



COMPARISON OF CARRYING ANGLE OF THE ELBOW JOINT WITH FOREARM LENGTH IN YOUNG ADULTS OF HARYANAVI POPULATION

Anatomy

Parul Upadhayay* Senior resident, Lady Harding medical college, Delhi *Corresponding Author

S. K. Rathee Senior Professor and Head, PGIMS, Rohtak

ABSTRACT

OBJECTIVES-To evaluate the carrying angle of the elbow joint in young adults and compare it with length of forearm.

METHOD- For present study, 35 females and 35 males who were asymptomatic, healthy students of Medical college, Nursing college, Dental college, belonging to various regions of Haryana and age ranging from 18-22 years were selected. Goniometer was used for the measurement of carrying angle on both the right and the left sides and measuring tape was used to measure the length of forearm.

RESULTS- The average value of carrying angle in females on right side was 15.80 ± 0.71 and that on left side was 15.40 ± 0.71 (forearm length on right side was 24.9 ± 1.7 cm and on left side was 24.8 ± 1.6 cm). The average value of carrying angle in males on right side was 11.4 ± 0.99 and 10.5 ± 0.69 on left side while (forearm length in males on right side was 27.8 ± 2.9 cm and on left side was 28 ± 2.9 cm).

CONCLUSION- Carrying angle was found to be greater in females as compared to males and angle had an inversely proportional relation to the length of forearm. Greater carrying angle in females is considered as secondary sex characteristic. Knowledge of carrying angle can be useful in the management and correction of various injuries around elbow.

KEYWORDS

carrying angle, goniometer, secondary sexual characteristic.

INTRODUCTION

The acute angle formed between the long axis of humerus and the long axis of ulna medially is called the carrying angle. It is seen when the elbow joint is fully extended and supinated due to lateral obliquity of the forearm. The transverse axis of elbow joint is oblique, directed downwards and medially as a result when elbow is extended, arm and forearm deviate laterally. The carrying angle varies from 5° to 15° and is more pronounced in females. The wider carrying angle in females avoids rubbing of forearms with the wider female pelvis while carrying loads, e.g., buckets filled with water from one place to another. This angle of deviation is termed as carrying angle¹.

MATERIAL AND METHODS

For present study, 35 females and 35 males who were asymptomatic, healthy students of Medical college, Nursing college, Dental college, belonging to various regions of Haryana and age ranging from 18-22 years were selected. The subjects were asked to stand in anatomical position. Goniometer was used to measure the carrying angle. The one arm of goniometer was kept fixed and was placed on the median axis of arm. The movable arm was adjusted to lie on the median axis of forearm and the angle was read on the goniometer. The length of the forearm was measured as the distance between medial epicondyle of humerus and styloid process of ulna using a measuring tape. The data collected was statistically analysed using student t-test. P- value < 0.05 was considered significant.



Figure 1: Goniometer



Figure 2: Method of measurement

RESULTS

TABLE 1: SHOWING AGE AND SEX WISE CARRYING

ANGLE

SEX	AGE (In years)	SIDE	CARRYING ANGLE (in degrees)	
			RANGE	MEAN $\pm$ S.D.
MALE	18-22	RIGHT	9-15	11.4 ± 0.99
		LEFT	10-15	10.5 ± 0.69
FEMALE	18-22	RIGHT	7-19	15.80 ± 0.71
		LEFT	6-18	15.40 ± 0.71

TABLE 2: COMPARISON BETWEEN FOREARM MEASUREMENTS AND CARRYING ANGLE

SEX	RIGHT FOREARM LENGTH (in cm)	LEFT FOREARM LENGTH (in cm)	RIGHT CARRYING ANGLE (in cm)	LEFT CARRYING ANGLE (in cm)
FEMALE	24.9 ± 1.7	24.8 ± 1.6	15.80 ± 0.71	15.40 ± 0.71
MALE	27.8 ± 2.9	28 ± 2.9	11.4 ± 0.99	10.5 ± 0.69

The average value of carrying angle in females on right side was 15.80 ± 0.71 and that on left side was 15.40 ± 0.71 . The average value of carrying angle in males on right side was 11.4 ± 0.99 and 10.5 ± 0.69 on left side. On comparing the length of forearm and carrying angle, an inverse relation was observed. Males having less carrying angle had increased length of forearm while females had more carrying angle and decreased length of forearm.

DISCUSSION

STUDY	Carrying angle in Female (in degrees)	Carrying angle in Male (in degree)
Kothapalli et al ²	13.54	12.9
Rajesh et al ³	13.6	6.7
Adhikari et al ⁴	13.7	11.72
Sharma et al ⁵	16.54	13.09
Present study	15.80	11.4

The present study has been done to measure the carrying angle in both girls and boys of similar age group and its comparison with other parameters like length of forearm. It has also been documented that the carrying angle is greater in females than in males and this difference is considered as a secondary sexual characteristic. The angle is greater in dominant limb as compared to non-dominant limb; this may be due to the reason that natural forces modify the carrying angle in elbow. The result of the present study is also showing a similar pattern. Balasubramanian et al⁶, reported that height, width or length of ulna has no relation to the carrying angle of elbow; In the present study carrying angle is higher in girls with short forearm length. Ruparelia et al⁷ explained that if height & length of ulna is lesser then the medial part of trochlear notch of ulna goes more away from the medial flange of trochlea which can now grow more than in a person with longer forearm, leading to greater carrying angle.

CONCLUSION

Carrying angle of males and females is almost equal till puberty, after puberty carrying angle increases in females⁸; hence knowing about the angle in detail is important to note any variation. Greater carrying angle in females is considered as secondary sex characteristic and mostly has cosmetic value. However, knowledge of carrying angle is also important in management of displacement of elbow, fractures and epicondylar diseases. It also helps in elbow reconstruction planning.

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