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Anatomy

A Study on Hand Anthropometry in Adult Tribal and Non-Tribal Light Working Women in Rajshahi Division

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Abstract **Original Research Article**

***Background*:** As the working styles of tribal and non-tribal working women differ, there may be variations in the anthropometric measurements of the hands. Physical prowess and anthropometric measures have strong correlations with various working activity performance levels. ***Objective*:** To evaluate the hand anthropometry in adult tribal and non- tribal light working women in Rajshahi Division. ***Methodology*:** This Cross-sectional comparative study was done at Department of anatomy, Rajshahi Medical College, Rajshahi in Different zone of Rajshahi division (Babolding Chapainawabgonj, Kolmakandi, Nachol, Chiniatola Rohonpur, Godagari Rajshahi, Bodolgachi Naogaon, Rajshahi University, Karitas Rajshahi, Rajshahi College) from 1 (one) year (July 2017 to June 2018). During the study, two group of women with in the age 18-45 years were randomly selected from different zone of Rajshahi division. Among that one group of tribal women total 135 and another group of non-tribal women total 150 respectively. ***Results*:** Throughout the research, 22.2% of tribal participants were 20 or older, whereas almost one-third (30.7%) of non-tribal participants were 20 or older. Moreover, 60 (44.44%) are light workers, whereas 75 (55.6%) are intermediate employees. There are 150 non-tribal employees, with 75 (50%) being light workers and 75 (50%) being moderate workers. palmer width was significantly greater among light worker tribal population than that among their non-tribal counterpart ($p < 0.001$). 3rd and the 4th digits of the former group were considerably longer than those of the later group ($p = 0.073$ and $p = 0.002$ respectively). All other hand anthropometrics were almost identically distributed between the light tribal and non-tribal workers. ***Conclusion*:** Hand/Palmer width was significantly greater among light worker tribal population than non-tribal group. In case of light workers 3rd and 4th digits length were longer in tribal than non-tribal group. In case of light workers rests of the finger length were almost identical between tribal and non-tribal. From this study, we can conclude that there was a little difference in hand anthropometry between tribal and non-tribal light working women according to their working pattern.

Keywords: Hand anthropometry, grip strength, adult tribal.

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INTRODUCTION

Human hand is a very complex structure and devoted to the functions of manipulation. It is also capable of relaying sensory information about temperature, shape and texture of the object to the brain. Full function and adequate strength of hand are necessary for dealing with demands of daily life.

Anthropometric measurement of hand means the systemic measurement of the size, shape and composition of the human hand. The word 'Anthropo' refers to human and 'Metric' refers to measurement. The Anthropometric measurement of hand is important for the identification of working pattern and designing functions concerning with human. Without anthropometric data, the designs cannot fit the people who are going to use them. Therefore the information regarding the human sizes is essential to be implemented in the design of various facilities. Persons with long fingers and larger hand surfaces enjoy stronger grip power [1, 2]. Therefore, some researchers have examined a number of factors and anthropometric

variables that explain this issue. Working type of tribal working female and non- tribal working female are different so there is a possibility of difference in anthropometric measurement of hand. There are high correlation between physical abilities and anthropometric measurements within the performance levels of various working activities [3].

The hand does not function in isolation and is dependent on the integrity of the shoulder and elbow complexes to allow the appropriate positioning of the hand in space to complete the desired task [4]. Its effectiveness in these activities is due to particular configuration of the bones and muscles which permits opposition of the pulp surface of the thumb to the corresponding surfaces of the other four finger tips in a firm grasp, together with a highly elaborated nervous control and sensitivity of the fingers [5].

Hand strength has been identified as an important factor predicting disability in musculoskeletal diseases, bone mineral density, and likelihood of falls and fractures in osteoporosis [6-9]. It even predicts complications and general morbidity after surgical interventions, general disability and future outcome in older age. Testing the grip strength is a useful screening tool in managing chronic wrist pain [10, 11]. It is often used as an indicator of overall physical strength, hand and forearm muscle performances, and as a functional index of nutritional status and physical performances [12, 13]. Along with the daily activity like gripping and pulling strength at the hand is essential for many activities of Tribal population such as rock climbing, swimming, cultivation, making basket by bamboo and other activities. Since women plays an important role of work in our country, and tribal group of population especially female are involve in various type of hand work, so hand grip strength and anthropometric data are essential in the implements from ergonomic considerations. Keeping these factors in view, this study had been undertaken. As far as I know no such study yet been done about evaluation of hand anthropometric measurements and grip strength between female tribal and non-tribal group in Rajshahi division. This study would search for the correlation of hand grip strength and anthropometric variables to excel the performances of different types of work like light work (do light housekeeping, making something by bamboo, office work, painting, driving, writing, telephone work etc) and moderate work (cleaning, washing, mopping, vacuuming, cultivation, playing badminton and tennis etc) in tribal and non-tribal female. The findings of this study would be of great value in medical research, population genetic studies and in physical therapy, treatment strategies.

OBJECTIVE

- To evaluate the hand anthropometry in adult tribal and non-tribal light working women in Rajshahi Division.

METHODOLOGY

This Cross sectional comparative study was done at Department of anatomy, Rajshahi Medical College, Rajshahi in Different zone of Rajshahi division (Babolding Chapainawabgonj, Kolmakandi, Nachol, Chiniatola Rohonpur, Godagari Rajshahi, Bodolgachi Naogaon, Rajshahi University, Karitas Rajshahi, Rajshahi College) from 1 (one) year (July 2017 to June 2018). During the study, two group of women with in the age 18-45 years were randomly selected from different zone of Rajshahi division. Among those one group of tribal women total 135 and another group of non-tribal women total 150 respectively.

After completion of data collection, the data collection form was rechecked and verified to reduce error. Necessary correction was done before computer entry. Finally, data were processed and analyzed with the help of a computer based on SPSS software program, version-20.0 for windows. After entry into computer, results were analyzed according to objectives and variables of the study. The summarized data were presented in the form of tables with necessary interpretations and inferences. Appropriate description, inferential statistics and test of significance were conducted. The level of significance was set up at 0.05 and $P<0.05$ was considered to be statistically significant.

RESULTS

Table 1 Age distribution shows that 22.2% of the tribal participants were 20 or < 20 years old, 40.7% 21 – 30 years, 23% 31 – 40 years and 14.1% > 40 years, while nearly one-third (30.7%) of the non-tribal participants were ≤ 20 years, 32% 21 – 30 years, 29.3% 31 – 40 years and only 8% was > 40 years old.

Table 1: Distribution of study population by their age between tribal and non-tribal ethnic groups

Age* (years)[#]	**Ethnic group**	
	Tribal(n = 135)	Non-tribal(n = 150)
≤ 20	30(22.2)	46(30.7)
21 – 30	55(40.7)	48(32.0)
31 – 40	31(23.0)	44(29.3)
> 40	19(14.1)	12(8.0)
Mean ± SD	22.9 ± 4.5	20.9 ± 4.1

Table-2 shows distribution of the study group according to types of work where 60 (44.44%) are light workers and 75(55.6%) are moderate workers. Non-tribal are 150 in number; out of them 75(50%) are light workers and 75(50%) are moderate workers.

Table 2: Distribution of tribal and nontribal working female according to type of work

	Tribal(n=135)	**Non-Tribal(n=150)**
Light Worker	60 (44.4%)	75 (50%)
Moderate Worker	75 (55.6%)	75(50%)
Total	**135**	**150**

Table-3 shows distribution of hand anthropometrics among tribal and non-tribal light workers. Where palmer width was significantly greater among light worker tribal population than that among their non-tribal counterpart ($p < 0.001$). 3rd and the 4th digits of the former group were considerably longer than those of the later group ($p = 0.073$ and $p = 0.002$ respectively). All other hand anthropometrics were almost identically distributed between the light tribal and non-tribal workers. Difference in BMI between tribal and non-tribal moderate workers was not significant.

Table 3: Distribution of hand anthropometrics among tribal and non-tribal light workers

Hand anthropometrics*	**Light worker**		***p-value**
	Tribal(n = 60)	Non-tribal(n = 75)	
Hand length (cm)	17.1 ± 0.9	17.2 ± 1.0	0.174
Hand width /Palmer width (cm)	7.7 ± 0.3	7.2 ± 0.4	< 0.001
Palmer length (cm)	9.8 ± 0.4	9.6 ± 0.7	0.196
Length 1st digit (cm)	5.3 ± 0.4	5.4 ± 0.4	0.224
Length 2nd digit (cm)	6.5 ± 0.3	6.4 ± 0.4	0.211
Length 3rd digit (cm)	7.1 ± 0.4	6.9 ± 0.5	0.073
Length 4th digit (cm)	6.5 ± 0.5	6.3 ± 0.4	0.002
Length 5th digit (cm)	5.2 ± 0.4	5.1 ± 0.5	0.796
2D :4D ratio	1.01 ± 0.07	1.02 ± 0.04	0.272
Palmer length width ratio	1.5 ± 1.0	1.3 ± 0.09	0.319
BMI	22.87±5.18	22.26±4.52	0.468

*Data were analyzed using **unpaired 't' Test** and were presented as **mean ± SD.**

DISCUSSION

This study showed moderate tribal workers had significantly wider hand than their moderate non-tribal group ($p = 0.002$). However, 1st to 5th digits of the moderate tribal workers were significantly shorter than those of the moderate non-tribal workers ($p < 0.001$). There was no significant difference in 2D-4D ratio and palmer length/width ratio between the tribal and non-tribal working group according to working pattern.

A study reported that, anthropometric variables like palmer length, palmer width, height, weight, BMI and handgrip strength were measured between female laborers and sedentary female groups using the following standard techniques. Findings of that study showed significant differences ($p \leq 0.001$) among the variables [13].

Another study was done on 60 healthy kitchen workers where hand length, hand width, palmer length, palmer width, and 3rd digit length were measured following standard techniques. From those hand-anthropometric variables. 2D:4D ratio, palmer length/width ratio and handgrip strength (kg) were calculated. Their findings about the measurement of the hand length, palmer length, hand/palmer width, palmer length/palmer width ratio and 2D/4D ratio were more or less similar to that of the present study. The difference might be due to different measurement technique [14].

In a study done in Turkey among Basketball, Volley ball and handball player to see the hand (Both right and left hand) parameters like hand length, hand width, hand length/width ratio, 3rd digit length, and hand grip strength. Significant difference was observed between different types of players [15].

A survey of hand anthropometry and Biochemical measurements of dentistry students showed the hand anthropometric data in both male and female in right and left hand. Then they compared the data with different countries like Thailand, India, Malaysian, British and Nigeria. Hand length, hand/palmer width, length of the 1st, 2nd, 3rd, 4th, 5th digits and hand grip strength were measured. The Turkish female fingers and hand length were larger and hand wide was bigger than that of present study. Grip strength also greater in Turkish female than that of present study. It might be due to racial factor [16].

CONCLUSION

Hand/Palmer width was significantly greater among light worker tribal population than non-tribal group. In case of light workers 3rd and 4th digits length were longer in tribal than non-tribal group. In case of light workers rests of the finger length were almost identical between tribal and non-tribal. From this study, we can conclude that there was a little difference in hand anthropometry between tribal and non-tribal light working women according to their working pattern.

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