



PHYSIOLOGICAL STUDY OF ASTHIVAHA SROTAS AND CLINICAL EVALUATION OF SHATAVARI ON POST MENOPAUSAL OSTEOPOROSIS

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ABSTRACT

Asthi kshaya is one of the degenerative disorders described by Ayurveda, where there is Kshaya of Asthi dhatu. There is a reduction in bone density in osteoporosis, which contributes to fragility and fracture. Asthi kshaya can also be compared to Osteoporosis. Osteoporosis is the most prevalent disease involving the elderly. Vata vriddhi triggers Asthi kshaya because of a mutual bond held by both Ashrayashrayi bhava. Though the treatment mentioned for Asthi kshaya in classics is Tikta Rasa drugs and usage of swayoni dravyas. As this disorder arises during Jara avastha, drugs having properties like Rasayana, Balya, Vatashaamaka and Vedana shamaka, Thikta rasa Shatavari was used. To study the efficacy of Shatavari the present study was undertaken on 30 patients of post-menopausal osteoporosis. Thirty patients who were diagnosed to be osteoporotic was taken into a single group, and Shatavari Churna 6 gm was given twice a day in divided dose for months along with Go-ksheera as anupana. Follow-up was done every 15 days during the course of the treatment and one month after the trial period. The treatment was more effective in the subjective parameters Asthivedana, Katishoola, Shrama, Keshapatan and Sandhishool. The treatment was moderately effective in objective parameters like bone markers of bone formation i.e. Serum calcium, serum alkaline phosphatase. The drug may act as anti-oxidant, anti-inflammatory, immunity booster and anti-aging. It can be used as a cost-effective quick treatment on an O.P.D basis with no side reactions and better outcomes. More studies with larger samples, a comparative study, a pharmaceutical and an observational study would be useful in order to authenticate the results reported in this study.

Keywords: Asthivaha Srotas, Post-Menopausal Osteoporosis, Shatavari

INTRODUCTION

Ayurveda lays more emphasis on the maintenance of health by preventing disease. It has been shown to be successful against new diseases that are evolving as a result of changing lifestyles and changing dietary habits. Indeed the status of women's health is fully related to the society in which she lives her place, as well as to the way in which she lives her life as an individual.

Aging is a real challenge for women. Post-menopausal osteoporosis is a condition of major health importance because of its association with fractures. Post-menopausal osteoporosis is regarded as a condition which is manifested due to estrogen deficiency in women.

Treatment of established bone loss is difficult. The place of Hormonal Replacement Therapy as the gold standard treatment for osteoporosis is now challenged as evidence for its effectiveness has come under great scrutiny and uncertainties about long term effects on coronary heart disease have emerged. Over the past decade a number of non-hormonal options have become available for prevention of osteoporotic fractures, yet no current available treatment modalities have potency to restore reduced bone density to normal.

Therefore, to provide an effective treatment, an effort has been made to improve the quality of life which shall render a great value to the society. Shatavari is the well-known herb used for promotion of women health at different stages of her life. Here, in the present study, an attempt is made to determine the effect of shatavari in preventing bone loss in post-menopausal women and hence minimizing the risk of postmenopausal osteoporosis.

Asthivaha Srotas - Acharya Sushruta has not mentioned Asthi vaha srotas in his eleven pairs of srotas, whereas Acharya Charaka has included Asthivaha srotas as one among thirteen srotas mentioned by him. Asthi vaha srotas mula - Meda and Jaghana. (Ca. V. 5 / 8)

Causes of Vitiating of Asthivaha Srotas -

1. Over indulgence in exercise causing excessive pressure and abrasion of bones.
2. Intake of food that vitiates vata.

Asthi and Vayu Relationship - According to the principles of Aashraya-Ashrayee Bhava, Asthi Dhatu is the seat of Vata Dosha. Asthi & Vata are inversely proportional to each other regarding Vriddhi & Kshaya. Vriddhi Vata leads to Kshaya of Asthi. (A.S.Su-20/1) So, if there is Vata Vriddhi that will lead to Saushirya in Asthi Dhatu causing Asthi Kshaya.

Disease Review – Ayurvedic: In Jarawastha, there is natural decline in quality and quantity of all dhatus. (Ca. Vi. 8 / 122) This gradual decline of all dhatus is attributed to the dominant Vata dosha in this stage of life. Postmenopausal osteoporosis is a condition unique in women, where there is excess decline in Asthi dhatu. Following is an attempt to understand Nidana panchaka of this disease in context of Ayurveda. Nidana are classified as Jataja, Sahaja, Svabhavaja, Samhanana and Jara Janya Nidana.

Samprapti Ghataka of Post-menopausal Osteoporosis -

- | | |
|------------|---|
| Dosha | : Vata is the leading Dosha as this is a disease related to Jara and Asthi dhatu. |
| Dushya | : Asthi is main Dushya in this disease with its Mala Nakha and Kesha. |
| Srotas | : Asthivaha srotas is affected. |
| Agni | : In old age, Jatharagni Vaishmya leads to poor Dhatugenesi, by affecting Dhatvagni and Bhutagni. |
| Roga Marga | : Considering involvement of asthi dhatu, it falls under category of Bahya Roga Marga. In later stages, with gradual involvement of joints, (asthi sandhi) it can also be categorized under madhyam roga marga. |

Asthi Saushirya - While commenting on the word 'Saushirya', The literal meaning of the word "Saushirya" means porous bones, which is similar to osteoporosis. Acharya Charaka has mentioned the symptoms of Majja kshaya. (Ca. Su. 17 / 68) which means that Asthi becomes weak and light in weight, as well as there is feeling of bones being broken down. Diseases of vata dosha always affect such a person.

Modern Review: The World Health Organisation describes osteoporosis as a "progressive systemic skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increase in bone fragility and fracture susceptibility."

Classification of Osteoporosis-

Primary- 1. Post-menopausal: Type I and 2. Age related: Type II

Secondary - Endocrine, Drugs, Inherited, Nutritional

Drug Review – Shatavari (Asparagus racemosus): It is a Rasayana herb and it is widely accepted as female rejuvenative. Since hundreds of years, Shatavari has been used as anti-ageing as well as women's tonic. Postmenopausal osteoporosis is regarded as a condition, which is manifested due to oestrogen deficiency in women. It contains steroidal saponins and isoflavones as chemical constituents that fall under group of phytoestrogens. Phytoestrogens are natural estrogens that provide estrogenic activity in body.

Properties – Shatavari possesses Tikta, Madhura Rasa, Guru, Snigdha guna, Sheeta Veerya, Madhura Vipaka and Rasayana prabhava. Acharya Kashyap has mentioned the use of Shatavari during the reproductive period and also after the cessation of menstruation. (Ka. Ka. 7) Tuberos roots are used in powder form of dose 3 to 6 grams.

Chemical constituents - Sarsapogenin, Saponins, A4-A7 glycosides of quercetin, Rutin, 4 saponins viz shatavarin I-IV, hyperoside, diosgenin, sosterol, polycyclic alkaloid, stigmastrol isoflavones, asparagine A and disaccharide in roots.

Active constituents - Steroidal saponins – known as shatavarin I to IV. Shatavarin I is the major glycoside with 3 glucose and thamnose moieties attached with sarsapogenin. Shatavarin IV contains alkaloids, proteins, starch and tannin. Isoflavones, Steroidal saponins are classified under Phytoestrogens.

AIMS AND OBJECTIVES

The present research work was planned with following aims and objectives-

1. To study the disease postmenopausal osteoporosis – as per Ayurveda and modern concept.
2. To assess the effect of Shatavari in minimizing bone loss.

MATERIALS AND METHODS

For clinical study, patients attending OPD and IPD OF J.I.A.R hospital presenting risk factors for developing the disease were registered. The drug Shatavari Moola Churna was prepared in the pharmacy of J.I.A.R.

Inclusion criteria - Women having menopause of age group 40 -60 years and presenting one or more risk factors for developing osteoporosis.

Exclusion criteria - Females suffering from chronic conditions like chronic renal failure, chronic liver disease, carcinoma will be excluded from the study.

Criteria of Assessment - The assessment was done on the basis of subjective as well as objective criteria.

Subjective criteria - Treatment effects were assessed on the basis of relief in Asthikshayatmaka lakshana with the help of a particular score pattern as reported in the study proforma.

Scoring pattern:

Symptom	Score
Asthivedana	
None	0
Only on movement	1
Pain without movement at rest	2
Pain even at night	3
Katishoola	
No pain	0
Occasional pain	1
Pain killer needs once a week	2
Totally dependent on painkiller	3
Sandhishoola	
No pain	0
Mild pain & no difficulty in walking	1
Slight difficulty in walking	2
Much difficulty in walking	3
Shrama	
No fatigue	0
Fatigue occasionally on doing heavy work	1
In carrying out routine work	2
Even without doing work	3
Kesha Patan	
Absent	0
Hair fall on washing	1
Hair fall on combing	2
Hair fall on Simple stretching	3

Objective Criteria - To assess the effect of treatment on bone degradation, biochemical bone markers were used before treatment (BT) and after treatment (AT) to detect any change in rate of bone formation and bone resorption. Marker level of Bone formation i.e Serum calcium (8.5-10.2mg/dl), Serum Alkaline Phosphatase (20-140 IU/L). Marker level of Bone Resorption i.e Urine calcium (20-275mg), Serum Acid Phosphatase (<2ng/ml).

OBSERVATIONS - Status of 30 patients of Post-menopausal Osteoporosis

Status	No. of Patients	Percentage
REGISTERED	30	100%
COMPLETED	30	100%
LAMA	0	0%

Age wise distribution of Patients

Age	No. Of patients	Percentage
40-45	19	63.53%
46-50	7	23.33%
51-55	3	10%
56-60	1	3.33%

Majority of the patients i.e. 63.34 % belonged to the age group of 40-45 years, whereas 23.33 % of patients were between the age group of 46 -50 and 10 % were from 51-55 years of age group

Duration of Menopause wise distribution

Duration	No. of patients	Percentage
< 2 YEARS	16	53.34%
2-4 YEARS	6	20%
4-6 YEARS	3	10%
>6 YEARS	5	16.66%

Duration of menopause when the patients were registered was less than 2 years in 53.34% of patients. In 20% of patient duration was between 2 to 4 years, in 16.66% patients, it was more than 6 years and in remaining 10% patients, the duration was between 4 to 6 years.

Menopausal Age wise distribution of patients

Menopausal age	No. Of patients	Percentage
35-40YEARS	7	23.54%
40-45 YEARS	10	33.33%
45-50 YEARS	10	33.33%
50-55 YEARS	3	10%
NATURAL	25	83.34%
SURGICAL	5	16.66%

The age at menopause was between 40-45 years and 45-50 years in 33.33% patients each. In 23.34% of patients, menopausal age was between 35-50 years. Maximum number of patients i.e. 83.34%, had natural menopause whereas 16.66% underwent hysterectomy.

Marital status wise distribution of patients

Marital Status	No of Patients	Percentage
MARRIED	24	80%
UNMARRIED	3	10%
WIDOW	2	6.67%
DIVORCEE	1	3.33%

80% were married, 6.67% of patients were widow, 10 % were unmarried.

Age of Menarche wise distribution of patients

Menarche Age	No. of Patients	Percentage
12-14 YEARS	19	63.5%
14-17YEARS	7	23.33%
UNKNOWN	4	13.37%

Age at menarche was between 12-14 years in 63.3% patients and between 14-17 years in 23.33% patients. In the remaining 13.37% patients, the age at menarche was unknown.

Parity wise distribution

Parity	No. of Patients	Percentage
NULLIPARA	2	6.66%
MULTIPARA	28	93.34%

Majority of the patients registered were multipara i.e. 93.34% and remaining 6.66% were nullipara.

Sharira Prakriti

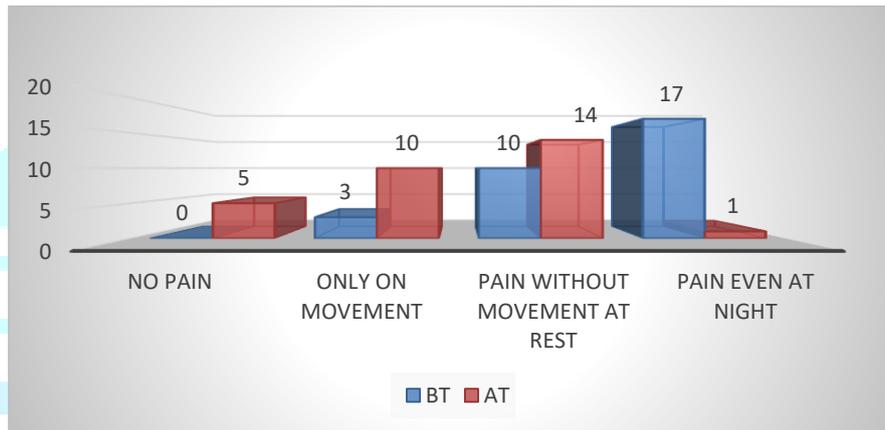
Prakriti	No. of Patients	Percentage
VATA PITTA	18	60%
VATA KAPHA	9	30%
PITTA KAPHA	3	10%

Prakriti parikshana of all the registered patients indicated that maximum number of patients were of vata pitta prakriti – 60 % followed by vata kapha prakriti – 30 %. Remaining 10% patients showed pitta kapha prakriti.

Menopausal Symptoms wise distribution

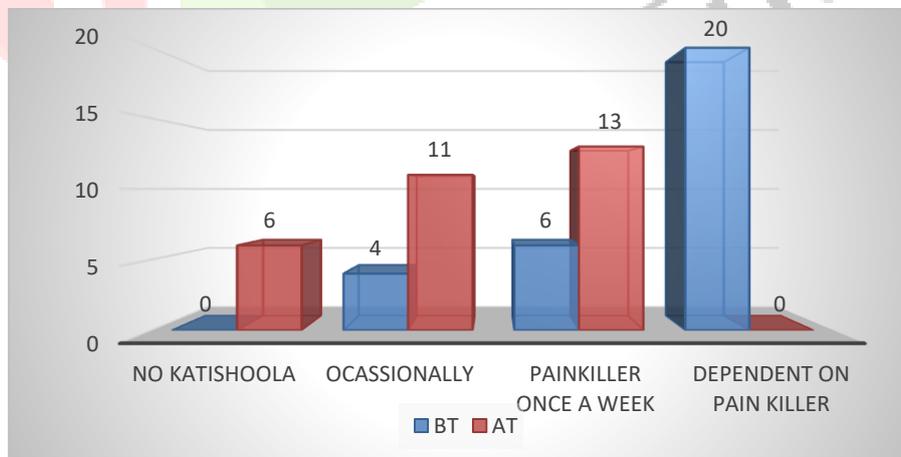
Symptoms	No. of Patients	Percentage
DIFFICULTY IN WALKING	26	86.66%
BONEPAIN	28	93.3%
EXTREME FATIGUE	27	90%
LOW BACK PAIN	28	93.3%
HEART PALPITATION	21	70%
CRAMPS IN LEGS	27	90%
PREMATURE GRAYING OF HAIR	20	66.66%

RESULTS: Effect of Shatavari on Asthikshayatmaka Lakshanas - ASTHIVEDANA

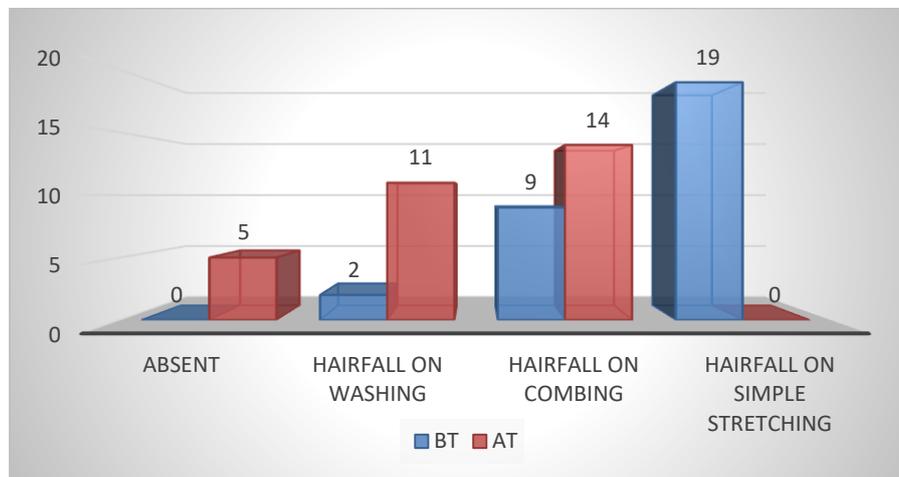


Among 30 patients, 17 patients had pain even at night, 10 patients had pain without movement at rest and 3 patients had pain only on movement before the trial. After trial 5 patients got complete relief from pain, 10 patients remained with pain only on movement and 14 patients remained with pain even without movement at rest and 1 patient remained with pain even at night.

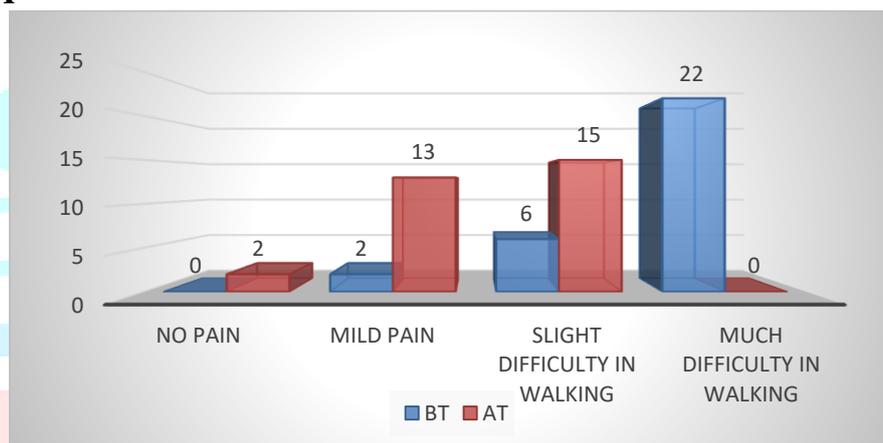
KATISHOOLA



Among 30 patients, 20 patients were dependent on painkiller, 6 patients were taking painkiller once a week and 4 patients had pain occasionally before the trial. After trial 6 patients got complete relief from pain, 11 patients remained with occasional pain and 13 patients remained with painkiller once a week.

KESHPATAN

Among 30 patients, 19 patients had hairfall on simple stretching, 9 patients had hairfall on combing and 2 patients had hairfall on washing before the trial. After trial, 5 patients got complete relief from hairfall, 11 patients remained with hairfall on washing and 14 patients remained with hairfall on combing

SANDHISHOOLA

Among 30 patients 22 patients had much difficulty in walking, 6 patients had slight difficulty in walking and 2 patients had mild pain before the trial. After trial, 2 patients got complete relief from pain, 13 patients remained with mild degree of pain and 15 patients remained with slight difficulty in walking.

Effect of Shatavari on Asthikshayatmaka Lakshana

Symptoms	Mean		M.D	N	Mean %	S.D ±	S.E ±	t value	P value	Sig.
	BT	AT								
Asthivedana	3.0000	1.7667	1.2333	30	53.39	0.4301	0.0785	15.703	0.05	S
Katishoola	3.0000	1.2667	1.7333	30	67.7	0.44978	0.8212	21.108	0.049	S
Shrama	3.0000	1.2000	1.8000	30	81.3	0.40684	0.07428	24.233	0.001	H.S
Keshpatan	2.5667	0.9333	1.6333	30	64.2	0.88992	0.16248	10.053	0.048	S
Sandhishoola	1.0600	0.3600	1.8000	30	76.8	1.0800	0.1900	3.52	0.001	H.S

Effect of Shatavari on Bone markers of Bone formation

Bone markers	Mean		S.D	S.E	t	P
	BT	AT				
Serum Calcium	9.25	9.89	8.63	2.30	3.86	<0.01
Serum Alkaline Phosphatase	50.62	48.04	41.90	11.20	3.45	<0.05

Markers of Bone Resorption

Markers	Mean		S.D	S.E	t	P
	BT	AT				
Urine Calcium	192.3	187.00	84.18	22.50	3.33	<0.01
Serum Acid Phosphatase	2.91	2.9	1.41	0.44	0.22	<0.05

DISCUSSION

Aging is a real challenge for women. Post-menopausal osteoporosis is a condition of major health importance because of its association with fractures. Post-menopausal osteoporosis is regarded as a condition which is manifested due to estrogen deficiency in women.

Bone is continuously being remodeled – old bone is replaced by new bone. In our classics, dhatu nirmana is a continuous phase in the body. Food for all dhatus is given by Ahara rasa and the preceding dhatu of that particular dhatu. Asthi poshaka rasa in Ahara rasa is required for proper nutrition of asthi dhatu. Other way of its nourishment is from medo dhatu (preceeding dhatu). This signifies the importance of Medodhatvagni. Vitamin D, which is derived from sterols, is essential for absorption of calcium in the body. Hence the moola of asthi vaha srotas is rightly considered as meda. Imbalance in asthi dhatvagni leads to improper formation of sthayi asthi dhatu from posaka asthi dhatu. Parathyroid hormone, calcitonin, estrogen etc. play significant role in metabolism of bone. These all can be classified under types of agni acting at different levels and in the case of formation of Majja, Meda dhatu which resides between bone in the formation of Asthi dhatu is known as Majja dhatu. So, Meda dhatu also plays an important role in nourishment of Majja dhatu. The asrasrayi relationship of Vata dosha and asthi dhatu forms a fundamental base to understand any pathological condition related to asthi dhatu. In addition, the treatment of asthi associated disorders is unique because of this relationship. Majja is the Apya Pradhan Dhatu. Vitiated Vata also decreases Majja means Majja dhatu kshaya.

Asthi kshaya is a disease clarified in nearly all of Ayurveda's samhitas. It is explained along with the kshayas of all the dosas, dhatus and malas. The term Asthikshaya itself denotes that it is made up of two terms, Asthi and Kshaya, meaning the depletion of the Asthi dhatu. There is no clear reference in the classics of the Asthi kshaya nidana or the causes that cause the Asthi Kshaya. But the relationship between Asthi dhathu and Vata dosha is beautifully explained through Ashrayaashrayi Bhava mentioned in our classics. According to this rationale, when Vata increases, asthi kshaya occurs and vice versa.

Treatment of established bone loss is difficult. The place of Hormonal Replacement Therapy as the gold standard treatment for osteoporosis is now challenged as evidence for its effectiveness has come under great scrutiny and uncertainties about long term effects on coronary heart disease have emerged. Over the past decade a number of non-hormonal options have become available for prevention of osteoporotic fractures, yet no current available treatment modalities have potency to restore reduced bone density to normal.

Probable mode of action of Shatavari- The probable mode of action of Shatavari on Asthi Saushirya can be explained on the basis of its Rasa Panchaka. Tikta rasa by its Khara and Soshana properties, which is similar to asthi dhatu when used with kshira is asthi vriddhikara. (A. Hr. Su. 11/31) Madhura rasa is vata shamaka and prithvi mahabhuta dominant. This helps in minimizing asthi kshaya. Guru guna is again prithivi mahabhoota dominant and hence can be thought to be acting at the level of asthi dhatu poshana. Tikta rasa along with Snigdha guna is again asthi vriddhi kara. (A. Hr.Su. 11/31) Both these properties are vata shamaka hence prevents kshaya of asthi dhatu. Madhura vipaka acts by virtue of privthvi dominant mahabhoutik constitution.

CONCLUSION

The present observational clinical study signifies the role of Shatavari in Post-menopausal Osteoporosis. The drugs Shatavari is having Vatashamaka properties and the Prithivi mahabhuta dominant in nature. Asthi kshaya is more prevalent in the persons with Vata predominant Prakriti, because vata is the responsible dosha for Asthi kshaya. The line of treatment is based upon Tiktakasaya Rasa, Usna Virya Kaphavatahara properties of the drugs. The drug may act as anti-oxidant, anti-inflammatory, immunity booster and anti-aging. The drug provided significant improvement in Asthivedana, Katishoola, Shrama, Keshapatan, Sandhishool and objective parameters in relative short period of time. It can be used as a cost-effective quick treatment on an O.P.D basis with no side reactions and better outcomes. More studies with larger samples, a comparative study, a pharmaceutical and an observational study would be useful in order to authenticate the results reported in this study.

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