International Journal of Anatomy and Research,
Int J Anat Res 2015, Vol 3(3):1249-51. ISSN 2321- 4287
DOI: http://dx.doi.org/10.16965/ijar.2015.204

Original Article

SEXUAL DIMORPHISM OF CLAVICLE IN SOUTH INDIAN POPULATION: A CROSS SECTIONAL STUDY

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ABSTRACT

Introduction: Estimation of sex is the ground for an exact identification of unknown human skeletal elements. Methods for sex assessment are based on the existence of morphological features in the skeleton that manifest differently according to sex or statistical differences in skeletal measurements. Due to the specific pattern of ontogeny and age related changes of sterna articular surface during adulthood the clavicle is widely used in the estimation of sex at death and in living people.

Objectives: To evolve an easily applied formula to enable the assessment of sex in unknown clavicles and to document the comparative differences between right and left clavicles by using metrical parameters.

Materials and Methods: The cross sectional study was conducted in the department of Anatomy, Yenepoya Medical college, Mangalore. The present study was conducted in 50 adult dry clavicle.Maximum clavicular length, maximum breadth of sterna end ,maximum breadth of acromial end and acromial surface area were measured by digital caliper and osteometric board.

Results: The maximum length of clavicle () was statistically significant when compared with the clavicle of females. The other values like breadth of sternal end, breadth of acromial end and acromial surface area were greater in males when compared to females.

Conclusion: Determination of sex the clavicle has a great medicolegal importance to the forensic people. And it also help the orthopedic implant manufactures and orthopedic surgeons to decide correct size and shape of plates and intramedullary nails for clavicular fractures in open reduction method.

KEY WORDS: Clavicle, Acromion, Osteometric board, Digital Caliper.

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Access this Article online

Quick Response code

DOI: 10.16965/ijar.2015.204

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 24 Jun 2015 Accepted: 20 Jul 2015
Peer Review: 24 Jun 2015 Published (O):02 Aug 2015
Revised: None Published (P):30 Sep 2015

INTRODUCTION

Determination of sex is the ground for an exact identification of unknown human skeletal elements. Earlier studies suggest that the pelvic bones show sexual dimorphism to a greater degree than any other bone, and the human clavicle shows the least [1]. Estimation of age and sex of human skeletal remains have always fascinated forensic workers and anthropologists. The need for reliable methods distinguishing males from females based upon various skeletal elements is evident in cases of commingled, eroded and/or missing remains.

The human clavicle is a long bone with a shaft and two ends. The lateral end of it will articulate with acromion process of scapula and form acromio clavicular joint. The acromio clavicular joint is the only connection of the scapula to the trunk; otherwise it attaches only by muscles. Both clavicle and scapula are very important elements for movements of the upper limb and thorasic cage. The complete ossification of clavicle takes place at the age 29 years [2]. The purpose of this study is to evolve an easily applied formula to enable the assessment of sex in unknown clavicles and to document the comparative differences between right and left clavicles by using metrical parameters.

MATERIALS AND METHODS

This cross sectional study has been conducted at the Department of anatomy, Yenepoya Medical College, Mangalore. Total number of 50 dry clavicles (25 male and 25 female) were collected based on the data registry of the department. Clavicles showing any pathology were excluded. The maximum length in cm was measured with the help of an osteometric board. Maximum breadth of sternal end and acromial end was measured by a digital caliper. Surface area of acromial end was measured and these measurements were compared.

Statistical analysis has been done by using descriptive statistics by students t test and p value is considered as <0.001.

RESULTS

Table 1: Showing the various clavicular measurements in male and female.

Parameters	Male	Female	p-value
Maximum length of clavicle(cm)	14.43± 0.72	12.8±1.01	0.0001*
Maximum breadth of sternal end	2.07±0.29	1.92±0.32	0.09
Maximum breadth of acromial end	0.97±0.29	0.88±0.28	0.28
Maximum length of acromial end	1.87±.37	1.85±.43	0.86
Surface area of acromial end.	1.86±.72	1.6±.53	0.17

*statistically significant.

DISCUSSION

The present study was conducted to determine the sex of unknown clavicles and to know about the comparative differences between the male and female clavicles, and to find out the differences between right and left clavicle. Several studies have been conducted on sexual determination from skeletal elements. In 1954 Stewart done a guess work of anthropometric observations are the measurements carried out by internationally accepted techniques [3]. The methods of recording the principal dimensions are established for all skeletal elements and the proportions are expressed as indices in 38th edition of Grays Anatomy [4]. In 1951, Oliver found that the left clavicle to be longer than the right in French people [5]. The present study also support with the previous study , the maximum length of clavicle in males were found greater than in females but the maximum length was more in left sided clavicle when compared to right side. Earlier studies say that though the maximum length of male clavicle is greater when compared to female clavicle, the length of bone was different in different races [6]. Trotter M et al described that the human clavicle is considered as a long bone and the right sided bones of limbs are usually longer than those of the left side [7]. But the present study was not in accordance with the previous study. Determination of sex using skeletal remains is the most important component in forensic identification and in anthropologic research [8]. Human pelvis and skull are the two most common skeletal elements using for sex determination The previous studies reveals that the measurements of male clavicle is greater than that of female. This study found that sternal height, breadth and surface area of the clavicles are more discriminating parameters for the identification of sex from clavicle. The present study also indicates that the measurem-

Parameters	Right male	Right female	Left male	Left female
Maximum length of clavicle(cm)	14.19± 0.76	12.72±0.89	14.54± 0.72	12.9±1.16
Maximum breadth of sternal end (cm)	2.25±0.27	1.98±0.31	1.98±0.23	1.29±1.16
Maximum breadth of acromial end(cm)	0.97±.25	0.85±0.11	1.02±0.38	1.1±0.66
Maximum length of acromial end(cm)	2.01±.32	1.82±.45	1.85±0.39	1.9±.42
Surface area of acromial end.(cm^2)	1.95±.62	1.56±.46	1.94±0.90	1.80±0.83

Table 2: Showing the various clavicular measurements in right and left clavicles.

-nts of male clavicle are greater than female. By measuring maximum length of clavicle, we can assess the sex and side.

CONCLUSION

The present study concludes that the sex of a human body can be determined using clavicular measurements with high relative accuracy. And it also help the orthopedic implant manufactures and orthopedic surgeons to decide correct size and shape of plates and intramedullary nails for clavicular fractures in open reduction method.

ACKNOWLEDGEMENT

We express our sincere gratitude to Dr.R.Avadhani, HOD, Dept.of Anatomy, Yenepoya Medical College, Mangalore for his support to carry over this study.

Conflicts of Interests: None

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How to cite this article:

Bindhu.S, Blessina Sugandhy. SEXUAL DIMORPHISM OF CLAVICLE IN SOUTH INDIAN POPULATION: A CROSS SECTIONAL STUDY. Int J Anat Res 2015;3(3):1249-1251. **DOI:** 10.16965/ijar.2015.204