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Exploration of Deerghayu Lakshana of Sushruta Samhita with special reference to Anguli Pramana

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Abstract:

"Life well spent is long", is well stated by Leonardo Da Vinci. Here the quality of life lived is given more importance rather than unhealthy years spent in bed. Ayurveda is the science of life which solely focuses on protecting the health of healthy individuals and eliminating diseases thereby imparting good quality of life to the individuals. Various terms such as deerghayu, hitayu, sukhayu are mentioned by acharyas denoting its importance.

The study explores Sushruta's concept of Deerghayu through Anguli Pramana, an ancient Ayurvedic measurement system. Analyzing 30 morphological characters where Anguli pramana is clearly mentioned has observed in 20 individuals crossing the age of 70 years. We have found significant correlations between specific Anguli pramana measurements and Deerghayu characters, suggesting a potential anthropometric basis for longevity. Bridging traditional knowledge with modern understanding, this research offers insights into achieving a long, healthy quality of life (Deerghayu).

Material method: A cross-sectional study (Pilot study) carried out with sample size of 20 individuals to assess deerghayu lakshana of Sushruta Samhita with the help of Anguli pramana.

Result: The study found that among 30 characters, in 5 parameters i.e. Mukha antara, Hastatala Vistara, Janghamadhya parinaaha, Pada ayama and Padamadhya parinaaha the results are proximal to textual measurements. Angushthamoola tarjani antara, Kanishthika(feet), Anamika(feet) and Bhru all 4 characters ascends textual value in all 20 individuals. Greeva parinaaha is found to descend in all individuals. Minimum difference (↓0.29%) in mean value is found in Janghamadhya parinaaha which is close to textual value. Maximum difference is found in Angushthamoola tarjani antara (↑48.6%)

Conclusion: The data shows clear logical interpretation of Deerghayu lakshana where morphological parameters is assessed through Anguli Pramana.

Keywords- deerghayu, anguli pramana, vaya, ayu, quality of life, longevity.

1. Introduction:

Long healthy life is the wish of every being since antiquity. In Ayurveda, the span of life is described to be determined on the basis of sharira, prakruti, dhatu-sarata, bala, satva, satmya and observance of sadvrutta.[1]

Acharya Charaka defines vaya and ayu separately quoting, Vaya is completely dependent on kala factor[2] while Ayu is the wholesome combination of Sharira, indriya, satva and atma. Its four synonyms are Dhari, Jivita, Nityaga and Anubaddha[3]. The concept of Ayu is multidimensional and is classified into sukhayu, dukhayu, hitayu, and ahitayu, reflecting not only the duration of life but also its experiential quality.

Acharya Sushruta emphasizes that longevity is not merely dependent on chronological age but on the qualitative harmony of life. In Aaturopkramaniya adhyaya emphasizes on examining the longevity (ayu) of patient before starting the treatment. [4] For this purpose, he mentions terms such as deerghayu, madhyamayu and alpayu. Among these, deerghayu refers to a long, disease-free, and productive life attained through equilibrium of doṣa, proper nourishment of dhatus, efficient functioning of agni, unobstructed srotas, and stability of mind and senses. Here the word deerghayu does not mean long life span and is not represented by the number of years a person survives but it is the quality of life maintained by the individual in all those surviving years.

In the present era, where lifestyle disorders, stress, and environmental toxins threaten healthy aging, revisiting classical concepts like Deerghayu Lakshana assumes greater relevance. Scientific exploration of these traditional measures may help bridge the gap between ancient wisdom and contemporary biomedical understanding. Hence, the present study aims to critically analyse the concept of Deerghayu Lakshana as described in Sushruta Samhita, with special reference to Anguli Pramana, and to explore its applicability in assessing longevity and quality of life in modern individuals.

Hypothesis:

Deerghayu Lakshan of Sushruta Samhita analysed through given Anguli Pramana indicates potential anthropometric basis for longevity.

Aim:

1. To evaluate Deerghayu lakshana of Sushruta Samhita with the help of Anguli pramana.
2. To evaluate morphological and physiological characters of these lakshana.

Objectives:

Individuals with age of 70 years or above are taken to assess deerghayu lakshana of Sushruta Samhita.

Need of this study-

Ayurveda emphasizes on examining the Ayu of patient before treatment. Acharya Vagbhatta advises not to treat Gatayush (one who has developed Arishta lakshana) patient (a.h.su.1/34)

Material method:

(a) Study design:- A cross sectional study (Pilot study)

Study is carried out with, Sample Size:- 20 healthy individuals

The study is carried out in persons of age 70 years or above from nearby areas of Government Ayurvedic college and hospital, Guwahati, Assam.

Morphological and physiological characters included under deerghayu lakshana of Sushruta Samhita will be examined in selected patients. Instruments like vernier callipers and measuring tape will be used to assess dimension.

(b) Inclusion criteria:

1. Healthy persons above or equal to 70 years of age, having proportionate body parts.

2. Free from involvement of any musculoskeletal disorders.

(c) Exclusion criteria:

1. Persons associated with altered anthropometric measurements either in height or weight.

2. Individuals with any physical disabilities along with amputation.

3. Individual free from any Congenital anomalies.

(d) Following Characters are selected for the assessment of Deerghayu Lakshana:-

Table-1:- Descrition of Deerghayu lakshana of Sushruta Samhita with measurement of Anguli Pramana:-[5,6]

If a person bears all these characters, he/she is considered to live high quality of life.

Morphological characters	Measurement consideration with Anguli Pramana [7]
Maha- Bigger (somewhat excess in length and breadth from the given measurement of anguli pramana)- 1. Pani- hands	Manibandha kurpara antara-16 Hastatala ayama-6 Hastatala Vistara – 4 Angushthamoola to Tarjani- 5
2. Pada- feet	Ayama-14 Parinaha-14 Padamadhya parinaha-14 Whole leg- 50
3. Dashana- teeth	2 angula
4. Vadana- face/ mouth	Mukha antara-4 Mukha ayama- 12
5. Lalata- forehead	Deergha- 4
6. Dirghanguli parva- long fingers and joints	(Hands- Madhyama- 5, Pradeshini- 4.5, Anamika- 4.5, Angushtha-3.5, Kanishthika-3.5)

	(Feet- Pradeshini- 2, Angushtha-2, Madhyama- 1.6, Anamika- 1.2, Kanishthika- 0.8)
7. Prekshana- eyes	Between 2 krushnamandala- 4 angula
8. Bahu- arms	Amsapitha kurpara antara- 16
9. Vistirna bhru- broader eyebrows	2 angula
10. Hrasva jangha- short legs	Ayama-18 Janghamadhya parinaah -14 (Gulphashritam janghamadhyam- Dalahana)
11. Hrasva medhra- short penis	4 angula
12. Hrasva greeva- short neck	Deergha-4 Parinaaha-24 (Parinaaha= 20 according to Dalhana)
13. Upachita maha romasha karna- big, hairy ears	Deergha-4
14. Paschanmastishka-	keshantamastaka antara 11, mastaka avatu keshanta antara-10

Table 2:- Description of Anatomical Dimensions of Characters taken for Anguli Pramana :-

Measurement points	**Measurement points consideration with Anatomical dimension**
Manibandha kurpara antara Hastatala ayama Hastatala Vistara Angushthamoola to Tarjani	From wrist to elbow Length of Palm of hand Breadth of palm Root of thumb to tip of Index finger
Pada Ayama Pada Parinaaha Padamadhya parinaaha	Length of feet Circumference of feet Circumference of midfeet
Danta	Teeth along with gums
Mukha antara Mukha ayama	Distance between both angle of mouth Length of face from chin to hairline
Lalata Dairghya	From nasion to hairline
Anguli parva	Length of each finger
Distance between 2 krushnamandala	Distance between 2 central portions of eyes (Pupils)
Amsapitha kurpara antara	From shoulder joint to elbow
Bhru Vistara	Breadth of eyebrows
Jangha Ayama Janghamadhya parinaaha (Gulphashritam janghamadhyam- Dalhana)	From knee to ankle joint Around maximum dimension of ankle joint

Greeva Dairghya Greeva Parinaaha	From hairline to lower border of C_7 Along the fuller part of neck
Karna Dairghya	Along the whole length of ear
Keshantamastaka antara Mastaka avatu keshanta antara	From hairline to vertex From vertex to hairline of neck

Table 3:- Description of Morphological and Physiological characters associated with Deerghayu but not calculated due to limitation of data.

Morphological characters	Physiological characters
1. Maha Parshva- large flanks 2. Stanagra- apex of breast 3. Maha Prushtha- Expanded back 4. Maha Skandha- Expanded shoulders 5. Vistirna stanatara- Expanded distance between each breast 6. Gambhira nabhi- deep umbilicus 7. Anuchheirbadhha stana- slightly raised compact breasts 8. Gudha sandhi sira snayu- deep or hidden joints, blood vessels and ligaments 9. Samhata anga- compact body parts 10. Uttarotara sukshetra- successively well-formed body parts	1. Dirgha uchhvasa- long inspiration 2. Gambhira satva- deeper psyche 3. Gambhira svara- deep voice 4. Snananuliptam murdhanupurvya vishushyamana sharira paschat vishushyamana haridaya- body dries first after taking bath and applying paste, heart/ chest portion dries afterwards 5. Garbhatprabhruti aroga- free from intra uterine disorders 6. Shane samupachiyate- develops gradually with physical and mental characteristics 7. Sthirendriya- stability of sense organs

Table 5:- Description of Madhyam Ayu Lakshana[8]

This person enjoys maximum lifespan of 70 years

Morphological characters:-
1. Adhastad akshyo lekha suvyata ayata, dwe va tistra adhika va api pado- 2 to 3long clear and distinct lines below clavicle and feet
2. Mamsala karna- fleshy ears
3. Nasagra urdhwa- tip of nose is slightly raised
4. Bhavet urdhwa lekhascha prushthata- lines or streaks in upper portion of back

Table 6- Description of Alpayu lakshana[9]

This person enjoys maximum lifespan of 25 years

Morphological characters:-	**Physiological characters:-**
1. Hrasva parva- short phalanges 2. Sumahatchaapi mehana- penis is enormously big 3. Na cha syata prushtham ayatam- back is not broad 4. Urdhwa cha shravan- ears are positioned upwards from normal position 5. Sthanat nasa cha uchha- tip of nose is raised 6. Hasato jalpato va api danta mamsa pradrushyate- gums are visible while smiling	1. Prekshate yashcha vibhranta- looks bewildered

Assessment of Anguli Pramana:

Vernier Calliper is used to measure the Swa-anguli Pramana of an individual which are recorded in centimetre.

Measurement of Swa Anguli is done by measuring Madhyama parva of Madhyama anguli of both hands and the total is divided by 2 (mean mediolateral measurement at proximal interphalangeal joint of middle finger of both hands).

Measurements of given body parts of the individual is taken with the help of measuring tape which is also recorded in centimetre and then reading is converted into Anguli Pramana by dividing the value by Swa-anguli Pramana of that individual.

Instruments used:

Fig.1-Vernier callipers

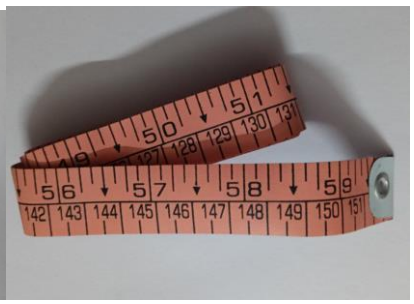

Fig.2- Measuring tape (Inch tape)

(ESAW vernier calliper with fine wheel measurement-125mm/12.5cm/5 inches)(Body measuring tape with mm, cm, inch calibration)

Precautions:

- **For taking Swa-anguli measurement:-**

1. Ornaments were removed from the fingers.

2. The vernier calliper was neither pressed too tight nor to loose. It was assured that there was no space between jaws of vernier calliper and the finger.

3. Measurement taken in seating posture with hands kept on flat surface when the arm remains on the site of thorax.

4. The vernier calliper was held perpendicular to the long axis of the finger.

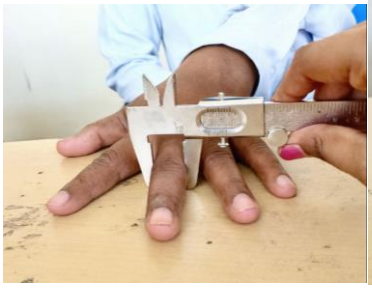

Fig.3- Madhyama Parva

Fig.4- Dorsal Aspect

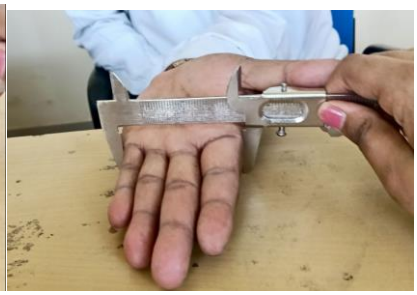

Fig.5- Ventral Aspect

- **For taking measurement of each body parts:-**

1. The volunteer was asked to remove his/her ornaments, spectacles, watch, footwear and socks.

2. Stability of each part was ensured to reduce the error in measurement.

Fig.6-Measurement of Madhyama anguli parva (Proximal interphalangeal joint of middle finger) with the help of Vernier callipers for taking Swa-anguli pramana

Fig.7-Measurement of Chaturanguli (Metacarpophalangeal joint- Dorsal Aspect) with the help of Vernier callipers for taking Swa-anguli pramana

Fig.8- Measurement of Hastatala Ayama with the help of Measuring tape

Fig.9- Measurement of Lalata and Greeva Parinaha with the help of measuring tape

Fig.10- Measuring Skinfold thickness with the help of vernier callipers

Result:

Measurement of Swa-anguli Pramana was taken on 3 levels:-

1. Madhyama parva of Madhyama anguli (mean medio-lateral measurement of proximal interphalangeal joint of middle finger of both hands.)

2. Measurement of Chaturanguli (four fingers together- near metacarpophalangeal joint of both hands) in dorsal aspect.
3. Measurement of Chaturanguli (four fingers together- near metacarpophalangeal joint of both hands) in ventral aspect.

But upon conversion of these 30 Characters in Swa-anguli Pramana, the values of madhayama parva was nearer to textual value. So here, we have considered only Madhyama parva measurement.

Acharya Dalhana has also opined to take Madhyama parva of Madhyama Anguli for the measurement of Swa-anguli Pramana

According to age, there is shrinkage in dorsal and ventral interdigital space as well as skin fold thickness also decreases due to loss of fat and muscle. Therefore, Madhyama anguli parva is standardised measurement for old age individuals.

Table 7- Showing Textual values of Anguli Pramana, Mean Value, Standard Deviation Standard Error, 95% Confidence interval and Percentile of 20 individuals.

Characters	Textual value (in Angula)	Mean	SD	SE	95% of CI	Percentile
1. Manibandh Kurpara antara	16	15.36	1.27	0.28	14.08-15.92	88-99.5
2. Hastatala ayama	6	5.41	0.72	0.16	5.09-5.71	84.9-95.4
3. Hastatala Vistara	4	4.7	0.529	0.118	4.47-4.93	111.7-123.3
4. Angushthamoola Tarjani antara	5	7.43	0.691	0.15	7.117-7.723	142.3-154.5
5. Pada ayama	14	13.38	1.095	0.245	12.90-13.86	92.1-99
6. Pada parinaaha	14	12.98	1.174	0.26	12.46-13.49	89-96.4
7. Padamadhya parinaaha	14	13.24	1.238	0.277	12.69-13.78	90.7-98.4
8. Mukha antara	4	3.51	0.58	0.13	3.26-3.76	81.4-94.1
9. Mukha ayama	12	10.8	1.21	0.27	10.27-11.33	85.6-94.4
10. Lalata	4	3.91	0.575	0.13	3.66-4.16	91.5-104
11. Angushtha (hands)	3.5	3.91	0.52	0.116	3.68-4.13	105.2-118.2
12. Pradeshini (hands)	4.5	4.45	0.26	0.058	4.33-4.56	96.4-101.4
13. Madhyama(hands)	5	4.98	0.48	0.107	4.77-5.19	95.4-103.8
14. Anamika (hands)	4.5	4.38	0.32	0.072	4.24-4.52	94.2-100.4
15. Kanishthika (hands)	3.5	3.82	0.16	0.036	3.75-3.89	107.1-111.1
16. Angushtha (feet)	2	2.56	0.96	0.215	2.139-2.98	107-149
17. Pradeshini (feet)	2	2.42	0.24	0.05	2.32-2.53	115.8-126.34
18. Madhyama (feet)	1.6	2.13	0.86	0.19	1.75-2.51	109.6-156.7
19. Anamika (feet)	1.2	1.76	0.81	0.18	1.41-2.12	117.1-176.3
20. Kanishthika (feet)	0.8	1.13	0.04	0.009	1.11-1.15	139-143.5
21. Drishti anatara	4	4.481	0.255	0.057	4.37-4.59	109.2-114.8
22. Amsapitha Kurpara antara	16	16.154	1.39	0.31	15.55-16.76	97.2-104.8
23. Bhru	2	3.652	0.369	0.08	3.49-3.81	174.5-190.7

24. Jangha ayama	18	19.684	2.33	0.52	19.66-19.71	109.2-109.5
25. Janghamadhya parinaaha	14	13.959	1.74	0.389	13.2-14.72	94.3-105.2
26. Greeva Dairghya	4	3.5	0.525	0.117	3.27-3.73	81.8-93.3
27. Greeva parinaaha	20	17.124	3.03	0.678	15.79-18.45	79-92.3
28. Karna dairghya	4	4.158	0.364	0.08	3.1-4.32	99.85-108
29. Keshanta Mastaka anatara	11	10.96	1.205	0.269	10.43-11.49	94.8-104.4
30. Mastaka Avatu keshanta anatara	10	10.813	1.035	0.23	10.36-11.27	103.6-112.7

According to 95% CI, Lower range crosses 100% in 12 Characters [such as- hastatala Vistara, angushtha Tarjani antara, Drishti antara, bhru, jangha ayama] while, upper range crosses 100% in 21 Characters [such as- hastatala Vistara, angushtha Tarjani antara, anguli parva, Drishti antara, bhru, jangha ayama, jangha Madhya parinaaha].

Table 8- Characters in percentage having Mean value Ascending and Descending relating to textual references:-

Characters	Percentage Value
1. Manibandh Kurpara antara	↓4%
2. Hastatala ayama	↓9.83%
3. Hastatala Vistara	↑17.50%
4. Angushthamoola Tarjani antara	↑48.6% (increased maximum)
5. Pada ayama	↓4.43%
6. Pada parinaaha	↓7.29%
7. Padamadhya parinaaha	↓5.43%
8. Mukha antara	↓12.25%
9. Mukha ayama	↓10%
10. Lalata	↓2.25%
11. Angushtha (hands)	↑11.71%
12. Pradeshini (hands)	↓1.11%
13. Madhyama(hands)	↓0.40%
14. Anamika (hands)	↓2.67%
15. Kanishthika (hands)	↑9.14%
16. Angushtha (feet)	↑28%
17. Pradeshini (feet)	↑21%
18. Madhyama (feet)	↑33.12%
19. Anamika (feet)	↑46.67%
20. Kanishthika (feet)	↑41.25%
21. Drishti anatara	↑12.02%
22. Amsapitha Kurpara antara	↑0.96% (increased minimum)
23. Bhru	↑82.60% (not significant)
24. Jangha ayama	↑9.36%
25. Janghamadhya parinaaha	↓0.29% (decreased minimum)

26. Greeva Dairghya	↓12.50%
27. Greeva parinaaha	↓14.38% (decreased maximum)
28. Karna dairghya	↑3.95%
29. Keshanta Mastaka anatara	↓0.36%
30. Mastaka Avatu keshanta anatara	↑8.13%

(Here ↑value shows Mean > Textual value, while ↓ value shows Mean < Textual value)

Mean value exceeded textual value in 15 Characters such as hastatala Vistara, angushthamoola tarjani antara, amsapitha kurpara antara, jangha ayama. Mean value exceeded most by 48.60% in angushthamoola tarjani antara while the value exceeded least by 0.96% in amsapitha kurpara antara.

Mean value has less value than textual value in 15 Characters such as Manibhandha kurpara antara, hasta tala ayama, pada ayama, pada parinaaha, padamadhya parinaaha, mukha ayama, jangha madhya parinaaha, greeva parinaaha. Mean value is decreased most by 14.38% in greeva parinaaha and decreased least by 0.29% in jangha madhya parinaaha.

Analysis:-

Table 9:- Distribution of individuals having measurement proximate to Textual value:-

Sr.no	Characters	Number of individuals	Percentage
1	Janghamadhya parinaaha	16	80%
2	Hastatala Vistara	12	60%
3	Pada ayama	12	60%
4	Padamadhya parinaaha	12	60%
5	Mukha ayama	11	55%
6	Mukha antara	9	45%
7	Lalata	9	45%
8	Keshanta Mastaka antara	9	45%
9	Pada parinaaha	8	40%
10	Jangha ayama	8	40%
11	Karna dairghya	8	40%
12	Manibandh Kurpara antara	7	35%
13	Amsapitha Kurpara antara	7	35%
14	Hastatala ayama	6	30%
15	Pradeshini (feet)	6	30%
16	Greeva Dairghya	6	30%
17	Madhyama (hands)	5	25%
18	Mastaka Avatu keshanta antara	5	25%
19	Anamika (hands)	4	20%
20	Pradeshini (hands)	3	15%
21	Angushtha (feet)	3	15%
22	Drishti antara	2	10%

23	Kanishthika (hands)	2	10%
24	Angushtha (hands)	1	5%
25	Madhyama (feet)	1	5%
26	Angushthamoola Tarjani antara	0	0%
27	Anamika (feet)	0	0%
28	Kanishthika (feet)	0	0%
29	Bhru	0	0%
30	Greeva parinaaha	0	0%

(Close to proximal is considered between less than 5% in ascending and less than 5% in descending value.) Here proximal is considered normal as minor alterations observed during study relates to deficiency due to increasing age-related changes.

Among 30 characters, Janghamadhya parinaaha is found maximum in 16 individuals where the data is close to proximal while in Angushthamoola Tarjani antara, Anamika(feet), Kanishthika(feet), Bhru and Greeva parinaaha the data is far from proximal.

In relation to over 50% Individual, 5 characters mainly Janghamadhya parinaaha, Hastatala Vistara, Pada ayama, Padamadhya parinaaha, Mukha ayama were found proximal to textual value with 80% for the first, 60% for middle three and 55% for the last respectively.

Table 10:- Distribution of individuals having measurement ascending than Textual value:-

Sr.no	Characters	Number of individuals	Percentage
1	Angushthamoola Tarjani antara	20	100%
2	Kanishthika (feet)	20	100%
3	Anamika (feet)	20	100%
4	Bhru	20	100%
5	Madhyama (feet)	19	95%
6	Angushtha (hands)	19	95%
7	Kanishthika (hands)	18	90%
8	Drishti antara	18	90%
9	Angushtha (feet)	17	85%
10	Pradeshini (feet)	14	70%
11	Madhyama (hands)	14	70%
12	Mastaka Avatu keshanta antara	14	70%
13	Hastatala ayama	13	65%
14	Pradeshini (hands)	12	60%
15	Anamika (hands)	12	60%
16	Karna dairghya	12	60%
17	Manibandh Kurpara antara	11	55%
18	Amsapitha Kurpara antara	10	50%
19	Lalata	9	45%
20	Mukha antara	8	40%

21	Keshanta Mastaka antara	8	40%
22	Hastatala Vistara	7	35%
23	Mukha ayama	6	30%
24	Pada parinaaha	5	25%
25	Jangha ayama	4	20%
26	Padamadhya parinaaha	4	20%
27	Pada ayama	3	15%
28	Janghamadhya parinaaha	3	15%
29	Greeva Dairghya	0	0%
30	Greeva parinaaha	0	0%

(Ascending is equal to 5% increase than textual value.)

In relation to over 50% Individual, 18 characters mainly- Angushthamoola Tarjani antara, Kanishthika (feet), Anamika (feet), Bhru, Madhyama (feet), Angushtha (hands), Kanishthika (hands), Drishti antara, Angushtha (feet), Pradeshini (feet), Madhyama (hands), Mastaka Avatu keshanta antara, Hastatala ayama, Pradeshini (hands), Anamika (hands), Karna dairghya, Manibandh Kurpara antara, Amsapitha Kurpara antara were found ascending to textual value with 100% for first four, 95% for next two, 90% for next two, 85%, 70% for next three, 65%, 60% for next three, 55% and 50% for last respectively.

Table 11:- Distribution of individuals having measurement descending than Textual value:-

Sr.no	Characters	Number of individuals	Percentage
1	Greeva parinaaha	20	100%
2	Greeva Dairghya	14	70%
3	Jangha ayama	8	40%
4	Pada parinaaha	7	35%
5	Pada ayama	5	25%
6	Pradeshini (hands)	5	25%
7	Padamadhya parinaaha	4	20%
8	Anamika (hands)	4	20%
9	Mukha antara	3	15%
10	Mukha ayama	3	15%
11	Amsapitha Kurpara antara	3	15%
12	Keshanta Mastaka antara	3	15%
13	Manibandh Kurpara antara	2	10%
14	Lalata	2	10%
15	Hastatala ayama	1	5%
16	Hastatala Vistara	1	5%
17	Madhyama (hands)	1	5%
18	Janghamadhya parinaaha	1	5%
19	Mastaka Avatu keshanta antara	1	5%

20	Angushthamoola Tarjani antara	0	0%
21	Angushtha (hands)	0	0%
22	Kanishthika (hands)	0	0%
23	Angushtha (feet)	0	0%
24	Pradeshini (feet)	0	0%
25	Madhyama (feet)	0	0%
26	Anamika (feet)	0	0%
27	Kanishthika (feet)	0	0%
28	Drishti antara	0	0%
29	Greeva parinaaha	0	0%
30	Greeva Dairghya	0	0%

(Descending is equal to 5% decrease than textual value.)

In relation to over 50% Individual, 2 characters mainly- Greeva parinaaha, Greeva Dairghya were found descending to textual value with 100% and 70% respectively.

Table 12- Showing number of Morphological Characters of each individual which have measurement proximal to textual value of given Anguli Pramana:-

Number of Characters	Number of individual (n=20)
26	2
25	3
24	2
23	4
22	2
21	3
20	3
18	1

Table shows the number of morphological characters in individuals that were within 5% of the textual value of Anguli Pramana. Maximum 26 characters were found in 2 individuals, 25 characters in 3 individuals, 24 characters in 2 individuals, 23 characters in 4 individuals, 22 characters in 2 individuals, 21 characters in 3 individuals, 20 characters in 3 individuals while minimum 18 characters in 1 individual.

Discussion and Summery:

The present study was conducted to evaluate Deerghayu Lakshana of Sushruta Samhita in 20 individuals in age group of 70 years and above. 30 Morphological Characters were selected from Sushruta Samhita and assessed on the basis of Anguli Pramana. Mean, standard deviation, standard error, 95% confidence interval, percentile distribution as well as %deviation from Mean were calculated to understand its relation to textual values. Apart from 30 selected characters, 17 other characters including 10 Morphological characters such as maha parshva, maha prushtha, maha skandha and 7 Physiological characters such as Dirgha ucchhvasa, gambhira satva, svara, nabhi were also identified. Due to limitation of data on Anguli Pramana of above Characters, they were excluded from calculation.

The findings revealed that most of the measured characters such as Manibhandha kurpara antara, amsapitha kurpara antara, hasta tala ayama, pada ayama, lalata showed values proximate to textual Anguli Pramana. Maximum 26 Characters were found in 2 individuals having proximate value to textual references.

In 4 Characters- angushtha Tarjani antara, bhru, Anamika and kanishthika (in feet) all 20 individuals showed values Ascending textual measurements. Apart from these, Characters such Dristi antara, Mukha antara, Jangha ayama, Angushtha, Madhyama and Kanishthika (in hands), Angushtha, Madhyama and Pradeshini (in feet) were also found exceeding to textual value.

Acharya Sushruta opines that Hrasva greeva and hrasva jangha are specific deerghayu lakshanas where Anguli Pramana should be less than mentioned. In this particular work, both these values are not proximal to textual value. Hrasva greeva was found in 14 individuals, while hrasva jangha was found in 8 individuals.

In all 20 individuals, Greeva parinaaha (Neck circumference) was found less than textual references. As Neck is formed from muscles, fascia and fat, wasting of muscles in old age may be the reason of decrease in circumference of neck.

In case circumference of structures like Janghamadhya, padamadhya values were proximate to textual values. It can be understood that as muscles of these regions are arranged in compartments as well as compactly attached to bones, signs of wasting due to age are seen minimum here.

The study clearly depicted minimum mean changes in Janghamadhya parinaaha and Madhyama (in hand) i.e. circumference around ankle joint and length of middle finger of hand with minimum difference to textual value at 0.29% and 0.40%. The work has also taken measurement of proximal interphalangeal joint of this finger for calculating Swa-anguli Pramana as it is found more accurate than other 2 places i.e. aggregate of dorsal metacarpophalangeal joint as well as aggregate of ventral metacarpophalangeal joint.

During assessment, 17 other morphological and physiological characters (which were not subjected to calculation of Anguli Pramana due to limitation of data) also showed dominance of Deerghayu lakshanas. A separate study can be done to assess these parameters using non-parametric measurements.

Conclusion:

Deerghayu lakshana is predominantly mentioned in Sushruta Samhita where an age of 70 years or above is considered as Deerghayu. The present study was conducted considering this age group as selection parameter. The data were assessed using Vernier Callipers (ESAW vernier calliper with fine wheel measurement-125mm/12.5cm/5 inches) for Swa-anguli pramana of each individual. The use of Anguli pramana provides a standardised and reliable method for evaluating these morphological characters. The results clearly demonstrated the exhibition of Deerghayu lakshanas as described in Sushruta Samhita. The study strongly supports the application of Anguli pramana in assessing these lakshanas. Mixed (mishre madhyamayu) and complete opposite (viparite alpayu) of these lakshanas indicate Madhyamayu and Alpayu respectively. Minor alterations observed may be attributed to age-related changes rather than the absence of Deerghayu lakshanas. Overall, the findings support the applicability of assessing Deerghayu through Deerghayu lakshana mentioned by Acharya Sushruta.

Future scope:

The present study is a pivot work in assessment of Deerghayu lakshana of Sushruta Samhita with the help of Anguli Pramana. This is the preliminary effort to apply Anguli Pramana for assessment of Ayu of individual. Evaluation of Deerghayu plays a significant role in future enhancement of Alpayu or Madhyamayu.

Clinical application of therapies mentioned in our samhitas for enhancing Ayu is definitely beneficial for Madhyamayu and Alpayu individuals. In future, study relating to application of diet, regimen, drugs including herbal and mineral as well as alteration of lifestyle opens new horizon in improvement of total health quality of affecting individuals.

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