PILOT STUDY ON MEASUREMENT OF SHIRAS OF DEERGAYU AND MADHYAMAYU PERSONS

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ABSTRACT

Acharya Sushruta has given the importance of ayu as a prerequisite before the commencement of treatment, the measurement of various angas and pratyangas are given in anguli praman. Among the shadangas the shiras is considered to be the most important part. A pilot study was conducted on 6 volunteers from Group A i.e. deergayu persons and six cadavers from Group B i.e. Madhyamayu persons. The selected three measurements of shiras given by Sushruta was measured in both the groups, among the three selected measurements one measurement was found to be statistically significant and hence can be considered as practically important and can be applied after detailed study on a larger data.

Keywords: anguli praman, deergayu, madhyamayu

INTRODUCTION

In Sushruta sutrastana 35th chapter i.e. Aaturopakramaneeya adhyaya, Acharya Sushruta has mentioned about anguli praman. In this chapter Acharya has described that a physician should observe the ayu of the patient before commencing the treatment, after that vyadhi, agni, vaya, dehabala, satva, satmya, prakruti, breshaja, desa, etc. should be observed and carefully examine\[^1\]. He has given the measurement of more than 50 anga pratyanga, all the measurement are in swanguli pramana\[^5\]. He has mentioned that a person with yukta pramana i.e. appropriate pramana will have deergayu and vitta, a person with madhyama pramana will have madhyamayu and vitta and a person with avara pramana will have heenayu and vitta, which is said as below

‘Dehah swarangulairaisha yathavatanukeertitah|
Yuktah pramanena puman yadi vaangana ||
Deeramayuravapnoti vittam ca mahadrichati |
Madhyamamadhyamaryaurvittam
Heenaistathaavaram |’\[^6\]

Aim: compare the measurement of shiras between deergayu and madhyamayu persons.

Objective:
1. To understand the concepts of Ayurveda related to deergayu and madhyamayu.
2. To find if there is any difference in the measurement of shiras among deergayu and madhyamayu persons.

Materials
1. Review from ayurveda, modern literature and previous work done.
2. Flexible measuring tape
3. Six volunteers from group A i.e. deergayu persons
4. Six cadavers from group B i.e. madhyamayu persons

**Inclusion criteria**

a. Head measurements from group A i.e. deergayu persons and from group B i.e. madhyamayu persons
b. Sex - male
c. Age - group A – above 85 yrs., group B – 35 to 55 yrs.

**Exclusion criteria**

a) With congenital and acquired deformity of head.
b) Age - group A - below 85yrs, group B -below 35yrs. & above 55yrs.

**Method**

a) Formation of two groups
b) Measurement of one *swanguli* in cm.
c) Measurement of selected *pratyanga* in cm.
d) Comparison of the difference in TDM & PMM of both groups

**a) Formation of two groups**

Formation of group A

To assess the measurement of deergayu person this group was formed. According to Sushruta’s classification of age, age group between 16yrs to 70yrs is considered to be *madhyama vaya*[^7], one can label the person as *madhyamayushi* if his death has occurred in *madhyama vaya*, therefore cadavers were selected for this purpose. To avoid error or bias in calculating age, difference of -15 was reduced and therefore person below 55 yrs and above 35 yrs were considered as *madhyamayu*.

**b) Measurement of 1 *swanguli* in cm.**

After formation of two groups, measurement of one *swanguli* in cm. was decided to be considered. For this previous work of Dr. Pooja Chauhan “Critical study of measurement methods of *brihatrayee* to measure human height” was referred. From her work the formula to calculate 1 *swanguli* in cm. was obtained. i.e. $N / 84 = 1\text{ swanguli praman}$ in cm. (N = height in cm of a particular person).

**c) Measurement of selected *pratyanga* in cm.**

After obtaining 1 *swanguli praman* of that person, measurement of selected *pratyanga* was done in cm. using flexible measuring tape and records as Practically Measured Measurement (PMM). To calculate TDM the one *swanguli praman* of that person was multiplied with the standard *anguli praman* of the particular *pratyanga*, thereby obtaining theoretically derived measurement (TDM) in cm. The 3 *pratyangas* selected from the head region are as follows

**Photograph 1:** showing measurement site of *kesanta –mastaka*

![Photograph showing measurement site of *kesanta –mastaka*](image)

- Measurement of *kesanta –mastaka* (a-b)
- Landmark a – *Utkhepa marma*
- Landmark b – hair whirl.
Photograph no: 2 showing measurement site of *mastaka – avatu- kesanta*

Measurement of *mastaka – avatu- kesanta* (a-b)
Landmark a - hair whirl.
Landmark b – *krukatika marma*.

Photograph no: 3 showing measurement site for *karna avatu*

Measurement of *karna avatu* (a-b)
Landmark a – tragus of ear on one side
Landmark b – tragus of ear on other side

d) **Comparison of the difference in TDM & PMM of both groups**
The TDM and PMM difference of both the groups was compared; the less difference indicates that the measurement is nearer to the standard measurement of *Sushruta*.

Observation

Table 1: observation of the difference in TDM and PMM of selected measurements in Group A

<table>
<thead>
<tr>
<th>SL.NO</th>
<th>Ht.(cm)</th>
<th>HEAD MEASUREMENT (Group A) in cm.</th>
<th>1. TDM-PMM</th>
<th>2. TDM-PMM</th>
<th>3. TDM-PMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>158</td>
<td>1.76</td>
<td>1.3</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>150</td>
<td>1.9</td>
<td>1.5</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>160</td>
<td>1.85</td>
<td>1.8</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>154</td>
<td>1.5</td>
<td>1.6</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>157</td>
<td>1.65</td>
<td>1.9</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>148</td>
<td>1.89</td>
<td>1.57</td>
<td>0.39</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: observation of the difference in TDM and PMM of selected measurements in Group B

<table>
<thead>
<tr>
<th>SL.NO</th>
<th>Ht.(cm)</th>
<th>HEAD MEASUREMENT (Group B) in cm.</th>
<th>1. TDM-PMM</th>
<th>2. TDM-PMM</th>
<th>3. TDM-PMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>158</td>
<td>0.98</td>
<td>1.24</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>150</td>
<td>1.23</td>
<td>1.43</td>
<td>1.23</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>160</td>
<td>1.33</td>
<td>1.67</td>
<td>1.55</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>154</td>
<td>0.88</td>
<td>1.8</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>157</td>
<td>1.35</td>
<td>1.56</td>
<td>1.22</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>148</td>
<td>1.99</td>
<td>1.32</td>
<td>1.67</td>
<td></td>
</tr>
</tbody>
</table>

**Statistical analysis:** Statistical analysis of two groups were done as follows

A. Table form
B. Diagram form- Bar Diagram
A. Table form

Table 3: statistical values

<table>
<thead>
<tr>
<th>Head measurement</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>T value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. kesanta mastaka</td>
<td>1.76</td>
<td>6</td>
<td>0.02</td>
<td>2.7</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>1.29</td>
<td>6</td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. mastaka avatu kesanta</td>
<td>1.61</td>
<td>6</td>
<td>0.05</td>
<td>0.88</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>1.50</td>
<td>6</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. karna avatu</td>
<td>0.64</td>
<td>6</td>
<td>0.04</td>
<td>-5.42</td>
<td>0.0002</td>
</tr>
<tr>
<td></td>
<td>1.36</td>
<td>6</td>
<td>0.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Bar diagram

1. Kesanta – Mastaka mean value of Group A is 1.76cm and of Group B is 1.29cm. Using two sample T test, P Value was 0< 0.02, therefore statistically significant.
2. Mastaka – Avatu Kesanta mean value of Group A is 1.61cm. and of group B is 1.50cm. , Using two sample T test, P value was 0.2< 0.40, therefore not statistically significant.
3. Mastaka- Avatu Kesanta mean value of Group A is 0.64cm. and of group B is 1.36cm. , using two sample T test, P value was 0 < 0.0002, therefore statistically significant.

Out of the above three measurements only Mastaka – Avatu Kesanta was found to be not significant and the other two measurements were significant.

DISCUSSION

Discussion regarding selection of 3 measurements of head

Sushruta has mentioned 16 facial measurements and 3 cranial vault measurements. The supremacy of man in animal kingdom is due to his well-developed brain which provides him the unlimited power of thinking, reasoning and judgement. To accommodate large brain, the size of the cranium also increased proportionately [8]. Head measurements are related to flat bones i.e. cranial vault. Hence the three cranial vault measurements indicating the development of brain were selected for the study. Therefore shiras is considered to be most important.
CONCLUSION
Difference in all the three measurements was observed between the group A and group B. Specific difference observed among the three measurement of shiras was in karna avatu measurement. Here the difference is less in deergayu than in madhyamayu i.e. the measurements of dheergayu persons are close to the standard measurement given by Sushruta, which can be considered to be significant in assessment of ayu. By prima facie it can be considered as a tool for assessment of ayu but requires further research in this line with a larger data.

REFERENCES
2. Yadavji Trikamji Acharya and Narayan Ram acharya, editor, Nibandh sangraha commentary by Sri Dalhanacharya and Nyay chandrika panjika of Sri Gayadasacharya on Nidansthana on Sushruta samhita sutrasthan, chapter 35, verse 14, choukhamba orientalia prakashan, 2013, P-151

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