ORIGINAL ARTICLE

THE PREVALENCE OF CERVICAL RIB AND ELONGATED TRANSVERSE PROCESS IN KARACHI ADULT POPULATION.

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ABSTRACT

BACKGROUND: Cervical ribs and elongated transverse process are congenital anatomical variations incidentally seen during conventional radiography and are usually ignored as most cases are of less clinical relevance. Cervical rib is generally noted in 1-2 % of the population. The main objective of this study was to find out the prevalence of this variation in our adult population.

METHODS: It is a retrospective cross sectional study which was conducted in Karachi at Ziauddin university hospital Kemari campus radiology department targeting adult population above nineteen years. Study period was six months between January to July 2015. Subject's x-ray chest P/A view were taken which were analyzed by radiologist for presence of these anatomic variations.

RESULT: In this study one thousand conventional frontal chest radiograph were taken in which 460 were males and 540 females patients who were analyzed for cervical ribs and elongated transverse process. Cervical rib was seen in thirty six patients with 2:1 female to male ratio. Elongated transverse process was noted in two hundred and twenty five subjects. Eleven patients having cervical ribs were symptomatic.

CONCLUSION: The prevalence of cervical rib and elongated transverse process as delineated by our study is slightly higher than reported in other populations. We also conclude that conventional radiography is effective diagnostic tool to determine presence of this anatomical variation.

KEYWORDS: *Cervical rib, variant, transverse process elongation*

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INTRODUCTION

Among causes of neck pain and neurovascular compression syndrome of upper limbs, cervical rib is one of differential diagnosis, other causes are cervical disc disease, neuropathies, anterior scalene muscle lesion, trauma, apical lung pathology, atony of shoulder girdle . Cervical or neck ribs are supernumerary small extra ribs which are birth defect noted in later life as lump in lower neck . It was first noticed by Galen in the second century, but was better recognized after advent of radiograph in 1895. It usually is referred to as protrusion in cervical region due to abnormal enlargement of transverse process of seventh cervical vertebra, or fibrous band traversing from C-7 to first true rib or sternum often seen posterior. These are commonly seen in females[1-5]. Previously, these were unnoticed with no clinical significance due to less understanding of thoracic outlet anatomy. Looking at the past in 1818 Cooper was the first one to describe thoracic outlet anatomy and related syndrome caused by compression of adjacent structure. Hastled in early nineteenth century documented that thoracic outlet syndrome is commonly caused by fibrous band squashing related structures rather through bony compression. In a recent study thoracic outlet syndrome has been shown to display a distribution of neuropathy 63%, arterial 33% and venous problems 4%. Mostly patients are asymptomatic however; subclinical nerve damage can be seen in these subjects [6-8].

Symptomatic patients are less than 10% they are clinically judged with the help of Adson, Eden and Wright tests. In the former one abduction and external rotation of shoulder leads to absence of radial pulse on effected side, which raises possibility of thoracic outlet syndrome due to compression of vessels. severe cases require intervention like first rib excision and scale nectomy which leads to short term improvement of quality of life. Residual or regrown cervical ribs can be a factor for reoccurrence of symptoms. [9-12]

Brachial plexus palsy and brachial plexopathy have been proved to have a common association with cervical ribs and transversemegaly as has been described in detail in previous literatures.[13-15] The objective of this study was to find out the prevalence of this variation in our adult population.

METHOD

A retrospective cross sectional study of one thousand patients were conducted over six months period between January to July 2015 at radiology department Ziauddin Hospital. Conventional standard recommended position radiographs of subjects were taken and then reviewed by radiologist on hardcopy and on console to see presence or absence of cervical rib and transversemegaly unilateral or bilaterally and recorded on the proforma **figure 1**. Positive finding for labeling these variation were a costal bony prominence arising from C7 vertebra. While for transversemegaly transverse process must curve and taper caudally with lack of fusion with costotransverse, costovetebral joints and first rib. Poor quality x rays were not included in this study. Statistical software SPSS was used for data analysis. Categorical variables, frequencies were calculated and the results were prepared in ratios and percentages.

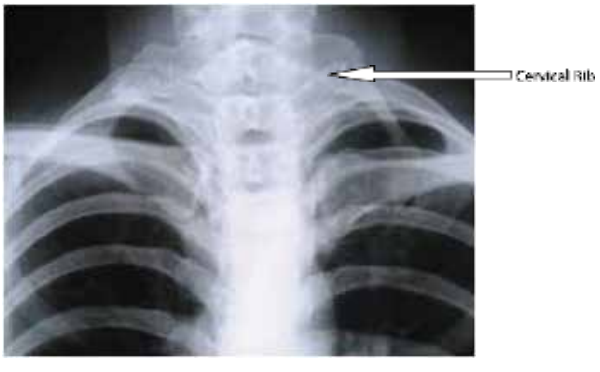

Figure 1: Frontal radiograph demonstrating cervical rib

RESULT

One thousand x rays of patients that fulfilled our criteria were included in the study. There were 460 males and 540 females as shown in **figure 2**. The age of these patients were above 19 years. Out of 1000 subjects, 36(3.6%) and 225 (22.5%) showed presence of cervical rib and elongated transverse process respectively with male and female ratio as 2.0:1 and 1.1:1.0. Cervical rib on either side was present in 15 (41.6%) patients, 10 (27.7%) on the right while 11(30.5%) on the left side **figure 3**. Elongated transverse process was seen in 125(55.5%) on both sides, 75 (33.3%) on the left while 25 (11.1%) on the right side **figure 4**. Eleven patients with cervical ribs were found to be symptomatic in this study.

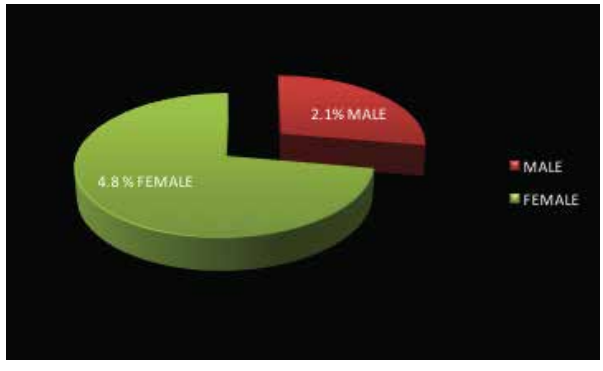

Figure 2: Pie-chart showing gender distribution in cervical ribs.

Table 1: Frequency and distribution of cervical rib and elongated transverse process.

Variable	Cervical rib	Prevalence	Elongated C7 transverse process n(%)	Prevalence
Male (n=460)	10	21%	100	21.7%
Female (n=540)	26	4.8%	125	23.1%
Total	36	3.60%	225	22.50%
Left	11	30.50%	75	33.30%
Right	10	27.70%	25	11.10%
Bilateral	15	41.60%	125	55.50

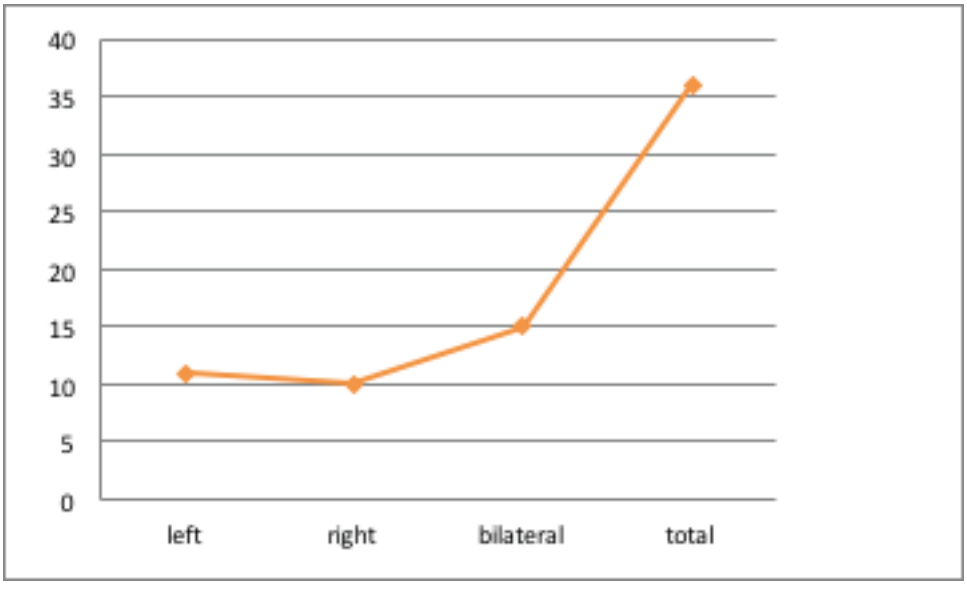

Figure 3: Occurrence of cervical rib with respect to side.

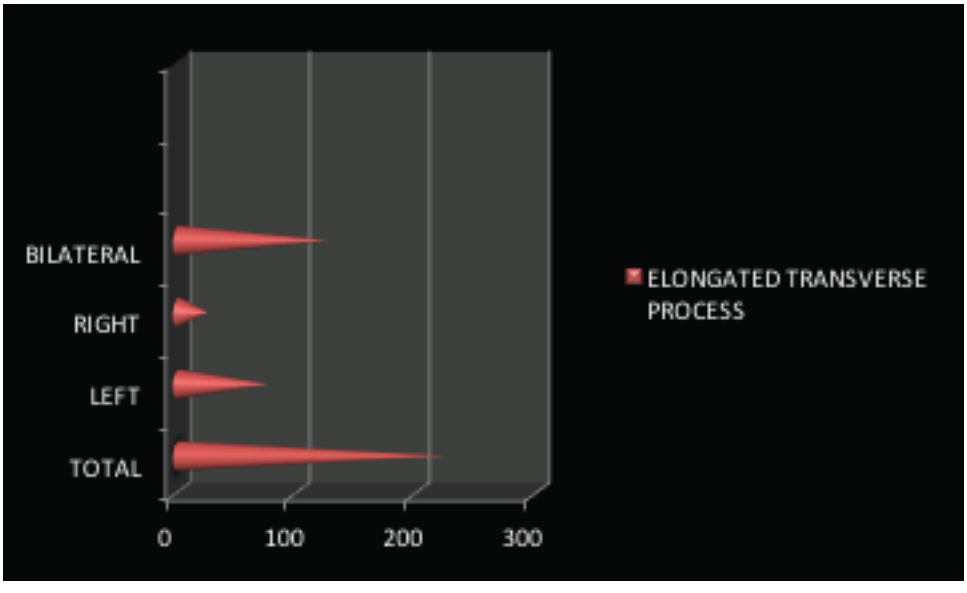

Figure 4: Bar-chart demonstrating elongated transverse process with respect to side.

DISCUSSION

Definition and prevalence of cervical ribs in literature is controversial, most of previous studies rely upon radiological evaluation of certain number to determine probable prevalence of cervical spine anomalies most notably cervical rib and transverse-megaly. Cervical rib is usually asymptomatic and is detected when a chest or neck X-ray are taken for some other purposes. The diagnosis may be confused with carpal tunnel syndrome, cervical disc prolapsed and neuritis of the ulnar nerve supplying part of the forearm and hands[16]. In other cases the condition produces symptoms in middle age due to sagging of shoulders and decline of muscle tone. Symptoms are seen in women more often than in men. The symptoms occur due to the rib pressing on the nerves or blood vessels, as they go from the spinal column to the arm.[17] Sensory symptoms like pain and tingling numbness are complained of in the forearm and hand, especially the inner side corresponding to the little finger. Motor symptoms include weakness of the arm and hand and impaired fine movements like writing and sewing. If the blood vessels like the subclavian artery are compressed, there may be bluish discoloration of the skin of that limb due to diminished blood supply or in rare cases frank gangrene of the fingers and the pulse at the wrist may be weak or absent.[18]

Genetic studies show that homeobox gene plays an integral role in development of axial skeleton in mammals; mutation to this gene leads to congenital anomalies more commonly cervical rib and increase incidence of childhood malignancies.[19] Some European studies support the hypothesis that cervical ribs are marker for developmental malformation during blastogenesis[20]. Recent study shows controversy in this regard[21]. Prior various radiographic studies reported incidences varying 0.05-3.05%. Karachi adult population shows 3.6% prevalence with 2.0:1 female to male ratio,11% are symptomatic **Table 1**. Our result also agrees with previous study in Saudi population which showed prevalence of cervical rib 3.4%[22]. Different studies from India report a prevalence of 1.0% - 2.5%,[23] these differences might be based on ethnicity. In London prevalence according to study conducted by Brewin et al showed incidence of 0.74% with more female predilection[24] **figure 5**.In Nigerian population Ani et al study depicts its prevalence of 0.7% .In white British people its prevalence is 5.9% [25]. The clinical importance of cervical rib is sometimes overlooked; as most cases are asymptomatic. It can however, be highly significant clinically, with patients presenting with symptoms of neurovascular compromised due to compression on the neurovascular bundle[26]. Studies shows that 8 to 10 % symptomatic patients requiring an operation for thoracic outlet syndrome are found to have cervical ribs.[27] .Cervical rib fractures are unusual and rarely seen in trauma cases however pseudoarthrosis and isolated rib fracture are reported in some previous studies. [28]

Digital radiography provide researcher to manipulate contrast and brightness and enlarge images at area of interest for proper diagnosis of cervical rib by clearly seeing costo-transverse articulation of C7 vertebra for its fusion or not[29]. A limitation and weakness associated with this study stems from the ambiguity in distinguishing a cervical rib from an elongated transverse process and smaller number of data with single departmental involvement, collaborative study involving relevant other departments like ENT and neurosurgery may lead to comprehensive data pool. Our study reiterates the necessity for the practicing physicians to consider this high prevalence in evaluating patients with neurological symptoms of the upper extremities.

COMPARISION WITH OTHER STUDIES:

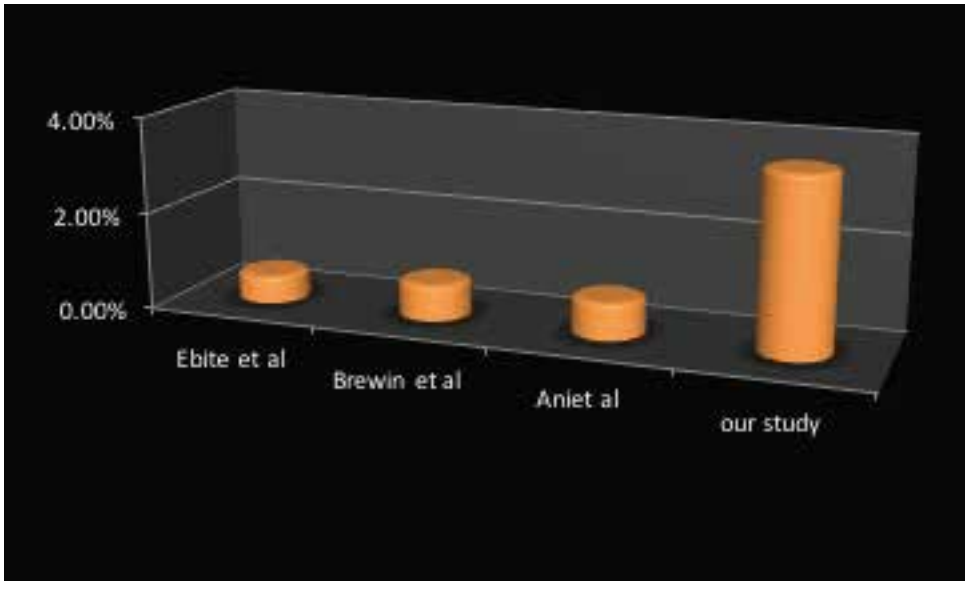

Figure 5: showing comparison with previous studies performed at different setup.

CONCLUSION

The prevalence of cervical rib on frontal chest radiograph in Karachi adult population is 3.6 %, slightly more common in females unilaterally, however elongated transverse process is in seen 22.5% of people. Some what similar results have been noted in Saudi and Kashmiri population. Thus it is concluded that in the populations with higher rates of consanguinity, there is high probability of occurrence of cervical ribs because of homeobox gene mutations. There is need for many more well designed studies to prove this association.

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