INTRODUCTION

A constant reactivity and change in the form and probably functioning is one of the important features of living beings in biosphere. Modern scientists say that biosphere is an open system which constantly reacts with the environment. However, the nature of reactivity varies from one organism to another, which is an inherent phenomenon. This is triggered at the time of conception, runs throughout the life span and when it totally ceases, the organism dies. Within the period of life span, the nature has bestowed two important mottos. One is growth and other is reproduction or multiplication of the species. Growth ensures proper maturity for reproductive phase. After cessation of reproductive phase, the organism declines towards death. Thus ageing, both chronological and qualitative, will be counted, in strict sense, from the time of conception. In other words, ageing occurs as a result of constant biological activities throughout living period. This incessant activity is made possible by continuous process of both consumption and preservation of substrances for energy. If soul is considered symbolically as a form of energy in a living entity, then pravritti (constant activity) can be observed obviously either at cellular microcosmic level or at systemic macrocosmic level. This was well explained in the definition of Ayu [1] as an inseparable bond between sarira, indriya, sattva and atma. Though ageing is restricted to sarira or physical body, other is essential factors and gives meaningful definition for Ayu. Various activities exhibited by the body indicate the presence of atma, which is the most important factor in sustaining life and without which the body will be declared dead as no activities could be seen [2]. The ageing is a natural ongoing process; the problem starts with the abnormal ageing which is the result of improper food and life habits. The remedy of this abnormal ageing is rasayan. The rasayan has multiple functions it is treatment in diseased conditions and rejuvenator in healthy condition. Different drugs had different action property in different age groups [3].

Aims & Objectives

- To study Ayurveda and Modern concept of ageing process.
- To study the concept of Rasayan in relation to ageing.

CONCEPTUAL STUDY

Ageing is the processes that occur during life which culminate in changes that decrease an individual's ability to cope with biological changes. It is a process of gradual and spontaneous change, resulting in
maturation through childhood, puberty and young adulthood and then declines through middle and late age. Senescence is the process by which the capacity for cell division, growth and function is lost over time, ultimately leading to an incompatibility with life i.e., the process of senescence terminates in death [4]. Although ageing has both the positive component of development and the negative component of decline, senescence refers only to the degenerative processes that ultimately make continued life impossible. Not all of the changes that occur with age, even those that occur in late life are deleterious (e.g. grey hair, baldness) and some may even be desirable (e.g. increased wisdom and experience).

The nature of reactivity within the organism is an inherent phenomenon. Starting at the time of conception, it runs throughout the life span and eventually terminates in death of an organism. The active life of an individual is nothing but the inseparable combination of sarira, indriya, satva and atma. Atma is the most important factor in sustaining life and activities of whole body. From birth, till death, there occurs continuous life process viz. anabolism and catabolism, concordance of which maintains body functions. These two are active throughout the life but their rate gets altered in different stages of life. These two processes were clearly stated in classical Ayurveda literature. The very definition of sarira i.e., kaya and sarira; the synonyms of Ayu viz. dhari, jivita and nityaga; the junction and disjunction of paramanu being carried out by vayu; and above all a quotation from nirukta directly signifies the activity of both of them at different stages of life (i.e. jayate, asti, viparimamate, vardhate, apaksiyate and vinasyati. Every acarya opined age as factor dependent on kala, which was even agreed by modern scientists who stated ageing as a process of unfavourable progressive changes, usually co-related with passage of time. Though there is difference of opinion between regarding different phases of life, they finally hold the same view. Balyavastha upto sixteen years of life as per Susruta was extended upto thirty years by Caraka [5], where complete growth has not yet occurred. Susruta agrees with the same but he included it under Madhyamavastha. Similarly, Vrddhavastha starts at sixty years according to Caraka whereas Susruta says it as seventy years. Here also, the last phase of Madhyamavastha [6] i.e., the Hani period which starts from sixty years is nothing but the onset of decrement in the functions and it becomes apparent from seventy years of life. Vrddhavastha which starts from sixty years (Caraka)/ seventy years (Susruta), is subdivided into two as kalaja and akalaja by Susruta and this is a unique contribution from Susruta.

Kalaja jara is nothing but chronological ageing which occurs naturally whereas Akalaja Jara is biological ageing which occurs either prematurely or later to normal age concealing the actual age of an individual. While Susruta gives importance more to physiological entities, Caraka gives due importance to physiological as well as psychological entities. The total life span of human beings was cut short by hundred years with yuga changing because of indulgence in adharma, [7] etc. It is quite evident if one considers the present scenario, Because of blown up civilisation / modernisation, air pollution, water pollution, fast reducing natural resources, stressful life, the average human life span has been reduced to seventy years from about hundred years about a century ago. Above said points indicate nothing but adharma only. Though a person is said to be growing, actually he loses gradually, some of his attributes which were rightly observed by our ancient Acaryas who told that a particular faculty gets deteriorated with each decade. This is truth till today as is supported by observations made by modern scientists. A few causative factors for the ageing process are known but still it is a mystery.

Kala is the most important one factor on which other factors are dependent. Swabhava comes next followed by Vayu and Virodhaka Bhava. Other factors include desa, ahara saustainavam and avighata which were rightly justified by extensive research by scientists in the form of increased air pollution, smoking; increased caloric intake and stress, generating excessive free radicals, eventually hastening the process of ageing. Modern view of ageing reveals that till date no perfect definition is given. Though ageing and senescence are relative terms, they have different meanings. While ageing has both the positive component of development and the negative component of decline, senescence refers only to the degenerative processes. Many theories have been put forth related to ageing. Only a few could give probable mechanisms of ageing. But, the most popular theory is 'Theory of free radicals' of Dr. Denham Harman (1946) which is still considered worldwide [8].

These free radicals are highly reactive because of the instability arose due to unpaired electron. Unless and until they become stable, they start attacking cell membranes and contents; create havoc in them resulting ultimately in disease process. These free radicals get originated from either exogenous such as air pollution, cigarette smoke, radiation, drugs, pathogen, etc. or endogens produced within the body. Variety of free radicals have been noticed so far like superoxide, hydrogen peroxide, hydroxyl radical, nitric oxide radical, carbon tetrachloride, single oxygen, though exact number is still not known. These free radicals cause cellular damage through lipid per oxidation, DNA damages and oxidative damage of proteins. Each cell protects itself from the onslaught of free radicals by producing free radical scavengers such as enzymes that neutralise free radicals. Thus balance is maintained between generation of free radicals and scavenging enzymes. This is known as antioxidant mechanism or defence system.
These antioxidants by any of the three mechanisms i.e., by inhibiting the generation of ROS or by directly scavenging the free radicals or by raising endogenous antioxidant defences. This antioxidant defence is of two types viz. primary and secondary, out of which primary is subdivided into antioxidant nutrients and antioxidant scavenging enzymes. Antioxidant nutrients are β-carotene, α-tocopherol, Vitamin-C, selenium, Zn, Mn, Cu, etc. while antioxidant scavenging enzymes like superoxide dismutase (SOD), catalase and peroxidases. While SOD lowers the state level of O2, catalase and peroxidases do the same for H2O2. Restricting the caloric intake has shown the delay in ageing through decreased production of mitochondrial O2 and H2O2 and increased production of antioxidant defences [9]. Free radicals are generated at the cellular level as a result of improper transformation of atoms / ions / molecules which lose one electron. Unless they are checked, they produce deleterious effects in the body.

Agni which transforms the food stuffs into tissue elements when deranged leads to the formation of ama. Such ama can get produced either at jatharagni, dhatvagni or bhutagni level and leads to the onset of a disease which in turn, causes dhatu ksaya. Classics say that when there is diminution of dhatvagni, they start attacking dhatu and eventually lead to ksaya of dhatu. If this is not checked, they individual may end up in mrtyu [10]. So, vitation of dhatvagni should be normalized.

Majority of Rasayan dravyas acts at dhatvagni level and bring back the aggravated dhatvagni to normalcy. Similarly, when free radicals are excessively produced, they attack cell membrane and organelles and destroy them. If not checked this becomes a chain of reactions ultimately resulting in death of a cell. So, it has to be counteracted by substances called antioxidants. Being one of the eight branches of Ayurveda, Rasayan is practiced since ages [11]. Rasayan though concerned primarily with improving the health status, also used for curative purposes. References related to Rasayan are available such as turning old subjects to young, delaying the ageing process, prolonging the lifespan and increasing the strength of the individuals [12]. In all Samhitas, Rasayan is given due importance. Caraka has dedicated the first chapter of Cikitsasthana and then subdivided into four subchapters while Susruta dealt in four separate chapters in chikitsasthana. Later Acaryas dealt in a single chapter. Different definitions of Rasayan are given by different authors. But, their ultimate view is one and the same i.e., nutrients travels through different Srotas to tissue elements, replenish them, thus enhancing total body strength and maintain youthfulness to a longer duration. Various types of Rasayans are mentioned in classics. They keep the body healthy by preventing the onset of disease, promoting the healthy status and curing the already manifested disorders. By Rasayan, one can check kala mrtyu, arista laksana, viruddhasanajanya rogas and janapadoddhwamsa vyadhis. These, actually, are made possible not only due to Rasayan but also due to tapa, japa, etc. along with that.

Both types of Jara i.e., kalaja and akalaja can be managed by Rasayan. Kalaja is yapya whereas akalaja is sadhya. Kalaja jara can be checked to some extent by Rasayan Karma. It is not possible to reverse this one because, it is a Svabhavika Vyadh and it is told that 'Svabhavo Nispratyanikah' i.e., Svabhava cannot be altered at any cost. Only thing one can do in Kalaja Jara is checking the process of ageing and preventing the disorders usually occurring in old age such as daurbalya, vati, paliyta, khaliyta, swasa, kasa, etc. So, the rate of ageing process can be slowed down to some extent but not forever by rejuvenation therapy in Kalaja Jara. That is why it is told that Kalaja Jara is Yapya. Akalaja Jara, on the other hand can be treated effectively with Rasayan therapy. Akalaja Jara may be resulted because of not following Swasthavrtta or Sadvrta or Acara Rasayan. In such cases, Nidana (etiological causes) Sevana is present any should be left. Though Parityaga of Nidana Sevana is done, it may not be sufficient to check the flow of already going on ageing process. So, Rasayan should be administered in such cases, not only to check the ageing process but also to reverse it. Thus, Akalaja Jara can be managed. For this reason it is said that Akalaja Jara is sadhya. Maximum benefits of Rasayan can be got either in purva vayas or madya vayas. Why Caraka did not mention the age limitations for Rasayan need to be discussed. The reason behind this may be, at that time the people were strictly following Sadvrta, Swasthavrtta etc. because of which they were hardly facing any disorders. Caraka has told that "Nityam Ksira Ghratabhyaso Rasayayam" i.e. daily consumption of milk and ghee is the best rejuvenator of body. So, they may be following this. Moreover they were performing Dharma which might have prevented them from coming in contact with ailments. Therefore Caraka did not think of about the administration of Rasayan only to certain age group. That is why even Vrddha Csavana became young after Rasayan [13].

Seers wanted to prolong the life span as far as possible and then noticed that Rasayan administered in young and middle age yield maximum benefits than in old age. Here, Purva Vayas is not Balyavastha as per the commentators, but is phase of life wherein the individual reaches or enters Yauvana and Madhya Vayas is remaining period of Yauvana. In the earlier phase of Yauvana, the formation of tissue elements is incomplete. So, Rasayan improves the nourishment to Dhatu, thereby improvement in the defence system. Later phase of Yauvana is endowed with complete growth and development of body tissue. Rasayan administered boosts the immune system and delays the ageing process. Why Rasayan is preferred in early adulthood over other two phases of life is again a
subject for discussion. As quoted earlier, once born, every individual has to see all phases of life and face the death ultimately. Though a natural phenomenon that cannot be stopped, nobody likes to remain in the same avastha for longer duration, to be precise, Balyavastha and Vrddhavastha. Everyone wishes to stay long as well as healthy in Madhyamavastha, the golden period of life, which everyone enjoys much. Moreover, childhood and late adulthood are more prone to ailments because of low immune system of the body. This is due to incomplete developed fully not manifested functions of the body elements and derangement in body functions respectively. So, the therapy cannot give the desired effect of Rasayan in such individuals because they may find it as an overload to body functions. Meanwhile, in early adulthood, the immune system of the body is up to the optimum. There is complete formation of body tissues and body is in a position to accept the good things needed and reject those not needed. Any infection or diseases process can be well tolerated in early adulthood. Hence, Rasayan nourishes the tissue elements more, replenishes them, increases the anabolic activity and immune system and delays the ageing process in young adulthood. Further in early adulthood there will be samyak agni and this phase of life is dominated by pitta. Samyak agni is responsible for Ayu, Bala [14,15], Varna, Ojas, etc. of the individual. Srotas and dhatus are properly formed. Agni that is Samyak is responsible for proper digestion and metabolism of food forms sara properly. This sara moves through the srotas and reach all dhatus and help in the formation of prasasta dhatus after getting transformation by respective bhuognis and dhatvagnis. So, the individual becomes endowed with prasasta dhatus enhancing bala, varna, ojas and ayu. Hence, Rasayan is of much benefit in Purva Vayasya. Bala and Vrdhha are usually not recommended for Rasayan for various reasons. In Bala, dhatus will be in developing stage and he will be sukumara. There will be dominance of kapha and pitta is not at its optimum, so is the Agni, there will be diminished agni because of which the rasa is not fully transformed into sara though it comes in contact with dahtvagni after getting acted upon by jatharagni and bhutagnis. Sara [16], very much essential for the formation of prasasta dhatus, is not formed in a perfect manner. So, there will not be the formation of any Prasasta Dhatu. Srotas that carry the essence is also not distinct in early phase of life. So, the essence/Sara will not reach the expected Dhatus. In Vardhakya, Dhatus become Sithila due to dominance of Vata at that period. Further, this dominant Vata kindles Jatharagni which in turn influences Bhutagnis and Dhatvagnis. So, Dhatvagnis become diminished. This diminished Dhatvagnis further causes depletion of Dhatus unless properly managed. This again increases Vata and it becomes a vicious cycle and body functions deteriorate continuously. The essence formed will be soon destroyed by Diptagni, hence no Sara is reached to Dhatus; no formation of Prasasta there by leading to Dhatus Ksaya. Hence, in old age, no proper nourishment is achieved. Moreover in old age, there will be Sithilata of Dhatus as well as Srotas. The elasticity of Srotas is reduced. So, the essence traversing within the Srotas will not be propelled properly towards the Dhatus. Again the Dhatus are deceived of the Sara. Further, Sodhana usually preferred prior to Rasayan, hampers the anabolism which is essential for growth in Balyavastha and increase the catabolism in Vrddha because Sodhana causes Dhatu Ksaya. Hence, Bala and Vrdhha are not preferred for Rasayan. The properties / beneficial effects of Rasayan mentioned in the classics Simulate with new activity of such drugs. That properly is known as Adaptogenic property.

The adaptogens, coined by Lazarev in 1947 are defined as substances meant to put the organism into a state of non specific heightened resistance in order to resist stresses and adapt to extraordinary challenges. These adaptogens normalise body functions, strengthen systems and have a protective effect against a wide variety of stress. The adaptogens are different from other remedies having relative actions, such as immunostimulants (which heighten the resistance), nootropics (which improve higher integrative brain functions like memory, learning, thinking, understanding), anabolics (which activate the growth), tonics (which mitigate the weakness) and geriatric remedies (which prevent the old age diseases). Some of the adaptogens have antistress effect along with immunostimulating which is Jivantiya, nootropic-Medhya, anabolic-Brmhana, tonic-Balya and geriatric remedies-Vayahshthapaka properties. The drug Aswagandha, a well known Rasayan drug, because of its Usna, Snigdha, Laghu Guna, Usna Virya subsides Vata and Kapha and causes Agnidipana. As a result of this, the nutrients / essence reaches the Dhatus traversing through the minutes Srotas. Thus, it helps in subsiding Vata dominant in old age causing Vayahshthapana to some extent and Kapha dominant in early adulthood, enabling the essence reach all Dhatus.

CONCLUSION

- Ageing in a natural time bound process which is unavoidable.
- The untimely ageing (akalaj jara) is avoidable by the use of rasayan dravayas according to age groups.
- There are factor which deteriorate gradually i.e balya , vrdhi, chavi, medha, twak , daristi, sukra, vikrama, buddhi, karmendariya at every 10 years. So, rasayan drugs should be administered which will replace the loss.
- Rasayan Drugs haves antistress, anabolic, antidepressant, antioxidant and immunomodulating properties which have been reported.
- In cahark samhita the Jeevaniya, Vayasthapaniya, Satanyajamaniya, Brahaganiya, Sukrajananiya mahakasaya
(Ch.Su.-4) have 10 -10 drugs which have Geriatric properties.

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