

AN ANALYTICAL STUDY OF *ADHAḤ ŚĀKHĀ PRAMĀṆA* AS DESCRIBED IN *BṚHATTRAYĪ*

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INTRODUCTION

Measurement of human body is always interesting since its origin. *Pramāṇa* means related to 'māna' or measurement.^[1] Anthropometry in contemporary sciences also means measurements related to the human form.^[2] Our sages mentioned references of *Pramāṇa śārīra* i.e. measurement of body parts and sub parts in terms of one's own finger length.^[3] References of *pramāṇa śārīra* are found in *sūtra sthāna* of *Suśruta saṃhitā*^[4], *Vimāna Sthāna* of *Caraka saṃhitā*^[5] and *Śārīra Sthana* of *Aṣṭāṅga Saṃgraha*^[6]. Purpose of description of *pramāṇa śārīra* is same in every *saṃhitā* i.e. person with standard body

measures will be healthy and if not so then it indicates unhealthy conditions. Our *ācārya* have also described the importance and significance of body measurements.^[7]

The human lower limb is structurally and functionally adapted for bipedal locomotion and weight bearing. The difference in the body size and shape is common phenomenon in human populations. Limb length and proportions can vary among populations, depending upon various factors such as biological affinity, growth, life conditions, socioeconomic condition, environmental factors and lifestyle. Previous research studies have revealed that length measurements of lower limb show maximum variations among all the measurements.^[8] Hence, the human lower limb has been the subject of research in various fields of Anatomy, Anthropology, Evolution, Ergonomics and Orthopaedics.

Description of *pramāṇa śārīra* is available not only in *Bṛhatrayī* but also in other classical texts too. Literature available on *pramāṇa śārīra* is scattered. The paucity of published literature and findings in *āyurveda* regarding this concept led to the recommendation that this

study has been conducted to analyse the opinion of references of *pramāṇa śārīra* of *adhah śākhā* in *Bṛhatrayī*.

MATERIALS AND METHODS

1. Review of *pramāṇa śārīra* literature from *āyurveda* classics including relevant commentaries.
2. Review of Anthropometry from its literature.
3. Review internet matter, magazines, journals, periodicals & previous research material related to subject.

After the methodical literal review of classics and contemporary science relevant to the topic, analysis was done to fulfil the need of study undertaken.

Review of literature

Ācārya Suśruta has described *pramāṇa śārīra* in context of *ātura parīkṣa* in 35th chapter of *sutrasthāna* i.e., *Āturopakramaṇīya* chapter, *ācārya Caraka* in the 8th chapter of *vimāna sthāna* i.e., *rogābhiṣagjitīya* chapter and *Vagbhatta* in *śārīra sthana* 8th Chapter. The essentiality of *pramāṇa* is depicted in fundamentals of *āyurveda* as *māna* of *hitāyu*, *ahitāyu*, *sukhāyu* and *duḥkhāyu* which constitutes *āyurveda*. Proportionate body (*Sama śārīra*) shows good health, *ojas*, *bala*, *sukha* and longevity. It has been suggested that disproportionate body by the criteria of *aṅgula pramāṇa* predispose to the disease.

Table 1 showing measurements of body parts of *adhaḥ śākhā* in *angula*^[9]

BODY PART	CHARAKA	CAKRAPĀṆĪ	GANGĀDHARA RĀYA	SUŚRUTA	DALHAṆA	HĀRĀṆA CANDRA	CAKRAPĀṆĪ-BHĀNUMATĪ	AṢṬĀṆGA SAMGRAHA	INDU
<i>Pādāṅguṣṭha, pradeśinī</i>				2	2		2	2	2
<i>Madhyamā</i>				1.6	1.5			1.6	1.6
<i>Anāmikā</i>				1.28	1.0			1.28	1.2
<i>Kaniṣṭhikā</i>				1.024	0.5			1.014	0.8
<i>Prapada</i>				4,5	*6 v		6 v	4	6 v
<i>Pādātala</i>				4,5	*5 v			4	5 v
<i>Pārṣṇī</i>				5,4	5,4			4	4
<i>Pāda</i>	4,6,14 u, v, ā	4,6,14	14	14 ā		14 ā		4 u	4 u
<i>Pāda Madhya</i>				14	14 *13				
<i>Gulpha Madhya</i>				14	14 *13				
<i>Jaṅghā</i>	18			18	18 *24		24	18	
<i>Jaṅghā Madhya/parikṣepa</i>	16		16	14	14 *13		13	14	
<i>Jānu</i>	4		4					4	
<i>Jānu Madhya</i>	16		16	14				14	
<i>Jānūpariṣṭāt</i>				32					
<i>Ūrū</i>				18	18		24	18	
<i>Ūrū pariṇāha</i>	30			32			32		

pāthāntara = * Circumference = c; *āyāma* = ā; *Vistāra* = v; *utsedha* = u; *parināha* = p

Ācārya Suśruta has described *aṅguli pramāṇa* primarily for the assessment or estimation of the longevity or lifespan of the individual and also to assess the status of the individual, especially the economic status like those who are *sama pramāṇa*, i.e. those who have normal body proportions should possess a long life and wealth whereas those who have *madhyama pramāṇa* i.e. moderate *sārīra pramāṇa* possess moderate lifespan and wealth and those having *hīna pramāṇa* have short lifespan and poor economic status.^[10]

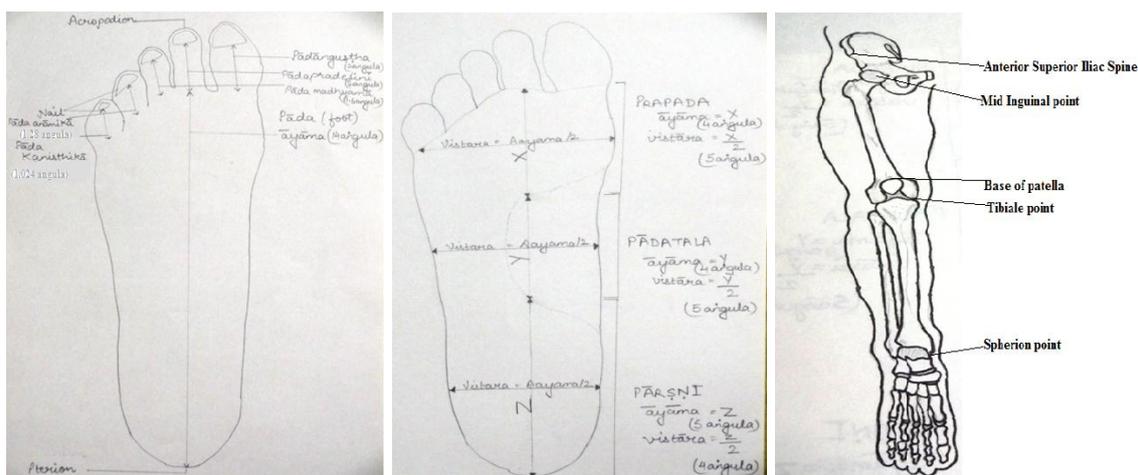


Image-1 Anthropometric landmarks of lower limb parameters

DISCUSSION

Āyāma = length,

Vistāra = breadth or width

Utsedha = prominence, elevation, height

Pariṇāha = circumference.^[11]

Sakthi means region from the *kaṭi sandhi* to the tip of fingers.^[12]

Same measurement of *pādāṅguṣṭha* and *pāda pradeśinī* has been described by *ācārya Suśruta* and *Vāgbhaṭa*. Both the *ācārya* describes the length of successive fingers from 2nd toe is less by 1/5th of the former finger, hence *madhyamā*- 1.6 *aṅgula*, *anāmikā*- 1.28 *aṅgula* and the *kaniṣṭhikā*-1.024 *aṅgula*. But this 1/5th part is 1/2 *aṅgula* as told by *Dalhaṇa*. Lengths of the digits are measured from dorsal aspect of foot as the lengths of digits are exclusive of nails (*Dalhaṇa*). Proximal end of great toe to proximal end of nail were taken as landmarks for *pādāṅguṣṭha* and same as for corresponding digits.

Sole of foot is divided into three parts: *prapada*, *pādata* and *pārṣni*. *Prapada* is the forepart of the front of foot excluding the digits (*Hārānacandra*). *Pādata* is the sole proper i.e. part

of the arch of foot and *pārṣṇi* is the *khudikā bhāga* (*Indu*) and part below *gulpha* or ankle (*Hārānacandra*). *Acārya Suśruta* says *āyāma* of the *prapada* to be 4 *aṅgula* and *vistāra* to be 5 *aṅgula*, *ācārya Vāgbhaṭa* also describes *āyāma* of *prapada* same as *Suśruta* i.e. 4 *aṅgula*, he has not told about *vistāra* of *prapada*, so both the *ācārya* has same opinion regarding *āyāma* of *prapada*. *Acārya Suśruta* has described *āyāma* and *vistāra* of *Pādātala* same as that of *prapada* i.e. 4 and 5 *aṅgula* respectively, *Vāgbhaṭa* has given only *āyāma* of *pādātala* which is 4 *aṅgula*, same as *Suśruta*. *Ḍalhaṇa* while commenting on *Suśruta* expresses the opinion of other *ācārya* that *vistāra* of *pādātala* is 5 *aṅgula* which is same as *ācārya Suśruta* and *Vāgbhaṭa*; no difference in opinion is found. *Āyāma* of *pārṣṇi* has been told by *ācārya Suśruta* and *Vāgbhaṭa*, they describe it to be 5 and 4 *aṅgula* respectively and same by their following commentators. This difference may be due to difference in deciding the landmarks of *pārṣṇi* being more distal or proximal points, or may be due to evolutionary or regional variations. *Vistāra* of *pārṣṇi* given only by *ācārya Suśruta* (four *aṅgula*) and the same has been adopted by *Ḍalhaṇa*.

Only *ācārya Caraka* has described the *utsedha*, *vistāra* and *āyāma* all the three measurements regarding *pāda*, *ācārya Suśruta* has given only *āyāma* and *ācārya Vāgbhaṭa* only *utsedha* of *pāda*. *Pāda* represent the total length of the sole of foot on plantar aspect. *Acārya Caraka* and *Vāgbhaṭa* both has given the same *utsedha* of *pāda*, also their commentators follow the same. *Āyāma* has been described by *ācārya Caraka*, *Suśruta*, *Vāgbhaṭa* and commentators, *vistāra* of *pāda* has been told by *ācārya Caraka*. Pterion i.e. hind-most point on the heel of the stretched foot to proximal end of 2nd digit of foot were taken as *pāda*.

Only *ācārya Suśruta* has given the measurement *pāda madhya* and *gulpha madhya* that is circumference of *pāda* and *gulpha*. *Acārya* says both the measurements to be 14 *aṅgula*. *Ḍalhaṇa* commenting on *Suśruta* also gives the same measurement but at the same time giving opinion of other *ācārya* says it to be 13 *aṅgula*.

All the three major *Samhitā* describes *jaṅghā* to be 18 *aṅgula* long; there is no difference in opinion but *Ḍalhaṇa* while commenting on *Suśruta* quotes about reference of *jaṅghā* in other texts to be 24 *aṅgula*. Generally *jaṅghā* is taken to the area between *jānu* and *gulpha* and then it measures 18 *aṅgula*. It may be defined as region between knee joint and ankle joint. But if one takes the measurement from mid of *jānu* up to the distal point of *gulpha* then it becomes 24 *aṅgula*, so this may be the possible explanation of difference in view. *Jaṅghā* may be considered as leg region. Tibiale i.e. highest point on the inner glenoidal margin of tibia and

Spherion i.e. lowest point on tip of medial malleolus of tibia were taken as landmark for *jaṅghā*.

Measurement of *pariṇaha* or *parikṣepa* of *jaṅghā* and *jānu* is present in all the three *saṃhitā* of *Bṛhatrayī*, *Suśruta* and *Vāgbhaṭa* has the same opinion of 14 *aṅgula* but *Caraka* gives different measurement of 16 *aṅgula*. When circumference is taken at the midpoint of *jaṅghā* and *jānu* it will be less than that at the point of maximum circumference, it may be possible *Caraka* has described the point of maximum circumference and the other two of midpoint of *jaṅghā* and *jānu*.

Āyāma of *jānu* is present in *Caraka saṃhitā* and *Aṣṭāṅga Saṃgraha* with same measurement. Knee or *jānu* is the joint between *jaṅghā* and *ūru* as mentioned by *Cakrapāṇi*.

Jānūpariṣṭā may be considered as region between tibiale point and lumbosacral joint. The anterior superior iliac spine is at the level of the sacral promontory (base of sacrum) which articulates with vertebra L5 at the lumbosacral joint hence line joining both anterior superior iliac spines was taken as landmark.

Āyāma of *ūrū* is present in *Suśruta* and *Aṣṭāṅga*. *Ūru* is the part between *jānu* and *vaṃkṣaṇa saṃdhi*, its length is 18 *aṅgula* which is similar to the length of *jaṅghā* according to both the *ācārya*. *Ūru* is the part between knee joint and hip joint. *Ḍalhaṇa* in his commentary also follows the same but *Cakrapāṇi* in his *Bhanumatī tīkā* says length of *ūrū* and *jaṅghā* both is 24 *aṅgula* in length each. Reason for the difference in opinion may be present if *Cakrapāṇi* has included *vaṃkṣaṇa saṃdhi* in the measurement while other *ācārya* has taken the distance between *jānu* and *vaṃkṣaṇa saṃdhi*. Measurement of *ūrū pariṇāha* is present in all the three *saṃhitā*. *Ūru* may be considered as the region of thigh. Fold of groin separates front of thigh from anterior abdominal wall. Because head of femur which articulate in hip joint lies beneath the mid inguinal point therefore midinguinal point was taken as a landmark. Patella is easily seen and felt hence base of patella was taken as landmark.

According to *Caraka* *ūrū pariṇāha* is 32 *aṅgula* while according to *Suśruta* and *Vāgbhaṭa* it is 30 *aṅgula*. It may be possible that *Caraka* has taken circumference at maximum thickness point while *Suśruta* and *Vāgbhaṭa* at the midpoint of *ūrū*.

On direct observation to the references of *pramāṇa śārīra*, the wise observation of our *ācāryas* regarding the proportions of the human body are self evident. But the fact that is

generally missed during the analysis is that even though the individual measures given are in proportion to the fundamental unit which is *anguli*, there is also a possibility of inter measure comparison to derive new proportions.

Thus, the measurement of *adhaḥ śākhā* may be divided into measurements of its constituent subparts, i.e. measurement of digits, measurement of foot, measurement of leg region, measurement of knee joint and measurement of thigh region. According to *Suśruta*, the total length of lower limb excluding foot is 50 *aṅgula* out of 120 *aṅgula*.^[13] It means that lower limb contribute to the major portion of total height. The individual height of each body part is not to be taken into account while ascertaining the measurement of the whole body because a portion of height of one body part at a time merges with the height of another body part.^[14]

CONCLUSION

The elaborated descriptions of *pramāṇa śārīra* in the ancient literature show the well established concept of anthropometry in past era. The elaborative descriptions given in the study regarding *pramāṇa* of *adhaḥ śākhā* proves it. The descriptions of *pramāṇa śārīra* according to different *ācārya* may seem to be dissimilar, a finer reading brings to light the inherent congruence and it can be understood that variations exists between opinions of *ācārya* are very limited. Most of the parameters of *adhaḥ śākhā* were found similar according to different *ācārya*. Maximum variations were found in *pramāṇa* of *pāda madhyamā*, *pāda anāmikā* and *kaniṣṭhikā*, *jaṅghā* and *ūrū āyāma*.

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