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A Comparative Study of Asthi Sarata and Asthi Asarta In Postmenopausal Condition: An Observational Study.

Kudale P.[1], Randive M.[2]

1. Assistant Professor at Departmental of kriya Sharir, Bhimashankar Ayurved college mancha, Pune.
2. Professor and HOD, Departmental of Kriya Sharir, Tilak Ayurved Mahavidyalaya Pune.

ABSTRACT:

Ayurveda is a traditional medical science that prioritizes health over treatment. The union of the body, mind, senses, and soul is known as ayu. Ayurvedic ideas like *dinacharya, rutucharya, prakriti, Agni, bala,* and others are beneficial in coping with the issues of modern life and can help create equilibrium of health. A "*swasthya"* is someone who is in good health. *Dhatu Sarata* is one of the tenfold examinations with are carried out for the examination of *atur,* i.e. *prakriti, vikriti, sara, samhanana, pramana, satmya, sattva, aharshakti, vyayamshakti,* and *vaya.* The patient is a cornerstone of the *karyadesha*. Examination of the patient is conducted for the knowledge of life span or the degree of *bala*. According to Ayurveda, menopause in women occurs around the age of 50 years due to *pakwa* Avastha of body. The age of menarche is 12 years and menopause is 50 years.[1] Permanent cessation of menstrual cycle at the end of reproductive life due to loss of ovarian follicular activity is referred to as menopause.[2] There is conflicting evidence about the need for postmenopausal women to consume enough calcium to preserve bone health and as a preventative and therapeutic measure for osteoporosis worldwide.

KEYWORDS: Asthi Sarata, Asthi Asarta, Postmenopause, Calcium.

CORRESPONDING AUTHOR:

Dr. Prajakta Shyam Kudale

Assistant Professor at Departmental of kriya Sharir,
Bhimashankar Ayurved college manchar, Pune.
Email- kudaleprajkta@gmail.com

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INTRODUCTION:

Features of different Sara according to samhitas-

Rasa/twak Sara- Individuals having the excellence of Tvak are characterized by unctuous, smooth, soft, clear, fine, less numerous, deep rooted and tender hair and lustrous skin. Such individuals are endowed with happiness, good fortunes, power, enjoyment, intellect, knowledge, health, excitement and longevity[3].

Rakta Sara- Individuals having the excellence of Rakta are characterized by unctuousness, red colour, beautiful dazzling appearance of the ears, eyes, face, tongue, nose, lips, sole of the hands and feet, nails, forehead and genital organs. Such individuals are endowed with happiness, great genius, enthusiasm, tenderness, moderate strength and inability to face difficulties. Their body remains hot[4].

Mansa Sara- Individuals having the excellence of the Mansa *Dhatu* are characterized by stability, heaviness, beautiful appearance and plumpness of temples, forehead, nape, eyes, cheeks, jaws, neck, shoulder, abdomen, axillae, chest and joints of upper and lower limbs being covered with flesh. Such individuals are endowed with forgiveness, patience, no greediness, wealth, knowledge, happiness, simplicity, health, strength and longevity[5].

Meda Sara- Individuals having the excellence of Meda-*Dhatu* are characterized by the abundance of unctuousness in complexion, voice, eyes, hair of the head and other parts of the body, nail, teeth, lips, urine and faeces. Such individuals are endowed with wealth, power, happiness, enjoyment, charity, simplicity and delicate habits[6].

Asthi Sara- Individuals having the excellence of *Asthi-Dhatu* or bone tissue 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[7].

Majja Sara- Individuals having the excellence of *majja* or marrow are characterized by softness of organs, strength, unctuous complexion and voice and robust long and rounded joints. Such individuals are endowed with longevity, strength, learning, wealth, knowledge, progeny and Honors[8].

Shukra Sara- Individuals having the excellence of *Shukra Dhatu* are characterized by gentleness, gentle look, having eyes as if filled with milk, cheerfulness, having teeth which are unctuous, round, strong, even and beautiful, clean and unctuous complexion and voice, dazzling appearance and large buttocks. Such individuals are loved by women; they are strong and endowed with happiness, power, health, wealth, honor and children[9].

Sattva Sara- Individuals having the excellence of mental faculties are characterized by good memory, devotion, gratefulness, wisdom, purity, excessive enthusiasm, skill, courage, brave in fighting, absence of sorrow, proper gait, and depth of wisdom and sincerity in actions and virtuous acts[10].

Material And Methods:

MATERIAL: It includes two parts as follows –

A. Literary Study Material

B. Observational Study Material

A. Literary Study Material

Literary review has been done from Ayurveda text books, bruhatrayi, modern textbooks, internet media, etc.

The data collected in presented in following headings from literature material.

1. Preview – Previous dissertations related to *Sarata*, *AsthiSarata*
2. Ayurveda literature study includes following highlighting points

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- Concept of *Sarata* and *AsthiSarata* from brihatrayee
- Concept of *Asthi dhatu*, *praman* prakriti from brihatrayee.

3. Modern literature review for following major points
   - Modern literature related anthropometry.
   - Modern literature review of bone and associated body parts.
   - Modern literature review of post menopause and Calcium.

Observational Study Material

1. Written informed consent was taken prior to observation.
2. The *AsthiSarata* of an individual is evaluated with the help of M.U.H.S. preform attached as annexure.
3. The observational study was conducted with the help of anthropometric measurements.
4. The anthropometry and sw*anguli praman* was taken as mentioned in annexure 3.
5. The blood calcium levels were tested in pathology laboratory.

SAMPLE SIZE:

Considering confidence interval at 95%, prevalence rate 66.67%[11] and rate of osteoporosis in post-menopausal females is 18% and absolute precession is 15% considering data insufficiency 15% sample size according to formula

$N = Z^2P(1-P)/ E^2$

$Z^2PQ/E^2=25.19=26$

For the convenience of study, 29 volunteers will be taken of Asthi sara and 29 volunteer of Asthi Asara.

N =58

For the sake of study 58 participants will be taken.

- **Type of Study Design**– A comparative observational study
- Sampling Technique– Purposive sampling was conducted

  Volunteers were selected according to inclusion and exclusion criteria to get desire number of sample.
- **Eligibility Criteria** –

a. Inclusion Criteria

Postmenopausal females with age group 45 to 55

b. Exclusion criteria

1. Females with history of chronic illness.
2. Females age above 60 years.
3. Females who are taking Hormonal therapy.
4. Females taking calcium supplement.

PLAN OF WORK

1. Conceptual Study
   - Previous work done
   - Conceptual study of *Sarata* and *AsthiSarata* from Brihatrayee.
2. Observational study with help of anthropometry.
3. Checking the blood calcium levels of all postmenopausal females.

Methodology:

1. Volunteers were screened as per inclusion and exclusion criteria to get desired number of volunteers. Written and informed consent of all volunteers was taken. *Asthi dhatu Sarata* was assessed with the help of standard MUHS *dhatu Sarata* proforma. Sw*anguli praman* was calculated using vernier Caliper and dimension of the head was calculated. Conversion of observed measurements from centimetre to *Anguli praman* was done.Blood calcium levels were done at pathology lab.Observational data was collected.Statistical analysis was done on collected observational data. Proper conclusion was drawn and interpreted.

Assessment of *AsthiSarata* using MUHS Proforma:

1. The characteristics in the proforma can be classified in physical, mental and physico-mental.

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2. The physical characteristics like *Sthool parshni, Sthool gulf, Sthool janu, Sthool Aratni, Sthool jatru, Sthool chibuk, Sthool shir/ Mahashira, Sthool parva, Sthool Asthi, Sthool nakha, Sthool dant, Maha skandh, sara prakriti* are purely physical characteristics. They are examined by *darshan, sparsh* and *prashna pariksha*. On *darshan Pareeksha* the the robustness of bony part is observed, In *sparsh Pareeksha* the differentiation of robust bony part is done from a muscle, tendons and ligaments. *Pramana* of *pratyanaga* is measured. In *prashana Pareeksha* details about the physiological strength of a particular part were asked.
3. *Mahotsaha, kriyawant, saubhagya, aayushmant* are mental chracteristics, they were examined by prashna *Pareeksha* with questions like
   1) Did you take initiatives in work and maintain high level energy and vitality till the end?
   2) Can you work effortlessly and with enthusiasm for long time?
   3) After a hectic schedule, can you do your further daily routine?
   4) Did you feel lucky, that you have been fortunate & have good fortunes in life.
4. *Sthira prakriti, Kleshsahatva* are physico-mental characteristics, they were examined by *darshan* and *prashna Pareeksha*. Some questions for *prashna Pareeksha* are as follow -
   1) Are you able to do heavy work?
   2) Are you able to face stressful situation with calm mind?
   3) Did you make involuntary/ voluntary movements of legs/ hands?
5. After examinations of all the characteristics, total percentage is calculated. According to the value of percentage grades of *sara*, i.e. *Uttam, Madhyam, Asar* as decided. A volunteer with score between 60 – 100 is considered *uttam sara*, score between 50 – 59 is considered Madhyam *sara*, score below 49 is considered A*sara*.[96]
6. *Praman prakritia* of individual *Pratyanga* is described in the *samhita*.

Observation - All volunteers were examined using M.U.H.S. *Asthi*srata Parikshan proforma and anthropometric measurements assessment of prakriti bhava. The data was collected.

Data has been presented under following headings.

- Demographic data
- Observed data
- Statistically analyzed data

Statistical Analysis - Descriptive statistics was used to describe the data. Mean and standard deviation was used for numeric variables.

Frequency and percentage were used for qualitative variables. An Independent sample t test was used to compare two qualitative groups. Chi-squared test was used to see an association between two qualitative variables.

Demographic data

- Age
- Gender
- Assessment criteria for '*Asthi*sarta' have been followed
- Observed data was arranged according to grades of *Asthi*sarta and anthropometric measurements.

Statistical analyzed data –

- Presentation of data has been done under following headings.

A. Tabulation

B. Graphical presentation.

- The frequency distribution analysis of demographic data was done & presented in tabular as well as graphical form.
- The frequency distributions analysis of individuals according to grades of *AsthiSarata*

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and anthropometric measurements were done & presented in tabular as well as graphical form.

OBSERVATIONS

Table no. 1 – Height (in cm) wise distribution

Height (in cm)	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	Percentage	No. of patients	Percentage
140 to 150	1	3.45%	6	20.69%
150 to 160	19	65.52%	21	72.41%
160 to 170	7	24.14%	2	6.90%
170 to 180	2	6.90%	0	0.00%
Total	**29**	**100%**	**29**	**100%**

The above table reveals that -

In Asthi Sara – Group A – majority of the patients i.e. 19 (65.52 %) were having height in between 150 to 160 cm, 7 (24.14 %) patients were having height in between 160 to 170 cm, 2 (6.90 %) patients were having height in between 170 to 180 cm, 1 (3.45 %) patient was having height in between 140 to 150 cm.

Where in Asthi Asara – Group B – majority of the patients i.e. 21 (72.41 %) were having height in between 150 to 160 cm, 6 (20.69 %) patients were having height in between 140 to 150 cm and 2 (6.90 %) patients were having height in between 160 to 170 cm.

Graph no. 1

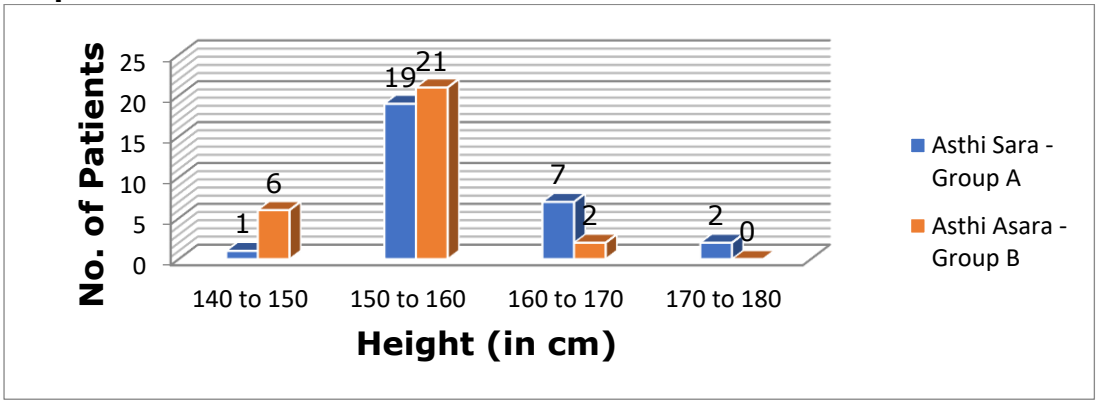

Table no. 2 – Weight (in kg) wise distribution

Weight (in kg)	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	Percentage	No. of patients	Percentage
40 to 50	0	0.00%	2	6.90%
50 to 60	19	65.52%	12	41.38%
60 to 70	9	31.03%	15	51.72%
70 to 80	1	3.45%	0	0.00%
Total	**29**	**100%**	**29**	**100%**

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The above table reveals that -

In Asthi Sara – Group A – majority of the patients i.e. 19 (65.52 %) were having weight in between 50 to 60 kg, 9 (31.03 %) patients were having weight in between 60 to 70 kg and 1 (3.45 %) patient was having weight in between 70 to 80 kg.

Where in Asthi Asara – Group B – majority of the patients i.e. 15 (51.72 %) were having weight in between 60 to 70 kg, 12 (41.38 %) patients were having weight in between 50 to 60 kg and 2 (6.90 %) patients were having weight in between 40 to 50 cm.

Graph no. 2

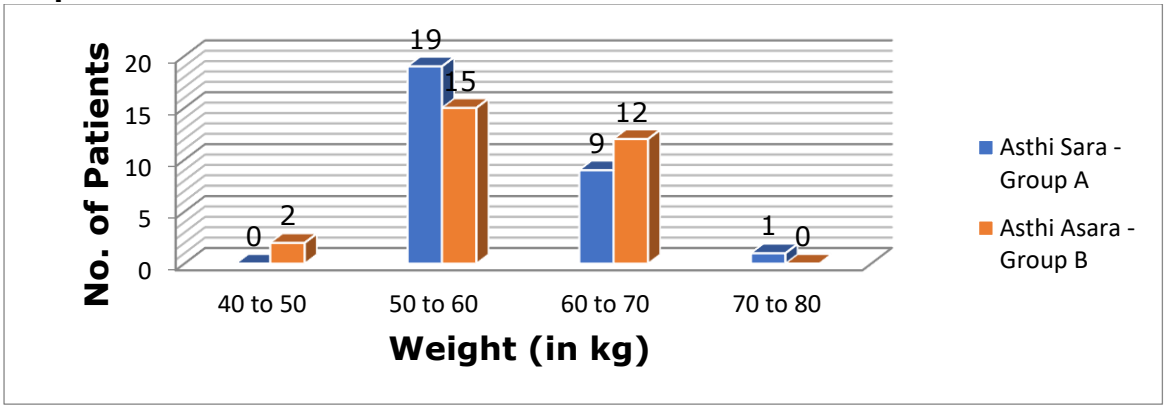

Table no. 3 – BMI (in kg / m²) wise distribution

BMI (in kg / m²)	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	Percentage	No. of patients	Percentage
18.01 to 25	23	79.31%	16	55.17%
25.01 to 30	6	20.69%	13	44.83%
Total	**29**	**100%**	**29**	**100%**

The above table reveals that -

In Asthi Sara – Group A – majority of the patients i.e. 23 (79.31 %) were having BMI in between 18.01 to 25 kg / m² and 6 (20.69 %) patients were having BMi in between 25.01 to 30 kg / m²

Where in Asthi Asara – Group B –majority of the patients i.e. 16 (55.17 %) were having BMI in between 18.01 to 25 kg / m² and 13 (44.83 %) patients were having BMi in between 25.01 to 30kg/m².

Graph no. 3

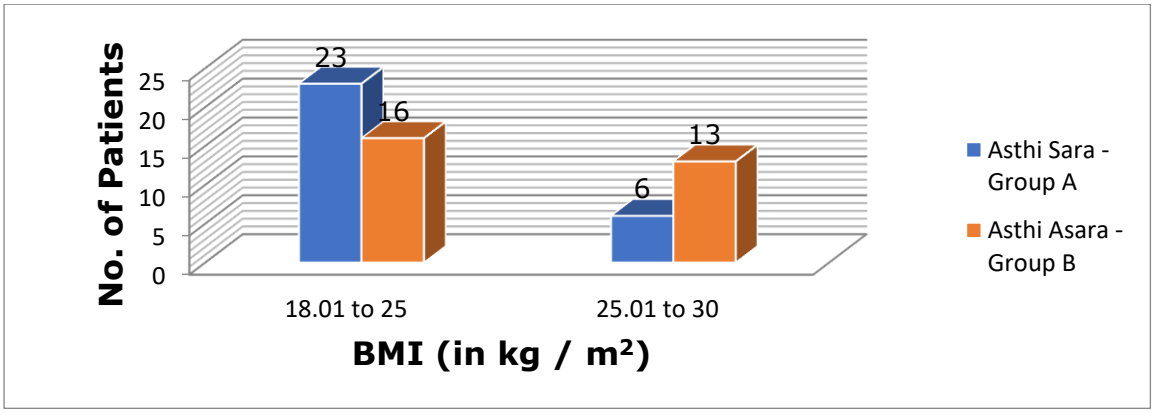

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Table no. 4 – Shir – Ayam wise distribution

Shir – Ayam	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	**Percentage**	**No. of patients**	**Percentage**
≤ 6 anguli	5	17.24%	21	72.41%
> 6 anguli	24	82.76%	8	27.59%
Total	**29**	**100%**	**29**	**100%**

The above table reveals that -
In Asthi Sara – Group A – majority of the patients i.e. 24 (82.76 %) were having Shir Ayam greater than 6 anguli and 5 (17.24 %) patients were having Shir Ayam less than or equal to 6 anguli.
Where in Asthi Asara – Group B – maximum number of the patients i.e. 21 (72.41 %) were having Shir Ayam less than or equal to 6 anguli and 8 (27.59 %) patients were having Shir Ayam greater than 6 anguli.

Graph no. 4

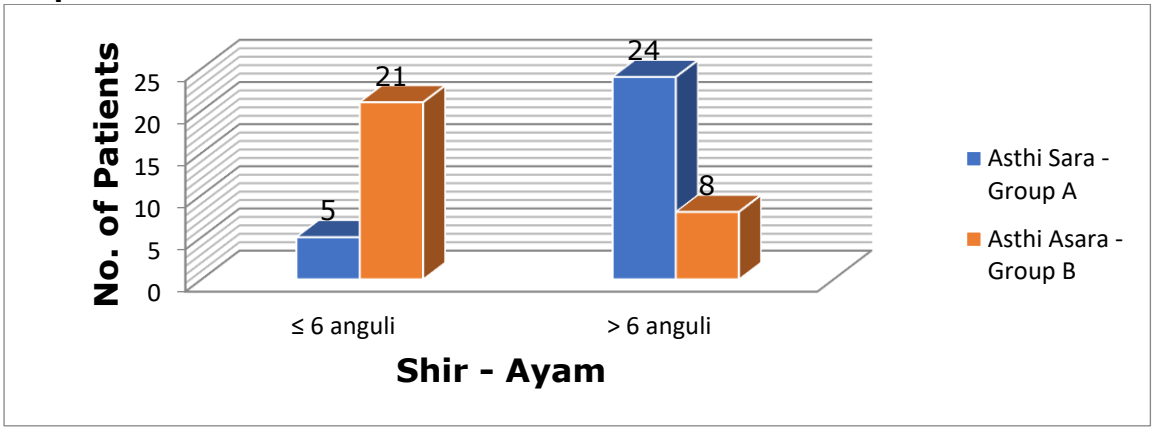

Table no. 5 – Shir – Parinah wise distribution

Shir – Parinah	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	**Percentage**	**No. of patients**	**Percentage**
≤ 32 anguli	16	55.17%	28	96.55%
> 32 anguli	13	44.83%	1	3.45%
Total	**29**	**100%**	**29**	**100%**

The above table reveals that -
In Asthi Sara – Group A – maximum number of the patients i.e. 16 (55.17 %) were having Shir Parinah less than or equal to 32 anguli
and 13 (44.83 %) patients were having Shir Parinah greater than 32 anguli.
Where in Asthi Asara – Group B – maximum number of the patients i.e. 28 (96.55 %) were having Shir Parinah less than or equal to 32 anguli and 1 (3.45 %) patient was having Shir Parinah greater than 32 anguli.

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Graph no. 5

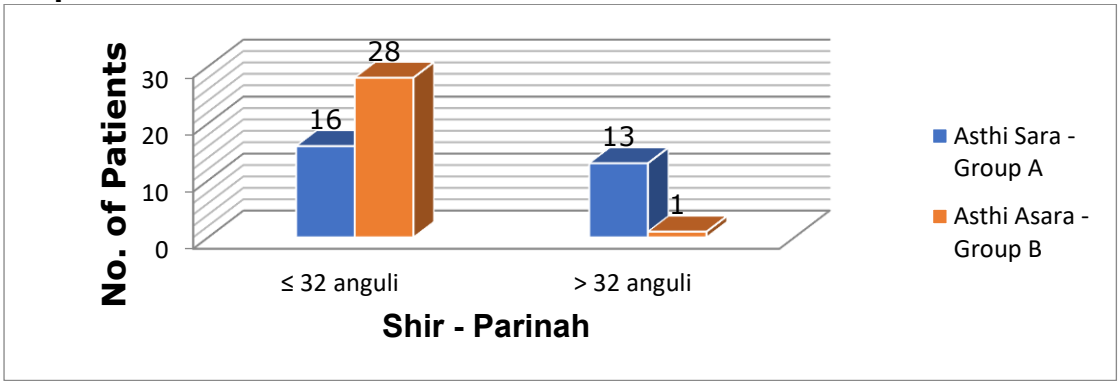

Table no. 6 – Janu – Ayam wise distribution

Janu – Ayam	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	**Percentage**	**No. of patients**	**Percentage**
≤ 4 anguli	9	31.03%	6	20.69%
> 4 anguli	20	68.97%	23	79.31%
Total	**29**	**100%**	**29**	**100%**

The above table reveals that -
In Asthi Sara – Group A – majority of the patients i.e. 20 (68.97 %) were having Janu Ayam greater than 4 anguli and 9 (31.03 %) patients were having Janu Ayam less than or equal to 4 anguli.
Where in Asthi Asara – Group B – majority of the patients i.e. 23 (79.31 %) were having Janu Ayam greater than 4 anguli and 6 (20.69 %) patients were having Janu Ayam less than or equal to 4 anguli.

Graph no. 6

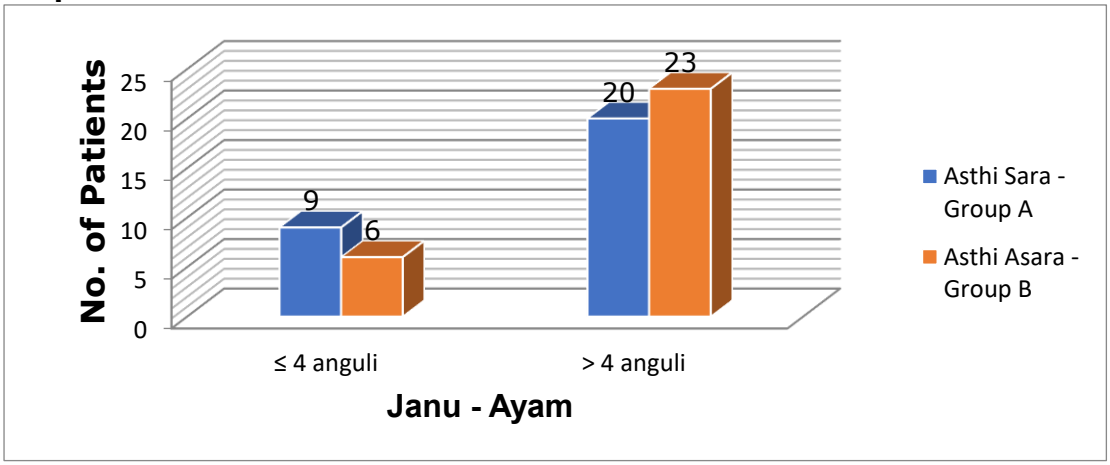

Table no. 7 – Janu – Parinah wise distribution

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Janu – Parinah	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	Percentage	No. of patients	Percentage
≤ 16 anguli	6	20.69%	23	79.31%
> 16 anguli	23	79.31%	6	20.69%
Total	**29**	**100%**	**29**	**100%**

The above table reveals that -
In Asthi Sara – Group A – maximum number of the patients i.e. 23 (79.31 %) were having Janu Parinah greater than 16 anguli and 6 (20.69 %) patients were having Janu Parinah less than or equal to 16 anguli.
Where in Asthi Asara – Group B – maximum number of the patients i.e. 23 (79.31 %) were having Janu Parinah less than or equal to 16 anguli and 6 (20.69 %) patients were having Janu Parinah greater than 16 anguli.

Graph no. 7

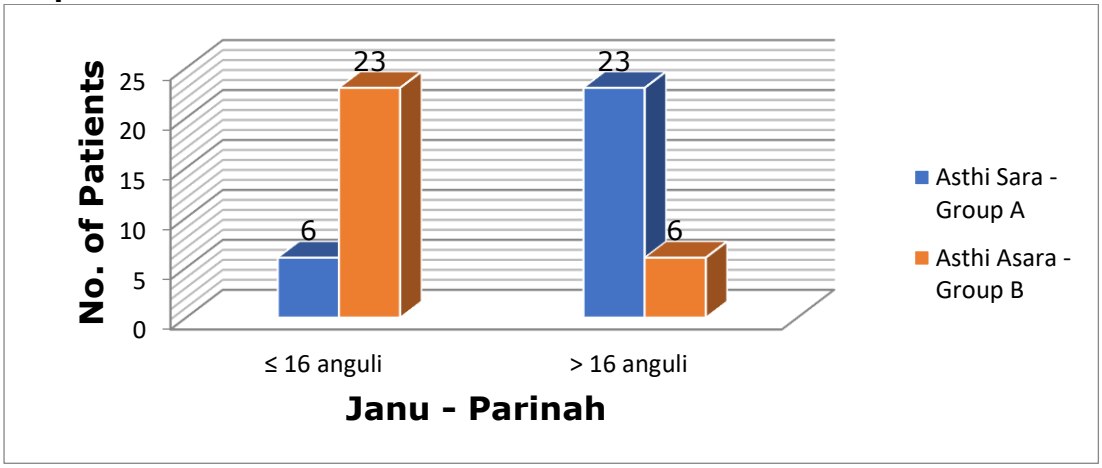

Table no. 8 – Aratni wise distribution

Aratni	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	Percentage	No. of patients	Percentage
≤ 22 anguli	6	20.69%	24	82.76%
> 22 anguli	23	79.31%	5	17.24%
Total	**29**	**100%**	**29**	**100%**

The above table reveals that -
In Asthi Sara – Group A – majority of the patients i.e. 23 (79.31 %) were having Aratni ayam greater than 22 anguli and 6 (20.69 %)
patients were having Aratni ayam less than or equal to 22 anguli.
Where in Asthi Asara – Group B – maximum number of the patients i.e. 24 (82.76 %) were having Aratni ayam less than or equal to 22 anguli and 5 (17.24 %) patients were having Aratni ayam greater than 22 anguli.

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Graph no. 8

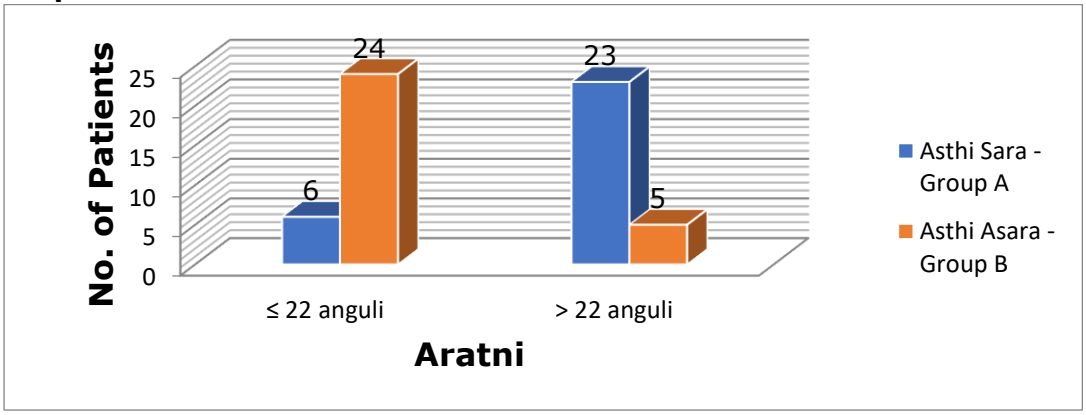
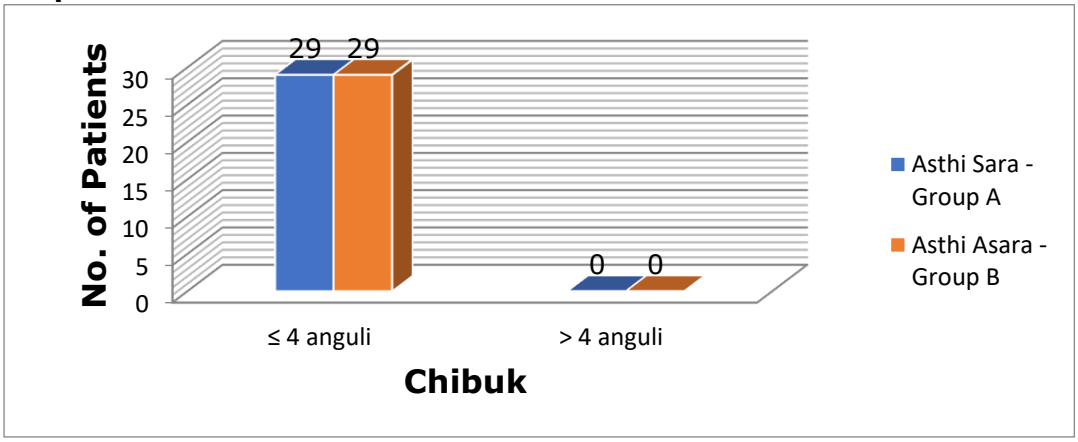


Table no. 9 – Chibuk wise distribution

Chibuk	Asthi Sara – Group A		Asthi Asara – Group B	
	No. of patients	Percentage	No. of patients	Percentage
≤ 4 anguli	29	100.00%	29	100.00%
> 4 anguli	0	0.00%	0	0.00%
Total	**29**	**100%**	**29**	**100%**

The above table reveals that -
In Asthi Sara – Group A – all of the patients i.e. 29 (100 %) were having Chibuk ayam less than or equal to 4 anguli.
Where in Asthi Asara – Group B – all of the patients i.e. 29 (100 %) were having Chibuk ayam less than or equal to 4 anguli.

Graph no. 9



Statistical analysis
Asthi Sarata and Serum Calcium
Chi square test – It is applied to prove whether there is association between the Asthi Sarata and Serum Calcium.

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- Null hypothesis

There is no association between the Asthi Sarata and Serum Calcium.

- Alternate hypothesis

There is an association between the Asthi Sarata and Serum Calcium.

Chi square table

	Sr. Calcium		Total
	Normal (8.6 to 10.3)	Below normal (<8.6)	
Asthi Sara – Group A	29	0	29
Asthi Asara – Group B	0	29	29
Total	29	29	58

Chi square (X^2) value of the above table is 58.
Degrees of freedom (df)
= (Column – 1) (Row – 1)
= (2 – 1) (2 – 1) = (1) (1) = 1
Chi square (X^2) tabulated value of df = 1 is 3.84 at P<0.05 i.e. at 95 % level of significance.
Conclusion: As the calculated chi square (X^2) value is greater than the tabulated (X^2) value, we should reject the null hypothesis and accept the alternate hypothesis.Probability of the difference occurring in Asthi Sarata and Serum Calcium by chance is less than 5 out of 100 Asthi Sara, i.e. probability of not getting the difference between Asthi Sarata and Serum Calcium in nature is 95 %. So the Asthi Sarata and Serum Calcium are associated or interdependent.

Result- The Asthi Sarata and Serum Calcium are associated or interdependent in postmenopausal condition.

DISCUSSION:

This project was designed to achieve the apparent conclusion on the concepts of Ayurveda. The title of this project is...

A comparative study of *Asthi Sarata* and *Asthi ASarata* in Postmenopausal condition: An Observational study.

Here, the correlation between *AsthiSarata* and *Asthi*asarta in postmenopausal condition is studied using observational and statistical analysis. The discussion is designed in various aspects and plotted as follows

Discussion on Importance and Selection of Topic

- **Discussion on concept of *Sarata* and *AsthiSarata***
- **Discussion on Bone and Calcium.**
- **Discussion on *AsthiSarata* and calcium**

Discussion on relation between *AsthiSarata* and *AsthiaSarata* in postmenopausal with the help of Blood Calcium level.

Discussion on observation and statistical analysis.

Scope for further study

1. **Discussion on importance and the selection of topic:**

As per the importance of *Dhatu Sarata* examination, it is helpful for the individual to choose between career options according to ones ability, as individual with particular *dhatu Sarata* can choose suitable field where particular physical and mental characters are required. *Dhatu Sarata* of specific *dhatu* can be improved by treatment which is required for their field of that respected person. The Excellence of *Asthi dhatu* is known as *AsthiSarata*. The purpose of this study is to check the *Asthi Sarata* and *Asthi* asarta in

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postmenopausal condition with the help of blood calcium level. Many research works have been carried on *Asthi*srata. No study was done to analyze a particular relation between *Asthi Sarata* and *Asthi* Asarta in Postmenopausal condition. For all of above-mentioned points, this topic is selected for research work. To accomplish the desired target, this study has been carried out into two sections:

- **Conceptual part:** It includes concept of *Sarata*, *AsthiSarata*, calcium level, and detailed information on anthropometry.
- **Observation part:** evaluation of *AsthiSarata* with the help of M.U.H.S. proforma, assessment of physical characters in volunteers with the help of anthropometry, assessment of calcium level, statistical analysis of collected data.

2. Discussion on concept of *Sarata* and *AsthiSarata*

Sarata is important concept of Ayurveda. Physician should not consider a person as strong or weak only by his appearance. Some individuals appear to be thin but they may possess strength and vice versa. This feature is provided by *Sarata* of particular *dhatu* of that respected individual. The *Sarata* of particular *dhatu* can be improved by improving nourishment of that *dhatu*. This *Sarata* is determined by specific physical and mental characteristics described in Ayurveda text. *AsthiSarata* means Excellence of *Asthi dhatu* in that individual. The main function of *Asthi dhatu* is sustenance i. e. dharana and this sustenance is predominantly provided by *Asthi dhatu* due to its properties. *Asthi* is considered as most hard prakriti bhav of the body. The person with excellence of *Asthi dhatu* is said to be *AsthiSarata*. As it is fifth *dhatu* with excellent quality that means previous *dhatu* are well nourished and it is responsible for nourishment of further *dhatu*s means they will also get-well nourishment. So here we can state that person with *AsthiSarata* will have all over good quality of all seven *dhatu*s so they possess longevity.

3. Discussion on relation between calcium level & Postmenopausal condition.

Calcium is a mineral which is essential for bone formation. We obtain calcium from our diet and it is absorbed from the gut into the blood circulation. Before menopause, you should have about 1,000 mg of calcium daily. After menopause, you should have up it to1,200 mg of calcium per day. Due to a decrease in estrogen production after menopause, women's bodies are less able to retain calcium from dietary sources. On the basis of this point, this study is more focused on establishing the correlation between the calcium level and postmenopausal condition.

4. calcium and Bone

Calcium is a mineral which is essential for bone formation. We obtain calcium from our diet and it is absorbed from the gut into the blood circulation. If blood levels of calcium fall, we produce parathyroid hormone, which increases the resorption of bone, freeing-up calcium from the skeleton and putting this back in the circulation, to keep the blood level of calcium within normal limits.

5. Discussion on post menopause and *AsthiSarata* relation

Postmenopausal women are more susceptible to osteoporosis and more likely to have fractures because of low estrogen level. Theories like *Asthi Dhatu Sarata* parikshan should be understood by co relating it with the help of modern tools like blood calcium levels, 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.

6. Discussion on Observations and statistical analysis:

Anthropometry- Anthropometric measurements of specific body parts associated with the characteristics of *AsthiSarata* are considered for this research.

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A. Height, weight and BMI

In *Asthi Sarata* - Out of 29 volunteers studied in this project, it was observed that maximum volunteers were seen in the height group 150-160 cm and weight group 50-60kg and. Maximum volunteers were found in the normal BMI group. (18.1-25kg/m^2).

In *Asthi*Asarta

Out of 29 volunteers studied in this project, it was observed that maximum volunteers were seen in the height group 150-160 cm and weight group 60-70kg and. Maximum volunteers were found in the normal BMI group. (18.1-25kg/m^2)

B. *AsthiSarata* and Calcium

Out of 29 volunteers in group A have calcium level in normal proportion. And In a Group B have calcium level below the normal proportion. Probability of the difference occurring in *Asthi Sarata* and Serum Calcium by chance is less than 5 out of 100 *Asthi Sara*, i.e. probability of not getting the difference between *Asthi Sarata* and Serum Calcium in nature is 95 %. So the *Asthi Sarata* and Serum Calcium are associated or interdependent in Postmenopausal condition.

The anthropometric measurements of associated body parts in the present study indicates that Shira (head), as well as Janu (knee), *Aratni*(forearm), are found to be robust i.e. gross in nature and bulk(*Sthool*) after trividh *Pareeksha* i.e. darshan, sparshan and prashan as described in the characteristics of *AsthiSarata* individual. *Asthi* has predominance of pruthvi *mahabhuta*. It is considered as parthiv bhav. It means it possesses all the qualities of pruthvi *mahabhuta*. *Sthool*ta is one of the qualities of pruthvi *mahabhuta*. Sustenance (dharan) is the main function of *Asthi dhatu* which indicates quality of sthirata (stability) of pruthvi *mahabhuta*. The body parts i.e. Shira, Janu, *Aratni* studied in the present study are combination of multiple bones as a joints which means the ultimate formation of *Asthi dhatu*. It is representative of parthiva bhava in the body. So *Sthool*ata (bulkiness) have been observed in these body parts. While considering these anthropometric measurements of individual Pratyanga and grades of *AsthiSarata* (as uttam, madhyam), the association between them is analysed by independent sample t-test for two independent samples. It gives negative association between them. It means anthropometric measurements described above are independent of uttam and Madhyam *Sara* of an individual. There is no significant difference between anthropometric measurements of Pratyanga and its grades of *AsthiSarata*. *AsthiSarata* means Excellency of *Asthi dhatu*. As described above, *Asthi dhatu* provides sustenance as it has dominance of pruthvi *mahabhuta*. *AsthiSarata* individual have great quality of covering over the body parts due to mansa *dhatu*. All these qualities give great level of strength to such individuals which increase their physical and mental capacity. They become to tolerate physical and mental stress. Therefore, these individuals are able to take part in many activities. *Asthi dhatu* and vata dosha have correlation with each other. Excellency of *Asthi dhatu* tends to proper functioning of vata dosha which remains in equilibrium state. Enthusiasm and activeness are chief functions of vata dosha. Ultimately these qualities are observed in *AsthiSarata* individuals. While considering this conclusion, the association between *Asthi Sarata* and calcium level are associated or interdependent. It was analysed by chi-square test. It gives positive association between Postmenopausal womens were *Asthi sara* had a normal or within a range of blood calcium levels. It is mainly due to *Sthool guna* of pruthvi *mahabhuta*, which is the composition of *Asthi dhatu*.

CONCLUSION:

1. Probability of the difference occurring in *Asthi Sarata* and Serum Calcium by chance is less than 5 out of 100 *Asthi Sara*, i.e. probability of not getting the difference between *Asthi Sarata* and Serum Calcium in

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nature is 95 %. So the *Asthi Sarata* and Serum Calcium are associated or interdependent.

2. According to anthropometric measurements, Shira (head)- *Ayam* (length) and parinah (circumference) are found to be *Sthool* (robust/bulky) as per described in characteristic of *AsthiSarata* individual.
3. Janu(knee) *Ayam* (Length) and parinah (circumference), aratni (forearm) length are also found to be *Sthool* (robust/bulky) as per described in characteristics of *AsthiSarata* individuals.
4. There is significant association between *AsthiSarata* and calcium levels.

There is no significant association between grades of *AsthiSarata* (uttam or madhyam) and anthropometric measurements of different pratyanga of those respective individuals.

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