



(RESEARCH ARTICLE)



## A survey study to evaluate the *Greeva Pramana* (anthropometric measurement of neck)

Seetharama Mithanthaya <sup>1,\*</sup> and Swati Bedekar <sup>2</sup>

<sup>1</sup> Department of Rachana Sharira, J S Ayurveda Mahavidyalaya, Nadiad, Gujarat, India.

<sup>2</sup> Department of Rachana Sharira, Sawkar Ayurvedic Medical College, Satara, Maharashtra, India.

International Journal of Science and Research Archive, 2023, 10(01), 866–872

Publication history: Received on 03 September 2023; revised on 13 October 2023; accepted on 16 October 2023

Article DOI: <https://doi.org/10.30574/ijrsra.2023.10.1.0837>

### Abstract

*Pareeksha of Karya Desha* i.e., *Atura Deha* is a prerequisite before performing the *Chikitsa*. The basic goal behind *Pareeksha* is an assessment of *Bala* and *Ayu*. The “*Swa-Angula Pramana*” is taken as the unit of measurement of the body parts and structures with respect to length, breadth, height, and circumference. In *Ayurvedic* literature due importance was given to the measurement of different parts of the body.

*Greeva* is that part of the body that connects the head to the trunk, is one among the *Shadanga*, and is also known by other names such as *Manya*, *Shirodhi*, and *Kandhara*. The *Ayama* (length) or *Utseda* (height) of *Greeva* is 4 *Angula*; the *Parinaha* (circumference) of *Greeva* is 22 *Angula* as per *Caraka Samhita* whereas *Sushruta Samhita* mentions it as 20 *Angula*. The present study was to evaluate the measurement of *Greeva Pramana* among 265 volunteers.

**Keywords:** Angula Pramana; Greeva; Anthropometry; Ayama; Vistar; Parinaha

### 1 Introduction

The subject of *Shareera Rachana* has been described in various aspects of *Ayurveda* Samhitas. Many hypotheses are found in Samhitas and these are needed to be reassessed and proved in modern parlance with the help of scientific observation, parameters, and experiments. The concept of *Pramana Shareera* is one such hypothesis that needs to be proved and rearranged as it forms a basis for the estimation of *Bala of patients*. A detailed exercise on the concept of *Pramana Shareera* is available in *Caraka Samhita* and *Sushruta Samhita*, later their perception was rearranged by *Ashtanga Sangraha* <sup>1, 2 & 3</sup>.

*Pareeksha of Karya Desha* i.e., *Atura Deha* is a prerequisite before performing the *Chikitsa*. A detailed description of *Atura Pariksha* otherwise termed as *Dashavidha Pareeksha Vidhi*, is available in *Caraka Samhita* and *Pramana Preeeksha* is one among them<sup>4</sup>. The basic goal behind *Pareeksha* is assessment of *Bala* and *Ayu*<sup>5, 6 & 7</sup>. The “*Swa-Angula Pramana*” is taken as the unit of measurement of the body parts and structures with respect to length, breadth, height, and circumference<sup>8</sup>. In *Ayurvedic* literature due importance was given regarding the measurement of different parts of the body. A detailed list of measurements of various body parts is available in the classics of *Ayurveda*<sup>9, 10 & 11</sup>.

*Greeva* is that part of the body that connects the head to the trunk, is one among the *Shadanga*, and it is also known by other names such as *Manya*, *Shirodhi*, and *Kandhara* <sup>12, 13</sup>. The *Ayama* (length) or *Utseda* (height) of *Greeva* is 4 *Angula*; the *Parinaha* (circumference) of *Greeva* is 22 *Angula* as per *Caraka Samhita* whereas *Sushruta Samhita* mentions it as 20 *Angula*<sup>14, 15</sup>.

\* Corresponding author: Seetharama Mithanthaya

The present study was to evaluate the measurement of *Greeva Pramana* among 265 volunteers.

### *Aim*

To evaluate the measurements of *Greeva* among 265 volunteers.

### *Objective*

- To do the literary review of *Pramana Sharira*
- To measure the *Angula Pramana* of 265 volunteers.
- To measure the *Greeva Pramana* of 265 volunteers.

#### **1.1 Inclusion criteria**

- Individuals from the age group 25-40 years.
- Individuals irrespective of gender, religion, and socio-economic status.

#### **1.2 Exclusion Criteria**

- Individuals who had undergone neck surgeries and any medical interventions related to head and neck.
- Individuals with disease related to the thyroid gland.
- Individuals with any congenital abnormalities related to the neck.

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## **2 Material and method**

The participants who fell under the inclusion criteria were selected for the study.

- Measurements of the proximal interphalangeal joint were taken to standardize *Angula Pramana*.
- Measurements of *Greeva Ayama* (height) and *Vistara* (circumference) were taken.

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## **3 Results**

A survey study was conducted to evaluate *Greeva Pramana* (anthropometric measurements of the neck). A total of 265 volunteers were enrolled in the survey after getting written consent from them. Various measurements including the width of the proximal interphalangeal joint on both the right and left middle finger, height, and circumference of the neck were measured.

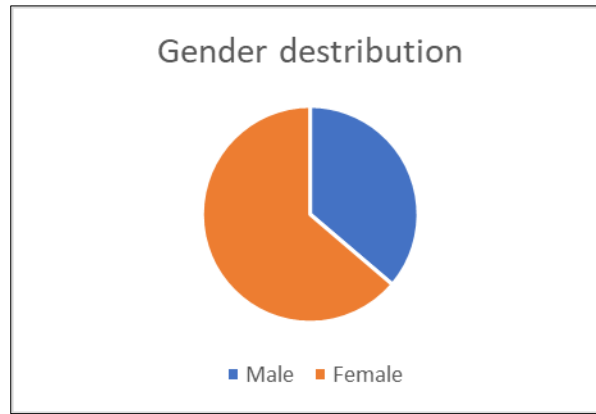
The following observations were made –

### **3.1 Gender**

Out of 265 volunteers, 96 were male and 169 were female.

**Table 1** Gender-wise distribution of volunteers in two groups

	<b>Gender distribution</b>
Male	96
Female	169



**Figure 1** Gender wise distribution of volunteers in two groups

### 3.2 Age

The median age of volunteers in Group A is 30 years with a minimum age of 25 years and a maximum of 40 years.

The median age of volunteers in Group B is 32 years with a minimum age of 25 years and a maximum of 40 years.

#### 3.2.1 *Parinaha (width) of right MadyamAngula*

The mean *vistara* (width) of *MadyamAngula* of the right hand is 1.73 cm with SD 0.14 cm. The median width of *MadyamAngula* of the right hand is 1.73 cm with minimum and maximum width respectively 1.25 cm and 2.21 cm.

#### 3.2.2 *Parinaha (width) of left MadyamAngula*

The mean *vistara* (width) of *MadyamAngula* of the left hand is 1.71 cm with SD 0.16 cm. The median width of *MadyamAngula* of the left hand is 1.7 cm with minimum and maximum widths respectively 1.25 cm and 2.16 cm.

#### 3.2.3 *Greeva Ayama (neck height) (in cm)*

The mean *Ayama* of *Greeva* (neck) is 10.53 cm with SD 1.02. The median *Ayama* of *Greeva* (neck) is 10 cm with minimum and maximum *Ayama* respectively 8 cm and 16 cm. The mode value is 10 cm.

#### 3.2.4 *Greeva Ayama (neck height) (in Angula - right)*

The mean *Ayama* of *Greeva* (*Angula Pramana* taken as per the measurement of width of right *Madyama Angula*) is 6.11 *Angula* with SD 1.63. The median *Ayama* of *Greeva* is 5.88 *Angula* with minimum and maximum *Ayama* respectively 4.47 *Angula* and 9.8 *Angula*. The mode value is 5.95 *Angula*.

#### 3.2.5 *Greeva Ayama (neck height) (in Angula - left)*

The mean *Ayama* of *Greeva* (*Angula Pramana* taken as per the measurement of width of left *Madyama Angula*) is 6.20 *Angula* with SD 1.10. The median *Ayama* of *Greeva* is 5.95 *Angula* with minimum and maximum *Ayama* respectively 4.37 *Angula* and 10.26 *Angula*. The mode value is 5.56 *Angula*.

#### 3.2.6 *Greeva Parinaha (neck circumference) (in cm)*

The mean *Parinaha* of *Greeva* (neck) is 30.55 cm with SD 3.26. The median *Parinaha* of *Greeva* (neck) is 30 cm with minimum and maximum *Parinaha* respectively 23 cm and 46 cm. The mode value is 34 cm.

#### 3.2.7 *Greeva Parinaha (neck circumference) (in Angula - right)*

The mean *Parinaha* of *Greeva* (*Angula Pramana* taken as per the measurement of width of right *Madyama Angula*) is 17.71 *Angula* with SD 1.80. The median *Parinaha* of *Greeva* is 17.5 *Angula* with minimum and maximum *Parinaha* respectively 13.29 *Angula* and 27.45 *Angula*. The mode value is 16.67 *Angula*.

3.2.8 *Greeva Parinaha (neck circumference) (in Angula - left)*

The mean *Parinaha* of *Greeva* (*Angula Pramana* taken as per the measurement of width of left *Madyama Angula*) is 17.95 *Angula* with SD 1.98. The median *Parinaha* of *Greeva* is 17.72 *Angula* with minimum and maximum *Parinaha* respectively 12.92 *Angula* and 27.10 *Angula*. The mode value is 16.67 *Angula*. To evaluate the relation between the Width of *madyamangula* and *Greeva Pramana* Karl Pearson test was applied and got the following results.

**Table 2** Results of correlation between right *Madyama Angula* and *Greeva Ayama*

<b>Pearson r</b>	
<b>r</b>	<b>0.133</b>
95% confidence interval	0.0131 to 0.250
R squared	0.0178
P value	
P (two-tailed)	0.0299
P value summary	*
Significant? (alpha = 0.05)	Yes
Number of XY Pairs	265

**Table 3** Results of correlation between right *Madyama Angula* and *Greeva Parinaha*

<b>Pearson r</b>	
<b>r</b>	<b>0.393</b>
95% confidence interval	0.286 to 0.490
R squared	0.154
P value	
P (two-tailed)	<0.0001
P value summary	****
Significant? (alpha = 0.05)	Yes
Number of XY Pairs	265

**Table 4** Results of Correlation between left *Madyama Angula* and *Greeva Ayama*

<b>Pearson r</b>	
<b>r</b>	<b>0.0708</b>
74% confidence interval	0.00129 to 0.140
R squared	0.00501
P value	
P (two-tailed)	0.2510
P value summary	Ns
Significant? (alpha = 0.26)	Yes
Number of XY Pairs	265

**Table 5** Results of Correlation between left madya amAngula and Greeva Parinaha in

<b>Pearson r</b>	
<b>R</b>	<b>0.327</b>
95% confidence interval	0.215 to 0.430
R squared	0.107
P value	
P (two-tailed)	<0.0001
P value summary	****
Significant? (alpha = 0.05)	Yes
Number of XY Pairs	265

**Table 6** Correlation between Greeva Ayama and Greeva Parinaha

<b>Pearson r</b>	
<b>r</b>	<b>0.372</b>
95% confidence interval	0.263 to 0.471
R squared	0.138
P value	
P (two-tailed)	<0.0001
P value summary	****
Significant? (alpha = 0.05)	Yes
Number of XY Pairs	265

## 4 Discussion

### 4.1 Discussion on observations

#### 4.1.1 Parinaha (width) of MadyamAngula – Standardisation of Angula unit

The mean Vistara (width) of Madyama Angula of right hand is 1.73 cm with SD 0.14 cm of left hand is 1.71 cm with SD 0.16 cm. Thus, it could be considered that the unit of Angula is  $1.73 \pm 0.14$  cm and  $1.71 \pm 0.16$  cm for right and left Madyama Angula.

#### 4.1.2 Greeva Ayama (neck height) (in cm)

The average Ayama of Greeva is  $10.53 \pm 1.02$  cm. The Ayama ranges between 8-16 cm Angula with a median value 10 cm. The mode value 10 cm indicates the maximum number of people had the measurement around this value.

#### 4.1.3 Greeva Ayama (neck height) (in Angula - right) –

The average Ayama of Greeva (Angula Pramana taken as per the measurement of width of right Madyama Angula) is  $6.11 \pm 1.16$  Angula. The Ayama ranges between 4.47-9.8 Angula with a median value 5.88 Angula. The mode value 5.95 indicates the maximum number of people had the measurement around this value. This value is slightly higher than the value mentioned in the classical reference which is 4 angula.

#### 4.1.4 Greeva Ayama (neck height) (in Angula - left) –

The average Ayama of Greeva (Angula Pramana taken as per the measurement of width of left Madyama Angula) is  $6.20 \pm 1.10$  Angula. The Ayama ranges between 4.37-10.26 Angula with a median value of 5.95 Angula. The mode value 5.56

indicates a maximum number of people had the measurement around this value. This value is slightly higher than the value mentioned in the classical reference which is 4 angula.

#### 4.1.5 *Greeva Parinaha (neck circumference) (in cm) –*

The average Parinaha of Greeva is  $30.55 \pm 3.26$  cm. The Parinaha ranges between 23-46 cm with a median value of 30 cm. The mode value 28 cm indicates the maximum number of people had the measurement around this value.

#### 4.1.6 *Greeva Parinaha (neck circumference) (in Angula - right) –*

The average Parinaha of Greeva (Angula Pramana taken as per the measurement of the width of the right Madyama Angula) is  $17.71 \pm 1.80$  Angula. The Parinaha ranges between 13.29-27.45 Angula with a median value of 17.5 Angula. The mode value 16.67 Angula indicates a maximum number of people had the measurement around this value. This value is slightly lesser than the value mentioned in the classical reference which is 20 angula.

#### 4.1.7 *Greeva Parinaha (neck circumference) (in Angula - left) –*

The average Parinaha of Greeva (Angula Pramana taken as per the measurement of the width of the left Madyama Angula) is  $17.95 \pm 1.98$  Angula. The Parinaha ranges between 12.92-27.10 Angula with a median value of 17.72 Angula. The mode value 16.67 Angula indicates a maximum number of people had the measurement around this value. This value is slightly lesser than the value mentioned in the classical reference which is 20 angula.

## 4.2 Discussion on results

- The measurements of right Madyama Angula and Greeva Ayama have an r-value of 0.133 at 95% CI (0.0131 to 0.500) and significant at a p-value of 0.029. This indicates there is a positive relationship between them.
- The measurements of right Madyama Angula and Greeva Parinaha have an r-value of 0.393 at 95% CI (0.286 to 0.490) the result is highly significant at p-value  $< 0.0001$  which indicates there is a positive relation between them.
- The measurements of left Madyama Angula and Greeva Ayama have an r-value of 0.0708 at 95% CI (0.00129 to 0.140) the result is not significant at a p-value of 0.25 which indicates there is a negligible positive relation between them.
- The measurements of left Madyama Angula and Greeva Parinaha have an r-value of 0.327 at 95% CI (0.215 to 0.430) the result is highly significant at p-value  $< 0.0001$  which indicates there is a positive relation between them.
- The measurements of Greeva Ayama and Greeva Parinaha have r-value 0.372 at 95% CI (0.263 to 0.471) the result is significant at p-value  $< 0.0001$  which indicates there is a positive relation between them.

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## 5 Conclusion

Reviewing the available literature and on the basis of observational study following conclusions were obtained.

- The unit of *Angula* is  $1.73 \pm 0.14$  cm and  $1.71 \pm 0.16$  cm for right and left *Madyama Angula* respectively.
- The *Greeva Ayama* is  $10.53 \pm 1.02$  cm, which is  $6.11 \pm 1.16$  *Angula* (Right) and  $6.20 \pm 1.10$  *Angula* (Left). Both values are nearer to the value of classical reference which is four *Angula*.
- The *Greeva Parinaha* in group A is  $30.55 \pm 3.2$  cm, which is  $17.71 \pm 1.80$  *Angula* (Right) and  $17.95 \pm 1.98$  *Angula* (Left). Both values are nearer to the value of classical reference which is twenty *Angula*.
- The *Greeva Ayama* and *Greeva parinaha* have a positive relation in group A (r value 0.372) indicating that a relative increase in *greeva ayama* will cause a relative increase in the *parinaha* of the neck.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest is to be disclosed.

### *Statement of ethical approval*

Approval has been taken from the institutional ethics committee, Ref no: letter no JSAM/IECHR/130/05-2021, dated 18/05/2021

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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