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An Analysis of the Effects of *Basti Kalpana* on *Asthikshaya* in Relation to Osteoporosis and Its Biomarkers - Review Article

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ABSTRACT

A condition known as Asthikshaya affects the Asthi dhatu and is brought on by vitiated Vata dosha or Srotorodha. People with characteristics of Asthikshaya are falling of hairs, nails, hairs of beard including mustaches and teeth, exertion and looseness of joints, pricking sensation in bones. Osteoporosis is the condition that bears the most likeness to this in allopathy medical science. It can be defined as a systemic skeletal disease characterized by low bone density and increase in bone fragility which leads to higher susceptibility to senile fractures. This sickness is becoming more common every day, and conventional sciences are only partially effective in treating it. The best treatment for vata dosha, according to ayurvedic science, is basti. Therefore, an effort has been made to compile all the greatest basti kalpana therapeutic references, with a focus on asthikshaya or osteoporosis. To choose an appropriate course of treatment, every problem must be detected early and sensitively. On the basis of many biomarkers for osteoporosis or asthikshaya, there are numerous diagnostic methods available. The objective of the current review study is also to compile several asthikshaya-related biomarkers in one place.

Keywords: *Asthikshaya*, osteoporosis, biomarkers, *vata, basti*.

INTRODUCTION

Basti, the prime treatment in *Panchkarma* is also considered as *Ardhachikitsa* (half of the treatment) in ayurvedic classical literature.[1] In the *basti* procedure drug is administered through anal canal and it reaches to colon region. Human colon is highly involved in absorption of water, electrolytes and transport of intra luminal contents. *Pakwashaya* is mentioned as prime shelter of *vata*. Though *vata* perform many important physiological functions in body such as *Vayutantrayantradhara*, It provides not only strength to support the body but also protect vital organs[2] .Vitiated *vata* causes many disorders such as *vinihanti garbhan* (miscarriage), *garbha vikriti* (malformed pregnancy), *garbha atikala dharan* (too long pregnancy), *bhaya* (fear), *shoka* (mourning), *moha* (affection), *khanjata* (bilateral amputee), *kubjata* (hump), *parva sankocha* (shortness of joints), *asthi bheda* (pricking pain in bones), *parva bhed* (pricking pain in joints) etc.[3]

In *vata vayah kala* patient frequently suffers from impaired skeletal maintenance and bone becomes relatively more fragile because of *vayu*. The *Asrayasrayi* inter-relationship of *asthi* and *vayu* relates them inversely proportion, increase of *vata* causes *asthidhatu ksaya*.[4] Commonest symptoms or signs in *asthidhatu ksaya* is pain or

tenderness of bone, increase in fragility of bone, falling of hairs, nails, hairs of beard including moustaches and teeth, exertion and looseness of joints. On the basis of signs and symptoms *asthikshya* can be correlated with osteoporosis.

Osteoporosis is a pathological condition where loss of bone mass occurs throughout the skeleton due to more bone is resorbed than laid down. Two types of osteoporosis are described in text. One is type I osteoporosis, this is related with deficiency of protective mechanism of estrogen hormone and another is type II osteoporosis which is actually senile osteoporosis.[5] The biomarkers are the biochemical, genetical, molecular indicator found in body which actually marks normal or abnormal body functions. The detection of these biomarkers helps to diagnose disease, monitoring of response of medicine and progression of disease.[6] Total alkaline phosphatase (ALP), bone alkaline phosphatase (BALP), osteocalcin (OC), hydroxyproline (HYP), osteopontin (OP) etc. are the biomarkers suggest normal or abnormal bone metabolism. It also includes Bone mineral density (BMD), serum calcium, vitamin D, trabecular bone score, DEXA (dual energy x-ray absorptiometry) all these are strongly related with bone remodeling process so detection of these biomarkers provides clear picture of bone health and use to detect osteoporosis.

MATERIAL AND METHODS

The main sources of knowledge include Ayurvedic literature, textbooks, books on contemporary medicine, and reliable internet sites. To accomplish the goal, critical examination of each of these materials will be done.

REVIEW OF LITERATURE

A disorder should be studied on three parameters which are *hetu*, *linga* and *aushadha*.

The reference of *asthidhatu kshaya* found in charak samhita, sushruta samhita, astang sangraha, astang hrudaya, bhavaprakash and harita samhita.

Hetu or etiological factors of *asthikshaya* separately not explained by any acharya but general cause of *kshaya* are well indicated by acharyas as Acharya Charak mentioned excessive exercise, intake of dry vegetables, dieting, stress etc. are common cause of any kshaya.[7] Almost all these factors vitiate *vata dosha*. Rather on other hand writer of astang hrudaya suggested that illuminated *dhatvagni* is the main cause of *dhatukshaya* [8]and *astang sangrahakara* writes that *swaguna hani* is main cause of any *kshaya*.[9] Symptoms of *asthikshaya* are well assembled by Shilpa M. Gabhane et. Al in their article.[10]

Symptoms	**Charak**	**Sushruta**	**Astang sangarah**	**Astang hrudaya**	**Bhavaprakash**	**Harit samhita**
Degradation of teeth	+	+	+	+	+	-
Falling of hairs of scalp	+	-	+	+	-	-
Falling hairs of body	+	-	+	+		-
Falling of hairs of beard and mustaches	+	-	-	+	-	-
Degradation of nails	+	+	+	+	+	-
Tiredness	+	-	-	-	-	-
Loosing of joints	+	-	+	-	-	-
Roughness	-	-	+	-	-	-
Dryness	-	+	+	-	+	-
Pain in bones	-	+ (*asthi shula*)	+ (*asthi toda*)	+ (*asthi toda*)	+ (*asthi shula*)	-
Desire to eat flesh attached to the bone	-	-	+	-	-	-
Slow efforts	-	-	-	-	-	+
Deficiency in semen	-	-	-	-	-	+
Loss of consciousness	-	-	-	-	-	+
Weakness	-	-	-	-	-	+
Bodyache	-	-	-	-	-	+
Inflammation	-	-	-	-	-	+

We also suggest that *asthisaushirya* which is a sign of *majjadhatudhatu kshaya* should consider as later on stage of *asthikshaya*. Commentator Hemadri has commented *saushirya* means *sarandhratvam*. *Asthisaushirya* or increase in porosity of bone may leads to *bhagna* afterwards. This pathogenesis follows pattern of *anulom kshaya*.

The *asthidhatukshaya* may cause further smooth bending of *nalakasthi* (rickets), Genu varum and Genu valgum.[11]

Osteoporosis is a metabolic systemic disorder which affects bone mass and causes micro architectural deterioration of whole skeleton.[12] In osteoporosis more bone is resorbed than laid down which increases fragility of bone and risk of fracture. Risk factors associated with this disorder are female, early menopause, old age, positive family history, low dietary calcium intake, sedentary lifestyle, smoking, excessive exposure to alcohol and caffeine, high protein intake and endocrinal disorders.[13] Two types of osteoporosis are described in text. One is type I osteoporosis; this is related with deficiency of protective mechanism of estrogen hormone and another is type II osteoporosis which is actually senile osteoporosis. Signs and symptoms of osteoporosis are bony pain, loss of mobility, kyphosis, loss of height, higher risk of fracture. Some special conditions are associated with osteoporosis causes special features. Such as - Osteoporosis circumscripta cranii is localized osteoporosis of skull. Osteoporosis of disuse is due to lack of normal functional stress. Glucocorticoid osteoporosis is due to long term use of glucocorticoids agents. Post traumatic osteoporosis is due to damage to nerve supply.

Review of biomarkers

For early detection of osteoporosis reliable, rapid, cost effective and good sensitive biomarker is required. Bone mineral density, total blood calcium, vitamin D, alkaline phosphatase, P1NP (Pro collagen type 1 N propeptide), trabecular bone score, osteocalcin, DEXA (dual energy X- ray absorptiometry) are the most common biomarkers which indicates bone health.

BMD (bone mineral density): - bone density is within 1SD (+ 1 or - 1) of the young adult is normal. -2.5 SD or more below bone density suggests osteoporosis. [14]

Vitamin D: - normal range recommended by experts between 20-40 ng/ml. <20 ng/ml level of vitamin D is insufficient to provide appropriate bone mineral density.

Total blood calcium: - between 8.5 to 10.5 mg/dl is required amount of total calcium in blood. Negative calcium balance results osteoporosis.

Alkaline phosphatase: - normal range of ALP is 44-147 IU/L. ALP is predictor of bone mineral density in postmenopausal females elevated level of ALP suggest chances of osteoporosis.

P1NP (Pro collagen type 1N propeptide): - it's a bone formation biomarker, higher the value of P1NP indicates more bone formation is taking place.

Trabecular bone score: - TBS >1.350 is considered normal. <1.350 TBS related with degraded microarchitechure.

Osteocalcin: - The reference intervals for osteocalcin are about 1.1 to 11 ng/ml in case of normal male and for normal female it is 0.7 to 6.5 ng/ml. Higher value of osteocalcin is indicator of free osteocalcin in circulating blood which is not performing its normal action of mineralization of bone.

DEXA (dual energy X- ray absorptiometry): - DEXA is the gold standard for measuring BMD. It measures strength and thickness of a bone which is necessary to evaluate chance of osteoporosis.

Review of basti kalpana in asthikshaya: -

A clinical study was conducted over 12 patients of osteoporosis, *majja basti* along with *asthishrinkhala* capsules were advised to patients. Results from collected data shown that 12.50% patients got marked and mild improvement rather 75% patients got moderate improvement.[15]

A case study published in Ayushdhara journal, represented effectively cure of pain in b/l knee joint and hip joint with the help of *tikta ksheera niruha basti*. In the part of discussion author claims that drug of *ksheerbasti* actually reach to *purishdhara kala* of *pakwashya* and according to acharya dalhan *purishdharakala* is nothing but *astidhartakala*.[16]

One more clinical study was published in same journal, this study was done in continuation to find out effect of *Guduchi sidhha ksheera basti* in osteoporosis. Obtained results for parameter *asthi toda* was highly significant with 59.90% improvement. Similarly on another parameter i.e., *sparsha asahyatava* the basti gave 76.60% result which was considered as highly significant also basti was effective to reduce mean value of BMD 't'score.[17]

January 2014, a case report was submitted to journal of AYUSH, this case study has evaluated effect of *lakshadi guggulu*, *tiktadi oil matra basti* and *tiktadi ksheer basti* in *asthikshaya*. They found group of patients who were medicated with both oral medication (*lakshadi guggulu*) and *basti* administration showed significant change in BMD (T- score).[18]

Vd. Devashree et. Al studied the effect of *panchtikta ksheer basti* in *asthikshaya*, 180 ml of administration of oil for 2 months in 30 patients gave effective result in both subjective (*asthishool*, *katishool*, *sandhishool*) and objective parameters (BMD T-score).[19]

Panchtikta ksheer basti was found very effective in one more study done by Vd. Vipin Kumar and Dr. Sonu. As *panchtikta ksheer basti* is indicated in *asthi pradoshaj vikara*, it reaches to *asthivaha srotas* and acts on *partihvagni, vayavagni and tejasagni* then it get transformed in *asthi poshakamshas*, claims the author.[20]

JAIMS gave place to a comparative clinical study which evaluated role of *basti karma* versus role of *virechana karma* in post-menopausal *asthikshaya*. In their work author administered *yashtimadhu sidhha ksheerbasti* (*yoga basti*) in 20 subjects and they find 90% patients get moderate relief.[21]

DISCUSSION

In today's perspective where poor life style, poor dietary habits are common, the incidence of *asthikshaya* is a burning problem. Women after menopause, old age, lack of calcium intake, smoking, alcoholism are the main predisposing factors of osteoporosis. *Asthikshaya* or osteoporosis further leads to increase tendency of fractures. For any disorder early and confirmatory diagnosis are mandatory, biomarkers provide a good picture of what the actual chemical reaction is happening within the body. In case of osteoporosis where rate of formation of bone is less than resorption, bone markers in blood and urine helps to detect severity of disease. There are multiple bone markers but DEXA is said to be the gold standard to detect osteoporosis as it clearly signifies the thickness and strength of a bone. -2.5 SD or below this amount of BMD suggests osteoporosis. Supplements of calcium and vitamin D, bisphosphonates, hormone therapy are the management advocated in conventional medical system but all these have mild to moderate side effects. Ayurveda suggest very scientific treatment of this disorder that is *basti kalpana*. As any kshaya can occur due to vitiated *vata dosha*, *asthi* is the seat of *vayu*, vitiation in this *dosha* may cause *asthikshaya*. *Basti* is the procedure recommended as best treatment for vitiated *vata dosha*. Different preparations of *basti kalpana* such *majja basti*, *tiktaksheer basti*, *guduchi sidhha ksheer basti*, *panchtikta ksheer basti* gave effective result in *asthikshaya*. *Majja* is the *dhatu* fills the space of *asthi dhatu*, according to *samanya* principle when processed *majja* of any animal administered in *pakwashaya* region reach to *asthi dhatu* and increases the strength and density of bone. Similarly different *ksheera basti kalpanas* approach to *basti dhatu* and increase calcium level. Acharya Arunadatta, explains the mode of action of *Panchatikta ksheer basti*,

according to acharya it has dual nature i.e. *snigdha* and *shoshana*, which produces *khara guna* which enhances *asthi dhatu* by *samanya* principle. Vitiated *Vata Pitta doshas* pacified by decoction made in *ksheer*, ability to cross micro channels of *saindhava lavana* help to target the *asthi dhatu* and bone get nourishment.

RESULTS

Osteoporosis also increases the likelihood of fractures. Bone markers in blood and urine aid to detect the severity of the disease. Asthi is the seat of Vayu, and since any kshaya can result from a vitiated Vata dosha, vitiation in this dosha may result in asthikshaya. It has a dual nature, according to Aacharya, consisting of Snigdha and Shoshana, which results in kharaguna and strengthens asthidhatu through samanya. According to the Samanya principle, when processed Majja from any animal is administered in the pakwashaya region, it reaches the asthidhatu and increases the strength and density of bone which fills the space of the asthidhatu.

CONCLUSION

Basti treatment is considered as half of the treatment. It is harmless to all age group persons such as *bala vrudh* and *yuva*. It helps in curing all the diseases and promotes happiness, longevity, strength and *agni*. [22]As osteoporosis is considered as metabolic disorder and *basti kalpana* helps to increases metabolic fire hence *basti kalpana* is effective in osteoporosis. According to ayurveda literatures *asthikshaya* is due to vitiated *vata dosha* or due to *srotosangh*, *basti kalpana* is type of *shodhana* procedure and it eliminates vitiated and corrects the all the channels in body along with that *basti kaplana* also helps to correct *vata dosha*.

Declaration by Authors

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