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Modern Techniques for the assessment of *Asthi Sarata*

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ABSTRACT

For the maintenance of health in Ayurveda, its principles depends on the examination of an individual. Even before the inception of any therapy or treatment, *Pariksha* is accomplished. *Sara Pariksha* is one out of ten that gives an outlook of the strength, of *Deha* as well as *Satva* of a person. With the changing diet and lifestyle patterns, the bone diseases have evolved into a common health problem prevailing in all ages throughout the world. The proper diagnosis, screening, prevention and treatment becomes the essential part of its management. Bone strength is measured through different methods of calculating Bone Mineral Density either X ray or ultrasound based. The essence of *Asthi Dhatu* is considered as *Asthi Sarata* in the body depicting good tolerance power, active life & strong body. *Asthi Sara* has been selected to look for the techniques used for its assessment. These will be helpful in setting an objective parameter for the evaluation of the *Asthi Sarata*. Present study is accomplished to collect the different techniques used for the determination of *Asthi Sara* and generating some objectivity in its evaluation. The characters of *Asthi Sara* are comparable with the strength of bone, which is assessed through Bone density. The techniques of evaluating Bone mineral density is another way for the appraisal of subjective characters of *Asthi Sara*.

KEYWORDS

Asthi Sara, Bone Mineral Density, Osteoporosis, Pariksha



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INTRODUCTION

Ayurveda the science of life focusses on the health of each individual. The description of preventive and promotive measures for long life is also comprised at various contexts in Vedic literature. For the sake of maintaining wellness, principles of Ayurveda rely on the examination of the person before the commencement of any treatment. Out of various types of examination depicted in Ayurvedic texts *Dashvidha Pariksha* has been quoted in *Vimana sthana* to obtain knowledge regarding the span of life, strength and the intensity of morbidity. Out of Ten, *Sara Pariksha* comes at the level of third position after *Prakriti* and *Vikriti Pariksha*. *Sara* of any *Dhatu* is the purest form of that *Dhatu*. It is an important factor by which the strength of a person can be easily known and gives complete assessment of *Dehabala* as well as *Satvabala*. It has been mentioned in *Samhita* that physician should not be mistaken for deciding any person's strength or weakness by just looking at him. Emphasis has been laid on *Sara Pariksha* by quoting the analogy of '*Pippilikaa Bhaara Haranavat Siddhi*'¹. In *Samhita* each *Dhatu Sara* is explained by their respective attributes (Guna) and physical appearance. It becomes difficult to assess *Sara* on this basis and hence no

uniformity has been observed among physicians for its assessment as various criteria for *Dhatu Sara* are mainly subjective and cannot be easily carried out. Moreover, in absence of objective parameters this assessment has been neglected during diagnosis and treatment. *Asthi Sara* is one among the eight *Sara*. *Asthi Sara* persons are said to be very enthusiastic and active in their life. They have good tolerance, strong body and long life. This study was done to look for the various modern methods used for the *Asthi Sara* assessment. *Asthi Sara* has been specifically selected for the study because these techniques will be helpful for prevention and diagnosing various bone diseases which have become a common health problem prevailing in all age groups throughout the world

MATERIALS & METHODS

Ayurvedic texts, commentaries were reviewed for the features of *Asthi Sara Purusha*. Published articles on *Asthi Sara* and various techniques/ instruments used for its assessment were considered and discussed in this paper. These techniques may be a tool for the assessment of *Asthi Sarata* in an individual.



REVIEW OF LITERATURE

In Ayurveda, mainly in *Charaka Samhita* the word *Sara* is used for examination of the patient or healthy persons for determination of his strength- *Bala*. *Sara* can be defined as.

- ❖ The thing which becomes stable is called *Sara*.
- ❖ *Sara* is anything that provides strength and stability to body.
- ❖ The most stable part of body.
- ❖ The successive rising in the excellence of a thing (the highest) is known as *Sara*.
- ❖ The most purified or vital of the *Dhatu* is known as *Sara*.
- ❖ One can co-relate the words such as power, strength, vigor and energy with that of *Sara* in Ayurveda.

The examination of patient is done to obtain insight about the life span, strength and morbidity. The intensity of disease is determined to decide the dosage of therapy, that rely on the strength or immunity of the individual². So, for deciding precise amount of strength, *Dhatu Sara* (excellence of *dhatu*s) is to be examined. *Dhatu Sara* is classified into 8 types by *Acharya Charaka*, *Acharya Sushruta* and *Vagbhatta* i.e. *Twaka Sara*, *Rakta Sara*, *Mamsa Sara*, *Meda Sara*, *Asthi Sara*, *Majja Sara*, *Shukra Sara* and *Satva Sara*. Only *Kashyapa*

Samhita has mentioned 9 *Sara*, *Oja Sara*, apart from 8 others³. The author of *Brihat Samhita Acharya Varaha Mihira* has depicted 7 *Sara* except *Satva Sara*.

AsthiSara Lakshanas

पार्श्विगुल्फजान्वरत्रिजत्रुचिबुकशिरःपर्वस्थूलाःस्
थूलास्थिनखदन्ताश्चास्थिसाराः |

तेमहोत्साहाःक्रियावन्तःक्लेशसहाःसारस्थिरशरीर
ाभवन्त्यायुष्मन्तश्च || Ch. Vi. 8/107

Excellence of *Asthi Sara* persons have characteristics of robust or strong heels, ankles, knees, forearms, collar-bones, chin, head, joints, bones, nails and teeth. These persons are very enthusiastic, active, able to tolerate physical and mental pressure, have strong and firm body as well as longevity.

महाशिरःस्कन्धदृढदन्तहन्वस्थिनखमस्थिभिः | Su.
Su. 35/16

According to *Acharya Sushruta Asthi Sara* individuals possess a big head, shoulder and strong teeth, jaws, bones and nails.

स्थूलस्थिरअस्थिसाराबलवान्विद्वावत्रःसुरूपश्च
|(Br. S. पुल | 99)

As per *Brihat Samhita* these persons have strong and thick bones and they are endowed with strength, knowledge and beauty.



In view of typical features of *Asthi Sara* described in Ayurveda, strength of bone in an individual may be considered as *Asthi Sarata*. Moreover, strength of bone depends on bone mineral density (mass per volume, which determines 70% of bone strength), mineral content and quality of collagen. The diseases described in *Asthipradoshaja Vikara* and features of *Asthi Dhatu Kshaya* like *Asthibheda* (cracking sensation in bones), *Asthisula* (pain in bones) holds some similarity with the symptoms of Osteoporosis.

Osteoporosis is a common metabolic bone disease in India, identified by low bone mass, structural deterioration, and porous bone, which is associated with higher fracture risk⁴. The bone strength chiefly reveals the integration of bone density and quality⁵. Bone density is depicted as grams of minerals per area or volume and bone quality is defined as the architecture, turnover, damage, accumulation and mineralization. Although currently there are no rational methods to determine overall bone strength, Bone Mineral Density (BMD) correlates with skeletal load bearing capacity and fracture risk closely. X-rays manifest changes late (when 50-70% calcium is already lost), so DEXA is safe, non-invasive, precise technology, which can diagnose osteoporosis quiet in early even in

asymptomatic stage. Bone strength can be defined using BMD (70%) and bone quality (20%)⁶.

There are two types of scans for measuring Bone Mineral Density:

1. Central DEXA⁷ — It is a painless procedure taking 10 to 20 minutes, having low amount of radiation than the normal chest X-ray uses. During DEXA scan, patient has to lie on his back on a flat table and is required to be motionless so that the images are not blurred. Two X-ray beams are produced by DEXA scanner machine, one high energy and the other of low energy. It checks the amount of radiation from each beam that pass through the bone. On the basis of difference between the two beams, it measures bone density⁷. The scan is usually carried out by a radiographer. During the scan, a large scanning arm passes over the body of the patient to measure bone density. It is carried out usually at the sites like hip and spine to detect osteoporosis. The advantages of DEXA scan comprises of short scan times, easy setup for patients, scanning with low dose radiation with good precision of density measurement.

2. Quantitative ultrasound (QUS) scanners⁸ - To determine Quantitative parameters and assessment of tissue properties QUS techniques are employed.



These do not include exposure to ionizing radiation representing a cheaper solution using portable devices. In this technique ultrasound pulses pass through the bone tissue to be investigated and transmitted pulses are again detected by the scanning device to calculate bone density. The site of bone that is under study for bone density is placed between the two probes. This method of ultrasonography proves to provide valuable clue, such as the distribution of the mineralized matrix within the bone (the connectivity and the thickness of the trabeculae) and the different resistance to loading of the bone tissue according to the trabecular orientation.

Table 1 WHO classification of Osteoporosis based on BMD⁹

Classification	Bone Mineral Density	T Score
Normal	Within 1 SD of the mean level for a young adult reference population	T score at -1.0 and above
Low bone mass (Osteopenia)	Between 1 and 2.5 SD below that of the mean level for a young adult reference population	T score between -1.0 and -2.5
Osteoporosis	2.5 or more below that of the mean level for a young adult reference population	T score at or below -2.5

DISCUSSION

Sara Pariksha is useful for understanding the physical as well as psychological strength of a person. It helps in rightly assessing the dose and type of medicine to

be prescribed on the basis of strength of the patient. *Sara* is a good reflector of the status of the *Dhatus* in the body. It is essential for rightly assessing the life span, strength and the degree of *Dosha* in the body. *Dashvidhpariksha* is mainly mentioned for *Atura* by *Acharya Charaka*. But *Chakrapani* in his commentary has quoted that word '*Atura*' is used for both *Swastha* persons as well as diseased⁹. In *Swastha* condition, all the ten factors of *Dashvidhpariksha* can be done for healthy people except for the *Vikriti pariksha*. *Vikriti pariksha* is assessed for the estimation of *bala* of *dosha*, *dushya*, *hetu* and *prakriti* of disease.

In view of all the literature study it is deduced that *Asthi Sarata* is the excellence of *Asthi Dhatu* and is indicative of bone strength. In modern literature the pathology of bone- Osteoporosis is comparable with the diseases mentioned in Ayurvedic texts where there is vitiation of *Asthi Dhatu* like *Asthi Kshaya* and *Asthipradoshaja vikara*.

A study was conducted to correlate *Asthipradoshaja vikara*, *Asthikshaya lakshana* and *Asthivridhhi lakshana* with the bone density value which concluded moderately Negative correlation¹⁰. In this study the technique used to measure BMD was CM- 200 Ultrasound Bone Densitometer.



Another study was conducted to study *Asthidushti lakshana* in relation with BMD that concluded more significant co-relation of *Asthi Sarata* with BMD than any other *Dhatu Sarata*¹¹. BMD was measured with the help of bone densitometer (SAHARA HOLOGIC) in the study. This is another Ultrasound based Densitometer.

The methods available at present for bone densitometry are based on either use of X-rays (considered as the “gold standard”) or Ultrasound. On the basis of different principle of working, the techniques associates differently with bone tissue. The amount of minerals present in bone tissue decides the amount of X-ray absorbed. Hence, it does not provide information about organic composition or microstructure, which has significant contribution in the mechanical properties of bone and also influences fracture risk assessment. Contrary to this, propagation of ultrasound depends on the tissue structure in bone tissue, the organic and inorganic composition of the calcified matrix and by the properties of the bone marrow⁸.

DEXA method because of its higher cost, radiation usage, large size equipment and limited availability can be best used for a second level of diagnosis of osteoporosis rather than for screening purposes. With the advantage of QUS devices that they are easier to use, much faster and portable than

DEXA, they do not use radiations and less expensive. They are the first choice for screening tool of osteoporosis. Their limitation being that they can only be applied to peripheral anatomical sites like calcaneus, the proximal phalanges of hand, tibial shaft and radius. Whereas DEXA technique can measure the actual site where most severe fractures occur- central skeleton (spine and femur). Particularly, lumbar spine, femur neck and total hip are measured by DEXA scans. These are considered as “gold standard” for osteoporosis diagnosis⁸. Major disadvantage of QUS scan is that the diagnosing and treatment based on these ultrasound are not well established yet¹². They are of low precision when used in women undergoing treatment because of slow rate of changes in bone mass at peripheral sites.

CONCLUSION

With the drastic change in diet and lifestyle worldwide, more people tend to get afflicted with Osteoporosis. Their *Asthi Sarata* is affected and diseases like *Asthipradoshaja Vikara*, *Asthi Kshaya* are occurring commonly. Accurate screening, early diagnosis would be helpful for the better treatment and management of disease. Presently available techniques for



the measurement of Bone strength include assessment of bone mineral density by various methods. These are either X-rays based or ultrasound based. Both having pros and cons in usage are to be used carefully according to the condition. These methods are approach for the assessment of subjective parameters of *Asthi Sara*. These will be helpful to researchers as well as clinicians in further development and estimation of *Asthi Sarata*.



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