Incidence of the Os incae (Interparietal bone) in middle and south anatolian adult skulls.

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Abstract:

Introduction: The occipital bone is the one of the singular bones of the cranium and it forms much of the base and posterior aspect of the skull. The occipital bone is saucer-shaped and can be divided into four parts: a squamous part (squama), a basilar part (basioccipital part), and two lateral parts (condylar parts).Sometimes the pars interparietale can remain as a separate bone from the pars supraoccipitale by a transverse suture and then it is called *os incae* or os interparietale. Aim of this study is to determine inca bones presence, incidence and sex characteristic morphologies in the middle and south Anatolian population. **Material and Method:** Seventy-seven adult skulls (52 male, 25 female) without any sign of trauma or primer cranial surgery were studied which are belong to the laboratories of the Department of Anatomy, Faculty of Medicine and Department of Anthropology, Faculty of Letter of the Cumhuriyet University. The presence and types of inca bones were determined macroscopically by observation. Kadanoff & Mutafov's method was used as a method of typing. **Results:** The incidence of os incae in this study was 5.19% in totally, 8% in female and 3.85% in male, respectively. **Conclusion:** This study may be useful for clinicians when they need to inform about population's cranial variations which they working with

Keywords: - Anatomy, Inca bone, Interparietal bone, Morphology, Os incae, Skull.

Introduction

The occipital bone is the one of the singular bones of the cranium and it forms much of the base and posterior aspect of the skull. The occipital bone is saucer-shaped and can be divided into four parts: a squamous part (squama), a basilar part (basioccipital part), and two lateral parts (condylar parts). These four parts develop separately around the foramen magnum and unite at about the age of 6 years to form one bone[1].

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In 1842, Bellamy realized that a transverse suture separates pars squamosa in two Peruvian mummy skulls and thought it was a racial anomaly[2]. Later, in 1844, Tchudi[3], in his study in the Peru coastal cemeteries, confirmed this observation and used the name os incae[4].

Pars squamosa os occipitale consists of two parts: supraoccipitalis and pars interparietale[5]. Sometimes pars interparietale

may remain as a separate bone with a transverse suture from the pars supraoccipitale that is called os incae or os interparietale[6]. Gray (1860)[7] was the first to describe the ossification of the occipital bone in the literature. He is reported that occipital bone develops from four ossification centers; one posterior or occipital part which is membranous, one basilar part and a pair of condylar parts which are cartilaginous. Membranous part of the occipital bone develops from two ossification centers which are continuously with each other and cartilaginous ossification center of the supraoccipital part.

As a result of the cranial variations in the development period, one or more separate bones are presence on the squamous part of the occipital bone which is named os incae[2]. Inca bones are less frequent than the other sutural bones like wormian bones[8].Numbers and shapes of the bones depends on the position of the fusion nuclei[5]. Inca bones are surrounded by the lambdoidal and mendosal sutures. Infrequently longitudinal sutures divide inca bones and as a result of bipartite, tripartite, and multipartite bonesoccur[9,10] Presence of the sutural bones usually relative with cranial and central nervous system anomalies[11].Presence, incidence, sex characteristic morphologies and number of the os incae is important for the clinicians[8].

Aim of this study is to determine inca bones presence, incidence and sex characteristic morphologies in the middle and south anatolian population. We believe that this study may be useful for clinicians who are working with this population.

Material and Method

This study is conducted with 77 (25 female, 52 male) adult skulls have show no trauma and cranial surgery sign which are belong to the laboratories of the Department of Anatomy, Faculty of Medicine and Department of Anthropology, Faculty of Letter of the Cumhuriyet University. Presence of the inca bones and types were determined macroscopically by the observation. Kadanoff and Mutafov[9]'s method is used for the classification.

Results

In this study totally 4 os incae were observed in 2 females and 2 males, respectively.

Table 1: Distributions of the os incae types regarding gender.

Os incae types	**Female (n= 25)**	**Male (n= 52)**
Os incae centrale (medianum)	1 sample (4%)	---
Os incae totum	1 sample (4%)	---
Os incae duplex bipartitum	---	1 sample (1.925%)
Os incae tripartitum	---	1 sample (1.925%)
Os incae	2 samples (8%)	2 samples (3.85%)
Total (n=77)	4 samples (5.19%)	

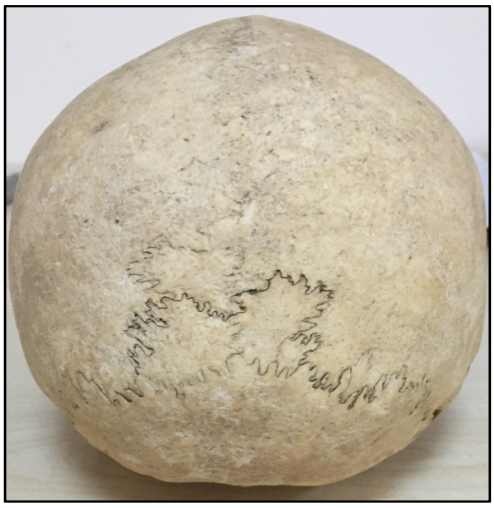
The incidence of os incae in this study was 5.19% in total, 8% in women and 3.85% in men, respectively. When the types of inca bones are examined: one of the females is os incae centrale (medianum) (Image 1), one is os incae totum (Image 2); in men, one os incae duplex bipartitum (Image 3) and one os incae tripartitum (Image 4) were determined (Table1).

Image 1: Os incae centrale (Female skull)

Image 2: Os incae totum (Female skull)

Image 3: Os incae duplex bipartitum (Male skull)

Image 4: Os incae tripartitum (Male skull)



Discussion

Anatomical variations of the skull have been the subject of many studies until today, because they contain important parts of the central nervous system.

Hanihara and Ishida (2001)[12] studied geographic and ethnographic distribution variations of inca bones in large human populations worldwide. Geographic conditions effects on the inca bones are not clear but there are regional distribution differences in some geographic areas. Inca bones were rarely observed in Western Eurasian and North Asian

samples. Northern coast of the New World's and West African populations have relatively higher rates for inca bones. In their study, Turkey is located at the West Asia region. Furthermore, they had found that the incidence of the inca bone as 0.0159 in sixty-three specimens. Our results show some higher incidence when the studies are compared. This may be related to the fact that our samples were taken from another region because they had used samples from the Hellenistic and Roman period in the Museum of Natural History in Istanbul and Cyprus.

Table 2 shows os incae Incidences on different studies

Author	Population (n)	Incidence (%)		
Srivastava[13]	Indian (n: 620)	0.8		
Marathe et al.[8]	Indian (n: 380)	1.31	Female 1.17	Male 1.42
Jadav et al.[14]	Indian (n: 50)	4		
Saxena et al.[6]	Nigerian (n: 40)	2.5		
Cireli and Tetik[15]	Turkish (n: 150)	4		
Magden and Muftuoglu[16]	Turkish (n: 420)	3.8		
Aycan[17]	Turkish (n: 91)	6.59		
Yucel et al.[18]	Turkish (n: 544)	2.8		
Cirpan et al.[19]	Turkish (n: 151)	1.98		
Our Study	Turkish(n: 77)	5.19	Female 8	Male 3.85

Studies in the Indian population: Srivastava determined inca bones rate as 0.8% in 620 skulls[13]. Marathe et al. found that the incidence of inca bone was 1.31% in 320 skulls. In addition, in order to reveal the difference between men and women in the study; found that this ratio was higher in men (1.42%) than women (1.17%)[8]. Jadav et al. reported incidence of inca bone rate as 4% in 50 skulls[14]. Saxena et al., in their study in Nigeria specimens identified inca bone incidence of 2.5% in 40 skulls[6](Table 2).

There are some differences between these studies and our study. Our results show that both the total value and the female-male incidence are higher than other studies. Changes in the number of samples, genetic background and geographic factors may have caused these different results.

In studies performed in Turkey: Cireli and Tetikin study with 150 skulls, 4%[15]; Magden and Muftuoglu in study with 420 skulls, 3.8%[16]; Aycan, in study with 91 skulls, 6.59%[17]; Yucel et al. in study with 544 skulls, 2.8%[18]; Cirpan et al. in study with 150 skulls, 1.98%[19], inca bone incidence rates were reported (Table 2).Turkey has been hosting people from many different civilizations throughout history. Obtaining different results may be due to the genetic diversity that comes with this historical background.

Fujita et al. reported on 2 cases of autopsy and ante-mortem cranial radiographs in which they found complete tripartite and complete asymmetric bipartite bones in the interparietal regions of the occipital bones. If ante- and post-mortem radiographs were available, they were suggested that inca bones could be used for identification[20].

Wu et al., in their study, they have investigated the link between craniosynostosis and inca bones. In 210 patients with craniosynostosis, the incidence of inca bone was 2.4% and, in 35 children the rate was 17.1%. As a result of this study, they suggested that inca bone incidence is associated with coronal and metopic synostosis but not with sagittal synostosis[21].

In conclusion, it is known that detailed information about the anatomy of the skull and its various variations is important for clinicians. We believe that the data obtained from this study may be useful for clinicians.

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