ORIGINAL RESEARCH PAPER
Volume-8 | Issue-12 | December - 2019 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

INCIDENCE OF METOPISM IN NORTH INDIA REGION

Anatomy

Dr. Yogesh Kumar Vashist Assistant Professor, Department Of Forensic Medicine, BPS Government Medical College For Women, Khanapur Kalan, Gohana, District Sonipat, Haryana.

Dr. Nisha Goyal* Associate Professor, Department Of Anatomy, Rama Medical College Hospital And Research Center, Hapur, Uttar Pradesh. *Corresponding Author

Dr. Anil Garg Associate Professor, Department Of Forensic Medicine, BPS Government Medical College For Women, Khanapur Kalan, Gohana, District Sonipat, Haryana.

Dr Yogendra Malik Associate Professor, Department of Forensic Medicine, BPS Government Medical College for Women, Khanapur Kalan, Gohana, District Sonipat, Haryana

Dr. Rahul Chawla Associate Professor, Department Of Forensic Medicine, BPS Government Medical College For Women, Khanapur Kalan, Gohana, District Sonipat, Haryana.

Dr. Gaurav Sharma Professor And Head, Department Of Forensic Medicine, BPS Government Medical College For Women, Khanapur Kalan, Gohana, District Sonipat, Haryana.

ABSTRACT

The study of fusion of cranial sutures for age estimation is an important parameter for anthropologist and forensic experts from past time. Various sutures were examined macroscopically for age estimation such as Metopic, Cranial, Saggital and Lambdoid suture etc. The metopic suture is present between two halves of frontal bones in midline going from Nasion to Bregma during infancy. Usually this suture is not appreciable in adult skulls. Metopsim is the presence of complete metopic suture from Nasion to Bregma in adult skull.

AIM: The present study is done to find out the incidence of Metopism and its medico-legal significance.

Material and Method: The total of 149 skulls was examined macroscopically during routine autopsy procedure with regard to the presence (metopism: M).

Results: It was observed that Metopism was present in 9 skulls (6.04%) of the skull examined, of which (5/92) were male and (4/57) were female.

KEYWORDS

Autopsy, Metopic Suture, Metopsim, Nasion, Bregma, Crania.

INTRODUCTION:-

The study of fusion of cranial sutures for age estimation is an important parameter for anthropologist and forensic experts from past time. Various sutures were examined macroscopically for age estimation such as Metopic, Cranial, Saggital and Lambdoid suture etc. Fusions of cranial sutures display morphological variations in skull all over the world with respect to age and race. The frontal bone, occupies the most anterior part of the cranium, constituting the forehead and part of orbit [1]. At birth the frontal bone appears in form of two halves, with the Metopic or Frontal Suture in the midline **[2]**. Frontal bone is ossified, from two primary centers that appear in the eight week in utero. The age of individual on complete fusion of metopic suture is highly variable ranging from 3 months to tenth year of life as reported by previous studies [**3 to 6]**.

Rarely, the two halves of the frontal bone do not fuse, and the metopic suture persists in adult life, and the traces can be seen in glabellar region [*7*]. On the basis of presence of the metopic suture, they are classified as complete (*i.e.,*Unfused metopic suture is present from Nasion to Bregma), and incomplete. [*7*).

Metopism is the term used to designate presence of complete embryonic form of frontal or metopic suture between the right and left halves of the frontal bone in adult life **[8).** The aim of the present study is to study the incidence of metopism in the routine autopsy cases coming to our tertiary care center in north India region, since there are very few studies in this part of world.

Materials and Method

During routine autopsy procedure, 149 adult cadaveric skulls were observed for the presence of Metopism. The study was done in tertiary care hospital in Department of Forensic Medicine and Toxicology, in Haryana. Scalp was incised across the vertex from tip of one mastoid process to the other. The scalp tissue was reflected anteriorly upto superciliary arches on forehead and posteriorly upto external occipital protuberance. The vault was completely cleaned by peeling off the temporalis muscle, soft tissue and periosteum and thus metopic suture was observed. Metopic suture was easily visualized in decomposed bodies as compared to the fresh bodies, as the scalp tissues were easily separable and peeled off. The skulls with injury or fracture or whose exact age was not confirmed, were not included in the current study. The observations and results thus obtained are tabulated, analysed and compared with previous studies by different authors and morphological significance of the metopic suture was discussed.

RESULTS

The observations are tabulated in the table No 1. We have observed complete metopic suture (metopism) in 9 skulls (6.04%), out of total of 149. Metopism is observed in 5 out of 92 male skulls (5.43 %) and 4 out of 53 female skulls (7.02 %). The data are statistically analyzed and Chi-square test is applied to the incidence of Metopism in male with respect to females. The Chi-square statistics is 0.1553. The P value is 0.693475. This result is not significant with $p< 0.05$. Thus, we can negate the hypothesis that there is association of the presence of metopism in males to the females.

Table 1: Incidence of Metopism

Sex	Present	Absent	Total
Male	5 (5.56 %)	87(86.44 %))	92 (100 %)
Female	4 (3.44 %	53 (53.56 %)	57 (100 %))
Total	9	140	149

The chondroid tissue is responsible for the growth of each frontal bone towards the other and thus leading to closure of the metopic suture, however a sutural space can be actively maintained by active resorption [**9].** In the region anterior fontanelle, separate ossicles may fuse with the frontal bone, thus explaining how the metopic suture is not always in line with saggital suture and thus the anterior end will not meet the saggital suture [***10].*** In our study we had 3 skulls having metopic and saggital sutures which were in line **(Fig 1)** and 5 skulls which were not in line **(Fig 2)**.

The causative factors of metopism include the abnormal growth of cranial bones, hydrocephalus, growth retardation, sexual influence, heredity, atavism, stenocrotaphia (abnormal narrowing of the temporal area of the) **[11]**.

The genetic influence is the most currently accepted factor among the scientific community **[12].** It was reported that the impaired closure of the metopic suture is common in Apert's Syndrome.

Medico-Legal Importance:-

In children and young adults, with head injury, the inter frontal line of weakness, left by the earlier fusion of metopic suture can reopen under mechanical stress [**4**]. The persistence of the metopic suture has been related to frontal sinus aplasia or hypoplasia **[13].** It is also useful in medico-legal cases in the department of forensic medicine and in the departments like neurosurgery for the treatment purposes (delayed closure of the metopic suture may be erroneously treated like a vertical fracture. plain X-ray is enough to diagnose this anatomical variation, it may be strongly misdiagnosed with vertical fractures in the emergency setting. The suture is not visible in the roentgenogram if the inner table is closed and if there is no sclerosis along the suture [**14**]. While reading the X-ray/CT & MRI films the possibility of metopic suture should always be evaluated in the list of differential diagnosis [***15***]

Discussion and Conclusion:

The incidence of metopism in the present study is 6.04% in north India. The persistence of metopic suture can be associated with regional and racial factors. Table 2 shows the comparison of the present study woth previous studies. While comparison, we found that the minimum incidence was reported in Egyptian population to the tune of 2.20 % [22] and Maximum in Indian (Kanpur) region population [17] and range being 2.20 % to 18.04 %. Our Result is in concurrence with the result already reported. This new study can help us understand the incidence of the metopism in north India, along with its medicolegal issues like interpreting the complete or partial metopic suture as fracture and thus reporting the medicolegal cases accordingly or misdiagnosis of fracture in the frontal bones in young adults as persistent partial or complete metopic suture and thus missed the diagnosis of fracture in golden hour of treatment of head injury by assault or accident in emergency setting. Thus, the knowledge of complete and partial metopic suture and incidence of metopism for all the medical officers dealing in emergency trauma or assault cases with respects like medicolegal as well as treating doctors. Since the incidence ranges between 2.20 % to 18.04 % in various studies, it was concluded that Metopsim is not so uncommon which can be ignored. So such doctors should be sensitized with respect to presence of Metopic suture and incidence of Metopism.

Table 2: Comparison Of Incidence Of Complete Metopic Suture With Respect To Population Groups Among Present Study With Previous Studies

Study	Year	Population group	Occurrence (%)
Baaten PJ et al [16]	2003	Lebanese	1.75
Anjoo et al [17]	2010	Indian (Kanpur)	18.04
Khamanarong K[18]	2015	Thailand	7.51
Nikolova et al [13]	2016	Bulgaria	6.85
Hemalatha et al[19]	2016	Indian (Andhra Pradesh)	6.66
Bernardes FM et al [10]	2016	Brazil	4.76
Halagatti et al [20]	2017	Indian (Karnataka)	6.02
Sangeetha V et al [21]	2018	Indian (Tamil Nadu)	5.71
Zdilla et al [22]	2018	European	8.06
		East Asian	15.38
		Egyptian	2.20
		Bengali	2.86
Present Study	2019	North Indian	6.04

Conflict of Interest

None

REFERENCES:

1. Matshes EW, Juurlink B. Human osteology and skeletal radiology: An atlas and guide CRC Press. p. 54.
2. Robisonn A, editor. Cunnigham's textbook of anatomy. 5th ed. NewYork: WilliamWood and company. 1918. p. 195
3. Susan Standring. Gray's Anatomy the Anatomical basis of Clinical Practice, 41st ed. Churchill Livingstone, Elsevier; 2016. p 622-3.
4. Saukko P, Knight B. Knights Forensic Pathology. 3rd ed. London Estimating the subject's age from skeletal structures.p. 121
5. WhiteTD, Black MT, Folkens PA Human osteology, 3rd edition 2012. Elsevier Academic Press. Page number 61
6. Saukko P, Knight B Knights Forensic Pathology 4rd edition London CRC press Estimating the subject's age from skeletal structures page 178
7. Ajmani ML., Mittal RK., Jain SP.: Incidence of the metopic suture in adult Nigerian skulls. J Anat 1983; 137: 1: 177-183
8. Agarwal SK, Malhotra VK, Tewari SP. Incidence of the metopic suture in adult Indian crania. Acta Anatomica. 1979 ; 105(4) : 469–474
9. Manzaranes, MC, Goret-Nicaise M., Dhem A. Metopic sutural closure in the human skull. J Anat 1998 Dec;161:203-15.
10. Bernardes FM, Giroldo AM, Roquette AGD and Marques KV. Incidence of Metopism in Adult Skulls from Southeast Brazil. Austin J Anat 2016;3(3):1059.
11. Del Sol M, Binvignat O, Bolini PDA, Prates JC. Metopismo no individuo brasileiro. Rev Paul Med 1989;107(2):105-7.
12. Castilho SMA, Oda YJ, Santana GDM. Metopism in adult skulls from Southern Brazil. Int J Morphol 2006;24(1):61-6.
13. Nikolova S, Toneva D, Georgiev I. A persistent metopic suture-incidence and influence on the frontal sinus development (preliminary data). Acta Morphologica et Anthropologica,23 Sofia 2016 p 85-92
14. Johan Torgersen (1950) A Roentgenological Study of the Metopic Sutuhe, Acta Radiologica, 33:1, 1-11, DOI: 10.3109/00016925009133453
15. Bademci G, Kendi T, Agalar F. Persistent metopic suture can mimic the skull fractures in the emergency setting? Neurocirugia 2007;18(3):238-240.
16. Baaten PJ , Haddad M, Abi-Nader K, Abi-Ghosn A, Al-Kutoubi A, Jurjus AR Incidence of metopism in the Lebanese population. Clin Anat. 2003 Mar;16(2):148-51.
17. Yadav A, Kumar V , Srivastava RK. Study of metopic suture in the adult human skulls of north India. J Anat Soc Ind 2010 Mar;59(2):232-6
18. Khamanarong K, Tuamsuk P, Woraputtaporn W, Namking M, Sawatpanich T, Toomsan Y, Iamsaard S. Incidence of metopism in adult Thai skulls. Int J Morphol 2015;33(1):51-54.
19. Hemalatha G, SubbaRao M. Persistent metopic suture in adult skulls of Andhra Pradesh. IOSR J Dent Med Sci 2016; 15(12):4-6
20. Halagatti MS, Srinivasa SB, Gouda C. Incidence of metopic suture in dry adult cadaveric skulls its morphology and importance. Ind J Clinical Anat Phy 2017;4(4):532-5.
21. Sangeetha V, Sundar G. Morphology of metopic suture and its clinical significance in human adult skull. Int J Anat Var 2018;11(2): 40-2
22. Zdilla MJ, Russell ML, Koons AW, Bliss KN, Mangus KR. Metopism : a study of the persistent metopic suture. J Craniofac Surg: 2018 Jan;29(1):204-8.