



Research Article

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ASTHI SARA PURUSHA LAKSHANAS AND BONE MINERAL DENSITY: A STUDY AMONG YOUNG INDIAN ADULTS

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ABSTRACT

Sara (essence of all dhatus) is the purest or most vital part of dhatu (tissues), providing strength and stability to the body. Sarata of dhatu will get modified due to variations in food, habitat, season, lifestyle, etc. There is the effect of Sara and Asara condition of dhatu on physical and mental health. The present study aims to find out if there is any relationship between Asthi Sara Purusha Lakshanas and Bone mineral density. The Asthi Sara Questionnaire and a dual-energy X-ray absorptiometry assessed the Asthi Sara and Bone mineral density, respectively. The result of the study indicates that a statistically significant association exists between the Asthi Sara categories and Bone mineral density. Furthermore, Asthi Sara scores were positively correlated with total Bone density and the T scores were measured using dual-energy X-ray absorptiometry. By assessing Asthi Sara Purusha Lakshanas, we can understand the strength of Asthi dhatu. This study finding helps Ayurvedic physicians use the tool developed by the researchers to determine Asthi Sara cost-effectively.

Keywords: Dhatu Sarata, Bone mineral density, Asthi Sara Purusha Lakshanas, Asthi Sara

INTRODUCTION

The balanced state of dosha (bodily elements), dhatu (tissues), and mala (waste products) are essential for human functioning. Among these elements, dhatus plays a crucial role as the stabilising pillar of the body. The body of every individual comprises seven dhatus, and the strength, resilience, and immunity of each person are different from the others due to variations in the level of dhatu. During the paka (metabolism), the seven dhatus of the body go through changes, and sara and kitta are produced as by-products. The kitta is excreted, and the Sara is utilised to develop dhatu, which operates the body's various functions. The ratio of this paka and its product, i.e. Sara bhaga (essence part of ahara) and kitta bhaga (excretory product), varies from individual to individual. Hence, the body, made up of seven dhatu in different quantities, differs from each other at the level of dhatu sarata.

Sarata is also depicted as vishuddatara dhatu (highest level of tissue excellence) by Chakrapani¹. There are eight types of Sara described by Charaka and Sushruta, namely, Tvak Sara or Rasa Sara (essence of skin tissue), Rakta Sara (essence of blood tissue), Mamsa Sara (essence of muscle tissue), Meda Sara (essence of fat tissue), Asthi Sara (enriched bone), Majja Sara (essence of bone marrow tissue), Shukra Sara (essence of semen) and Satva Sara (essence of mind). Qualitative, quantitative, and functional assessment of dhatu sarata through Dashavidha Pariksha (tenfold examination) is outlined in the 8th chapter of Charaka Samhita Viman Sthana. Dashavidha Pariksha helps assess a person's body and mind strength^{2,3}.

Among these Ashtavidha Sara, Asthi Sara is vital for longevity and overall health. The quality, integrity, and strength of bones are the major determinants of Asthi Sara. By assessing Asthi Sara Purusha Lakshanas, we can also understand the strength of Asthi dhatu. Issues such as osteoporosis are more prevalent in the Indian

population, and it severely affects the strength of the bone tissues and leads to fractures. The Asthi Sara Purusha Lakshana refers to the characteristics of an individual with healthy Asthi Sara, which include sturdy and bony solid structure, good bone density, flexibility, ease of movement, average joint size and function, normal growth and development and absence of bony disorders. Along with these factors, the individual's overall health is also considered. Asthi Sara Purusha will have sthoolata (stout) in paarshni (heel), gulpha (ankle), janu (knee), arathni (forearm), jathru (scapula and shoulders), chibuka (mandibular areas), shira (head), parva (small joints), asthi (bone), nakha (nail), and danta (teeth). That means their joints and bones will be more prominent when compared to other Sara individuals, and their teeth will be stronger. Kesha (hair) is the mala of Asthi dhatu, so their hair will also be strong, and hair fall will be less. They will also have properties like mahotsaha (enthusiastic), kriyavanta (activeness), kleshasaha (tolerance capacity), sthira shareera (stable body), and ayushmanta (longevity of life), which makes them efficient in managing stress and excelling in physical and mental activities. These persons are always enthusiastic, active, robust and efficient in managing stress.

The assessment of Asthi Sara is further challenging as there is no clarity on the normal growth and development of the population, and no specific normal ranges are mentioned for each of the Lakshanas (features) specified in the Ayurvedic textbooks⁴⁻⁶. We cannot compare the global populations as genetic, climatic, and other factors significantly affect these parameters. The absence of standardised tools based on anthropometric measurements and other measurable factors makes it challenging to assess Asthi Sara. In this regard, a study was conducted to create a cost-effective tool to measure Asthi Sara and evaluate bone mineral density through dual-energy X-ray absorptiometry^{7,8} to assess the relationship between Asthi Sarata and Bone mineral density.

MATERIALS AND METHODS

To achieve the objectives, a non-randomised observational study was conducted among healthy individuals of either gender aged 18-40 years selected from an Ayurveda Medical College in Bengaluru, Karnataka, India. The participants were assessed for Asthi Sara using a tool developed by the researchers. The recruitment was completed when 14 individuals were allotted to the Asthi Sara group and 14 to the non-Asthi Sara group. Volunteers suffering from any systemic and chronic illness, pregnant and lactating women, were excluded from the study.

The Asthi Sara Questionnaire consists of 21 questions, out of which the first 15 questions were related to anthropometric measurements of different bones and joints mentioned for Asthi Sara individuals as per classics, and the following two questions were related to assessing the quality of nails and teeth. The last four questions were meant to assess the mental factors as per classical reference. As per the classical reference of Asthi Sara Purusha Lakshanas, there will be the prominence of paarshni (heel), gulpha (ankle), jaanu (knee joint), aratni (forearm), jatru (prominence of scapula and shoulders), chibuka/hanu (mandibular area), shira (head), parva (small joints) and the mental factors like mahotsaha (enthusiasm or zest), kriyavanta (active), klesha saha (can bear strain or stress) was observed. The sthulata of the bones mentioned above and joints were assessed using anthropometric measurements of each part. Parshni (heel) was assessed by heel breadth, gulpha (ankle) was assessed by ankle circumference, jaanu (knee) was assessed by knee breadth, aratni (forearm) was assessed by forearm circumference, jatru (scapula or shoulder) was assessed by Biacromial breadth. Chibuka or hanu (mandibular area) was assessed by Bigonial width, shira (head) was assessed by head circumference, and parva (small joints) were assessed by the breadth of distal interphalangeal joint and proximal

interphalangeal joint of right and left little fingers. Nakha and danta were assessed by their quality. Nakha was assessed by its normalcy, brittleness and discolouration and danta (teeth) was assessed by its normalcy, discolouration and dental caries. Mental factors like mahotsaha, kriyavanta, and klesha saha were assessed through a Likert scale. Scores were allotted to all questions; the maximum possible score was 102, and the minimum possible score was 34. Hence, these Ashi Sara scores were arbitrarily categorised into above-average (80-102), average (57-79), and below-average (34-56). For the purpose of recruitment, average and above average were considered to be Asthi Sara individuals, and those who came below average were considered non-Asthi Sara individuals.

A dual-energy X-ray absorptiometry⁷ was also done on these participants to assess their bone mineral density. Bone mineral density (BMD) provides information through parameters on the quantity of minerals in bone, which refers to the main component of bone strength. The density of bone minerals was tested using X-rays to measure the amount of minerals in bones. It is a painless and quick test which estimates the thickness of the bone. The prevalence of osteoporosis is estimated through descriptive statistical tools using WHO criteria for osteoporosis⁹. Normal BMD, if the T score is equal to or above -1 SD; Osteopenia, if the T score ranges between -1 SD and -2.5SD; and Osteoporosis, if the T score equals or below -2.5SD¹⁰.

Ethical considerations

The ethical permission was obtained from the Ethical Committee of Sri Kalabyraveshwara Swamy Ayurvedic Medical College and Research Centre, Bangalore, Karnataka, India. The authors certify that they have obtained the patient's consent to participate in the study. The patient understands that his name and initials will not be published, and due efforts are made to conceal his identity.

Table 1: Association between Asthi Sara category and Bone Mineral Density

Variables	Bone Marrow Density		$\Delta\chi^2$	df	p-value
	Normal	Low			
Asthi Sara	5	9	38.816	1	.001*
Non- Asthi Sara	0	14			

*Significant at 0.05 level of significance (Δ -Likelihood Ratio)

Table 2: Relationship between Asthi Sara Scores and BMD Scores

Variables	Asthi Sara Score	Total Bone density	T scores
Asthi Sara Score	$\rho=1$	$\rho=.419^{\#}$ ($p=.027$)	$\rho=.616^{\#}$ ($p=.001$)

$\#$ Significant at 0.05 level of significance

RESULTS

Association between Asthi Sara category and Bone Mineral Density

The association between the Asthi Sara category and bone mineral density was assessed through crosstabulation, and the likelihood ratio was calculated; this is mentioned in Table 1.

Five out of 28 participants had low bone mineral density, and 23 had normal bone mineral density. All the 14 in the Asthi Sara groups had normal BMD. Among non-Asthi Sara individuals, 9 had normal bone mineral density. The data in Table 2 suggests a significant association exists between the Asthi Sara categories and BMD ($\Delta\chi^2_{(1)}=38.816$).

Relationship between Asthi Sara Scores and BMD Scores

Spearman's rho was calculated to find out the relationship between Asthi Sara scores, total bone density scores and T scores of BMD. The details are mentioned in Table 2.

Data in Table 3 indicates a statistically significant positive correlation between Asthi Sara's score and total bone density $\rho =.419$; $p=.027$) and the T score of BMD ($\rho=.616$; $p=.001$). One unit increase in Asthi Sara score will lead to .419 and .616 increases in the total bone-density score and T score of BMD, respectively.

DISCUSSION

Asthi Sara individuals are endowed with the properties of sthoolatha in joints like parshni, gulpha, janu, arathni, jathru, chibuka, shira, etc. and manasika lakshanas like mahotsaha, kriyavantha, kleshasaha. These are peculiar features present in them. As a result, these individuals are always active, enthusiastic, and efficient in managing stress. As Asthi and Vata act in opposite ways, these persons will have less Vata in them. This diminishes the chance of getting affected by diseases, as Vata is the causative factor of most diseases. These persons excel in activities which involve lots of stress and strain. The person is also having sthira shareera. That makes him strong when compared to other Saras.

In the current study, out of 28 participants, 14 had Asthi Sara, and 14 had non-Asthi Sara. Among the Asthi Sara group, 50% had normal Bone mineral density with a T Score at or above -one standard deviation (S.D). No subject in the Asthi Sara group was found to have low scores. From this, we can understand that the Asthi Sara rating scale tool is as highly diagnosable as the gold standard test, i.e., the BMD test. However, it is not mandatory for Asthi Sara individuals to always have more BMD. It was found that the non-Asthi Sara group had both normal BMD with a T score of -1 or above and low BMD with a T score between -1 and 2.5 S.D. Hence, non-Asthi Sara individuals can also have a normal BMD and low BMD.

CONCLUSION

A person of a particular Sara will have more resistance against the disease the dhatu produces. Asthi Sara is an essential tool for assessing the strength of Asthi dhatu. If a person is said to have Asthi Sara Purusha Lakshanas, then they are more resistant to the diseases affected by Asthi dhatu. The study's findings help Ayurvedic physicians understand the strength of Asthi dhatu using a questionnaire rather than a costlier dual-energy X-ray absorptiometry. Hence, this will contribute to our science.

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