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EVALUATION OF VALIDITY OF *ANGULĪ PRAMĀNA* IN PRESENT ERA: A PILOT STUDY

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ABSTRACT

Ayurveda is an ancient health science in India. *Pramāna shārīr* is the glorious concept put forth by our āchārya which deals with the measurements of the human body. It helps in assessing the life span, strength of normal as well as diseased person. As there were no standard units of measurement, our sages adopted the unique method of measurement i.e. *angulī pramāna*. Here, individual's own finger width is used to measure the body parts, hence it is also known as *swa-angulī pramāna*. Measurements of different body parts is already given by our āchāryas thousands of years ago. All these measurements are in terms of *angulī*. Present study is planned to validate an ancient *angulī pramāna* which is being told by our āchāryas thousands of years ago. Due to evolutionary changes and lifestyle of human being, the validation of *angulī pramāna* needs to be done. Also anthropometric measurements stated in Anthropology are mainly applicable to the western population. In such conditions normal range of measurements for Indian population needs to be revised and established. These normal measurements can be used for assessing the health and nutritional status of population in our society.

Anthropometry is the modern counterpart of ancient *angulī pramāna*. Anthropometry is a branch of Anthropology. It is a series of systematized measuring techniques that express quantitatively the dimensions of the human body and skeleton. It is a single most portable, universally applicable, inexpensive and non-invasive technique for assessing the size, proportions and compositions of the human body.

Keywords: *Pramāna shārīr*, *Angulī pramāna*, Anthropometry.

INTRODUCTION: Ayurveda is the science which has developed many unique concepts through the process of observation, examination and interpretation. One such contribution of our āchārya is the concept of *pramāna shārīr* especially *angulī pramāna*. An *angulī pramāna* is stated as the tool for determination of '*ayu*' (lifespan) of the person as well as strength and health of person and diagnosis of the disease too.[1][2] In Ayurved the term *anguli* (breadth of one's own finger) has been accepted as smallest unit for measuring human body parts.[3]

Anthropometry is the modern counterpart of ancient *angulī pramāna*. Anthropometry is a branch of Anthropology. It is a series of systematized measuring techniques that express quantitatively the dimensions of the human body and skeleton. It is a single most portable, universally applicable, inexpensive and non-invasive technique for assessing the size, proportions and compositions of the human body.[4]

The words '*pramāna*' and 'metry' are related to measurement. *Angulī pramāna*

of different parts and subparts of the body have been mentioned in Ayurvedic classics. It is clear that our āchāryas were fully convinced with the values of measurement in medical science; due importance was given to the measurement of different parts of the human body. They listed in detail anthropometric values of each part of the body. As it is stated by our āchārya thousands of years ago, its validation in the present era is the prime necessity which is the main objective of the present study.

METHODOLOGY: Survey was the tool for collection of the data. Survey was carried out in Ahmed Nagar and Nasik region as these two regions are having same geographical conditions also easily approachable to the researcher. Total 89 participants were selected by non-probability sampling technique.

METHOD OF SELECTION OF STUDY SUBJECTS:

a) Inclusion criteria-

- Age group 18 to 50 years of both genders,
- From same geographical area,
- Same socio-economic status,

b) Exclusion criteria-

- Wheel chair bound individuals,
- Persons having physical disability,
- Persons having metabolic disorders,
- Persons who have difficulty in standing steady or straight,
- Persons with hair style or turban.

MATERIALS: Stature meter to measure height, Measuring tape to measure body parts, Digital vernier caliper to measure the width of volunteer's own middle finger, Weighing machine to measure weight of volunteer, Calculator, Informed Consent Form, Case Record Form.

METHOD OF DATA COLLECTION: Survey

For present study 89 healthy volunteers of age group 18 to 50 selected from Ahmed Nagar and Nasik region. After the age of 18 years there are no major developmental changes found in the body. After the age of 50, degenerative changes start hence the age group is fixed.

PROCEDURE: Volunteers are selected from Ahmed Nagar and Nasik region as these regions are easily approachable for the study. Convenient random sampling was preferred for the study. Survey was the tool for collection of data. All the volunteers were given prior idea about the study (pre-counseling) and information explained to them in their mother tongue, informed consent taken before taking measurements. The measurements of female volunteers were taken by female attendant and that of male volunteers by male attendant. Orientation and training was given to both male and female attendants regarding the study.

Measurement of following body parts is taken,1) *Purush* (Height), 2) *Shir*, 3) *Bahu*, 4) *Prakoshtha*, 5) *Manibandha*, 6) *Hasta*, 7) *Uru*, 8) *Janu*, 9) *Jangha*, 10) *Gulpha*, 11) *Pada*, 12) *Kati*. Measurements thus obtained are recorded in terms of cm as well as *swa-anguli pramana*. The measurement values stated by āchārya Charak and Sushruta were considered as the standard for comparison with the sample mean for each parameter.

Data obtained recorded on Case Record Form. After the data collection is over, statistical analysis of data was done.

MEASUREMENT OF *SWA-ANGULI PRAMANA*: For standardizing *swa-anguli pramāna*, width of individual's own

middle finger (BM) used as a parameter.[5][6] It was measured with the help of digital vernier caliper. Breadth of middle finger (BM) measured at the level of proximal inter phalangeal joint**.**

PRECAUTIONS TAKEN DURING MEASUREMENTS: All instruments checked for their precision, calibration and cleanliness. While using vernier caliper ring or ornaments or accessories removed from the fingers. The vernier caliper should not be pressed too tight or too loose. The vernier caliper held perpendicular to the long axis of the finger. In case of measurements related to limbs, right side was preferred.

STATISTICAL ANALYSIS: Sample of 89 participants was considered and their body measurements in terms of various parameters are recorded in cm and then converted into *Anguli pramāna*. Ācharya Charak and Sushruta had mentioned *Anguli pramana* for the person for the same parameters which is considered standard. For the statistical analysis of the data one sample t-test is applied.

OBSERVATIONS AND RESULTS: To compare if there is any significant difference between average body measurements and the *Anguli pramana* by Charak, t-test for single mean is applied at 95% confidence level and 88 degrees of freedom, separately for each parameter recorded actually. The results obtained are shown in **Table-1**.

It can be observed from the Table-1 that except for parameters *Shir parināh*, *Pād āyām* and *Pād vistār*, all remaining parameters significantly differ in average value from the *Anguli Pramāna*. While three parameters *Shir parināh*, *Pād āyām* and *Pād vistār* do not differ significantly. So only for these three parameters *Anguli pramana* by Charak is valid in the present era.

Similarly to compare if there is any significant difference between average body measurements and the *Anguli pramana* by Sushruta, once again t-test for single mean is applied at 95% confidence level and 88 degrees of freedom, separately for each parameter recorded actually. The results obtained are shown in **Table-2.**

It can be observed from Table-2 that except for parameters *Prakoshtha āyām*, *Gulpha parināh* and *Pād āyām*, all other parameters show significant difference between average measurement value and *Anguli pramana* by Sushruta; while three parameters *Prakoshtha āyām*, *Gulpha parināh* and *Pād āyām* do not differ significantly from *Anguli pramana*. So only for these three parameters *Anguli pramana* by Sushruta is valid in present era.

	Table 1 Actual measurements compared with CHARAK *Anguli pramana* [2]							
No.	**Parameter**	**Mean Score**		**S.D.**	**S.E.**	**t value**	**P value**	**Remark**
		Actual	**Expected**	**Actual**				
1	Purush Aayam	95.74	84	8.8408	0.9371	12.5287	0.0000	Significant
2	Purush Vistar	97.77	84	5.6027	0.5939	23.1839	0.0000	Significant
3	Shir Parinah	32.27	32	2.4939	0.2644	1.0246	0.3084	Not Significant
4	Bahu Aayam	18.25	16	1.3565	0.1438	15.6585	0.0000	Significant
5	Bahu Parinah	15.61	12	2.1119	0.2239	16.1392	0.0000	Significant
6	Prakoshtha Aayam	15.88	15	1.2449	0.132	6.6286	0.0000	Significant
7	Prakoshtha Parinah	NIL						
8	Manibandh Parinah	NIL						
9	Hasta Aayam	10.48	12	0.8602	0.0912	-16.6728	0.0000	Significant
10	Hasta Vistar	NIL						
11	Uru Aayam	26	18	2.7911	0.2959	27.0309	0.0000	Significant
12	Uru Parinah	28.13	30	3.4957	0.3705	-5.0372	0.0000	Significant
13	Janu Aayam	4.85	4	0.7416	0.0786	10.7947	0.0000	Significant
14	Janu Parinah	21.03	16	2.4678	0.2616	19.2308	0.0000	Significant
15	Jangha Aayam	21.36	18	2.0174	0.2138	15.7279	0.0000	Significant
16	Jangha Parinah	19.59	16	2.0347	0.2157	16.6535	0.0000	Significant
17	Gulpha Parinah	NIL						
18	Pad Aayam	13.75	14	1.3856	0.1469	-1.7175	0.0894	Not Significant
19	Pad Vistar	5.84	6	1.0863	0.1151	-1.4083	0.1626	Not Significant
20	Pad Parinah	NIL						
21	Kati Vistar	20.78	16	3.7736	0.4	11.9487	0.0000	Significant
22	UrdhwaShakha Aayam	NIL						
23	Adho Shakha Aayam	NIL						

	Table 2 Actual measurements compared with SUSHRUTA Anguli pramana [1]							
No.	**Parameter**	**Mean Score**		**S.D.**	**S.E.**	**t value**	**p value**	**Remark**
		Actual	**Expected**	**Actual**				
1	Purush Aayam	95.74	120	8.8408	0.9371	-25.8873	0.0000	Significant
2	Purush Vistar	97.77	120	5.6027	0.5939	-37.4345	0.0000	Significant
3	Shir Parinah	NIL						
4	Bahu Aayam	18.25	16	1.3565	0.1438	15.6585	0.0000	Significant
5	Bahu Parinah	15.61	12	2.1119	0.2239	16.1392	0.0000	Significant
6	Prakoshtha Aayam	15.88	16	1.245	0.132	-0.9426	0.3485	Not Significant
7	Prakoshtha Parinah	11.73	12	1.1832	0.1254	-2.1424	0.0000	Significant
8	Manibandh Parinah	8.94	12	0.5	0.053	-58.2261	0.0000	Significant
9	Hasta Aayam	10.48	6	0.8602	0.0912	49.1262	0.0000	Significant
10	Hasta Vistar	4.79	4	0.2646	0.028	27.1195	0.0000	Significant
11	Uru Aayam	26	18	2.7911	0.2959	27.0309	0.0000	Significant
12	Uru Parinah	28.13	32	3.4957	0.3705	-10.4349	0.0000	Significant
13	Janu Aayam	NIL						
14	Janu Parinah	21.03	14	2.4678	0.2616	26.8757	0.0000	Significant
15	Jangha Aayam	21.36	18	2.0174	0.2138	15.7278	0.0000	Significant
16	Jangha Parinah	19.59	16	2.0347	0.2157	16.6535	0.0000	Significant
17	Gulpha Parinah	13.87	14	2.2428	0.2377	-0.5453	0.5869	Not Significant
18	Pad Aayam	13.75	14	1.3856	0.1469	-1.7175	0.0894	Not Significant
19	Pad Vistar	5.84	5	1.0863	0.1151	7.2898	0.0000	Significant
20	Pad Parinah	13.76	14	0.9695	0.1028	-2.3057	0.02348	Significant
21	Kati Vistar	20.78	18	3.7736	0.4	6.9489	0.0000	Significant
22	Urdhwa Shakha Aayam	41.8	32	2.5788	0.2734	35.8579	0.0000	Significant
23	Adho Shakha Aayam	54.07	50	5.016	0.5317	7.5829	0.0000	Significant

DISCUSSION: There are detailed descriptions of *Anguli pramāna* given in Samhita. *Swa-anguli pramāna* is used as unit for measurement of *āyām* (length), *vistār* (breadth), *parināh* (circumference) and *utsedh* (height) of various parts of the human body. Individuality is the characteristic feature of ancient *Anguli pramāna*. In an ancient era our āchārya have mentioned measurement of the body parts in a single number also there is difference in measurements of the body parts stated by āchārya Charak and Sushruta. Such kind of difference should be ruled out and evaluated practically by performing survey on mass level and then comparing it with *anguli pramana* stated by Charaka and Sushrut. There might be a normal range of measurements which we will have to find out.

Present study is planned to validate the ancient *anguli pramana*. *Anguli pramana* is being told by aacharya thousands of years ago. Due to evolutionary changes and lifestyle of human being, the validation of *anguli pramana* needs to be done. Also anthropometric measurements stated in anthropology are mainly applicable to the western population. In such conditions normal range of measurements for Indian population needs to be revised and established. These normal measurements can be used for assessing the health and nutritional status of population in our society.

Lot of work has been done regarding *anguli pramana* at P.G level on theoretical basis. But that should be extended on mass level by performing survey of society. India is having varied geographical conditions depend upon which is the stature of an individual. In such conditions we have selected Ahmed Nagar and Nasik region for the survey study so as to have uniform stature and large sample 89 healthy volunteers for more precision. This study will help in validation of *anguli pramana* in present era.

It is observed that except for parameters *Shir parināh*, *Pād āyām* and *Pād vistār*, all the remaining parameters significantly differ in average value from the *Anguli Pramāna* stated by āchārya Charak. While three parameters *Shir parināh*, *Pād āyām* and *Pād vistār* do not differ significantly. So only for these three parameters *Anguli pramana* by Charak is valid in the present era.

Similarly it is observed that except for parameters *Prakoshtha āyām*, *Gulpha parināh* and *Pād āyām*, all other parameters show significant difference between average measurement value and *Anguli pramana* by Sushruta; while three parameters *Prakoshtha āyām*, *Gulpha parināh* and *Pād āyām* do not differ significantly from *Anguli pramana*. So only for these three parameters *Anguli pramana* by Sushruta is valid in present era.

CONCLUSION:

On the basis of survey study, we have concluded that obtained measurements of the selected body parts significantly differ from that of found in our ancient samhita except for few body parts. This may be due to evolutionary changes and life style of the human being. Also the sample size for the study is small as compared to total population. The results may differ when it will be carried out on bigger population. Overall it can be stated that the ancient Anguli pramana stated by Charaka and

Sushruta for some body parts cannot be taken valid in present era.

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