

## Research Article

# Prevalence of cervical ribs and elongated transverse processes in Kashmiri population

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## ABSTRACT

**Background:** The aim of this study was to describe the prevalence of cervical ribs and elongated transverse process in the Kashmiri population.

**Methods:** We reviewed 2000 chest x rays of adult patients which were done in a period of 4 months in the department of Radiology, Govt Medical College Hospital, Srinagar, J& K.

**Results:** The diagnosis of cervical rib was made in a total of 50 radiographs with a prevalence of 2.67%. The prevalence of cervical rib was higher in females (3.1%) as compared to males (2.1%). A total of 67 cervical ribs were seen in 50 patients. Unilateral cervical rib was seen in 33(66.0%) patients, right sided in 20(40.0%) and left sided in 13(26.0%). Bilateral cervical ribs were seen in 17(34.0%) patients. Elongated transverse process was seen in 280 patients constituting a prevalence of 14.96%. The prevalence in females (17.95%) was higher than males (12.15%).

**Conclusions:** Prevalence of cervical rib and C7 transversomegaly is high in Kashmiri population. Similar results have been noted in Saudi 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 HOX gene mutations. There is need for many more well designed studies to prove this association. Keeping in mind the high prevalence of cervical rib, patients with unexplained cervical pain need to be evaluated for this entity.

**Keywords:** Cervical rib, Transversomegaly, Hox gene

## INTRODUCTION

Cervical ribs are relatively common anomalies with reported incidences varying between 0.05 to 3.0% in various radiographic studies.<sup>1-3</sup> Most of these cases are asymptomatic and symptoms of thoracic outlet syndrome are seen in only 10% of cases.<sup>1,4</sup> Fetal spine develops from groups of mesenchymal cells from mesoderm on either side of neural tube forming somites which after ossification become vertebrae.<sup>5</sup> Normally 7 cervical vertebrae are formed followed by 12 rib bearing thoracic vertebrae. Genetic studies have shown that Hox gene plays an important role in the development of axial

skeleton in mammals.<sup>6</sup> Mutation of this gene have been shown to cause wide variety of anomalies, the development of cervical rib being one among them. These mutations are also associated with stillbirths and increased incidence of childhood malignancies.<sup>5,7</sup> In skeletal survey of patients with embryonal cancers a prevalence of cervical rib ranges from 17.1 to 33.0% compared to the much lower baseline prevalence in general population.<sup>7-11</sup>

The aim of this study was to describe the prevalence of cervical ribs and elongated transverse in the Kashmiri population.

**METHODS**

We reviewed 2000 chest x rays of adult patients which were done in a period of 4 months in the department of Radiology, Govt. Medical college Hospital, Srinagar, J& K. In our study only those radiographs were included, in which there was complete visualization of seventh cervical and first dorsal vertebra with proper centering and adequate exposure. All those examinations were excluded where there was incomplete visualization of cervico-dorsal junction, inadequate exposure or rotation. Repeat radiographs or radiographs in which obvious pathology obscured bony details were also excluded. A total of 129 radiographs were excluded. Thus, 1871 skiagrams constituted our study group. All these radiographs were posterior anterior projections of chest. In order to avoid selection bias, radiographs of cervical spine were not included in the study. This would lead to factitious increase in prevalence as cervical spine radiograph is usually done in symptomatic patients. The criteria for diagnosing cervical ribs were same as used in several previous studies.<sup>1,7,9</sup> These were as follows:

1. The cervical rib must articulate with the C7 vertebra with a well-defined joint. If the rib was fused with the vertebra, it was considered an elongated transverse process.
2. The rib must not arise from cranially directed transverse process of the first thoracic vertebra, but rather from the seventh cervical vertebral transverse process which is directed caudally and laterally.
3. For a rib to qualify as cervical rib it must not articulate with the manubrium sterni, but it may be joined to first rib. This will differentiate it from the rudimentary first rib.

The transverse process of C7 was considered to be enlarged if it extends beyond lateral margins of the first thoracic vertebra (Figure 1). These radiographs were reviewed on digital system and were labeled as normal, transversomegaly or cervical rib on the basis of above mentioned criteria. Radiological features and demographic data of patients were recorded. Laterality was specified with each abnormality detected, and results were then reviewed.

**RESULTS**

In our study we reviewed a total of 1871 chest radiographs, 963 were of males and 908 were of females. The diagnosis of cervical rib was made in a total of 50 radiographs with a prevalence of 2.67%. The prevalence of cervical rib was higher in females (3.1%) as compared to males (2.1%). A total of 67 cervical ribs were seen in 50 patients. Unilateral cervical rib was seen in 33(66.0%) patients, right sided in 20(40.0%) and left sided in 13(26.0%). Bilateral cervical ribs were seen in 17(34.0%) patients. Elongated transverse process was seen in 280 patients constituting a prevalence of 14.96%. The

prevalence in females (17.95%) was higher than males (12.15%).



**Figure 1: Chest radiograph demonstrating elongated left transverse.**

**Table 1: Prevalence of cervical rib.**

	Total no.(%)	Male no.(%)	Female no.(%)
Total sample	1871 (100)	963 (51.47)	908 (48.53)
Prevalence of cervical ribs	50 (2.67%)	21 (2.1%)	29 (3.1%)
Unilateral	33(66.0%)		
Bilateral	17(34.0%)		

**Table 2: Prevalence of C7 transversomegaly.**

	Total no (%)	Male no. (%)	Female no.(%)
Total sample	1871 (100)	963 (51.47)	908 (48.53)
Prevalence of C7 transversomegaly	280 (14.96%)	117 (12.15%)	163 (17.95%)
Unilateral	123(43.9%)		
Bilateral	157(56.01%)		

**DISCUSSION**

There is lot of confusion regarding the definition of cervical rib and transversomegaly in the literature. Different studies have reported a wide range of prevalences of cervical ribs. In our study there was a prevalence of 2.67%. Same prevalence of 3% was reported in a Turkish study.<sup>12</sup> A prevalences of 3.4% was reported by Bokhari et al in Saudi population.<sup>13</sup> Brewin et al reviewed 1352 chest radiographs and found a prevalence of 0.74% in London.<sup>1</sup> Different studies from India report a prevalence ranging from 1.0% to 2.5%.<sup>14</sup> These differences might be based on ethnicity.

In our study the elongated process of C7 was seen in 14.96%. This high prevalence can be attributed to the fact that there may be high probability of abnormal Hox gene in our population because of high rate of consanguinity in our study population. Abnormality of this gene has been related to the development of cervical rib. There are only few other studies which have reported the prevalence of transversomegaly. In the study conducted by Brewin et al a prevalence of 2.2% was reported.<sup>1</sup>

A higher prevalence of 23.0% was seen in the study conducted by Bokhari et al in Saudi population.<sup>13</sup> He attributed the high prevalence to the fact that there could be high probability of abnormal Hox gene in his study population as there is high rate of consanguinity in Saudi population like Kashmiri population and their study was conducted in a centre with high referral of malignancy patients like ours.

## CONCLUSION

High prevalence of cervical rib and C7 transversomegaly has been noted in Kashmiri population. Similar results have been noted in Saudi population. Thus it is concluded that in the populations with higher consanguinity like Muslims there is high probability of occurrence of cervical ribs because of possibility of Hox gene mutations. There is need for many more well designed studies to prove this association. The physicians dealing with the patients of cervical complaints in these populations should be aware of the high prevalence of this anomaly and should not forget to exclude this otherwise unnoticed etiology.

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