

REVIEW OF ANATOMICAL AND PHYSIOLOGICAL CHANGES IN JARA (AGING) AS PER AYURVEDA

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Article Received on
05 Sept. 2019,

Revised on 26 Sept. 2019,
Accepted on 16 Oct. 2019

DOI: 10.20959/wjpr201912-16114

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ABSTRACT

Aging in modern science is defined as a Progressive failure of the body haemostatic, adaptive response; *Ayurveda* has considered *Jara* or *vardhakya* as a natural and inevitable process as well as a *swabhavaja vyadhi* (Natural disease) as old age sets in, homestasis between the *Tridosas* are disturbed. *kapha* decreases resulting in an increased *vata* this result in disturbance in *pitta* too. *Jara* (aging) is influenced by factor affecting *shareera*(physical), *indriya*(emotional), *satwa*(psychic level), *agni*(metabolism) and *bala ojas*(immunity). *Vriddhavastha(jara)* is the last part of the life span. This stage is

characterised by decay in the body. *Dhatu*(various anatomical tissues), perception power of *indriya* (sensory and moter organ) potency, strength, speech, various mental and cognitive functions (e.g memory, intellect, reception, retention, analytic ability etc.) During this phase there is predominance of *vaaya dosha*, (one of the three physiological body factors). The major physical changes seen at this time are wrinkling of skin, graying of hair, baldness and diminishing ability to do physical work. These Pathological changes include loss of compactness of the muscles, looseness of joints, vitiation of *Rakta*(blood), excessive production of *meda* /fatty tissue), failure of *majja* (marrow) accumulation in bone failure of production of *Shukra*(semen) and loss of *oja(vista)* factor. Aging represents structural and functional changes of an organism over its entire life span.

KEYWORDS: *Jara, vardhakya, swabhavaja, vata, dhatu, satwa, agni.*

INTRODUCTION

Ayurveda has considered *Jara* or *Vradhakya* as a natural and inevitable process as well as a *Swabhdvaja vyadhi* (natural disease). Acharya Charaka mentioned that the normal life span of humans is one hundred years^[1], though life span is plummeting alarming; now a days it is considered as 70 years. Aging can be defined as the normal process of life which is characterized by degeneration of organs of various systems, and consequently losing their anatomical and physiological functions.^[2] Today the study of aging is based on model of pathology i. e., how to diagnose the diseases and chronic disabilities afflicting the elder people to give probable remedies. Since then, researcher have taken effort to reinterpret aging as a normal, healthy and positive feature of the life span, but till date they are facing avalanches of difficulties. Proposed article aims to discuss normal anatomical and physiological changes that occur with aging. To enlighten the preventive measure describe in *Ayurveda* to minimize the increased risk related to normal physiological process of aging and increased prevalence of coexisting systemic diseases. On historical point of view it has been considered that old age and diseases related to it seems to be as old as recorded *Ayurveda* itself. In aged *vata dosha* physiologically in a dominant state and *rasadi dhatu sara* in a deficient state. This potent combination is responsible for the various degenerative changes and process of decay in the body. In present scenario due to improper dietary habits, defective life style, excessive stress and lack of exercise, the process of ageing starts very earlier. These factors produce various degenerative changes as well as metabolic disorders in our body. Some diseases and conditions that are common in old age are osteo-arthritis, hypertension, urinary incontinence, diabetes mellitus, arthritis, atherosclerosis, cardiovascular disease, cerebrovascular accidents, respiratory disease, senile dementia, delirium, confusion etc. Modern system of medicine has nothing much to recommend in geriatric care except the medical management of some diseases of the old age with limited health and prevention of diseases in old age.

MATERIALS AND METHODS

Classical texts of *Ayurveda* viz. *Charaka*, *Sushruta* and *Vagbhata Samhita* with commentaries were consulted as references of *jara*, *rasayana* to state the remedies. Literature available regarding anatomical and physiological changes from various journals, books and internet were collected. These references from both the streams of knowledge were compared and analyzed critically.

CHANGES OCCURRING DURING OLD AGE

- **Cardiovascular System**

Blood vessels become stiff and less responding to hormones which relax the valve of vessel and thus result in increasing systolic blood pressure. Due to lipid deposition and collagen degeneration, valve in the chamber of heart becomes thick and stiff.^[3]

- **Respiratory system**

Mobility of the ribs decreases due to calcification of ribs and thus chest wall becomes stiff along with larynx and trachea in the elder people. Cilia lining the trachea helps to push up dust, debris and mucus in to pharynx also becomes less effective. Lungs become rigid due to loss of elasticity. The functional unit of lung alveoli enlarges in size and the vital capacity decreases.^[4]

- **Gastrointestinal system**

In old age, stomach shrinks with inflammation of the mucosa called as atrophic gastritis. Due to lack of vitamin B12, stomach produce insufficient amount of acid which may lead acid deficiency called as achlorhydria. Loss of control of the internal and external anal sphincters in the old age is one of the worst traumatic experiences.^[5]

- **Urinary system**

Kidneys are the principal organs which are responsible for the regulation of the chemical composition of blood and fluid volume of the body by formation of urine. The size and function of the kidney begins to decrease in forty year of age and significantly decreases by sixty years.^[6] Decrease in the secretion of vasopressin declines the ability to conserve salt which may lead to dehydration. The urinary bladder with age is characterized by a decrease in storage capacity and urinary flow, increase in residual urine and frequency.

- **Nervous system and sense organs**

The aging of the central nervous system results in irreversible loss of functions and decrease in ability of doing normal functions. Memory problems are increased after the age of 40 years.^[7] Reflexes, sensory and motor responses of the body become slow. Visual and hearing impairment are very common in elderly people. Iris becomes more rigid with reduced tear formation causing dry eyes. With the reduced pupil size and decrease in cone number vision hampered in night. The labyrinth and vestibule begins to degenerate with age and older individuals may complain loss of balance. Sensation of smelling is lost gradually due to

decrease in smell receptor. Taste diminishes with the age because of atrophy of taste buds. In old age sense of touch is also diminished.

- **Endocrine system**

The endocrine system is a complex network of glandular tissues that secrete hormones directly into the blood which are used by target organs of the body. Insulin resistance may prohibit the conversion of glucose into energy in elderly.

- **Reproductive system**

In female menopausal age is considered as 51 years. At menopause ovulation ceases and estrogen levels falls by 90% [8]. Women are more susceptible for osteoporosis after menopause. Vaginal wall becomes thin due to delicate epithelium. Women experience decrease in lubrication of vagina. After 30 years of menopause FSH and LH levels falls down slowly which causes loss of muscular tone of breast. Rate of sperm production and size of testes is decreases with aging. There may be reduction in sex drive and erectile dysfunction affecting 42% of the adults between the ages of 40 and 60 years. [9]

- **Musculoskeletal System**

Arthritis is common painful condition that occurs with age and leads to reduced mobility of joint. Long bones appear to be disproportionate in size due to decrease in the stature. Shortening of the trunk may occur due to thinning of vertebral disk. Many old persons assume forward bending with flex knees and bending of arm at elbow. These structural changes occur because of calcium loss from bone.

- **Skin**

Elder persons generally have thin skin. Atrophy of the epidermis occurs with age and it is predominantly found in exposed areas of neck, face, upper part of the chest, and outer parts of the hands and forearms. Hair becomes gray because of the decrease in melanin production. Nails develop striations and grow slowly. [10]

CHANGES IN OLD AGE AS PER AYURVEDA

(A) Role of Tridosha in ageing

In *Ayurveda*, the phenomenon of ageing is also related to principle of *tridosha*. The *tridosha* (*vata*, *pitta* and *kapha*) is the most important factor in maintenance of good health and production of disease. These *doshas* exists in the body all the time but it varies as per age,

day or night period and after taking meals. During childhood *kapha dosha* predominates, in the middle age *pitta dosha* and in the older age *vata dosha* is said to be dominant. The properties of *vata dosha* are described as *ruksha*, *laghu*, *sheeta*, *khara* and *vishada*. So *Vata dosha* by nature, decreases luster of skin, lessens body strength, dries and decays the body and hastens ageing process. Thus the process of ageing can be evaluated in terms of the *tridoshika* physiology.

(E) Role of Agni in ageing

Apart from *doshas*, *Agni* also plays an important part in ageing process. Body tissues are regularly nourished by dietary substances and *agni* is said to be responsible for the conversion of dietary substances into tissue elements. In old age, more vitiation of *vata dosha* occurs which is responsible for *vishamagni*.^[11] which affects the digestion and creating under nourishment of the tissues. This under nourishment of the tissues may have an impact on low status of *dhatwagni* which creates diseases in elder people. Thus ageing effects are more closely related to *agni* having *vishamagni*.

(F) Role of Dhatus in ageing

Though the classical text do not explain the exact role of *dhatu* in ageing process but it is clearly mentioned in classics that during old age quantity as well as quality of *dhatu* is decreased. *Oja* (the essence of all the *dhatu*) is also termed as *Bala*^[12] which is responsible for resistance against diseases or *vyadhikshamatva* (immunity) is also decreased. So the *dhatu kshaya* and *oja kshaya* are also responsible for process of ageing and diseases in old age.

(G) Role of Srotas in ageing

Charaka has described that various pathological conditions arise in the body due to *srotodusti* of different *srotasa*. The main function of *srotasa* (channels of body) is to transfer the body fluids. In *Srotodushti* there are four pathological conditions that takes place i.e. *Atipravritti*, *sanga*, *siragranthi* and *vimargagama*. The main cause for *sroto dushti* is vitiation of *vayu* and *mandagni* which are prominent in aged.

DISCUSSION

Aging is one of the unavoidable processes occurring in each and every living being and one cannot prevent it. Classics have mentioned it as a *Svabhavika Vyadhi* (naturally occurring disease) because risk of developing various diseases increases in old age. There are structural and functional changes at cellular level, tissue level and organ level. The biochemical

composition of cells and tissues undergo changes with age, physiological capacity reduces and the ability to maintain homeostasis in adapting to various stressors decline thereby person becomes more vulnerable to diseases. For understanding the process of aging in terms of *Ayurveda*, needs the analysis of the physiological changes occurring at the level of *Tridoshas*, *Saptadhatu*s, *Malas*, *Srotas*, *Indriyas*, *Agni* and *Ojas*. The main Dosha involved is *Vata* and there is *Agnimandya* leading to improper nourishment of various entities of body. There are different patterns of functional deteriorations occurring with aging. There may be gradual and partial functional loss or complete functional loss. The dependent *Dhatu*s also undergo improper nourishment. This process is gradual and leads to irreversible process of aging. *Nidanas* (causative factors) such as *Ati Ahara Vihara* (excess food intake and improper lifestyle), *Manasika Vega Adhaarana* (non-suppression of unpleasant emotions) leading to *Srotalepa* (blocks the body channels) which in turn causes *Agnimandya* and *Ama*. When the function of *Agni* is vitiated, there is improper nourishment of *Rasa* and successive *Dhatu*s. Finally leads to *Shareera Apachaya* (improper nourishment of body) and *Ojo Haani* (damages the *Ojas*) resulting in *Akaala Jara* (premature aging).

CONCLUSION

Different anatomical and physiological changes occur by age. These changes often lead to health problems and even death in elderly. In order to ensure health and wellbeing of this growing age group, it is important that health care professionals, the government, the community, their families and the elderly themselves understand the changes that are happening and adapt the preventive measures to avoid the suppression of natural urges, follow the *dincharya* practice of regular yogic exercise, *shodhana* according to *ritu* and consumption of *rasayana* drugs at proper time. All these things will help to avoid increased risk related to aging.

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