

AGE RELATED CHANGES IN MUSCULOSKELETAL SYSTEM W.S.R. TO USE OF CHYAWANPRASHA RASAYANA

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ABSTRACT

Jara is a specific stage of life which develops as a late stage of life. Aging is a natural inevitable, irreversible always progressive biological process associated with decline of physical and mental function. Aging is associated with musculoskeletal changes and altered walking pattern. According to *Ayurvedic* text diminution of body tissue occurs after the age 40 or between the age 40 to 70. According to modern concept, from the age of 30 the density of bones begins to diminish in men and women. As a result bone becomes more fragile and more likely to break. Additionally joint become stiffer because of connective tissue with in ligament and tendon become more rigid and brittle. As life expectancy grows, the decline in muscles strength with aging

becomes a matter of increasing importance. In old age lack of flexibility may increase injury rate and may cause functional problem. The health promotive, disease preventive and rejuvenation approach available in Indian system of medicine like *Ayurveda*. The ancient *Ayurvedic* physician understood the delicate cellular mechanism of body and deterioration of functional efficiency of the body tissue. These ancient *Ayurvedic* physicians had thus developed certain dietary and therapeutic measures to arrest aging and rejuvenating process. This revitalization and rejuvenation is known as "*Rasayana Chikitsa*". The *Rasayan* prevents

aging, re-established youth, strengthen life and prevent disease. The changes are always degenerative in nature, so it is necessary to rejuvenate the body system by the use of *Rasayan*.

KEYWORDS: Aging, *Jara*, joint flexibility, muscles strength, *Rasayan*, Rejuvenation.

INTRODUCTION

Aging is a natural inevitable, irreversible, always progressive biological process associated with decline of physical and mental function.^[1] It is also associated with musculoskeletal changes and altered walking pattern. In old age, lack of flexibility may increase injury rate and may cause functional problems. Study of age related changes at different level social, behavioural, physiological, morphological, cellular and molecular is needed in every second of life. With people reach age 50, they begin to pay the price of sedentary life style.^[2] The predictable consequences are detrimental changes in body composition, including loss of lean body mass, strength, flexibility and bone density along with an increase in body weight and body fat.^[3] According to *Ayurvedic* texts, diminution of body tissue occurs after the age of 40 or between the ages of 40-70.^[4] According to modern concept, from the age of 30 the density of bone begins to diminish due to dietary habits. Now a day's having low calcium diet, not exercising, smoking and taking certain medications such as corticosteroids, due to all these factors bone become more fragile and more likely to break especially in old age and muscles strength also diminishes. Inactivity with aging is the primary factors in these changes; because physical activity level is one of the most important factors affecting body composition from childhood through old age.^[5] the skeleton provides support and structure to the body. Joints are the area where bones come together. They allow the skeleton to be flexible for movement. In a joint, bones do not directly contact with each other. Instead they are cushioned by cartilage in the joint, synovial membrane around the joint and fluid. Muscles provide the force and strength for the movement of the body. Changes in the muscles, joints and bones affect the posture and walking pattern and leads to weakness and slowed movement. The health promotive, disease preventive and rejuvenation approach available in Indian system of medicine like *Ayurveda*.^[6] This review study have been shown that age related changes in the body composition can be retarded even reversed through the use of *Rasayana* especially *Chyawanprasha Rasayana*.

MATERIAL AND METHOD

This study is done by reviewing different classical texts of *Ayurveda* as well as modern literature and various articles, journals, research papers and relevant sites.

As the life expectancy grows, the decline in the muscles strength, density of bone and also flexibility of joints. From the age of 30, the density of bones begins to diminish in men and women. As a result, bone becomes more fragile and likely to break in old age. The cartilage inside the joint become thinner and the component of cartilage become altered, which may make the joint less resilient and more susceptible to break. Loss of muscles is a process that starts around age of 30 and progresses throughout life. In this process, the amount of muscles tissue and number and size of muscles fibers gradually decreases.

Muscles Strength related with Aging

Strength is a crucial component of quality of life. Without adequate strength level even the most tasks become difficult or impossible to perform without assistance.^[7] As the life expectancy grows, the decline in muscles strength with aging becomes a matter of increasing importance.^[8,9] To understand the gross changes in muscles mass with aging, it is important to understand the micro and macro structural changes in this complex tissue. Metabolic changes with aging as a significant contributor to sarcopenia. These changes include a decrease in muscles protein synthesis but little changes in degradation. This suggests that muscle turnover and repair capacity is likely decreased with age. This occurs in the setting of increasing insulin resistance and higher percentage body fat mass.^[10] Muscles, as a highly vascular and metabolically active tissue, are affected by oxygen delivery throughout the body. Endurance capacity declines 10% per decade (as measured by maximal oxygen consumption). Similarly, enzymatic changes in energy production occur with age; anaerobic enzymes seem to remain constant with age, while aerobic energy production is decreased with age.^[11] Age-related changes in muscles fiber distribution have been identified. Type 1 fibers are small, slow-contracting, low tension output fibers with many mitochondria and anaerobic enzymes for energy production. These fibers are highly resistant to fatigue and are capable of metabolizing fat for energy expenditure. Type 2 fibers are much larger and faster contracting fibers that produce large tension output but fatigue quickly. It is clear that aging lead to an increasing percentage of type 1 fibers as compared to type 2.^[12] Similarly general muscles strength decrease with age, possibly related to decreased contribution from progressively smaller numbers of large tension-producing type 2 fibers.^[13] A research suggest

that from ages 30-80 years, back, legs, and arm strength decreases 30-40%.^[14,15] Another study showed that muscles tissue declines with age, while fat is redistributed. A research study found that strength increases into the fourth decade and then decreases thereafter at an accelerated rate.^[16]

Joint Flexibility related with Aging

Flexibility is defined as the range of motion of a joint.^[17] Adequate flexibility help a person meet the functional demands of life as well as enhances the person's participations in leisure activities.^[18,19] Lack of flexibility may increases injury rate and may cause functional problems, especially in middle aged and old aged person. Flexibility declines with age.^[20,21,22,23] It appears that flexibility declines 20 to 30% between the ages of 30 and 70 years.^[24,25,26] A research study determined that the relative contribution of soft tissue to total resistance encountered at a joint are as follows: joint capsule, 47%; muscles and its fascia, 41%; tendons and ligament, 10%; and skin, 2%.^[27] Little evidence suggests biological changes such as tendon stiffening, joint capsule changes, or muscles changes are responsible for age related decrease in flexibility.^[28,29,30] As people age, their joints are affected by changes in cartilage and connective tissue in joints. The cartilage in the joint becomes thinner and component of connective tissue i.e. proteoglycans (a substance that help to provide the cartilage's resilience) become altered, which may make the joint less resilient and more susceptible to break. In some people, the surface of the joints does not slide over each other as they used to. Additionally, joints become stiffer because the connective tissue within ligaments and tendons becomes more rigid and brittle. This change also limits the range of motion of joints. Fluid in the joint may decrease, synovial membrane become thinner, the cartilage may begin to rub together and wear away.

Bone Density related with Aging

People loss bone mass or density as they age, especially women after menopause, the bone loss calcium and mineral. The long bones of arm and legs are more brittle because mineral loss, but they do not change length. Beginning around age 50, there is a significant decline in bone mineral density (BMD), a condition called osteoporosis.^[31] Osteoporosis is a systemic skeletal disorder characterized by a reduced bone mineral density (BMD), which in turn increases fracture risk. Bone mineral density peaks at 20-30 years and decreases after. This pattern is similar in men and women before about 50 years of age, but after this, the two become very difficult, which is attributed to the menopause.

Effect of *Chyawanprasha Rasayana* on Aging Changes in Musculoskeletal System

Ayurveda explains management strategies to combat these old age problems and these may be termed as *jara chikitsa*. One should follow daily regimen, dietary instructions, seasonal regimen, *Rasayana therapy*, *Vajikaran therapy*, control of old age diseases to a greater extent are strategies which combat age related diseases. *Rasayan* is one of the excellent therapies to combat old related problems.^[32]

Rasayana therapy is that which rejuvenate the whole body and makes the disease free body. *Rasayana* is a union of two Sanskrit words 'Rasa' and 'Ayana', literally means 'rasa is the essence of something'. We intake anything into the body in the form of food or medicines is the first transform into *Rasa dhatu*. 'Ayana' literally means 'marge'. *Rasa* is the first *dhatu* that form in our body and *ayana* is the *marge*. According to *Acharya Dalhan* the definition of *Rasayana* is "Rasayana is the therapy which purifies the route of *rasa raktadi-dhatu* and also provides nutrition to all *dhatu*". The concept of *Rasayana* consist of two main principles.

- 1) Conservation of energy
- 2) Transmutation of energy.

Rasa is the pure nutrient part of food. *Ayana*, or turning towards, basically means that the *dhatu*s, instead of degrading and drying due to disease and aging, will be nourished, supplemented and replenished.^[33] Ultimately *Rasayana* is a tonic to nourish whole body and also beneficial for nearly all diseases, but especially for disorders of aging. One of the *rasayana* mentioned in *Ayurvedic* text is *Chyawanprasha rasayana*. This recipe has remained India's most popular remedy for around 2000 years, since the times of *Vedas*. According to the *Charaka Samhita*, *Chyawanprasha* is "the foremost of all *Rasayana*." By using *Chyawanprasha Rasayana* 'a person acquires intelligence, memory, free from diseases, longevity, strengthens the senses, strengthens the digestive fire, and facilitates healing of wound. *Chyawanprasha* has been widely used in India as tonic, rejuvenator, energizer, anabolic, immunomodulator and memory enhancer.^[34,35]

Chyawanprasha is a well known *Ayurvedic* recipe, which is being used since ancient times for rejuvenation and immune boosting effects on human body and provides resistance against diseases. *Chyawanprasha* is made up of 36 of herbs where *Amla* (*Emblica officinalis*) is the main ingredient which is the main source of vitamin C. Other ingredient also has immunomodulator and health promotive properties.^[36]

Main Ingredient of *Chyawanprasha Rasayana*

Amlaki is the main ingredient of *Chyawanprasha rasayana*, all ingredients also works to help in rejuvenating the body tissue. According to *Acharya Charaka* in *agraya prakaran* “*Amlaki* is *Vyasthapananama*”. It helps to delay the aging process.^[37]

Active constituent of *Amlaki* (*Emblica officinalis*)

Emblica officinalis also known as ‘Indian gooseberry’ family Euphorbiaceae. *Amlaki* contain *panchrasa* i.e. *madhur*, *amla*, *katu*, *tikta*, *kshaya*. The active constituent of *Amlaki* is ascorbic acid, tannins and gallotannins.^[38] According to *Charaka Samhita* *katu rasa* is *srotovispharak* which helps to absorb substance to the *srotas* and also purify the route of *rasa* i.e. *srotas*. *Amlaki* is rich in *katu rasa*.^[39]

Action of *Amlaki* (*Emblica officinalis*)

The action *Amlaki* is *tridoshahara*, *Vrishya*, *Rasayana*, and *Cakshushya*. According to modern concept this is equivalent to such effects, it is Aphrodisiac effect, nutrient to body and mind with adapto-immuno-neuro-endocrino-modulator properties and good for eye sight.^[40]

Properties of *Chyawanprasha Rasayana*

Chyawanprasha is used as a dietary health supplement. *Chyawanprasha*’s major ingredient is *amla*, which is known as vitamin C. Ascorbic acid, commonly known as vitamin C is a immunomodulator and also help to fight against infections.^[41]

- *Amlaki* is one of the main constituent of many *Ayurvedic* preparations such as *Chyawanprasha* and *Triphala* and is regarded as a “one of the best rejuvenating drug”.^[42,43] *Amlaki* is useful as an astringent, cardiac tonic, diuretic, laxative, liver tonic, anti-inflammatory and digestive medicine.^[44,45] It is posses’ hepatoprotective, antioxidant, antimutagenic, cytoprotective and antitumor effects etc. The fruit of *Amlaki* contains two hydrolysable tannins Emblicanin A and B, which have antioxidant properties; one on hydrolysis gives gallic acid, ellagic acid, and glucose, where as other gives ellagic acid and glucose.^[46,47]
- *Piper longum*, *Cinnamon zeylanicum*, and *Emblica officinalis* helps to correct hyperacidity, dyspepsia and flatulence which helps to absorption of nutrients.^[48]
- *Amlaki*, *purarnawa*, *pushkarmoola*, *kachur*, *vasaka*, *bala*, *shalparni*, *prishniparni*, *brihati* and *gokhru* helps in strengthen the cardiovascular system which protects people to many heart diseases and also gives a longer life.

- *Chyawanprasha* nourishes the neuronal cells and promotes intelligence and memory because it is an antioxidant property.
- *Chyawanprasha* has a calming effect on nervous energy and on stress, while improving concentration and memory, with its inclusion of *Withania somnifera*, *Bacopa monnieri* and *Asparagus racemosus*.^[49]
- *Nagkesar*, *Guduchi*, *Nagarmotha*, *Vidarikanda*, *Agar*, *Ashwagandha*, *Shalparni*, *Prashniparni*, *Amlaki* helps to sharpen the CNS, which helps to suppress the age related diseases and also improves immune system.^[50]
- The presence of herbs in *Chyawanprasha rasayana* like *Bhumiamlaki* (*Phyllanthus niruri*), *Amla* (*Embllica officinalis*), *Punarnava* (*Boerhaavia diffusa*), and *Guduchi* (*Tinospora cardifolia*) makes *Chyawanprasha* a very good liver tonic.
- It is believed that *Chyawanprasha* purifies blood, eliminates toxins and is beneficial to liver.^[51]
- *Chyawanprasha* also works as an antioxidant because many herbs have antioxidant properties, thus slowing down the aging process.
- It lowers blood glucose and blood cholesterol level.^[52]
- It also improves muscles tone by enhances protein synthesis.
- *Chyawanprasha* is helpful in cleaning the accumulated excreta by promoting digestion and excretion. *Chyawanprasha* is helpful in gastritis, peptic ulcer and intestinal cramping. It is a hepatoprotective, strengthens liver, and streamlines the metabolism of fat and proteins.
- *Chyawanprasha* nourishes the cells of brain, promotes coordination among various body parts, improves memory, and increases learning ability, storage, recall and intellect. It has a calming effect on Central Nervous System (CNS), thereby reducing anxiety and stress-induced psychiatric problems and imparts sound sleep. Several of these ingredients possess antioxidant and anti inflammatory properties.
- *Chyawanprasha* is a powerful cardio tonic and strengthens heart, improves forces and rate of contraction of heart by improving the blood supply to cardiac muscles. It helps in purification of blood and elimination of toxins. *Chyawanprasha* also lowers cholesterol level by improving blood lipids profile.
- *Chyawanprasha* strengthens immunity and facilitates healing process. It comprises ingredients possessing antioxidant, anti mutagenic and anticarcinogenic activities.

Chyawanprasha, a household remedy in northern India is popular for its nutritional value. People around the world now use *Chyawanprasha*, for its anti-stress and anti-aging properties. It has been found to be effective as an immunity booster, vitalizer and a comprehensive general tonic. *Chyawanprasha* improves all aspects of health, when taken regularly.

Effect of *Chyawanprasha* on Muscles Strength

Muscles strength is an important component of quality of life. As the life grows decreases in muscles strength with aging is a major problem. *Chyawanprasha* is an *Ayurvedic* remedy which can delay the changes in the muscles tissues and increases the muscles strength. The components of *Chyawanprasha rasayana* help to increases the protein synthesis which increases the muscles tone of the body. *Chyawanprasha rasayana* also have antioxidant property which delay the damage of muscles tissues. *Chyawanprasha rasayana* also help in metabolism which is help to delay the age related changes in muscles tissue and increases muscles strength. That *Rasayana* therapy helps to increases the age of the muscles tissue and gives strength to the body.

Effect of *Chyawanprasha* on joint flexibility

As the age expectancy grows, there is decrease in range of motion of joints which is also known as decreases in joint flexibility. As we know in older age there is decrease in width of cartilage i.e. cartilage become thinner this causes loss of flexibility of joints. The constituents of *Chyawanprasha rasayana* have antioxidant properties which delay death that retards the cartilage changes in joints. A research study suggest a beneficial effect of fruit consumption and vitamin C intake as they are associated with a reduction in bone size and the number of bone marrow lesions. This increases the flexibility of joint and also delay the age related changes.

Effect of *Chyawanprasha* on Bone density

Aging causes change in the bone density; decrease in bone marrow density causes osteoporosis. Osteoporosis is the common symptoms in old age persons. In old age person there is a change in mucous membrane of intestine, which decreases the absorption of nutrients from intestine like calcium and mineral. This causes the decrease of level of calcium in body that causes decrease of bone density. *Rasayana* therapy is that which purify the route of nutrient, which increases absorption from intestine. *Chyawanprasha rasayana* have many constituents which increases absorption from intestine which increases the absorption of

nutrient and calcium from intestinal wall and increase bone density which delay the aging process.

DISCUSSION

In this review study we discussed the aging effects on musculoskeletal system. We discussed the strength of muscles, change in bone density and joint flexibility as the age increases. In old age, there are many problems due to musculoskeletal changes like altered walking pattern and change in posture. In this study we use the *Rasayana* therapy to delay the age related changes in older person. In *Ayurveda*, *Rasayana* therapy is one of the therapy that retard even reverse the age related changes. *Chyawanprasha Rasayana* has many ingredients that work on age related changes in the body. *Amlaki* is the main ingredient of *Chyawanprasha Rasayana* which have antioxidant, antimutagenic and anti toxic properties which suppresses the aging process.

CONCLUSION

In conclusion aging is a natural, inevitable, and irreversible process which causes many changes in our body. Due to irregular life style and dietary habits aging changes occurs before the older period of time. In *Ayurveda*, *Rasayan* therapy is that therapy which rejuvenates the whole body and delays the degenerative changes in our body, so that *Rasayana* therapy is also called rejuvenation therapy. In *Rasayana* therapy *Chyawanprasha* is one of the *Rasayana* which retard the age related changes in our body.

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