component of a healthy lifestyle since it can slow down many of the impacts of aging, even though the body changes naturally as we age. Whether it's strength training, yoga, swimming, or walking, being active has many advantages that improve mental and physical health.

A growing proportion of people who engage in physical activity are aging athletes, who are athletes 60 years of age and older. In sports medicine clinics worldwide, aged athletes—from those who have been active their entire lives to those who have just started—are becoming a familiar sight. As people age, sports medicine professionals should feel at ease talking about the advantages and drawbacks of exercise and an active lifestyle. [1]

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Ageing and Physical Activity

The combination of decreased physical activity and the rise in chronic diseases that accompany aging often leads to a vicious cycle: diseases and associated disabilities lower physical activity, which in turn impairs functional ability and exacerbates the illnesses' disabilities. An active lifestyle can help avoid many of the detrimental impacts that aging has on one's health and functional ability.

Engaging in physical activity is also the most effective strategy to escape the vicious cycle and begin a journey of gradual progress. In the end, this improves older people's freedom and helps them cope. Physical inactivity is a needless waste of human resources, according to a WHO expert group that emphasized the health benefits of exercise in 1995. The expert group noted that a passive, primarily sedentary lifestyle is recognized as a significant risk factor for ill health and diminished functional abilities. [2]

Physical Activity is Key to Healthy Aging

The best course of action may be to aim for a healthy lifestyle, such as regular physical activity, as physical degeneration cannot be avoided. The best investment in public health is still physical activity, which is "just good medicine." It is still true that physical activity helps older persons avoid many of the common age-related deterioration and associated chronic diseases.

In addition to preventing diabetes, obesity, hypertension, and colon cancer, exercise also strengthens the heart. In addition, it enhances immunity, 12 sleep, mental health, coordination, flexibility, muscle strength, and weight control. [3]

- **Improves Heart Health**
- The beneficial effects of regular exercise on heart health are among its biggest advantages. Exercise helps control blood pressure, strengthens the heart, and enhances circulation.
- **Maintains Strength and Mobility**
- As people age, their bone density and muscle mass naturally decline, increasing their risk of falling and causing frailty. On the other hand, consistent weight-bearing activities and strength training support bone health and muscle strength. Exercises that increase mobility, balance, and coordination—such as resistance training, bodyweight exercises, and even gardening—can lower the risk of injury.
- **Aids in Weight Management**
- As we age, our metabolism slows down, which makes it harder to control our weight. Frequent exercise promotes calorie burning, weight maintenance, and the avoidance of obesity-related diseases including diabetes and high blood pressure. Maintaining a healthy body composition can be greatly impacted by even modest physical activity, such as daily walks or mild aerobic workouts.
- **Boosts Mental and Cognitive Health**
- Not only is physical activity beneficial to the body, but it is also critical for the health of the brain. By generating endorphins, which enhance feelings of wellbeing, exercise lowers stress, anxiety, and sadness. Being active reduces the risk of dementia by enhancing memory and cognitive function. The brain is kept active and sharp by simple hobbies like dancing, tai chi, or even sports.

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- **Enhances Flexibility and Balance**
- For older persons, falls are a serious concern since they frequently result in injuries and hospital stays. Fall risk can be decreased by engaging in exercises like yoga, pilates, and tai chi that emphasize flexibility, balance, and coordination. These exercises make everyday motions safer and more controllable by strengthening core muscles, improving posture, and increasing body awareness.
- **Encourages Social Interaction**
- Seniors who exercise have a great opportunity to socialize, which is important for their mental and emotional health. Participating in community sports, strolling with friends, or taking a fitness class promotes social connections and helps fight feelings of isolation and loneliness. A longer, healthier life has been associated with maintaining social engagement.
- **Promotes Better Sleep**
- Through the regulation of the body's natural sleep-wake cycle, regular exercise helps to improve the quality of sleep. Exercise makes it simpler to fall and stay asleep by lowering tension and anxiety. Light exercises like stretching or taking a stroll in the evening can help people unwind and fall asleep more deeply and soundly. [4]

Resources on Physical Activity and Health Aging

- For older persons who are active and exercising, the National Institute of Aging offers useful information.
- Heart Healthy Toolbox: eight sheets on physical activity are part of this set of lifestyles change patient education resources. [5]

REVIEW OF LITERATURE:

The majority of scholars agree that aging is a physiological, natural process that everyone goes through at different speeds (Grayston, 2018). It is easy to identify the age/aging phases, but it is more difficult to define and prove the mechanisms causing the aging process. All living things are impacted by the natural aging process. The complex biological aging process is caused by a combination of environmental, genetic, and time factors. Different cells and tissues experience it in different ways. People age at different rates, therefore the biological age and the chronological age do not always match. Numerous indicators and changes associated with aging are seen in the human body. Normal aging, physical ailments and certain chronic problems, and psychological, cognitive, and social changes are some of the categories that can be used to group the changes that accompany aging. [6]

Furthermore, there is a decrease in bone density, which may raise the risk of osteoporosis and fractures. Cognitive function also changes as people age. As they age, many people see a decrease in their executive function, memory, and cognitive speed. The development of techniques for preserving cognitive health is crucial since these changes may affect independence and day-to-day activities. The increased vulnerability to chronic illnesses is a major consequence of aging. As people age, diseases including cancer, diabetes, and heart disease become increasingly common. For most common chronic diseases, including cancer, heart disease, and dementia, aging is the main risk factor (Zhang et al., 2024). The percentage of people with one or more chronic illnesses increases as a result. Despite being a major risk factor for many chronic illnesses, aging is not the same as disease. Healthy aging, on the other hand, refers to maintaining a high level of functioning and wellbeing as one ages, whereas aging is a natural and inevitable process that happens in all living organisms, including humans, and refers to the gradual loss of physiological function over time, resulting in physical, cognitive, and emotional

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changes. This entails preserving mental clarity, emotional stability, and physical fitness. Concepts like successful, healthy, productive, or active aging reflect a lengthy history of development in the field of healthy aging. [7]

It is instructive to profile very athletic older people (master athletes) because while the motor neuron and muscle fiber (Lexell et al. 1988) losses that occur with aging cannot be replaced, exercise training can improve the structure and function of the metabolic, musculoskeletal, and cardiorespiratory systems. Master Athletes show remarkable physical prowess for their age and participate in sports on a daily basis. When compared to non-athletes of the same age, they often maintain better bone, muscle, cardiorespiratory, metabolic, and brain health; yet, it is still clear that physiological systems deteriorate with age, even in individuals who continue to be incredibly active. [8]

Objectives:

- To study the role of Physical Activity in Promoting Healthy Aging
- To study the goal of physical activity is to restore the deficits and increase mobility
- To explain process of aging is intricate and unique
- To study the exercise causes endorphins and other neurotransmitters to be released, which enhance feelings of wellbeing and lessen stress and anxiety.

Research Methodology:

The study of research, The Role of Physical Activity in Promoting Healthy Aging. The research studies using secondary sources of data, taking into consideration the resources available and the viability of the current research study. Secondary data has been gathered from a variety of sources, including books, research articles, dissertations, journals, and numerous psychological and sociological theories.

Result and Discussion:

Physical Activity in Aging

It has been demonstrated that engaging in regular physical activity has several positive effects on general health and wellbeing, including reducing some of the negative effects of aging. Exercise maintains muscular mass and strength, improves cardiovascular health, increases longevity, and improves cognitive function. Frequent engagement in physical activities, ranging from mild walking to more strenuous sports and resistance training, can help avoid cardiovascular and metabolic diseases, obesity, falls, cognitive decline, osteoporosis, and muscular weakness. [9]

The process of aging is intricate and unique to each individual.

- Recent research has demonstrated that nine cellular and molecular traits, including as loss of proteostasis, telomeric attrition, genomic instability, epigenetic changes, and dysregulated nutrition sensing, may account for the aging process.
- Cellular aging, stem cell depletion, reduced mitochondrial function, and impaired intercellular communication are additional variables that contribute to this phenomenon.
- Energy expenditure from skeletal movement is the focus of physical activity.
- A type of physical activity known as exercise is repetitive, structured, and planned with the goal of preserving or enhancing physical fitness.
- One aspect of health or talent that may be measured objectively is physical fitness. [10]

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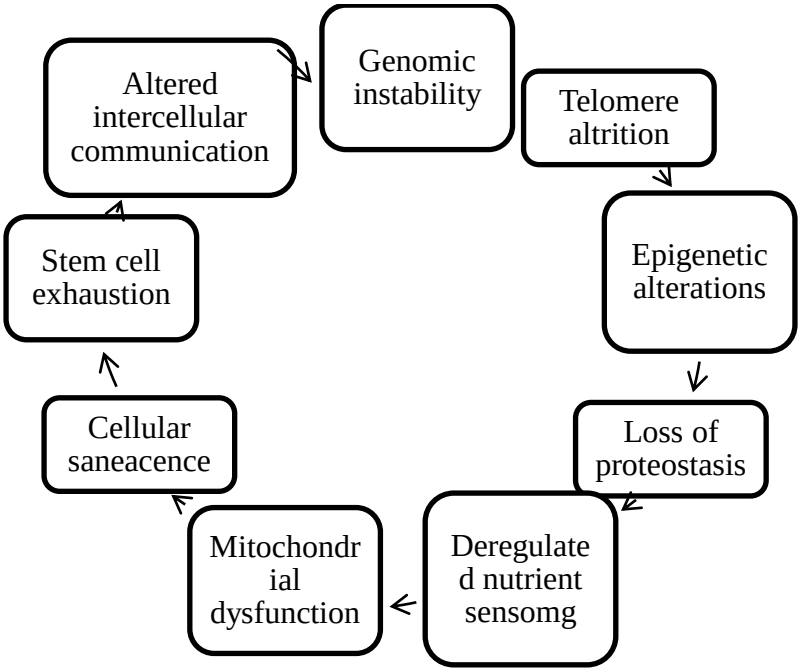

Figure 1: Physical Activity in Aging

Aging and Physical Activity:

According to this theory, even little stressors can trigger biological processes that increase resistance and resilience to more serious ones. One of the hermetic stressors that has been thoroughly researched for its positive impacts on aging is exercise. Hormesis has been suggested as a possible way to slow or prevent age-related decline and increase longevity in the setting of aging.

Frequent exercise, especially resistance and aerobic training, causes mild inflammation and oxidative stress, which sets off adaptive reactions in bones, muscles, and other tissues, resulting in increased resilience and function as people age. This stress sets off a series of physiological reactions meant to adjust to the demands made of it. Figure 2 illustrates these modifications, which consist of:

Strength and Muscle Growth: Weightlifting and other resistance training put strain on muscles, causing tiny damage to muscle fibers.

Cardiovascular Fitness: By raising heart rate and blood flow, aerobic activity, such as jogging or cycling, strains the cardiovascular system.

Bone Density: Weight-bearing activities that put stress on the bones, such jogging or walking, promote bone remodeling and boost bone density.

Metabolic Health: Exercise improves lipid profiles, increases insulin sensitivity, and encourages muscles to absorb glucose. These factors all help to improve metabolic health and lower the risk of diseases like metabolic syndrome and type 2 diabetes.

Mood and Cognitive Function: Exercise causes endorphins and other neurotransmitters to be released, which enhance feelings of wellbeing and lessen stress and anxiety. Frequent exercise has also been associated with better cognitive function and a lower chance of aging-related cognitive deterioration.

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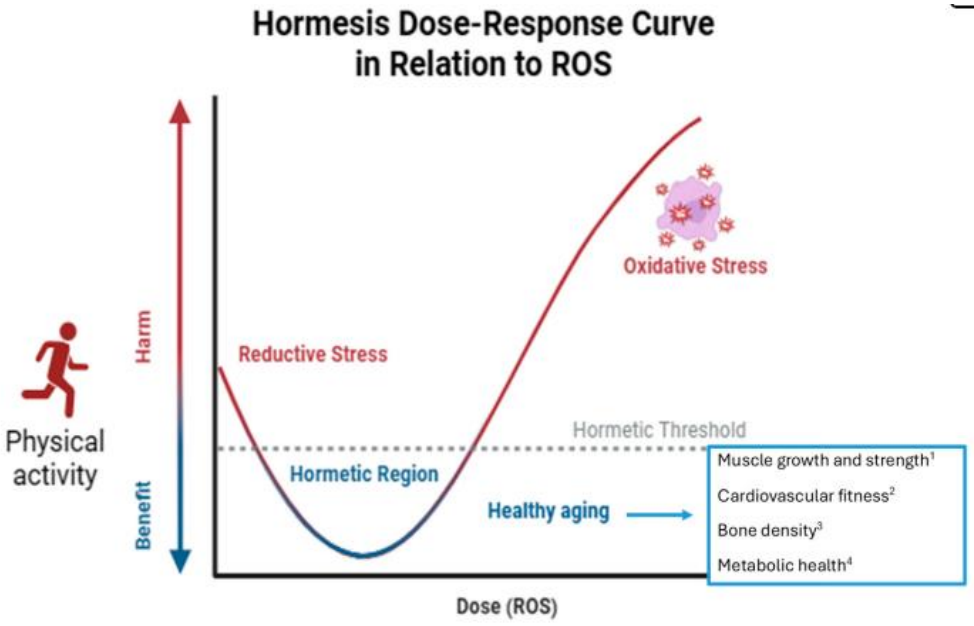

Figure 2. Exercise as a hormetic stressor and its beneficial effects: on muscle strength 1; cardiovascular fitness 2; bone density 3 and metabolic health 4 during aging.

Strength, skill, and aerobic exercises that are developmentally appropriate can be incorporated into youth exercise programs by fitness experts. In order to change the trend toward physical inactivity and associated comorbidities, well-designed interventions are required to address neuromuscular weaknesses and remove obstacles, rather than assuming that less active kids will just "outgrow" physical inactivity. Strength-building exercises are crucial since proficient jumping, kicking, and running require a certain amount of muscular strength. Regular engagement in strength-building activities is necessary to create robust physical capacities that support continued participation in a variety of active play, exercise, and sport activities, even though most youth will only gain a modest degree of muscle strength with sporadic MVPA sessions. [12]

The developing body requires three primary fitness macronutrients to sustain muscular strength growth, movement skill competency, and cardiovascular function over the foundational decade, much as dietary macronutrients are necessary for preserving general health and well-being.

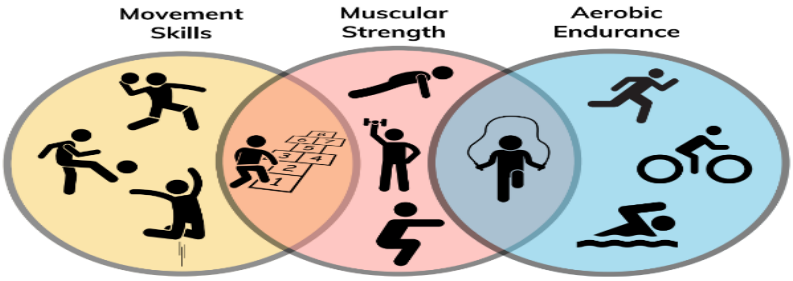

Figure 3: Macronutrients of youth fitnes

The "oldest" old are expected to experience the fastest increase, with the number of people over 85 rising from 1.4 million to over 3.5 million. Fig. 3 shows a generic schematic picture of aging. Around the age of forty, a decline in the physiological systems' ability to function can be observed, along with

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related morphological and ultrastructural alterations. For example, skeletal muscle atrophies and weakens over time (sarcopenia); age-related decreases in bone mineral density result in osteopenia and osteoporosis; and cumulative cognitive losses impact memory and learning. There is significant inter-individual heterogeneity; some older persons have extremely good health, while others exhibit rapid onset of weakening, impairment, and frailty. Nevertheless, chronological age is a convenient and frequently very good predictor of health status, disease burden, and physical capabilities. [13]

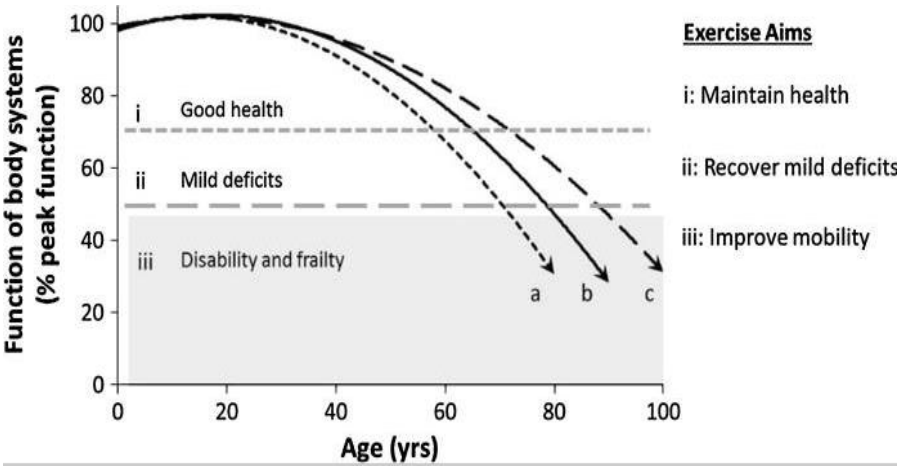

Figure 4: Generic Schematic Picture of Aging

Individual workout requirements and aging trajectories are shown schematically. Up until middle age, good physiological function is maintained; beyond that, it gradually declines. The basic goal of physical activity is to maintain excellent health above the top horizontal dashed line, which is a theoretical point at which deterioration appears as moderate functional limitations. The goal of physical activity is to restore the deficits and increase mobility since the lower horizontal dashed line represents a theoretical barrier beyond which a person becomes frail and disabled. Accelerated aging, normal aging, and healthy aging are represented by the curved lines. For exercise programs to be effective, they should be tailored to the individual's physical capabilities rather than their age.

CONCLUSION

In conclusion, maintaining physical function and encouraging healthy aging in older persons require regular exercise. Exercise can be tailored to a person's talents and preferences, avoid chronic diseases and cognitive decline, and increase strength, balance, and flexibility. Graded physical activity is a vital prescription for postponing or reversing aging, or even better, for reducing aging-related disorders. There are numerous advantages to maintaining an active lifestyle, and since chronic illnesses and diagnoses can occur, exercise is advised. We still don't fully comprehend the unique requirements of aging sportsmen, though. Evidence from studies on the benefits of physical activity and healthy aging may be significant from the standpoint of public health.

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