

OBSERVATIONAL STUDY TO ASSESS *ASTHI SARATA* IN POST MENOPAUSAL WOMEN WITH BONE MINERAL DENSITY**¹*Dr. Rashmi Arvind Kumar Dohare and ²Dr. Archana A. Kulkarni**

¹Assistant Professor, Kriya Sharir Department B.S.D.T's Ayurved College, Wagholi, Pune, Maharashtra, India.

²Professor, Roga Nidan Department B.S.D.T's Ayurved College, Wagholi, Pune, Maharashtra, India.

Article Received on
12 March 2022,

Revised on 01 April 2022,
Accepted on 22 April 2022

DOI: 10.20959/wjpr20225-23967

Corresponding Author*Dr. Rashmi Arvind****Kumar Dohare**

Assistant Professor, Kriya
Sharir Department
B.S.D.T's Ayurved College,
Wagholi, Pune,
Maharashtra, India.

ABSTRACT

Ayurveda the science of life focuses on the health of each individual. Various concepts like *Tridosha*, *Sapta Dhatu*, *Trimala*, *Agni* etc have been mentioned in *Ayurveda* to enhance the wellbeing of humans. Dhatus are the one which supports the body to maintain equilibrium. Sarata of the dhatu tells us about the *Bala* of *Dhatu*. If *Dhatus* are *Saravan* then the overall strength of the person against the disease will be good and if diseased, the severity of the disease will be less. *Asthi Dhatu* is the one which does *dharana* and helps in maintaining the posture of the body. As the age progresses, there will be depletion of *dhatu* which will lead to *Dhatu asarata*. *Asthi Asarata* is the most common thing which is observed in post menopausal women. So an observational study was carried out to assess *Asthi Dhatu Sarata*

Lakshanas in post menopausal women with bone mineral density. At the end of the study, it was found that *Asthi Dhatu Sarata Parikshan* is very important to check the quality of bones in elderly women so that the risk of fractures can be reduced to some extent by taking preventive measures with the help of proper diet and medicines in early stages of life.

KEYWORDS: *Asthi Dhatu*, BMD, *Dhatu Sarata*.

INTRODUCTION

Ayurveda aims to maintain the health of a healthy individual and to cure the diseased ones. Various concepts have been mentioned in *Ayurveda* to enhance the wellbeing of humans.

According to *Ayurveda*, *Dosha*, *Dhatu* and *Mala* are the root factors of human body. Those who give support and strength to the living body are called as *Dhatu*.

The purest form of *Dhatu* is called as “*Sara*”. *Sarata* is a factor which tells us about the *Bala* of a *Dhatu*.

Condition of *Dhatu*s should be known that whether they are strong or weak to prevent diseases. To know the strength of *Dhatu*s, *Acharyas* have mentioned *Sarata Parikshan*.

There are eight types of *Sarata* out of which seven are of seven *Dhatu*s i.e., *Rasa*, *Rakta*, *Mamsa*, *Meda*, *Asthi*, *Majja* and *Shukra* and eighth one is *Satva* i.e., mind. Examination of *Dhatu Sarata* is done at physical, social and psychological level.^[1]

Asthi Dhatu is the inner hard core of human being which helps them to stand. *Asthi Dhatu* does *dharan* of body and nourishment of the succeeding *Dhatu* i.e. *Majja Dhatu*. From *ahara rasa*, *rasa Dhatu* is produced and from *rasa Dhatu*, succeeding *Dhatu*s are nourished.

It is always better to prevent the disease than to treat. *Sarata Parikshan* is very essential from both aspects prevention and treatment. So if *Asthi Dhatu* of an individual is strong, then the person is said to be *Asthisara* and will possess stout joints, *Nakha*, *Danta* and thick bones. But the human body continuously undergoes wear and tear process throughout life. So as the age progresses, there will be *Kshaya* of *Dhatu*s which leads to *Dhatu Asara Lakshanas*. *Asthi Asara* individuals can be seen in post-menopausal women due to low oestrogen levels or surgical removal of both the ovaries.

Hence to rule out the strength of *Asthi Dhatu* in post-menopausal women, *Asthi Dhatu Sarata Parikshan* will be helpful.

Menopause is the transitional period in which patient land up from fertile period into the end of reproductive function.

According to *Ayurveda*, menopause in women occurs around the age of 50 years due to *Pakwa Awastha* of body. The age of menarche is 12 years and menopause is 50 years respectively.^[2]

According to modern science, menopause is defined as the absence of menstrual periods for 1 year. The age of menopause ranges between 45-55 years, average being 50 years.

One of the many complications that women may develop after menopause is osteoporosis which is confirmed by densitometry.

Bone density, or bone mineral density is the amount of bone mineral in bone tissue.^[3] Osteoporosis is characterized by low bone mass and defects in micro-architecture that are responsible for decreased bone strength and increased risk of fracture.

So it is essential to rule out the quality of bone in women especially after menopause. To check the quality of bone and to treat *Asthi asarata*, *Ayurveda* has explained *Asthi Dhatu Sarata Parikshan*. So an attempt is made to observe *Asthi Dhatu Sara Lakshanas* in post menopausal women with bone mineral density.

AIM AND OBJECTIVES

AIM

To assess *Asthi Sarata* in post-menopausal women with Bone mineral density.

OBJECTIVES

- Compilation of all the references about *Asthi Sarata* from *Ayurvedic* textbooks
- Compilation of all the references about Bone mineral density from modern textbooks
- Comparative study of bone mineral density and *Asthi Sarata* in post-menopausal women

MATERIALS

- *Ayurvedic* and Modern textbooks regarding the subject.
- *Sarata Parikshan* questionnaire from Ayusoft CDAC.
- Portable bone densitometer instrument for densitometry.
- 150 healthy female volunteers between the ages of 45 – 55 years in post-menopausal phase.

METHODOLOGY

- Volunteers of age group between 45-55 years & who has achieved menopause since 1 year was selected for this research
- Volunteers who had no history of fractures and were not taking any medications like calcium and vitamin D were selected for this study
- *Sarata Parikshan* was assessed with the help of questionnaire from Ayusoft C-DAC

- Bone mineral density was measured with the help of Bone mineral densitometer (FURUNO CM-200)
- Correlation between bone mineral density and *Asthi Sarata* in post menopausal women was assessed with the help of statistical analysis.

SELECTION CRITERIA

INCLUSION CRITERIA

- 150 female volunteers were included for this study
- Female volunteers included for the study were between 45 – 55 years age group
- Only those volunteers were included who had not got menstrual periods since 1 year.
- Female volunteers included for this study were healthy and free from any major illness.
- Volunteers who were not having history of fractures and were not on medication like calcium and vitamin D were included.

EXCLUSION CRITERIA

- Volunteers who were not willing were excluded.
- Females below 45 and above 55 were excluded from this study.
- Females having major illness were excluded from this study.
- Volunteers having history of fracture and who were on medication like calcium and vitamin D were excluded.

REVIEW OF LITERATURE

CONCEPT OF *DHATU SARATA*

“*Sara*” is the essence of all *Dhatu*s. *Sarata* is a factor which tells the strength of all *Dhatu*s. The strength of *Dhatu*s differs from person to person. There are 3 conditions of *Dhatu*s in the body i.e. *Shuddha*, *Vishuddha* and *Vishuddhatar*. The *Vishuddhatar Dhatu* is called as “*Sara*” or “*Prasad*” *Dhatu*.^[4]

The purest form of *Dhatu*s is called as “*Dhatu Sarata*”. There are eight types of *Sarata* in which seven are of seven *Dhatu*s and eighth one is *Satva Sarata*.

Sarata of a person depends upon the predominant *Lakshanas* of a particular *Dhatu*. If a *Dhatu* shows predominant *Lakshanas* than other *Dhatu*s, then the individual can be called as *Sarawan* of that particular *Dhatu*. In *Sarawan Dhatu*, the *Pachan-Vibhajan* and *Vardhan* occurs faster than any other *Dhatu*.

Sarawan Dhatu shows its effects on *Sharir Avayava* and mind, because the *Sharir Avayava* are formed from *Sara Amsha* of *Dhatu*. *Sharira Avayava* shows their effect on *Manas* and *Manas* on *Sharira*. *Sharira* and *Manas Stithi* depends on each other.

Therefore, *Acharyas* have mentioned *Lakshanas* of each *Dhatu Sarata*, by which *Bala* or strength of each individual *Dhatu* can be determined.

The *Lakshanas* are of two types-

Murta: Pratyakshadarshi Lakshanas: the *Lakshanas* can be determined by seeing the *Sharir Avayava Stithi*, body structure, *Praman* etc.

Amurta: Anumangyeya Lakshanas: the *Lakshanas* can be determined by individual's nature, mental status etc.

Types of *Saratwa*

In *Sarata Parikshan*, there are eight types of *Saratas* mainly. In that there are two subdivisions;

- ***Adhibhoutik:*** *Rasadi Shukrant Dhatu*s comes under *Panchabhotik Vikaras*. So their *Saratwa* is *Adibhoutik*.
- ***Adhyatmic:*** As *Sharira Avayava* shows its effect on *Manas Bhavas* and vice versa. By assessing *Dhatu Sarata*, one can judge the true strength of a particular *Dhatu* but only the ability or strength is not enough to get success; the liking or interest is also essential to achieve success. Hence, it is important to know the *Saratwa* of *Manas Bhavas*. *Ayurveda Acharyas* have mentioned *mana* as *Adhyatma Dravya*, so the *Saratwa* of *Manas Bhavas* comes under *Adhyatmic* i.e. *Satva Sarata*.

ASTHI SARA LAKSHANAS

Individuals who have *Asthi* excellence are characterized by robust heels, ankles, knees, fore-arms, collar-bones, chin, head, joints, bones, nails and teeth. Such individuals are very enthusiastic and active and are endowed with strong and firm bodies as well as longevity.

An individual with large head, and a large pair of shoulders, and having firm teeth, bones, cheek- bones, and finger nails, should be regarded as a man of *Asthi Sara*. The *Lakshanas* opposite to *Asthi Sarata Lakshanas* are called as *Asthi Asara*.

According to Acharya Charak, *Asthi Pradoshaj Vikaras* are *Ati-Asthi-Danta*, *Danta-Asthi-Shoola* and *Vivarnata*, *Kesha-Loma-Nakha-Smashru-Dosha*.

LITERARY REVIEW OF MENOPAUSE

Permanent cessation of menstrual cycle at the end of reproductive life due to loss of ovarian follicular activity is referred to as menopause.^[5] Menopause is the transitional period in which patient land up from fertile period into the end of reproduction. The clinical diagnosis is confirmed following stoppage of menstruation for 12 consecutive months or 1 year. Age of menopause is between 45-55 years average being 50 years.

It has three phases:

- Pre-menopausal phase – it is the period prior to menopause
- Post-menopausal phase – it is the period after menopause
- Peri-menopausal phase – it is the period around menopause

The cause of menopause is degeneration of the ovaries due to senility and significant fall of oestrogen levels.

The loss of oestrogens causes marked physiologic changes in the function of the body, including – Hot flushes, sweating, Irritability, Fatigue, Anxiety, Decreased strength and calcification of bones throughout the body, Disturbed sleep due to night sweats, Headache, Depression, Mood swings, Dementia, Sexual problems, Bladder problems (bladder incontinence, difficulty in urinating etc, Dryness of vagina, Joint and muscular discomfort and Heart discomfort (palpitation, chest tightness etc.)

EFFECT OF MENOPAUSE ON BONES

After menopause, almost no oestrogens are secreted by the ovaries. This oestrogen deficiency leads to –

- Increased osteoclastic activity in the bones
- The decreased bone matrix
- Decreased deposition of bone – calcium and phosphate
- Decreased absorption of calcium from the gut
- Inhibits calcitonin secretion from the C cells of the thyroid
- Decreases 1,25 dihydroxy vitamin D

All these leads to demineralisation of the bones.

In some women, this effect is extremely severe and the resulting condition is osteoporosis, bone fractures (especially of the vertebrae). Hence, post-menopausal women are more susceptible to osteoporosis.

Bone strength gradually declines due to osteoporotic changes. The decline in the formation of calcitriol, decreased secretion of oestrogen in female after menopause and decline in testosterone secretion in male facilitates osteoporotic changes.

BONE DENSITY

Bone density measurement is used in clinical medicine as an indirect indicator of osteoporosis and fracture risk. It is measured by a procedure called densitometry, often performed in the radiology or nuclear medicine departments of hospitals or clinics.

The measurement is painless and non-invasive and involves low radiation exposure. Measurements are most commonly made over the lumbar spine and over the upper part of the hip.^[6] The forearm may be scanned if the hip and lumbar spines are not accessible.

One of the risk factor for low bone density and primary considerations for the need for a bone density test is in females of age 65 yrs or older.

FACTORS AFFECTING BONE DENSITY

Heavy alcohol consumption, Cigarette smoking, Lack of weight bearing exercise, Sedentary lifestyle, Lack of certain hormones, particularly oestrogen in females and androgen in males, Use of certain medications, such as corticosteroids and anticonvulsant, Eating disorders such as anorexia nervosa, Low calcium diet, Hereditary, Age related changes in endocrine functions. All these factors are responsible for low bone mineral density.

BENEFITS OF BMD TESTING

Bone densitometry is a simple, quick and non-invasive procedure, No anaesthesia is required, The amount of radiation used is extremely small—less than one-tenth the dose of a standard chest x-ray, and less than a day's exposure to natural radiation.

“T” score gradations as per WHO^[7]

	“T” SCORE
Normal	Above -1.0
Osteopenia	Between -1.0 and -2.5
Osteoporosis	-2.5 or below -2.5

- BMD tests helps in the detection of osteopenia and osteoporosis.

Bone remodelling occurs in every person but in elderly; the amount resorbed is much less satisfactorily replenished by new bone deposition. This is particularly true in oestrogen deficient women. Consequently, the collagen fibres (also to some extent calcium salts) lost during bone resorption is never replenished adequately. When this process occurs for a long time (in the old persons) frank clinical osteoporosis sets in.

OBSERVATION

Sr. No.	<i>Asthi Sarata</i>	Average value	'T' score
1	<i>Heena Sarata</i>	35.97%	Osteoporosis (-3.02)
2	<i>Madhyam Sarata</i>	52.39%	Osteopenia (-1.6)
3	<i>Uttam Sarata</i>	75.38%	Normal (0.48)

The volunteers having minimum *Asthi Dhatu Sarata Lakshanas* are graded between 25-50%, moderate *Asthi Dhatu Sarata Lakshanas* are graded between 50-75% and maximum *Asthi Dhatu Sarata Lakshanas* are graded above 75%.

RESULT

- After examining 150 volunteers, 32 volunteers having normal 'T' score showed maximum percentage of *Asthi Dhatu Sarata Lakshanas*. Average of *Asthi Dhatu Sarata Lakshanas* in 32 volunteers was 75.38%; hence they were *Uttam Asthi Sara*.
- 42 volunteers having osteopenia showed *madhyam Asthi Dhatu Sarata Lakshanas*. Average of *Asthi Dhatu Sarata lakshanas* in 42 volunteers was 52.39%; hence they were *Madhyam Asthi Sara*.
- 76 volunteers having osteoporosis showed minimum percentage of *Asthi Dhatu Sarata lakshanas*. Average of *Asthi Dhatu Sarata lakshanas* in 76 volunteers was 35.97%; hence they were *Heena Asthi Sara*.
- This proves that there is significant relationship between *Asthi Sarata* and bone mineral density in post-menopausal women.

DISCUSSION

- Health is not just merely a disease free condition of the body but one also need to have a healthy positive mind with it, which is collectively called Positive health.
- *Dhatu* plays an important role in maintenance of health. *Dhatu Sarata* is useful to identify the condition of dhatus that whether they are healthy or not. Acharya Charak has aslo

described *Atur Bala Parikshan* with the help of *dashavidha pariksha*. Chakrapani in his commentary has quoted that the word *atur* is used for both *Swastha* person as well as diseased.^[8] One of the *Dashavidha Pariksha* is *Sara' Pariksha* which helps in the determination of *Bala* or strength.^[9]

- Due to lifestyle disorders in present era of life, there is increased risk of fractures, osteoporosis in elderly women.
- Also Post-menopausal women are more susceptible to osteoporosis and more likely to have fractures because of low oestrogen levels which leads to degeneration of ovaries due to senility and are replaced by fibrous tissues or if there is surgical removal of both the ovaries.
- Theories like *Asthi Dhatu Sarata Parikshan* should be understood by co-relating it with the help of modern tools. Also, this will be beneficial for the women in early ages to identify their quality of bones with some quantitative parameter and to take preventive measures in early stages of life itself. Modern tools like portable bone densitometer which is economical, hazardless, handy and also reliable can be used, which gives the quantitative estimation about the quality of the bone.
- So, by considering both the concepts of *Ayurveda* and modern regarding bone in post-menopausal women, there might be some co-relation between bone density and *Asthi Dhatu Sarata*.
- The study was carried out in 150 female volunteers who has got menopause since 1 year between the age group 45-55 years. The study was carried out by taking the consent of the volunteers and was given a simple and valid *Dhatu Sarata* questionnaire prepared by Ayusoft C-DAC which is standard, reliable and valid. After taking *Dhatu Sarata* of the volunteers, bone mineral density was measured on the right heel with the help of bone densitometer (FURUNO CM-200).
- Out of 150 female subjects, 32 were having normal "T" score, 42 were having osteopenia and 76 were having osteoporosis.
- Most common *Lakshanas* found in *Asthi Sara* volunteers were *Kriyavanta*, *Dridha Danta*, *Kleshasahishnutvam*
- *Kriyavanta* – because most of them were housewife and involved in different household activity
- *Kleshasahishnutvam*- because they could tolerate physical and mental stress.
- *Dridhadanta*- because they did not have dental carries.

- In post-menopausal women, if an individual is *Asthi Sara* and is having normal “T” score, then they will be having good quality of bones and hence the risk of osteoporosis and fractures will be less in them.

CONCLUSION

- In post-menopausal stage, it is observed that there are maximum chances of osteopenia and osteoporosis.
- Volunteers having normal ‘T’ score showed maximum percentage of *Asthi Dhatu Sarata Lakshanas* like *Kriyavanta*, *Dridhadanta*, *Kleshasahishnuta* etc
- Volunteers having osteoporosis showed minimum percentage of *Asthi Dhatu Sarata Lakshanas* like lack of enthusiasm and activeness, weak bones and joints, etc
- In this study, it is observed that, there is association between *Asthi Dhatu Sarata* and bone mineral density.
- *Asthi Dhatu Sarata Parikshan* is very important to check the quality of bones in elderly women so that the risk of fractures can be reduced to some extent by taking preventive measures with the help of proper diet and medicines in early stages of life.
- Also, quantitative parameters are very essential nowadays to understand *Ayurvedic* concepts.

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