Published online in http://ijam.co.in ISSN No: 0976-5921

International Journal of Ayurvedic Medicine, Vol 14 (4), 2023; 926-930

Scientific Study of *Dalhanokta Anguli Pramana* (Measurement) with reference to *Purusha Ura Vistaar* (Male Chest Breadth)

Research Article

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Abstract

In *Ayurveda* the word "*Pramana*" refers to measurement. *Ayurveda* classics have explained the normal measurements of *Anga Pratyanga* in terms of *Ayama* (length), *Vistaar* (breadth), *Utsedha* (height) and *Parinaha* (circumference) with the help of *Swa-Anguli Pramana* (measurement by own finger). In the ancient time length, breadth, and height of body's parts measured by using the technique of *Anguli Pramana* in which measurements of parts of body have given in terms of *Swa-Anguli*. It can be the perfect parameter irrespective of age, sex, race and place etc. Principles of *Ayurveda* have given the individualistic approach rather than the generalized by providing the concept of *Swa-Anguli Pramana*. *Acharyas* said that before we start the treatment one should do the *Ayu Pariksha* (longevity of life) of that patient which depends upon proper measurement of parts and sub parts of body along with *Sara* of body. Present study was taken to validate the *Dalhanokta Anguli Pramana* of *Purusha Ura Vistaar* (male chest breadth) which was given as 24 *Angula*. The data of *Purusha Ura Vistaar* of 60 healthy volunteers was collected and statistically analyzed. As very less work has been done the current study was conducted.

Keywords: *Anthropometry, Swa-Anguli Pramana, Measurements, Diameter, Ayam*.

Introduction

Ayurveda is boon to mankind as this science is immensely useful not only in preventing the disease but also in curing the disease. *Ayurveda* is full of tremendous knowledge. Entire and deep knowledge of body from embryology to completely developed body is most important for the physician in order to provide a healthy and happy life for human being (1). Among the *Dashavidha Aturpariksha* (10 factors of patient's examination) "*Pramana*" plays a very significant role. *Anguli Pramana* is one of the unique concepts illustrated in *Ayurveda*. It is a scientific tool for research. Longevity of life depends upon the proper measurement of *Anga Pratyanga* (body and its sub parts) along with *Sara* of body said by *Sushruta* (2). Unless you don't know the normal measurement, you are unable to decide what is abnormal. *Acharya* measured *Anga-Pratyanga* of body by using the technique of *Anguli Pramana* in which *Pramana* of *Anga -pratyanga* have given in terms of *Swa-Anguli*. *Acharya* used the *Swa- Anguli* as reference unit of measurement. Principles of *Ayurveda* have given the individualistic approach in place of generalized by providing the concept of *Swa-Anguli*. Anthropometry is the study of measurements and proportions of human body. *Sushruta* has described that *Anguli Pramana* of *Purusha Ura Vistaar* is same as *Stree Shroni* (female pelvis) (3). *Ura* is said to be chest that is area below *Kantha* (neck) and above the *Hrudaya* (heart). *Shroni* is said to be area below *Urusandhi* (hip joint) and above the *Smaramandira* (clitoris). *Anguli Pramana* of *Purusha Ura Vistaar* and *Stree Shroni Vistaar* has given as 24 *Angula*. The Knowledge of *Anguli Pramana* helps us to diagnose the congenital and pathological structural deformities. We observed that there is need to do work on *Anguli Pramana* as only little work has done. So, the subject is undertaken to validate the *Anguli Pramana* of *Purusha Ura Vistaar* (male chest breadth) as per *Dalhana.*

Aim: To study the *Dalhanokta Anguli Pramana* in reference to *Purusha Ura Vistaar* (male chest breadth)
Objective: To validate *Anguli Pramana* of *Purusha Ura*.

Literature review

The information regarding the *Anguli Pramana* is not only available in Various *Ayurveda Samhitas* but also available in other *Ayurveda classics* such as *Vedas*, *Puranas*, *Upanishads*, oldest medical texts etc. *Maan* is called as *Parimana* i.e. quantification has elucidated by *Vaidyaka-Shabdasindhu* (4). *Tula Maan*, *Anguli Maan* and *Prastha Maan* have explained in the *Ayurveda Shabdakosha* (5). *Pautav Maan* used for measuring

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weight of solid substances, *Dravya Maan* utilized for measuring liquid substance and *Payya Maan* utilized for measuring circumference, height, breadth as well as length of solid substances mentioned in *Amarkosha* (6). *Pramana* is the measurement of body in terms of *Utsedha*, *Vistaara*, *Ayama* etc. (7) - When *Pramana* is associated with different measurements comes under metrical classification. This is also divided into two types.1 .*Anjali Pramana* 2.Anguli *Pramana*.

Anjali pramana

Joining of both palms at little finger we get measurement unit of *Anjali* w*hich is used* to measure the constituent of body like *Rasa*, *Rakta*, *Mutra*, *Purusha*, *Udaka*, *Kapha*, *Pitta*, *Vasa*, *Meda*, etc. As *Ayurveda* believes in individualistic approach rather than generalized, *Swanjali Pramana* has mentioned for the measurement of body constituent of an individual. Mostly it is based on *Anumana Pramana* (8). According to *Dalhana* the word *Anguli Granthi* can be used for the term *Anguli Parva* which means interphalangeal joints of the finger which are easily palpable (9). Measurement of body and its parts with the help of *Anguli* is known as *Anguli Pramana*. *Acharyas* has mentioned that measurements should be taken in terms of *Swa-Anguli* i.e. own finger of that particular individual. *Swa- Anguli* is the standard unit to measure the length, breadth, circumference of the any entities. According to *Adhamalla* commentary on *Sushruta*, measurement can be obtained by measuring the width of proximal interphalangeal joint of middle finger of hand (10). *Vistaar* means *Vyas* that is Horizontal length (11). *Vistaar* means breadth. The term *Utsedha* means elevation, height, or thickness (12). *Ayam*a defined as *Deerghata*. *Ayama* refers to vertical height or length of a person (13). Person with equal *Ayama* and *Vistaar* is indication of *Ishtasharir* (healthy body) that is healthy as well as proportionate body (14). The measurement obtained by wrapping a rope around any substance or area is known as *Parinaha* which means the circumference of that substance or area by *Acharya Dalhana* (15). As per *Parishadhyam Shabdartha Shariram* Generally the *Ura*, *Vaksha* and *Vakshasthala* are the synonyms for each other and all this words are used for "Chest", "Thorax" or Breast. *Vakshastha* refers to part of chest (16). *Purusha Ura* is said to be 12 *Angula* and 24 *Angula* by *Dalhana* which is identical to *Stree Shroni* (17). *Charakacharya* has described that *Ura Utsedha* is 12 *Angula*, *Vistaar* is 24 *Angula* (18). *Purusha Ura Vistaar* is said to be 24 *Angula* which is equal to the *Stree Shroni* by *Chakrapani* (19). *Sushrutacharya* has mentioned that before starting the treatment, *Ayupariksha* is essential procedure. Anthropometry developed in nineteenth century. It refers to the science of obtaining systematic measurements of human body. Anthropometric measurements include size, shape and composition of human body. Anthropometry was used to study the human evolution and variation. *Anguli Pramana* can consider as anthropometry of *Ayurveda*. But *Anguli Pramana* is based on personalized approach rather than generalized.

Table 1: Showing *Ayama and Vistaar* of body as per *Sushruta, Charaka and Vagbhata*

	Sushruta Samhita	*Charaka Samhita*	*Ashtang Samgraha*	*Ashtang hridaya*
Ayama	120	84 *Angula*	84 *Angula*	3 ½ Vyama
Vistaar		84 *Angula*	84 *Angula*	

Materials and Methods

This is the observational type of study, carried out in 60 healthy volunteers at *Ayurveda* College and hospital and its periphery between the age group of 25-30 years.

Method of selection of study subjects

Inclusion criteria

Healthy volunteers were selected irrespective of education, occupation and religion with age group 25-30 years because *Dalhanacharya* has explained concept of *Samtwagatvirya* that is measurements are attained after maturity. Volunteers with normal BMI 18.5-24.9 were selected, as in modern science these parameters mostly determined the proportionate body.

Exclusion criteria

Person who had any disease which causes change in *Anguli Pramana*-generated edema, arthritis or any surgical local disorders, dwarfism and gigantism. Person having any traumatic injury congenital anatomical or pathological and structural deformity at chest region.

Operational definition

Site of measurement of *Ura* (chest)

Exact location of measurement of *Ura Vistaar* is not mentioned in the *Samhitas*. But according to *Dalhanacharya*, area below the *Kantha* and above the *Hridaya* is *Ura Pradesha* (Chest region) (20). In general chest measurement has taken in term of circumference, but *Sushrutacharya* has used the word *Ura Vistaar* which means chest breadth. So, in this study, site of measurement of *Purusha Ura Vistaar* was taken as anteriorly at the level of nipple between the two mid – axillary line. Measurements were taken by measuring tape in centimeters then converted in terms of *Anguli*.

Research tools

Weighing machine, Measuring tape, Vernier calipers.

Plan of study

According to inclusion and exclusion criteria 60 male healthy volunteers were selected from Ayurveda College and hospital and area of about 4-5 kms from college. At first volunteer's height was measured by measuring tape and weight by weighing machine. Body mass index (BMI) of volunteers was calculated by following formula (21).

$$BMI = \text{weight (kg)} / \text{height (m)}^2$$

Then volunteers whose BMI was within normal range,-i.e., 18.5-24.9, were selected.

Measurement of *Swa-Anguli Pramana* (Fig. No. 1)

To calculate the *Swa-Anguli Pramana* of all 60 males, they were asked to remove the rings or ornaments from the finger, kept the hand on flat surface, then width of the *Madhyamparva* of *Madhyamanguli* (Measurement of medio-lateral proximal interphalangeal joint of middle finger) of right and left hand was measured with the help of vernier calipers (22). In *Ayurveda*, various methods are available to calculate *Swa-Anguli Pramana*. But in today's era method of measuring *Swa-Anguli Pramana* seems most accurate which is given by *Adhamalla's* commentary on *Sharangadhar Samhita* . The Vernier calipers was placed in such way that, it should be perpendicular to the long axis of the finger and made sure that it was not pressed too tight or too loose. Average value of *Swa-Anguli Pramana* of that individual was calculated as

Swa Anguli Pramana = (r+ l)/ 2 where,

r - Measurement of medio-lateral proximal interphalangeal joint of middle finger of right hand.

l- Measurement of medio-lateral proximal interphalangeal joint of middle finger of left hand.

Fig. No. 1

Fig. No. 2

Measurement of *Ura Vistaar* (chest breadth) (Fig. No. 2)

The individual was asked to remove heavy clothing or any other armaments, to stand erect with feet together, marked the both right and left mid axillary line, measuring tape is positioned at the level of nipple. Then distance between two mid- axillary line was measured anteriorly at the level of nipple by measuring tape. It was ensured that the tape was not too tight nor too loose. They were asked not to flex or puff out the chest. Then these measurements were converted into *Anguli Pramana* and result was draw.

Calculation of *Purusha Ura Vistaar*

Purusha Ura Vistaar in *Angula* was calculated by dividing the *Ura Vistaar* (chest width) in centimeter by obtained value of *SwaAnguli Pramana* of that volunteers. Same method was followed for all 60 males to obtain the measurement of *Purusha Ura Vistaar* in terms of *Swa-Angluli Pramana*.

Observations and results

Data of healthy volunteers were collected and entered into Microsoft Excel spreadsheet. Tables were generated using Microsoft word and excel software. Continuous variables (anthropometry parameters) were presented as Mean ± SD. Categorical variables (subjective parameters) were expressed in frequency and percentages.

Correlation of *Anguli Pramana* of *Purusha Ura Vistaar* with height, weight and BMI was assessed by correlation coefficient (r-value). $p<0.05$ was considered as statistical significance. Statistical software STATA version 14.0 was used for data analysis.

Table 2: Showing age distribution of study population

Age in years	*Purusha* Group	
	Number	Percent
25	19	31.67
26	13	21.67
27	9	15.00
28	7	11.67
29	5	8.33
30	7	11.67
Total	60	100
Mean ±SD (Range)	26.78 ±1.72 (25 – 30)	

Among 60 male volunteers, 19 (31.67%) volunteers were from age of 25 years, 13 volunteers (21.67%) were from age of 26 years, 9 (15%) volunteers were from age of 27 Years, and 7 (11.67%) volunteers were from age of 28 years, 5 (8.33%) volunteers were from age of 29 years, 7 (11.67%) volunteers were from age of 30 years. Therefore, mean age of male volunteers was 26.78 with SD ±1.72 and ranges from 25 – 30 years.

Table 3: Showing religion wise distribution of study population

Religion	*Purusha* Group	
	Number	Percent
Hindu	58	96.67
Muslim	2	3.33

Out of 60 male volunteers, 58 (96.67%) volunteers were belongs to Hindu religion while 2(3.33%) were belongs to Muslim religion.

Table 4: Showing the anthropometric parameters of *Purusha Pramana*

Parameter	*Purusha Praman*	
	Mean	SD
Height in cm	171.68	5.92
Weight in kg	63.86	7.24
BMI	21.065	1.87

Mean ± SD of height of male was 171.68 ± 5.92, Mean ± SD of weight of male was 63.86 ± 7.24, mean ± SD of BMI of male was 21.065 ± 1.87

Table 5: Showing comparison of width of *Madhyamparva* of middle finger (proximal interphalenyngeal joint of middle finger) (cm) between right and left hand in *Purusha*

	Purusha	
	Right hand	Left hand
Mean	1.89	1.87
SD	0.089	0.084
Median	1.91	1.89
Range	1.68 – 2.17	1.65 – 2.04
t-test	3.1157	
p-value	0.0028, HS	

Volunteers showed a greater variation in width of *Madhyamparva* of middle finger of right hand than the left hand. This was statistically highly significant with p value 0.0028. Mean ± SD of right and left hand was 1.89 ± 0.089 and 1.87 ± 0.084 respectively. Median of right hand was 1.91 and left hand was 1.89. Range of right hand and left hand was 1.68-2.17 and 1.65 -2.04 respectively.

Table 6: Showing *Swa-Anguli Pramana* (cm) of *Purusha*

	Purusha
Mean	1.88
SD	0.087
Median	1.89
Range	1.67 – 2.15

Mean ± SD of *Swa- Anguli Pramana* was 1.88 ± 0.087, median was 1.89 and *Swa-Anguli Pramana* was ranges from 1.67 - 2.15.

Table 7: Showing *Purusha Ura Vistaar* (cm)

	***Purusha Ura Vistaar* (cm)**
Mean	48.69
SD	3.32
Median	48.75
Range	41 – 56

It was observed that the mean ± SD of *Purusha Ura Vistaar* (cm) was 48.69 ± 3.32, median was 48.75 and it was ranges from 41-56.

Table 8: Showing *Purusha Ura Vistaar* (in *Anguli)*

	***Purusha Ura Vistaar* (in *Anguli*)**
Mean	25.82
SD	1.93
Median	26.17
Range	21.71 – 29.83

From table no. 8 it was observed that mean ± SD of *Anguli Pramana* of *Purusha Ura Vistaar* was 25.82 ± 1.93, median was 26.17 and it was ranges from 21.71 - 29.83.

Table 9: Showing correlation of *Anguli Pramana* of *Purusha Ura Vistaar* with height, weight and BMI

Parameter	***Anguli Pramana* of *Purusha Ura Vistaar***	
	r-value	**p-value**
Height in cm	-0.0205	0.8763,NS
Weight in kg	0.3247	0.0114,S
BMI	0.4376	0.0005,HS

Correlation coefficient ‘’r’’of Height was “–0.0205” having the p value 0.8763, which was not significant result and Correlation coefficient ‘’r’’of weight was “0.3247” having the p value 0.0114, which was significant result. Correlation coefficient ‘’r ’’of BMI was “0.4376” having the p value 0.0005, which was highly significant result.

Discussion

Volunteers were selected between age group 25-30 years as *Dalhanacharya* has given the concept of *Samtwagatvirya* that is measurements are attained after maturity. From the above observation and result, mean ± SD of width of *Madhyamparva* of middle finger of right and left hand was 1.89 ± 0.089 and 1.87 ± 0.084 respectively. This indicate that it is not necessary *Pramana* of right and left hand would be same in the particular individual. To minimized error of the *Swa-Anguli Pramana*, the average value of both right and left hand finger were calculated. *Swa- Anguli Pramana* of *Purusha* was a range from 1.67 - 2.15 i.e. minimum value of *Swa-Anguli Pramana was* 1.67 and maximum value was 2.15 in male. The mean ± SD of *Purusha Ura Vistaar* (male chest breadth) observed in 60 healthy volunteers was 48.69 ± 3.32 when measured in terms of centimeters. The mean ± SD of *Anguli Pramana* of *Ura Vistaar* was 25.82 ± 1.93.According to *Acharya Dalhana* and *Chakrapani Anguli Pramana* of *Purusha Ura* is 24 *Angula*. As per Charaka *Ura Utsedha* is 12 *Angula*. But in present study, obtained *Anguli Pramana* of *Purusha Ura Vistaar* was not exactly 24 *Angula. it is nearer to it.* This variation may be due to site of measurement, as in *Samhita* perfect location of measurement has not mentioned. *Dalhana* has mentioned the site of *Ura* as below the *Kantha* (neck) and above the *Hrudaya* (heart). Generally we measure the chest in terms of circumference but in this article we had measured the *Vistaar* means breadth. It is not found as mentioned in *Samhita*. It may be due to small sample size, different geographical area and nutritional status of that individual. So, there is a of need research to explore concept of *Anguli Pramana.* There are various structural deformities associated with *Ura* (chest).Chest deformities include alar chest, flat chest, pigeon chest, rickety, barrel chest. In such condition shape and size of chest changed, so in order to find out such deformities we should know the normal *Anguli Pramana* of *Ura(chest)*.

Conclusion

In the present study, it is found that mean width of *Madhyamaparva* of middle finger of right hand was more than the left hand. *Swa –Anguli Pramana* of volunteers was differing from Person to person. There was a negative correlation of *Anguli Pramana* of *Purusha Ura Vistaar* with height (cm) and positive correlation with weight (kg) and BMI. From this study, it was found that mean of *Purusha Ura Vistaar* was 48.69 when measured with measuring tape in centimeters. The mean ± SD of *Anguli Pramana* of *Ura Vistaar* was 25.82 ± 1.93 which is not exactly 24 Angula as explained by *Dalhanacharya* but nearer to it. Though the measurement of *Ura Vistaar* of two persons measured in centimeters is same, it may differ when measured in terms of *Anguli Pramana*. But it may be changed, if study conducted on large scale of population, belonging to different geographical area, nutritional status, and different age groups.

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