

Original Research Article

Sexual Dimorphism of Adult Human Clavicles in Tamilnadu Population

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Abstract: Clavicle is also called as "Collar Bone". The bone has a double-curve hence its name Clavisa Key (the Roman key was S-Shaped) in the horizontal plane. The clavicle is thicker and more curved in manual workers, its muscular attachments being well marked. Sexing of the clavicle has been attempted by various workers. 90 dried adult clavicles (48 right sides & 42 left sides) were studied for the present study. Bones were collected from the Anatomy Department of KFMS&R, Coimbatore. Total five Anthropometric parameters were obtained from each clavicle. The measurements obtained from each clavicle were statistically analysed. Determination of sex of clavicle is important to know before planning for intramedullary nails for clavicle, which helps for orthopaedic implant manufactures and orthopaedic surgeons.

Keywords: Clavicle, Sexual differences, identification, Parameters

INTRODUCTION:

Human body shows the destructive effects of post-mortem putrefaction and decomposition following death [1]. The osseous skeleton is the only structure to resist this effect for longer time. Anatomists are frequently consulted to give their expert opinion for medicolegal purposes regarding the personal identity as regards to sex, age, race and also probable cause of death [2]. Clavicle is also called as "Collar Bone". The bone has a double-curve hence its name-Clavis-a Key (the Roman key was S-Shaped) in the horizontal plane. It extends almost horizontally across the root of the neck laterally towards the point of the shoulder [3]. The complete ossification of clavicle takes place at the age 29 years [2, 3].

The female clavicle is shorter, thinner, less curved, and smoother and its acromial end is carried lower than the sternal. In males it is in level with or slightly above sternal end when the arm is pendent [4]. The clavicle is thicker and more curved in manual workers, its muscular attachments being well marked. Determination of sex by using whole skeleton or bony remnants had been explored since more than a century; individual bones including the clavicles may help at least in part if not whole [5].

In the opinion of Krogman (1962) [2], the accuracy of sexing of bony material is as follows:

Entire skeleton - 100%, Skull alone - 92%, Pelvis alone - 95%, Pelvis + Skull - 98%, Long bones alone - 80%, Long bones + Pelvis - 98%. But with the present available knowledge, none of the bones can give 100% correct identification of sex. 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 [6].

The aim of the current study is to use the basic measurements of adult human clavicles of known sex from the dry bones collected from the dead bodies of Tamil Nadu.

MATERIALS & METHODS:

This study has been conducted at the Department of anatomy, KFMS&R, Coimbatore. 90 dried clavicle from adult bodies of known sexes (50 male and 40 females) were collected for the study. 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 Measurements of clavicle in male and female

Parameters	Male	Female	p-value
Maximum length of clavicle(cm)	13.78± 0.73	12.9±1.03	0.0001*
Maximum breadth of sternal end	2.13±0.39	2.03±0.42	0.08
Maximum breadth of acromial end	1.02±0.29	0.98±0.27	0.24
Maximum length of acromial end	1.77±0.47	1.65±0.43	0.76
Surface area of acromial end (cm ²)	1.96±.62	1.8±0.63	0.14

Table 2: Showing clavicular Measurements in right and left clavicles.

Parameters	Right male	Right female	Left male	Left female
Maximum length of clavicle(cm)	14.30± 0.86	12.62±0.87	14.94± 0.82	13.0±1.26
Maximum breadth of sternal end	1.95±0.37	2.01±0.41	2.01±0.23	1.49±1.16
Maximum breadth of acromial end	1.09±0.35	0.95±0.11	1.02±0.38	1.1±0.66
Maximum length of acromial end	2.41±0.34	1.92±.45	1.75±0.37	1.7±0.52
Surface area of acromial end (cm ²)	2.03±.62	1.76±.46	1.84±0.90	1.90±0.83

DISCUSSION:

Determination of sex using skeletal remains is the most important component in forensic identification and in anthropologic research 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 [6]. 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].

Davivongs [7] using some slight variations in standard anthropometric procedure has published his results on shoulder girdles and femur of Australian aborigine. Various research workers have also claimed the utility of the study on various other bones in relation to sex identification. Singh and Sohal [8] have reported on estimation of stature from clavicle in Punjabis and they have stated that it is possible to calculate stature from the length of clavicle.

Robert Van Doengen [9] studied the shoulder girdle and humerus of the Australian aborigin. He studied 216 humeri, 134 scapulae and 103 clavicles. For clavicles, he studied length, midshaft circumference, acromial breadth and sternal breadth as parameters for sex difference. He concluded that the length is highly significant in sex difference and midshaft circumference was better criteria for sexing female clavicles. Jit and Singh [10] studied 236 male and 112 female clavicles from Amritsar Zone for sex difference on the basis of length, weight, midshaft circumference. They concluded that length alone was more useful for sexing female clavicles while midshaft circumference was a good criterion for sexing the male clavicles. Trotter M *et al.*; [11] 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.

In the past, the methods used for sexing the skeleton were mainly non-metric i.e., based on the observations of the morphology of bones [12]. These criteria can be highly accurate in the hands of research workers with many years of experience. The use of these criteria by their relative nature becomes subjective when research workers deal with the bones which appear to be intermediate in morphology with respect to sex.

CONCLUSION:

The current study focused on identification of sex of clavicle by using morphometric measurements with high relative accuracy. Length of the clavicle, sternal breadth, surface area and have been found to be more discriminating parameters for the identification of sex from clavicle. It was found that the sex of clavicle cannot be decided on the basis of the single parameter. All the parameters must have to be considered together for this purpose. The measurements also helpful to the orthopaedic implant manufactures and orthopaedic surgeons to decide accurate size and shape of plates and intramedullary nails for clavicular fractures.

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