Aging- Causes and Prevention – A Review

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Abstract: Aging is a process in which continuous failure of maintenance and repair mechanism occurs which are very important for cellular homeostasis. Antioxidants and growth hormone regulators are used to decrease the process of longevity or abnormal aging. Protandim and nuclear factor 2 (Nrf2) are used as super antioxidant to minimise the oxidative stress in the body. Some aging syndromes are also there in which age of person increases three times of its original age such as progeria. Progeria occurs due to gene changes in the body and this disease does not have any cure and a person with this disease having a life of only 13-14 years.

Key words: Growth Hormones · Insulin Growth Factor-1 · Progeria · Protandim · Reactive Oxygen Species · Nuclear Factor-2

INTRODUCTION

Now-a-days everyone wants to look younger and attractive always, it is not possible to block our age but you can decrease the process of aging. Aging can also be recognised by the visual aspects of the body. Most of the peoples are bothered about one common affair called age. Aging occurs continuously without our approbation. Aging is an intricate process characterised by the gradual failure of maintenance and repair pathways important for homeostasis of cell which results in progressive accretion of unwanted macromolecules and organelles. The accretion of these unwanted macromolecules and organelles has harmful effects on cellular homeostasis and cause hindrance with activity of functional molecules which tends to subsequent dysfunction [1,2].

There are certain changes that are pernicious, gradual and thus far irrevocable. Aging damage occur to molecule to cell and to organs. The molecular damage associated with aging may increasingly perturb normal homeostasis and increase the susceptibility to disease and disability.

Symptoms of Aging: Aging changes are frequently related with an increase in eventuality of mortality, but this is not necessarily the case i.e., greying of hairs is a symptom of aging but this does not increase eventuality of mortality [3]. T cell populations having the most age related change that decreases the number of native cells and accumulation of sensitized cells [4]. Aging is a concept that includes physical changes to our bodies, psychological changes to our minds and social attributes through adult life [5].

Symptoms That Transpire with Aging Are Categorised As:

Physical Aging: There are certain symptoms of Physical aging which are as follows

- Decrease in Physical strength, endurance and flexibility.
- Decline in the body organs.
- Slower reflexes.
- Decline in the senses.

Psychological Aging: DEMENTIA is the major symptom of Psychological aging in which sudden memory and behavioural changes occurs.

- D- Drugs Confusion between the drugs prescribed by the doctor and the over the counter drugs.
- E- Emotions especially depression, have a major impact on memory but the persons suffering from DEMENTIA do not complain about their memory problems.
- M- Medical problems, lack of fluid in the body (dehydration) and lack of oxygen to the brain (hypoxia) can commonly cause confusion and disorientation.
- E- Eyes, ears and environmental changes also may affect behavior.
- N- Nutritional deficiency
- T- Trauma or a head injury from any type of accident, including a fall or a brain tumor, can cause confusion and disorientation.
- I- Infection, pneumonia or urinary tract infection, a high fever, or syphilis can cause dementia.
- A- Alcoholism, whether a recent or long-standing problem, can cause temporary confusion and disorientation or permanent brain damage.

Social Aging: The symptoms of social aging are loss, Grief and Bereavement [6,7].

The gradual decline in functional ability and muscle strength is related to normal aging processes [8]. The rate of aging varies from individual to individual and the age of different organ system is different in same person.

Causes of Aging:

- Intrinsic Aging: This type of aging is caused by the internal defects in the human body system. Some time there is some hormonal changes in the body and some time there is unwanted changes in the genes of human that will cause aging [9].

- Aging Due To Gene: A point mutation in the gene causes aging syndromes like PROGERIA and WERNERS SYNDROME. PROGERIA (Hutchinson Gilford progeria syndrome) is extremely rare genetic disease. The first symptoms manifest in infants and neonates. Cause of progeria is identified by a point mutation at position 1824 of lamin A (LMNA) gene.

- Symptoms of Progeria: Typical symptoms of progeria are growth insufficiency, wrinkled skin, loss of eye sight, hair loss, cardiovascular diseases etc. the earliest symptoms may include a localised scleroderma like skin condition, a distinctive appearance i.e., small face, pinched nose and shallow, recessed jaw are all characteristics of progeria [10].

- Treatment: There is only a drug which focuses on reducing complications and i.e., farnesyl tranferase inhibitor called lanofarnib which is able to improve the cardiovascular health and increase their weight gain but there is no treatments have been proven effective to symptoms of progeria.

- Aging Due To Hormonal Change: Growth hormone (GH) and insulin growth factor-1 (IGF-1) plays a vital role in normal growth and development in humans [11]. Normal release of growth hormone in body is essential for aging process but excess release of growth hormone and concomitant increase in circulating IGF-1 levels by GH producing adenoma causes in abnormal growth i.e., tissue overgrowth, metabolic abnormalities such as diabetes and hypertension [12,13].

From this flow chart it is cleared that as growth hormone increases, insulin growth factor and cellular senescence also increases due to this anti oxidant enzyme and insulin sensitivity of the body decreases. Thus these are the main cause for the aging process of the body [14].

Fig. 1: Possible involvement of ROS-induced cellular senescence in the regulation of lifespan.

- Extrinsic Aging: This type of aging is mainly caused by the external environmental conditions. Most commonly ultraviolet rays are responsible for the extrinsic aging which results in cell damage and formation of free radicals.
Aging Due To Ultra Violet Rays & Photo oxidation: Ultra violet rays mostly produces free radicals in the body that sometimes causes aberrant side reactions resulting in cell damage and thus causes the mutation and affect the cell cycle and causes symptoms of aging like atherosclerosis.

It may also involve in Parkinsonism disease & Alzheimer disease. UV commences a number of cellular responses, including reactive oxygen species (ROS) production within upper layer of the skin and middle layer of the skin i.e., epidermal and dermal cells. The free radical theory of aging suggests that aging results from the accretion of the oxidative damage over time, which persuade to cellular dysfunction and organism death. The epidermis becomes shrivel compared to sun protected areas on the same individual. There are some structural alterations found in the epidermis cell due to ultraviolet rays which particularly corrode the biochemical properties of the skin. A cutaneous aging was found by the comparative studies between photo exposed and photo protected areas in same individual [15, 16].

Treatment: Use of the antioxidant is the most successful treatment. Now-a-days Protandim & nuclear factor 2 (Nrf2) are used as super antioxidant. Protandim is patented dietary supplement that has five herbs with antioxidant properties and increase body’s natural antioxidant protection by inducing two protective enzymes i.e., superoxide dismutase (SOD) & catalase (CAT).

Composition of Protandim:

- Milk thistles (silybum marianum) extract (225mg).
- Bacopa (bacopa monniera) extract (150mg).
- Aswagandha (withania somnifera) root (150mg).
- Green tea (camellia sinensis) extract (75mg).
- Turmeric (curcuma longa) extract (75 mg).

Nuclear factor-2 (Nrf2) stimulates the Superoxide dismutase (SOD) and fights oxidative stress and help to regulate at peak efficiency.

Nuclear factor-2 (Nrf2) is the protein messenger that binds itself to the DNA. It is the master regulator of the body’s aging process and fight against oxidative stress. It communes with the cells & instructing them to do what they were design to do.

CONCLUSION

As we have reviewed that the aging is the process of progressive failure of functioning of parts in the body which is important for cellular haemostasis. Due to this our appearance also decreases, as we aged our body functioning decreases. There is one deadly syndrome of the aging which occurs due to mutation in 1824 position of LMNA gene, the syndrome named as PROGERIA. Aging due to photo oxidation is treated by using antioxidants. Now protandim is used for the treatment of photo oxidation as a super anti oxidant and nuclear factor-2 (Nrf-2) also used as super oxidant & it is the master regulator of the body’s aging process.

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