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Short Communication

Morphometric and Morphological Study of First Rib

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Ribs are protective ribbon-like bony elements, normally present within the chest wall and are few of the most imaged structures in the clinical practice. First rib takes part in the formation of bony boundary for the inlet of the thorax. The key muscle of the root of the neck; the scalenus anterior is inserted into the inner border of the first rib, by producing a scalene tubercle. The prominence of which varies in front of it on the superior surface there is groove for the subclavian artery. There is no angle and no costal groove for the first rib. The rib may not be complete being replaced by cartilage or ligament in which case signs and symptoms of cervical rib may be occur. The first rib was chosen due to its distinct shape, compact size and increased sustainability to the taphonomic processes encountered in forensic and bioarchaeological situations. Rib anomalies are relatively common and affect almost one percent of the general population. Commoner rib anomalies include cervical ribs, bifid ribs, rib dysplasia, and intercostal fusion. Keeping all these things into account a study of the first rib was undertaken.

Keywords: Thoracic rib, Atypical rib, True (vertebrosternal) rib.**1. Introduction**

The first rib is the most curved, flattest, strongest of all ribs and is the shortest of the true ribs [1]. It is located at the top most region of the rib cage and attaches to the first thoracic vertebra at its posterior aspect and to the sternum at its anterior aspect. The characteristics features present on the first rib: head, neck, tubercle, sternal end, and two subclavian grooves (subclavian artery, vein and inferior trunk of the brachial plexus) which are present on upper surface of rib. Side of first rib can be determined by placing on a flat surface, when both the head and sternal end should touch the surface; if wrongly placed, the head will be lifted above that level and the subclavian grooves will be on the superior surface [1,2]. The rib anomalies whether pathological or normal variants such as cervical rib, pelvic rib, bifid rib, bicipital ribs etc., often indicate an underlying systemic disorder [5].

The articulation of the first rib to only the body of the first thoracic vertebra is unique to humans as the only extant hominoid with this articulation [3].

1.1 Aim of the study

To study the scalene tubercle and impressions on the superior surface, whether the first rib is complete or incomplete or any abnormalities are there, and certain other morphological features.

2. Materials and Methods

It was cross-sectional observational study. We have taken 48 first ribs for the study, obtained from Dept. of Anatomy, Sri Satya Sai Medical College Research Institute. Thoracic ribs were measured using sliding Vernier Callipers; all measurements were recorded in centimetres.

The parameters included:

Total exterior length (ASHL),

Interior length from sternal end to head (PSMH),

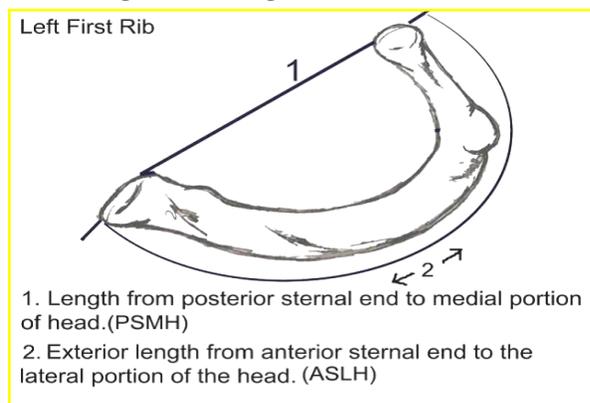
Presence /absence of scalene tubercle,

Presence /absence of subclavian groove

The exterior length was measured from the anterior sternal end to the lateral portion of the head (ASLH). The inner length was measured from the posterior portion of the sternal end to the medial portion of the head (PSMH).

These length measurements were taken to see if there was any correlation between them.

Figure 1: length measurements



2.1 Inclusion criteria

All normal right and left ribs are included.

2.2 Exclusion criteria

First ribs that are broken.

2.3 Statistical Analysis

Data entered in Microsoft excel sheet and analyzed by using statistical software.

3. Observation and Results

Table 1: Descriptive statistics of Rib measurements

Variables	n	Minimum	Maximum	Mean	Std. Deviation
left_ASLH	25	6	9.5	7.86	0.84
Right_PSMH	23	4	7	5.57	0.85
left_PSMH	25	4.5	8	5.65	0.80
Right_ASLH	23	6	9	7.63	0.97

(All measurements in centimetres)

ASLH: Anterior sternal end to lateral portion of head

PSMH: Posterior sternal end to medial portion of head

Table 2

Variables	T test	df	p value	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Right_ASLH	37.85	22.00	0.00	7.63	7.21	8.04
left_ASLH	46.56	24.00	0.00	7.86	7.51	8.21
Right_PSMH	31.23	22.00	0.00	5.57	5.20	5.93
left_PSMH	35.46	24.00	0.00	5.65	5.32	5.98

(df: Degree of freedom)

18.75% ribs absence of scalene tubercle. 81.25% ribs presence of subclavian groove and 18.75% subclavian groove absent.

4. Discussion

Ribs form from costal process of thoracic vertebrae and thus are derived from the sclerotome portion of paraxial mesoderm.[6] One percent of the population shows some variation of the ribs, including bone dysplasia, focal rib abnormalities, cervical rib, intercostals synostosis and bifid anterior extremity, associated or not with malformations of thoracic vertebrae.[7]

First rib has been examined for its overall usefulness in physical anthropology, most, if not all of that research has focused on the sternal end, especially as an aging technique. The majority of the research examined the costal cartilage and its versatility in aging and sexing individuals.

“The first rib is less fragile than other skeletal elements, such as the pubic symphysis, and is, therefore, more likely to survive in archaeological and forensic contexts” [4].

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