

ANTHROPOMETRICAL STUDY OF TIBIA WITH SPECIAL REFERANCE TO OSTEOARTHRITIS

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ABSTRACT

Anthropometry is systemic, quantitative representation of human body. It deals with the physical dimensions, proportions and variations in measurements. Anthropometry is a latin word. ‘Anthropos’ means human and ‘metry’ means measurement. Anthropometry was first used in 19th and early 20th century in criminalistics to identify criminals. Now it has wide application in the field of medicine, space programming and archaeology etc. In our ancient science, there are numerous references of human measurements and they are explained in terms of anguli praman, Anjali praman, yava praman. The morphological characters such as height, bredth etc. are given in swa anguli praman, (breadth of one’s own finger). In our ancient classics, the tibia is termed as antarjanghaasthi and it is eighteen anguli, measured bredth of the individual’s finger. The praman shaarir is explained in the context of investigatory methods ie. In dashavidha pareeksha and those who are coming under heena pramana is more susceptible to pathology. Osteoarthritis is the most common pathology in present era and upper end of tibia is the main victim. Tibia is the main weight bearing bone in the body so the study is aimed to observe the patients of osteoarthritis and to find out the variations of tibial length anthropometrically.

Key words : Anthropometry, Tibia, Praman Sharir, Osteoarthritis.

INTRODUCTION

In ayurveda the *sharir* is given prime importance as one among those factors which contributes to *ayu* of an individual, the other factors being *indriya*, *satwa*, *atma*. This complete knowledge about *sharira* at all times is very much essential for a physician in order to provide a healthy life for mankind. The essentiality of *praman* is depicted in the fundamentals of *ayurveda* as , the *mana/ praman of hitayu, ahitayu, sukhayu, and dukhayu* is the one which constitutes ayurveda.¹ *Ayurvedic*

literature pertaining to *sharir rachana* furnish detailed description on measurements of body and its elements. In our classics *praman sharir* is the term given to this subdivision which depicts the importance of measurements or anthropometry. *Praman*, the other way defines the concept of measurements of various biological entities. It bears an ample importance in medical applied science. Before starting with the *chikitsa* which is consider as *karya* in the field of medicine, the wise physician should perform the *pareeksha* of *karyadesha* i.e. *ATUR SHARIR*.² *ACHARYA*

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CHARAK explained *dashveedha pareeksha vidhi*. *Praman pareeksha* is one of them.³ The basic goal behind *pareeksha* is to get knowledge regarding the *bala of rogi* where *ACHARYA SUSHRUTA* considered it as the main tool to get the information regarding *ayu* along with that of *Bala*³. The *sharir praman* is only tool for determining the *ayu* of an individual. The ayurvedic classical literature are documented along with many hypothetical concepts. The concept of *praman* is also one among them which should be evaluated scientifically to bring out the hidden logical knowledge of ayurveda. *Pramaan* of *purusha* gives the detailed information regarding each body parts in terms of its external features. This can be helpful in the understanding the anatomical knowledge required for the practice of *Aurveda*. The modern ANTHROPOMETRY also has a similar kind of intentions in the field of medical science. Anthropometry is systemic, quantitative representation of human body. It deals with the physical dimensions, proportions and variations in measurements. Anthropometry is a latin word. *Anthropos* means human and *metry* means measurement⁴. Anthropometry was first used in 19th and early 20th century in criminalistics to identify criminals. Now it has wide application in the field of medicine, space programming and archaeology. In our ancient science, there are numerous references of human measurements and they are explained in terms of *anguli praman*, *Anjali praman*, *yava praman*. The morphological characters such as height, breadth etc. are given in *swa anguli praman* (breadth of one's own finger). In our ancient classics, the tibia is termed as *antarjanghaasthi* and it is eighteen *anguli*, measured by breadth of the individual's finger⁵. The *pramaan shaarir* is explained in the context of investigatory methods, ie. In *dasavidha pareeksha* and those who are coming under *heena pramaana* is more susceptible to pathology. *Sandhigatavata* is described under *Vatavyadhi* in all the *Samhita* and *Sangraha Grantha*. In *Vriddhavastha*, all *Dhatu*s undergo *Kshya*, Thus leading to *Vataprakopa* and making individual prone to many diseases.

Among them *Sandhigatavata* stands top in the list. Osteoarthritis is the most common articular disorder begins asymptotically in the 2nd and 3rd decades and is extremely common by age 70. Almost all persons by age 40 have some pathologic change in weight bearing joint. 25% females and 16% males have symptomatic OA.⁶ The disease Osteoarthritis may be regarded as a reward of longevity. It seems man has paid price for standing on hind limbs in form of osteoarthritis of weight bearing joints of the body.⁶ Arthritis is second only to heart disease as a cause of work disability. It limits everyday activities such as walking, dressing, bathing etc., thus making individual handicapped. No treatment is available which can prevent or reverses or blocks the disease process. In Allopathic science, mainly analgesics, anti inflammatory drugs or surgery are the options for the treatment of Osteoarthritis. These don't give satisfactory relief and also causes great adverse effect. Researchers are looking for drugs that would prevent, slow down or reverse joint damage. Drugs that slowdown or halt disease progression are critically needed. For the search of cure of the disease *Sandhigatavata*, many researches has been carried out. Still till date we don't have treatment which can actually cure or provide good relief in *Sandhigatavata*. Prevention is better than cure, The present study is a humble effort in search of prevention of the disease *Sandhigatavata*. Osteoarthritis is the most common pathology in present era and upper end of tibia is the main victim.⁷ Tibia is the main weight bearing bone in the body⁸, so the study is aimed to observe the patients of osteoarthritis and to find out the variations of tibial length anthropometrically.

Objectives:-

1. Compile the description of *pramaan shaarir* and *antarjanghaasthi* in *brihat trayees*, mainly *Sushruth Samhitha*
2. Survey study to determine the measurement of tibia in osteoarthritic patients and to correlate it with *pramaan shaarir* of *Ayurveda*.

- To analyse the *anguli pramaana* of selected patients.

MATERIALS AND METHODS :-

- The ayurvedic literature of related subject will be studied from *brihat trayee*, mainly *Sushruth Samhitha*.
- The modern literature related to anthropometry will be studied.
- A survey study will be conducted in fifty osteoarthritic patients for the collection of anthropometrical data of length of tibia.
- The *anguli pramaan* of patients will be assessed by taking the breadth of four fingers except thumb, at different sites, i.e. proximal and distal interphalangeal region. The obtained data will be analysed and compared with the textual references.
- The measurement of tibia will be taken by appropriate, authentic instruments.
- Internet materials, journals, periodicals and previous research papers related to this subject will be reviewed

Criteria for patient selection :-

1. Inclusion :

- Age between 35 to 70 years.
- Male patients belonging to Rajasthan

2. Exclusion:

- Patients with other systemic disease

NEED OF STUDY:-

- To scientifically analyse and explain the concept of *pramaan shaarir* given in our classics
- Eventhough there are previous studies related with anthropometry, no studies related with anthropometry of tibia has been done yet.
- Osteoarthritis, being one of the most common disease, a study related to the subject will be beneficial for better prognosis of the disease.
- To substantiate that the inclusion of *pramaan sharir* in *dasavidha pareeksha* is both scientific and authentic.

OBSERVATION:- The different features observed in individual patient were recorded in a case sheet after the proper history taking, examining the patients who were selected for the clinical observational study based on diagnostic, inclusion and exclusion criteria. After completion of the study the observations were analyzed, tabulated and presented in the form of tables as follows -

S.No.	Sharirik Prakriti	No. of Patients	Percentage
1.	Vataj	00	00.00%
2.	Pittaj	00	00.00%
3.	Kaphaj	00	00.00%
4.	Vata-Pittaja	19	37.25%
5.	Vata-Kaphaja	16	31.37%
6.	Pitta-Kaphaja	16	31.37%
7.	Tridoshaja	00	00.00%

Table no. 1: Showing the incidence of Age in 51 registered cases of Osteoarthritis.

S.No.	Age Group (In Years)	No. of Patients	Percentage
1.	35- 45 Years	12	23.53%
2.	45-55 Years	19	37.25%
3.	55-70 Years	20	39.22%

Table no. 1 show that maximum patients are of under 55 to 70 years group i.e. 39.22%, after that 37.25% patients are under 45-55 years group ,minimum no. of patients are under 35-45years i.e.23.53%.

Table no. 2: Showing the incidence of Religion in 51 registered cases of osteoarthritis.

S.No.	Religion	No. of Patients	Percentage
1.	Hindu	45	88.24%
2.	Muslim	04	07.84%
3.	Sikh	01	01.96%
4.	Sindhi	01	01.96%

Table no.2 shows that out of 51 registered cases maximum i.e.88.24% are of hindu community ,after that 7.84 %were muslims, sindhi and Sikhs both 1.96%.

Table no. 3: Showing the incidence of Sharirika Prakriti in 51 registered cases of Osteoarthritis.

Table no.3 and fig.no.3 shows that maximum no. of patients,19, are from *vata pitta prakriti* i.e.37.25%, then *vata-kapha* and *pitta-kapha* both having 16 patients i.e.31.37%, however we have zero patients of pure *vata*, *pitta*, *kapha* and *tridoshaja prakriti*.

Table no. 4: Showing the incidence of Chronicity (in years) in 51 registered cases of Osteoarthritis.

S.No.	Chronicity (In years)	No. of Patients	Percentage
1.	1 Year	08	15.69%
2.	2 Year	17	33.33%
3.	3 Year	17	33.33%
4.	4 Year	08	15.69%
5.	5 Year	01	01.96%

Table no.4 shows that maximum patients having 2 and 3 years of chronicity i.e.17 (33.33%),then 08 patients having 1and 4

years of chronicity i.e.15.69% and only a single patient with 5 years of chronicity i.e.1.96%.

Table no. 5: Showing the incidence of Occupation in 51 registered cases of Osteoarthritis.

S.No.	Occupation	No. of Patients	Percentage
1.	Govt Service	10	19.61%
2.	Retired	03	05.88%
3.	Pvt. Job	17	33.33
4.	Labour Work	14	27.45%
5.	Farmer	07	13.73%

Table no. 5 shows maximum no. of patients,17i.e.33.33% are privet servants, then 14 patients were labours i.e. 27.45%,10 patients19.61% are from

government service.07patients are farmer(13.73%),03 are retired patients 05.88%.

Table no. 6: Showing the incidence of *Anguli pramana of Right Jangha* in 51 registered cases of *Osteoarthritis*.

S.No.	Anguli Pramana	No. of Patients	Percentage
1.	17 - 18.5	11	21.57%
2.	18.5 - 19	10	19.61%
3.	19 - 19.5	14	27.45%
4.	19.5 - 20	09	17.65%
5.	20 - 20.5	04	07.84%
6.	20.5 - 21	01	01.96%
7.	21 - 21.5	02	03.92%

Table no. 7: Showing the incidence of *Anguli pramana of Left Jangha* in 51 registered cases of *Osteoarthritis*.

S.No.	Anguli Pramana	No. of Patients	Percentage
1.	17 - 18.5	10	19.61%
2.	18.5 - 19	09	17.65%
3.	19 - 19.5	14	27.45%
4.	19.5 - 20	09	17.65%
5.	20 - 20.5	05	09.80%
6.	20.5 - 21	02	03.92%
7.	21 - 21.5	02	03.92%

Table no. 8: Showing the incidence of Actual *Anguli pramana of Right & Left Jangha* in 51 registered cases of *Osteoarthritis*.

Patient Sr. No.	RIGHT	LEFT
1	18.88	19.14
2	19.32	19.47
3	21.15	21.15
4	19.80	19.53
5	18.29	18.39
6	19.29	19.19
7	18.65	18.19
8	18.65	18.19
9	18.45	18.35
10	17.14	17.03
11	20.38	20.06
12	20.46	20.41
13	18.71	18.71
14	19.18	19.14
15	19.21	19.17
16	19.58	19.34
17	19.30	19.10
18	18.06	18.43
19	19.00	19.15

20	18.90	18.79
21	19.33	19.55
22	19.32	19.06
23	18.80	18.12
24	19.36	19.41
25	18.58	19.15
26	21.45	21.00
27	19.16	19.86
28	18.29	18.48
29	19.82	20.11
30	19.86	19.13
31	18.28	18.52
32	20.71	20.34
33	18.43	18.72
34	18.60	18.30
35	19.33	18.88
36	19.74	19.54
37	18.36	18.57
38	19.24	18.84
39	19.45	19.50
40	19.84	19.58
41	18.34	18.90
42	19.67	19.56
43	19.67	19.60
44	18.08	18.20
45	19.36	19.41
46	18.58	19.15
47	20.40	20.50
48	19.16	19.80
49	20.48	20.96
50	19.82	20.00
51	18.28	18.52

DISCUSSION

On PRAMANA : In *ayurveda*, *pramanas* are considered as the methods for gaining knowledge. *Anguli pramana* is used to quantitatively express the dimensions of the human body part. *Acharya charak* considered as it as one among the *dashvidh parikshabhavas*. In the era of *sushrutacharya* and *charakacharya*, *swa-anguli pramana* is used for estimating the *anga-pratyang* and other body constituents. the person should be examined by

measuring *angapratyang* by using *swa-angula praman* as unit measurement. It helps in determining the *ayu and bala* of person. The person having appropriate *pramanas* of *anga-pratyangasis* considered to attend the *deergayu*. Basically there are 2 type of *pramanas* explained in *ayurveda*. Those are *anguli pramaan* and *anjali pramaan*. The *anjali praman* is used for measuring other body constituents including fluids. But *anguli praman* which is based

on *swa-anguli praman* is used for measuring the dimensions (*ayam, vistara, parinaha* etc.) of different *anga-pratyangas* of the body.

On JANGHA : The *jangha* is that anatomical part which is present below the *janu* and above the *gulpha*. In some context, this word is being replaced by *uru and anga*. The measurement of *jangha* are mentioned in both *charak and sushrut samhitas*. In *charak samhita*, in the context of *dashvidh atura pareeksha* in *vimana sthan* 8th chapter, it is said as, *ASHTA DASH ANGUL DEERGA*, and *SHODASHAANGULA PARIKSHEPA* in the *pramaan of jangha*. In the *sushrut-samhita*, 35th chapter of, *sutrasthana*, named *AA-TUROPKRAMANIYA ADHYAYA*, the *sharir pramaan* enlisted in which the *pramaan of jangha* is said as, *CHATURADASHANGULA PARINAH* and *ASHTADASHANGULA DEERGA*. No anatomical land marks are being mentioned, neither by author nor by the commentators, so the modern anthropometric procedures and technique were personalized accordingly.

Anatomically *jangha* is considered as the LEG (or the lower leg), based on the definitions available in *ayurvedic* literatures. The normalized anthropometric data documented in the book “*introduction to*

On the observation:-

Group A	Mean	S.D.	S.E.	t	p
Rt. jangha	19.21	0.84	0.12	10.35	< 0.001
Lt. jangha	19.22	0.81	0.11	10.69	< 0.001

The study was conducted on 50 osteoarthritic patients in the age group 35 to 70 years and all patients were belongs to rajasthan In the collected data the following the observations.

So from this study it is derived that mean length of *jangha* of osteoarthritic patients were 19 angula approximetly. The length of *jangha* of healthy person, given in our clas-

biomechanics”, university of rhode island ,department of bio medical engineering , suggests that the average lenth of lower leg is 50cms.,but while calculating these measurements they have included both knee and ankle joint. In this survey study this has been modified by selecting particular anatomical point, the measurement are documented.

On Anthropometry:-

Anthropometry is a systemized body of techniques for measuring and taking the observations on man, his skeleton, the limb and trunk etc. by most reliable means and scientific methods. It concentrates on the observations and measurement of the physical variation both within and between human populations seeking to understand the origins and mechanisms of survival of the variations. In view of the fact that no two individuals are ever alike in all their measurable characters and that the later tend to undergo change in varying degree, hence person living under different conditions and members of different ethnic groups frequently present interesting differences in body form and proportions. The anthropometry forms a mean of giving quantitative expression to the variations exhibited by such traits.

sics is 18 angula. with afrosaid data, it may be say that there is a variation in length of *jangha* of healthy individual and diseased person (here it is osteoarthritis).

CONCLUSION AND RESULT

1. Individualistic approach of *pramaan shareera* helps to plan the treatment and decide the prognosis

depending on the result of *dashvidh pareeksha*. Applicability of *pramaan shareera* in the assessment of disease prognosis and mortality is true from centuries.

2. The description of specific anatomical landmarks for *jangha* are not explained by *samhitas*. With the available references in ayurvedic and contemporary science the TIBIA and FIBULA was togetherly considered as *jangha* in this study and landmarks are from tibial tuberosity up to inferior medial malleolus.
3. The study entitles "*anthropometrical study of tibia with special reference to osteoarthritis*" gave positive results in proving the relation of length of *jangha* and osteoarthritis.
4. Observation of the present study revealed that mean length of *jangha* of osteoarthritic patients were 19 *angula* approximetly. The length of *jangha* of healthy person, given in our classics is 18 *angula*. With aforesaid data, it may be said that there is a variation in length of *jangha* of healthy individual and diseased person (here it is osteoarthritis).
5. The observations from this study also gives strong positive thought about, the length of *jangha* of healthy person (18 *angula*), which is given in our classics, is significant.
6. We can also, may be, said that individual with more than 18 *angula* length of tibia are prone to the disease osteoarthritis.

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