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Concept and management of Asthikshaya in Rajonivruttikala (Menopausal Osteoporosis) in Ayurveda

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Abstract: Background : Menopause is inevitable. Ayurveda describes menopause as Rajonivrutti and it is a part of ageing process (jaravastha). There is anuloma kshaya in Jaravastha Where Rasa, Rakta, Mamsa, Meda Asthi, Majja and Shukra dhatu start depleting. Asthikshaya in menopausal women is of concern as this may lead to fractures. Ayurvedic management of menopausal Asthikshaya is based on bringing homeostasis of vata, pitta and kahpa dosha . This paper is an attempt to concise ayurvedic management in menopausal osteoporosis.

Objective : To elaborate concept of Asthikshaya in Rajonivrutti (menopausal osteoporosis) in Ayurveda and the treatment modalities. **Review methods :** This paper describes and appraises the ancient literature as well as overviews and discusses , critiques previous work done by researchers on different ayurvedic herbs.

Conclusion: Menopausal osteoporosis is emerging as one of the major public health issues. Postmenopausal women are susceptible to primary osteoporosis since osteoporosis is closely related to estrogen deficiency. Ayurveda offers comprehensive approach to the condition. This paper elaborates trisutra therapy offered by Ayurveda ahara (Diet and nutrition), Vihara (Lifestyle changes) and aushadhi (Medicines and panchakarma).

Keywords: Postmenopausal osteoarthritis, Ayurveda , rajonivrutti, asthikshaya.

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INTRODUCTION :

Menopausal osteoporosis is emerging as one of the major communal health problems. Menopause known as Rajonivrutti; is related to ageing process in Ayurveda¹ Dhatukshaya occurs because of ageing. Artav which is upadhatu of Rasa dhatu starts declining in consequence to the decline of Rasa dhatu. The function of reproductive organs and secondary sex characters also tapers down. 50 years is mentioned as Rajonivrutti Kala is mentioned by almost all Acharyas.²

Natural menopause has been defined by World Health Organization (WHO) as at least 12 consecutive months of amenorrhea not due to surgery or any other cause.³ The mean age at natural menopause (ANM) is 51 years in industrialized nations, while it is 48 years in poor and non-industrialized nations. Reduced production of estradiol, the most active form of estrogen as well as increased levels of follicle-stimulating hormone (FSH) and decreased levels of inhibin are observed in menopause.⁴ Most women experience near complete loss of production of estrogen by their mid-fifties. This results into hot flushes, Heart Discomfort, Sleep Problems, Depressive mood, Irritability, Anxiety, Physical & Mental Exhaustion, Sexual problems, and Dryness of Vagina while joint and muscular discomfort.⁵

Menopause and Osteoporosis : Pathophysiology

Bone metabolism occurs throughout life. There are three phases in bone metabolism. In the resorption phase, osteoclasts generate an acidic microenvironment between the cell and the surface of the bone, dissolving or resorbing the mineral content of the bone. In the reversal phase osteoclasts undergo apoptosis and osteoblasts are recruited to the bone surface. In the formation phase, osteoblasts then deposit collagen; this is mineralized to form new bone. Bone metabolism involves repetitive turnover cycles for formation of bone osteoclasts and osteoblast. Osteoclast, breaking down the bone structure, referred as bone resorption and bone osteoblast building up the bone structure, known as bone remodeling. In women estrogen is needed to keep a healthy balance between bone resorption and bone remodeling. During menopausal stage; estrogen deficiency leads to increase in osteoclastic resorption whereas osteoblastic activity; i.e bone deposition is reduced. There is increase in cytokines and IL-1, IL-6, and TNF.⁶

Rajonivruttijanya Asthikshaya :

In Ayurveda, menopause is depicted as Jarapakwaavastha manifesting into rajonivrutti. Ageing is associated with anuloma dhatu kshaya (degenerative changes) in the body. In Jaravastha (Ageing); Vatadosha is dominant.⁷ Predominance of vata manifests into symptoms like nidranash (insomnia), Chinta (anxiety), urinary symptoms, rukshata (dryness of vagina) and asthikshaya (osteoporotic changes). Symptoms like hot flushes (sarvangdaha and swedadhikya),

krodha(anger) and irritability are due to Pitta predominance. As said earlier;Vata is a predominant dosha in ageing process. Asthi is adhishthan of Vata.⁸When Vata increases, there is kshaya of asthi. As ageing process, gradually muscles become flaccid, joints lose their hold, bones are devoid of reticular tissue, reproductive tissue declines and ojas starts depleting.⁹ Vatavrudhi leads to *Asthi kshaya* and *Asthisauhirya*. *Asthi kshaya* is “decrease in the bone tissue” and *Asthisauhirya* means “porous bones”. Acharya Hemadri explains “Sauhira” as “*Sarandhratvam*” which means “with pores”.¹⁰ Osteoporosis means the decline in the bone tissue. Osteopenia is a pre-stage (prodromal symptom) of osteoporosis. Osteopenia presents with decrease in the bone mineral density and *asthivedana* (pain in bones). In rajonivrutti, Majjakshaya is followed by *asthi kshaya* after fundamental of anulomkshaya.

According to Sushrutacharya; asthi remains in its own state even after death for a long time.¹¹ Kshaya is ‘*Kshiyate anenaiti Kshaya*’; ‘*Kriya kshayakarattwatu Kshayaityucyate budhaihi*’; ‘*Kshayavyadhi visheshaha*’¹². Decreases in quality and /or quantity is kshaya. *Asthi kshaya* is decrease in bone tissue. *Asthi kshaya* plays as *asthibheda*, (*asthisula* (pain in bones), *keshalomanakha*, *smashru*, *dantavikara* and *paata* (disorders of hair, nails, teeth), *sandhi shaithily* (flaccidness of joints), *rukshta* (dryness). *Asthidhatwagnimandya* leads to the abnormality in the transformation of poshakadhatu (Dhatu

specific nutrients) into poshya/sthayaisthidhatu, resulting in *Asthidhatuvikriti*. Generalized osteoporosis may be primary or secondary. Primary Osteoporosis is often due to aging and natural menopause in women. Osteoporosis caused or worsened by other disorders or medication exposures is referred as ‘Secondary Osteoporosis’. Bone mineral density (BMD) is the most important tool for the diagnosis of osteoporosis. The gold standard for measuring BMD is the dual-energy X-ray absorptiometry (DEXA) densitometer, a specialized X-ray device that precisely quantifies BMD at the spine, femur, and other skeletal site. Therefore, screening of women post age of forty must be encouraged.

Symptoms :

Menopausal women usually show following symptoms :

1. Ushnaanubhuti Daha (Hot flushes)
2. Mutradaha (burning micturition),
3. Yonidaha,
4. Santapa
5. Krodha (anger),
6. Trushnakshudhadikyata (excessive thirst and hunger)
7. Svedaadyata (Excessive sweating),
8. Glani (drowsiness),
9. Shirashoola (Headache),
10. Balakshaya (Weakness),
11. Vibandha (Constipation),
12. Anidra/Alpanidra (Sleeplessness),
13. Anavasthitachitvatvam (Mood swing),
14. Chinta (Anxiety),

15. Krichchhra Vyavayata(Loss of libido),
16. Maithuna asahishnuta (Dyspareunia),
17. Sandhivedana (Joint pain),
18. Yoni Shushkata (Vaginal dryness).

Management :

Ahara (Nutrition) : Diet having low calcium, magnesium and vitamin-D; smoking or tobacco in any form, lack of exercise (sedentary life style), alcoholism, advanced age, history of fracture as an adult are etiological factors in postmenopausal osteoporosis. The nutrients of most standing to bone health are calcium and phosphorus, since they compose 80-90 percent of the mineral content of bone. Adequate calcium intake is important, with the current NOF guidelines recommending 1200 mg daily for women. Absorption of calcium citrate may be as much as 24% more than with calcium carbonate. In postmenopausal women, the intake of vitamin D should be in addition to sunlight exposure. 180-350 ug /day Vitamin K may be needed. Dried plum in its whole form has been observed to prevent bone loss in postmenopausal women, with long-lasting bone-protective effects.¹² Postmenopausal women who previously consumed 100 g dried plum per day during one-year clinical trial retained bone mineral density to a greater extent than those receiving a comparative control.¹³

A dietary pattern study encouraged the intake of fruit, vegetables, whole grains, poultry and fish, nuts and legumes, and low-fat dairy products and discouraged the intake of soft

drinks, fried foods, meat and processed products, sweets and desserts, and refined grains showed a beneficial impact on bone health. Overall, devotion to a healthy dietary pattern can improve bone mineral status and reduce the risk of osteoporosis.¹⁴

Vihara :Lifestyle modification; Adequate physical activity is needed for maintaining bone health. Randomized clinical trials show that exercise training can prevent /minimize/reverse almost 1 % bone loss per year in both pre and postmenopausal women.¹⁵

Yoga and pranayama: Structured yoga- asanas, Pranayama, and Suryanamaskar induce improvement in BMD in postmenopausal osteoporotic female. Motorwala et al have reported Improvement in T-score of DEXA scan.¹⁶ Walking as a singular exercise therapy for 6 months has shown significant effects on BMD at the femoral neck.¹⁷

Aushadhi :Drugs having rasayana, deepana, pachana, medhya, balya, vayasthapana properties help in building dhatu and hence are beneficial in rajonivrutti and rajonivruttijanyaasthikshaya. Some of the drugs of medicinal importance are :

Shatavari :**Asparagus racemosa** and kukkutandtwakbhasma :

Earlier in randomized controlled study; Jaypee J has reported that Kukkutandatwakhbhasma decreases bone resorption. Shatavari increases serum calcium and decreases levels of urine calcium indicating

role of shatavari in bone formation as well as bone resorption.¹⁸

Ashwagandha (*Withania somnifera*)

Withania somnifera increases serum calcium levels. Fasting urinary calcium and phosphorous estimation are also considered as a useful tool for estimating net bone resorption. Treatment of ovariectomized rats with methanolic extract of *Withania somnifera* has significantly decreased urinary calcium excretion suggesting its role in bone resorption.¹⁹ In another study by Gupta D, Ashwagandha- Arjuna Ksheerapaka has shown highly significant improvement in Asthivedana and Sandhi vedana.²⁰

Asthishrunkhala (*Cissus quadrangularis* linn.)

Commonly known as the “bone setter,” the plant is referred to as “Asthisamdhani” in Sanskrit and “Hadjod” in Hindi because of its ability to heal bones fractures. It also helps early regeneration and quick mineralization of the callus.²² *C. quadrangularis* accelerates bone healing by acting as a glucocorticoid antagonist.^{23,24} It not only expedites the remodeling process of the healing bone, but it also increases bone tensile strength and reduces fracture healing time. Bones weakened by treatment with cortisol were healed faster with *C. quadrangularis* owing to its anti-glucocorticoid property. It also enhances bone formation.²⁴ The stem extract of this plant contains a high percentage of calcium ions and phosphorus, both essential for bone growth.²⁵ The calcium ions,

phosphorous and phytoestrogens present in this plant extract help in the process of ossification and fracture healing.²⁶

Kusumbha :Safflower (*Carthamus tinctorius* L.)

An increase in uterus weight in ovariectomized mice and an increase in seminal vesicle weight in castrated mice treated with Safflower has been observed; indicating its estrogenic activity.²⁷ Safflower has shown potent calcium antagonistic action.²⁸ Oral administration of safflower seed oil at a dose of 1 ml/kg to ovariectomized rats for 30 days showed improvement in serum levels of insulin-like growth factor-I (IGF-I), IGF-II, insulin like growth factor binding protein-3 (IGBP-3), estrogen, total alkaline phosphatase (TALP), bone-specific alkaline phosphatase (BALP), calcium and phosphorous in serum: compared to the vehicle treated ovariectomized control rats. Safflower seed significantly accelerates rates of osteoblast differentiation.²⁹ Phytoestrogen rich safflower seeds demonstrated proliferation of osteoblasts indicating a protective effect on bone loss caused by estrogen deficiency.³⁰

Bakuchi (*Psoralea corylifolia*) :

Bawachi (*Psoralea corylifolia* (PC) extract is found to regulate Calcium levels as well as decreases urinary osteocalcin resulting in positive effects on bone mineral density as well as bone formation.³¹ The flavonoids corylin and bavachin of *P. corylifolia* stimulate bone formation and reduce osteoporosis.³²

Dadima (Punica granatum):

Punica granatum was found to exhibit anti-osteoporotic activity in ovariectomized rat model of osteoporosis where increase in femur length, weight and density, increase in serum calcium, phosphorus was observed. It also has a stimulatory effect on osteoblastic.³³

Panchtiktaghuta: Munshi et al have reported Improvement in the BMD scores and significant improvement in the bone-specific biomarkers, namely serum vitamin D, osteocalcin, and TRAP-5b, in the Panchtiktaghruta guggul untreated group compared with the standard treatment group. Panchtikta Ghruta guggulu slows down the bone degeneration processes indicating potential benefit in osteopenia.³⁴ Other ayurvedic medicines rich in calcium which are frequently used to treat asthikshaya are Pravalbhasma, Pravalpishti, Mukta shuktibhasma, Shankha bhasma, Kapardika bhasma, Kukkutandatwak bhasma, Guggulu kalpa: Lakshadi Guggulu, Abhadi Guggulu, Trayodashang Guggulu, Yograj Guggulu.

Basti Chikitsa: Basti Chikitsa is the main treatment for Vatadosha. Basti plays an important role in strengthening the AsthiDhatu and also reduces Asthikshaya. Vagbhata had mentioned Tiktaksheera Basti in the treatment of Asthikshaya. For Asthipra doshaja Vikara, Charakacharya has given the similar line of treatment which include Basti with Kshira, Ghrita and Tikta Dravya.³⁵

Panchtikta ksheerbasti has shown positive effects on BMD and has proven its ability to repair degeneration of bones & cartilages.³⁶

DISCUSSION :

Menopause is inevitable. Ayurveda describes menopause as Rajonivrutti and it is a part of ageing process (jaravastha). There is anuloma kshaya in jaravastha where Rasa, rakta, Mamsa, meda asthi, majja and shukra dhatu start depleting. Asthikshaya in menopausal women is of concern as this may lead to fractures. Ayurvedic management of menopausal asthikshaya is based on bringing homeostasis of vata, pitta and kahpa dosha. Ayurveda takes integrated approach in prevention and treatment of a disease. Rajonivrutti kala affects body and mind both. Therefore though the manifestation is asthidhatu kshaya; there is indeed an involvement of manas doshas. Ayurveda takes care of body, mind and soul while treating the patient. As the predominance of Vata is seen in menopause the vatashamak dravyas along with Basti is highly recommended. There is also an association of Pitta dosha; which is manifested through hot flushes. In these cases; different types of ghruta fortified with pittashamak herbs are beneficial.

CONCLUSION:

Menopause has been considered as a part of Jaravastha (Ageing process). Due to ageing; the risk of low bone mass and osteoporosis (Asthikshaya) is also increasing. The diet, lifestyle

, medicines and Panchkarma can help in the maintenance of bone health. These modalities reduce osteoporosis, enhance bone remodeling. Herbs that are rich in phytoestrogens, exercise, calcium and vitamin D supplementation can slow down the process of Asthikshaya. There is a scope of more clinical work to be done in this direction.

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