AYU

Access this article online
Website: www.ayujournal.org
DOI: 10.4103/0974-8520.127709
Quick Response Code:

Clinical Research

Scientific study of *Charakokta Anguli Pramana* in reference to human height

Shashikant K. Muley, Ajit A. Surve[1], Swati D. Bhingare[2]

Associate Professor and Head, Department of Sharir Rachana, Government Ayurved College, Nanded, Maharashtra, [1]Reader, Department of Sharir Rachana, J.G. Co-operative Society's Ayurved Medical College, Ghataprabha, Belgaum, Karnataka, [2]Lecturer, Department of Sharir Rachana, S.N.K.D. Trust's Ayurvedic College, Nalasopara, Thane, Maharashtra, India

Abstract

Ayurveda has dynamic and creative view on health and gives importance to the individual while managing his health and also during treating the diseases. Ayurveda is a system of health science which not only includes the knowledge of body and diseases but also includes the way of living healthy i.e., "*Swastha*". The concept of *Maana-Pramana* is one of the significant contributions of Ayurveda. This study was undertaken to evaluate the *Charakokta Sutra* (verse) which implies that "Height (*Aayama*) of human being is 84 fingers (*Anguli*) and is equal to Arm Span (*Vistaara)*". In the present study, anthropometric measurements by finger were taken and exact site of particular finger in a manner to execute "*Anguli Sthana Nishchiti*" was determined. The data of *Aayama* and *Vistaara* of the 100 volunteers was recorded and statistically analysed. After comparing the *Anguli Pramana* (Measurement through finger) obtained at 78 different sites of both hands, it was established that measurement of *Anguli Pramana* at the site of medio-lateral proximal interphalangeal joint of middle finger of right and left hand, would be most accurate in estimating *Anguli Pramana*.

Key words: *Aayama-Vistaara, Anguli Pramana*, anthropometry, human height

Introduction

No two individual are completely alike physically, physiologically, psychologically, or in vital reactions. Hence, Ayurveda has individualized the concept of health. The word "*Swastha*" is significant of this recognition of individuality denoted by the term "*Swa*", which means one's own peculiar constitution.[1] Ancient sages of India, like Charaka and Sushruta have built up their system of health and disease on this bed-rock of individual constitution. If physician wants to know the state of equilibrium of all the body elements, he can do it only by finding the sign of perfect health in that individual i.e. *Samadosha. Samaagni*, *Samadhatu*, *Sama Malakriya*.[2] For measuring the *Maana* of *Doshas* and *Dhatus* various system of measurements like *Anjali Pramana*, *Anguli Pramana* are been described.[3]

For theoretical purposes, the norms of healthy man in general can be described as a range of values to be accepted as a standard, found to be the average, in a person who appears healthy and free from disability or disease. But for practical application, the study of individual will be necessary to achieve accuracy in diagnosis and therapeutics.

All the *Bruhat Trayees* (three major classical texts of Ayurveda) have mentioned regarding *Anguli Pramana*, but have not mentioned the specific site of *Anguli* to be used for measurement.

The principal of *Anguli Pramana* is an exclusive unique entity of Ayurveda, compared to other system of medicine and it's utility has to be made the practical hence the study was undertaken to evaluate the *Charakota Anguli Pramana* in reference to human height.

Address for correspondence: Dr. Shashikant Krishnakant Muley, Flat No. 6, Mandakini Apartment, Gurudwara Road, Nanded - 431 601, Maharashtra, India.
E-mail: drskmuley1960@rediffmail.com

Materials and Methods

For the present study, 100 healthy volunteers were selected from outpatient department (OPD) and inpatient department (IPD) of Govt. Ayurved medical college and Hospital (staff members), Nanded, Maharashtra.

Criteria for selection

Inclusion criteria

1. Healthy volunteers having proportionate body parts
2. Age group of 16-70 years.

Acharyas have described the age group 16-70 years as *Madhya Vaya* (Middle stage of life). In this age all the *Sharir Dhatus* are

matured and the possibility of volunteer being healthy is more when compared to other groups. So this age group was selected.

Exclusion criteria

1. Unhealthy persons with known bony disorders like Gout, etc
2. Clinical conditions like severe dehydration, malnourishment, generalized edema etc
3. Traumatic injuries or pathologies which are likely to interfere while measuring the *Anguli*, height and Arm Span
4. *Atihraswa* (excessive short stature)
5. *Atidirgha* (excessive long stature)
6. Handicapped personnel (both extremities damaged).

Methods

In the present study, anthropometric measurement by *Anguli* was conducted to decide the exact site of finger of the volunteer used for measurement and in manner which "*Anguli Sthana Nishchiti*" should be measured. Then, *Aayama* and *Vistaara* of the volunteer were measured on Anthropometer.

Methods for taking Anguli Pramana, Aayama and Vistaara

1. *Anguli Pramana*: Reference of Hand Geometry was used. With the help of Vernier Calliper, reading was taken as follows
2. Reading of *ChaturAnguli* (four finger together) taken at the level of
   I. Proximal interphalangeal joint of little finger
   II. Proximal interphalangeal joint of index finger.
3. Reading of *Tarjani* (index finger) taken at 3 different levels, both in antero-posterior direction and mediolateral direction.
   I. Metacarpophalangeal Joint
      a) Antero-posterior b) Medio-lateral
   II. Proximal interphalangeal joint
      a) Antero-posterior b) Medio-lateral
   III. Distal interphalangeal joint
      a) Antero-posterior b) Medio-lateral.

Similarly 6 reading of *Madhyama* (middle finger), *Anamika* (Ring finger) and *Kanishthika* (little finger) were taken.

In this way, total 26 readings of right hand and Left hand were taken. Average reading of right and left hand were calculated and recorded in record paper. In this way total 78 reading were recorded. "Hand geometry" for *Anguli pramana* was studied in 100 patients.

Methods for Aayama and Vistaara measurement

The level was kept on the foot board, to ensure that the "Anthropometer" was mounted on perfectly horizontal plane. The horizontal bar was approximated to the shoulder height of the volunteer.

The volunteer was asked to stand erect on the foot board with the heels together, head in the Frankfurt's plane and both arm extended laterally at the shoulder height. The movable 'Head Board' was brought in contact with the vertex of the head. The volunteer was asked to inhale deeply and at the same time the height was recorded. Furthermore the Arm Span reading was recorded from tip of middle finger of one hand to the tip of middle finger of another hand. The height measurement was recorded in centimetre and divided by the measurement of *Anguli* and was recorded in terms of *Anguli*. Similarly the height was expressed in term of *Anguli* at 78 different levels in one volunteer. The same procedure was followed for all 100 volunteer.

Precautions

While taking measurement of Anguli for Anguli Pramana

1. Ring ornaments were removed from the finger
2. The vernier calliper was not pressed too tight nor left too loose. It was assured that there was no space between the calliper and the finger
3. The hand was kept on the flat surface
4. The vernier calliper was held perpendicular to the long axis of the finger.

While taking measurement for Anguli Pramana

1. The volunteer was asked to remove his/her footwear and socks
2. The head of the volunteer was kept in Frankfurt's plane
3. The volunteer was asked to inhale deeply and maintain full erect position while taking measurement
4. It was assured that the volunteer's heels were not elevated while deep breathing
5. The measurer remained at the eye level of the head board while noting down the measurement.

Results

A total number of 100 healthy volunteer, registered to find out and fix which *Anguli* (finger) need to be measured in order to get *Anguli Pramana* equal to or near to 84 *Anguli* The major observations on age and sex wise distribution and statistical results of measuring *Aayama* and *Vistaara* have been tabulate. [Tables 1-3].

1. The number of volunteers having *Aayama* equal to 84 *Anguli* (±0.85) is 82
2. The number of volunteers having *Aayama* and *Vistaara* equal to each other were 13 (13%)
3. The number of volunteers having *Aayama* and *Vistaara* qual to 84 *Anguli* were 11 (11%)
4. The number of volunteerss having *Vistaara* more than *Aayama* was 80 (80%)
5. The number of volunteers having *Aayama* more than *Vistaara* were 7 (7%)
6. Out of 82 right handed volunteers, the number of volunteer

Table 1: Age and sex wise distribution of 100 patients

Age group	No. of patients		Total	Percentage
	Male	Female		
16-20	5	0	5	5
21-25	13	5	18	18
26-30	19	6	25	25
31-35	13	3	16	16
36-40	8	1	9	9
41-45	5	0	5	5
46-50	3	0	3	3
51-55	4	0	4	4
56-60	4	0	4	4
61-65	5	0	5	5
66-70	6	0	6	6
Total	85	15	100	100

Table 2: Site wise distribution of volunteers having *Aayama* (height) near to or equal to 84 *Anguli*

Finger	Site	Level of joint	No. of volunteer		Average of right and left hand
			Right hand	Left hand	No. of volunteer
4 finger	Proximal interphalangeal joint of little finger	-	-	1	2
	Proximal interphalangeal joint of index finger	-	-	-	-
Index finger	Metacarpophalangeal joint	AP	1	3	2
		ML	-	1	-
	Proximal interphalangeal joint	AP	-	-	-
		ML	-	-	-
	Distal interphalangeal joint	AP	-	-	-
		ML	-	-	-
Middle finger	Metacarpophalangeal joint	AP	-	-	-
		ML	-	-	-
	Proximal interphalangeal joint	AP	-	-	-
		ML	12	8	77
	Distal interphalangeal joint	AP	-	-	-
		ML	-	-	-
Ring finger	Metacarpophalangeal joint	AP	-	1	1
		ML	-	1	-
	Proximal interphalangeal joint	AP	-	-	-
		ML	-	-	-
	Distal interphalangeal joint	AP	-	-	-
		ML	-	-	-
Little finger	Metacarpophalangeal joint	AP	-	1	1
		ML	-	-	-
	Proximal interphalangeal joint	AP	-	-	-
		ML	-	-	-
	Distal interphalangeal joint	AP	-	-	-
		ML	-	-	-

AP: Antero-posterior, ML: Medio-lateral

having exclusively only right hand measurement leading to height equal to or near to 84 *Anguli* were 6 (7.3%)

7. Out of 18 left handed volunteer, the no. of volunteer having exclusively only right hand measurement leading to height equal to or near to 84 *Anguli* were 3 (16.6%)

Table 3: Statistical values for *Aayama* (height) and *Vistaara* (arm span) in 100 volunteer

Statistical test	*Aayama* (height)	*Vistaara* (Arm span)
Mean	84.11 *Anguli*	86.26 *Anguli*
Median	84.16 *Anguli*	86.11 *Anguli*
Mode	84.26 *Anguli*	88.18 Antero
SD	±0.851	±2.078
Range	81.58 *Anguli*-86.79 *Anguli*	80.93 *Anguli*-90.41 *Anguli*
SE	0.0851	0.2078
Confidence limit (mean±2 SE)	83.93 *Anguli*-84.28 *Anguli*	85.86 *Anguli*-86.66 *Anguli*

SE: Standard error, SD: Standard deviation

8. Range of *Aayama* was 81.58 *Anguli* to 86.79 *Anguli* and of *Vistaara* was 80.93 *Anguli* to 90.41 *Anguli*
9. The mean *Aayama* was 84.11 ± 0.851 *Anguli* and of *Vistaara* was 86.26 ± 2.078 *Anguli*
10. The confidence limit at 95% (mean ± 2 Standard error [SE]) for *Aayama* was 83.93 *Anguli*-84.28 *Anguli*. The confidence limit at 95% (Mean ± 2 SE) for *Vistaara* was 85.86 *Anguli*-86.66 *Anguli*
11. The co-efficient correlation between *Aayama* and *Vistaara* was 0.24, which is significant at 5% level ($P < 0.05$)
12. The difference between Mean *Aayama* and *Vistaara* was 2.1492 *Anguli*
13. Z value for mean *Aayama* and *Vistaara* was 9.57 *Anguli* which was greater than 2 SE (0.44)
14. The mean *Aayama* was 84.1 *Anguli*
15. The mean *Vistaara* was 86.2 *Anguli*.

Discussion

According to Charaka the *Aayama* of human being should be 84 *Anguli* and should be equal to *Vistaara*, such a body is called *Sama Sharir* i.e. anatomically proportionate body. This study was designed to prove the above hypothesis. It included anthropometrical measurements of 100 volunteer of age 16-70 years.

First the *Anguli Sthana Nishchiti* was done and then *Anguli Pramana* with respect to *Aayama* and *Vistaara* was studied. While taking *Aayama* and *Vistaara*, standard anthropometrical protocol for measuring *Aayama* and *Vistaara* was followed.

Out of 78 sites of both the hand, the probability of height near to or equal to 84 *Anguli*, at the site of average of right and left hand, mediolateral proximal interphalangeal joint of middle finger is 77 out of 100 volunteer i.e. 77% which is more when compared to other sites.

The mean height in *Anguli* is 84.11 which are nearer to 84 *Anguli*, as said by *Charakacharya*. Also the standard deviation at this site is ±0.8. This indicates that, regarding the hypothesis of *Charakacharya* about 84 *Anguli Aayama*, the *Anguli Sthana Nishchiti* can be done at the site of Average of right and left hand, mediolateral proximal interphalangeal joint of middle finger. And this would be most accurate in estimating *Anguli Pramana*.

While taking *Anguli Pramana*, sum of measurements of medio-lateral proximal interphalangeal joint of middle finger

of right and left hand should be taken and this sum should be divided by 2.

$$Anguli\ Pramana = \frac{R + L}{2}$$

R = Medio-lateral Measurement of Proximal Inter phalangeal joint of Middle finger of Right hand.

L = Medio-lateral Measurement of Proximal Interphalangeal joint of Middle finger of Left hand.

Regarding the *Aayama* and Mean *Vistaara*

11 out of 13 volunteers (84.61%) had *Aayama* and *Vistaara* of 84 *Anguli*. It implies that the probability of equal *Pramana* is more in persons having *Aayama* equal to *Vistaara* i.e., *Sama Aayama* and *Vistaara*.

In maximum no. of volunteers (80%), the *Vistaara* was greater than *Aayama*. The difference between Mean *Aayama* and *Vistaara* was 2.1492 *Anguli*. Z value (9.57) was greater than 2 SE (0.44). It implies that in 95% of population the difference between *Aayama* and *Vistaara* is because of real variability and not by chance (biological variability). In the ancient times, *Vistaara* as described by was 84 *Anguli*, but in today's era in maximum volunteer *Vistaara* is found to be more than *Aayama*. In the recent research it was found that *Vistaara* is more than *Aayama*. This difference may be because of some evolutionary changes in the human being.

The percentage of right handed volunteer having exclusively right hand measurement leading to *Aayama* equal to or near to 84 *Anguli* were 7.3% while that of left handed volunteer having exclusively left hand measurement leading to *Aayama* (Height) equal to or near to 84 *Anguli* were 16.6% implies that being right or left handed did not play any role in doing *Anguli Sthana Nishchiti*.

The co-efficient correlation between *Aayama* and *Vistaara* was 0.24 which implies that the co-relation is partially positive i.e., *Vistaara* increases with increase in *Aayama* and vice-versa, in 95% of population.

The confidence limit range for *Aayama* was 83.93 to 84.28 *Anguli*, and for *Vistaara* was 85.86 to 86.66 *Anguli*, which implies that this range contains the 95% of population.

Today, height of a person is measured in centimetres, inches etc., Even though, height of two persons measured in centimetres might be the same but according to *Anguli Pramana* both the persons may differ in height. While that of volunteer may differ apparently in height in centimetres but according to their *Anguli Pramana* i.e. relation of height with their own finger width, they both might be of same *Anguli* height and both of them might be equally healthy. This shows wherever *Anguli Pramana* is to be applied, *Anguli* (one's own finger width) should be used for measurement. In this way the principal of *Anguli Pramana*, an unique and individualized concept of Ayurveda can be compared to Modern science.

Charaka, Sushruta, Vagbhata have described the *Ang-Pratyanga Pramana* i.e. dimension of various normal body parts in terms of *Anguli*. But in today's era before measuring those dimensions, the physician should be aware of the unit "*Anguli*" in terms of centimetres. While measuring the *Ang-Pratyanga Pramana* of a person the Average of right and left hand, medio-lateral proximal inter phalangeal joint of middle finger in centimetres should be considered as one *Anguli*. With the knowledge of *Ang-Pratyanga Pramana* one can judge whether the concerned body parts are structurally normal or not.

Conclusion

Anguli Sthana Nishchiti should be done at the site of "Average of right and left hand, medio-lateral proximal interphalangeal joint of middle finger". Measurement of *Anguli Pramana* at the above site gives more accurate result of *Anguli Pramana* compared to the, commonest site used today i.e., Average of *ChaturAnguli* of right and left hand. *Anguli Pramana* i.e. Measurement of finger width of the examinee and not the examiner, should be considered while studying the *Anguli Pramana* of the person. The probability of a person of having *Sama Sharir* (anatomically proportionate body) is more if his or her *Aayama* and *Vistaara* are equal. In the present study *Vistaara* was more than *Aayama* in maximum number of people. There was partially positive correlation (0.24) between *Aayama* and *Vistaara*. Adding up *Anguli Pramana* is one of the general clinical examination points, which would help the physicians and surgeons to get an idea about the physical health.

References

1. Charaka, Charakasamhita. In: Acharya VS, editor. Vaidya-manorama Hindi commentary. 1st ed. Vimanasthana, Chapter 8, Delhi, India: Chaukhambha Sanskrit Publication; 2003. p. 11.
2. Sushruta, Sushrutsamhita, with Dalhan. In: Achary YT, editor, Nibandhasangraha commentary. 1st ed. Varanasi, Uttar Pradesh, India: Chaukhambha Surabharati Publication; 1994. p. 65.
3. Physical Status: Use and Interpretation of Anthropometry, W.H.O. Technical Report Series. Geneva: W.H.O. Publication Dept.; 1995. p. 1-47.

हिन्दी सारांश

लम्बाई के परिप्रेक्ष्य में चरकोक्त अंगुली प्रमाण का वैज्ञानिक अध्ययन

शशिकान्त के. मूल्ये, अजित ए. सुर्वे, स्वाति डी. भिंगारे

आयुर्वेद शास्त्र में आयु का सक्रिय एवं सृजनात्मक दृष्टि से अवलोकन किया गया है । स्वास्थ्य तथा रोगोपचार का व्यक्तिविशिष्टता से वर्णन किया गया है । आयुर्वेद, आरोग्य विज्ञान की वह शाखा है जिसमे न केवल शरीर और व्याधी का ज्ञान मिलता है परंतु स्वस्थ जीवन की शैली भी यह सिखाता है । मन, आत्मा, त्रिदोष, पंचकर्म, रसायन, वाजीकरण, मर्मविज्ञान यह आयुर्वेद की कुछ विशेषतायें है जिनमें से एक है मान–परिमाण । इस परीक्षण में चरकोक्त सूत्र ''केवलं पुनः शरीरमंगुलिपर्वाणि चतुरंशीतिः । तदायामविस्तारसमं समुच्यते'' का अध्ययन किया गया । वर्तमान अनुसंधान परियोजना में, अंगुली द्वारा मानवशास्त्रीय माप लिया गया और 'अंगुली स्थान निश्चिती' पर अमल करने के लिए एक तरह से विशेष रूप से उंगली की सटीक स्थान निर्धारित किया गया । बाद में १०० व्यक्तियों की आयाम और विस्तार का सांख्यिकीय विश्लेषण किया गया । दोनों हाथों की ७८ अलग स्थानों पर प्राप्त अंगुली प्रमाण की तुलना करने के बाद यह निष्कर्ष निकाला गया की, दाहिने और बांए हाथ के औसत के स्थल पर अंगुली का माप, मध्यम उंगली की अंतर पार्श्व समीपस्थ संधी संयुक्त, अंगुली आंकलन में सबसे सटीक होगा ।