

CORONOID PROCESS OF DRY HUMAN MANDIBLES- A MORPHOLOGICAL STUDY IN EASTERN ODISHA

Gyanraj Singh¹, Sudeepa Das^{*2}, Manoja Kumar Muni³, Minati Patra⁴,
Satyanarayan Shamal⁵

^{1,2} Assistant Professor, Department of Anatomy, Kalinga Institute of Medical Sciences, KIIT Deemed to be University, Patia, Bhubaneswar, Odisha.

³ Assistant Professor, Department of Anaesthesia, Kalinga Institute of Medical Sciences, KIIT Deemed to be University, Patia, Bhubaneswar, Odisha.

^{4,5} Professor, Department of Anatomy, Kalinga Institute of Medical Sciences, KIIT Deemed to be University, Patia, Bhubaneswar, Odisha.

Corresponding Author- Sudeepa Das*

Abstract:

Introduction- Various shapes of coronoid process have been described, they are triangular, rounded and hook. **Aim-**To find the proportion of different morphological types of coronoid processes. **Materials and methods-** 90 dry human mandibles (180 sides) were used for the study. The mandibles belonging to Department of Anatomy and Department of Forensic Medicine, Kalinga Institute of Medical Sciences, Bhubaneswar was utilized for the study. **Results-** The most common type of coronoid process present was triangular (40.55%), followed by hooked shape (31.67%) and least common was round shaped (27.78%). **Conclusion-** The knowledge of the different morphological type of coronoid process is useful for anatomists, maxillofacial surgeons, reconstructive surgery, anthropologists and forensic experts.

Key words- Coronoid process, mandible, morphology.

1. Introduction:

The mandible is the largest and strongest bone in the face. It has got a U shaped body and two quadrangular rami present. The coronoid and condyloid processes are situated on the rami. The coronoid process projects antero-superiorly as a triangular plate of bone[1]. Coronoid processes have been reported to have 3 morphological shapes – triangular, rounded and hook shaped. It is influenced by chewing/dietary habit, genetic factors, hormonal and activity of temporalis muscle. The coronoid process can be used as an autologous bone graft. It can be used for reconstructive surgeries of orbital floor, alveolar socket, fracture of mandible, osseous defects and in cranio-maxillo-facial surgeries. It can be used as an anthropological marker for detection of races[2]. The three types of coronoid processes have been described to have following features-

Triangular has a tip pointing straight upward, Rounded shape has a rounded tip and Hooked shape shows a tip pointing backward [3].

2. Aim of the study:

To find the proportion of different morphological types of coronoid processes.

Objectives:

- To find the proportion of triangular, rounded and hooked types of coronoid processes in the sample.
- To compare the proportion of triangular, rounded and hooked types between male and female.
- To compare the proportion of triangular, rounded and hooked types between right and left sides.

3. Materials and methods:

This was an observational study which was done in Department of Anatomy, Kalinga Institute of Medical Sciences, KIIT Deemed to be University, Bhubaneswar, Odisha, in the month of January 2021. 90 dry human mandibles were used for the study. These mandibles are available in the bone library of Anatomy department (75) and Forensic Medicine Department (15). Necessary permission was obtained from Heads of the respective departments for using the dry mandibles for this study. Gender was determined using the standard sex determination criteria as mention in osteology text books. Adult human dry mandibles were included in the study. Mandibles of newborn, children, edentulous, broken/fractured, mutilated mandibles were excluded. The mandibles were observed for the morphological type of coronoid process according to following criteria:-

- Triangular: Apex pointing straight upwards, anterior and posterior border are straight.
- Rounded: Blunt apex, anterior and posterior border are straight.
- Hook shaped: Tip pointing in backward direction, convex anterior border, concave posterior border[4].

The observations were entered in excel sheet. Percentage of coronoid processes showing triangular, round and hooked types was calculated for the sample. The variations between gender and side was determined as percentage.

4. Result:

Total sample size of 180 coronoid processes belonging to 90 mandibles were present. There were three morphological types of coronoid processes in the sample. 40.55% of the coronoid processes were triangular in shape, 27.78% were of round shape and 31.67% were hook shaped [Table 1].

Male mandibles showed 25% triangular, 21.67% round and 23.33% hooked shape. Female mandibles showed 15% triangular, 6.12% round and 8.33% hooked shape [Table 2].

On the right side there were 20% triangular, 12.78% round and 17.22% hooked shapes. On the left side there were 20.56% triangular, 15% round and 14.44% hooked shapes [Table 3].

5. Discussion:

The findings of the present study was compared with studies done by other researchers in the last 5 years. The most common type of coronoid process in the present study was triangular, followed by hooked and least common was round shaped. Similar findings were also reported by Dhanaji S Yadhav (2017), A Priyadarshini Gouthaman (2017), Kanwar R (2018), Sufia Parveen (2018) and Hina Kausar (2020). [Table 4]

The most common type of coronoid process present in male mandibles was triangular shape and least common was round shape. This finding is similar to the observations of Dhanaji S Yadhav (2017), Sufia Parveen (2018), Anamika Gaharwar (2019) and Hina Kausar (2020) Saurjya das(2020).[Table 5]

In female mandibles the most common type of coronoid process present was triangular and least common was round shaped. This finding was similar to the observations of Dhanaji S Yadhav (2017), Kanwar R (2018), Sufia Parveen (2018), Anamika Gaharwar (2019) and Hina Kausar (2020).[Table 5]

The observational differences with other studies may be due to race, dietary habit and constitutional factors.

6. Conclusion:

The most common morphological type of coronoid process present is triangular shape and the least common is round shaped. The knowledge of the different morphological types of coronoid process is useful for anatomists, dental and maxillofacial surgeons, reconstructive surgery, anthropologists and forensic experts.

REFERENCES:

1. Susan Standring. Gray's anatomy. 40th ed. London: Churchill Livingstone Elsevier; 2008. 530-32,
2. Maria Kala, Usha Mukkera, Rajasree TK, Sri Sarada Devi S. Variation in shapes of coronoid process in human mandibles. MRIMS J Health Sciences 2017;5(2):60-62.
3. Lalitha B, Sridevi NS. Variations in the Shape of Coronoid Process of Indian Adult Dry Human Mandibles. Int J Sci Stud 2016;4(5):22-25.
4. Dhanaji S Jadhav, Shashank B Vedpathak. Variations in the shapes of the coronoid process of adult human mandible in Marathwada and Western Maharashtra region. MedPulse – International Journal of Anatomy. November 2017; 4(2): 17-19.
5. PA Kasat, PS Bhuiyan. A study on the coronoid process of the dry adult human mandibles. Journal of the Anatomical Society of India 2016; 65: 9–14
6. Gouthaman AP, Yuvaraj MF, Dev R, Sankaran PK, Begum MZ, Kumaresan M and Raghunath G: Morphological and morphometrical study of coronoid process in human mandibles. Int J Pharm Sci Res 2017; 8(9): 3881-86.doi: 10.13040/IJPSR.0975-8232.8(9).3881-86.

7. Kanwar R, Agrawal R. Morphological study of variation in shape of coronoid process of mandible in dry human bone in Mahakaushal region. *Int J Med Res Rev* 2018; 6(07):355-359. doi:10.17511/ijmrr.2018.i07.03.
8. Modasiya Umesh P, Kanani Sanjaykumar D. Morphological study of coronoid process of mandible and its clinical significance. *Indian Journal of Anatomy* 2018; 7(3):323-27.
9. Meril Ann Soman. A study of variations in the shape of coronoid process in dry adult human mandibles. *International Journal of Bioassays* 7.3 (2018) pp. 5612-5615. DOI: <http://dx.doi.org/10.21746/ijbio.2018.7.3.2>.
10. Sufia Parveen et al. A Morphological Study of Coronoid Process of Adult Human Dry Mandibles. *Journal of Medical Science and Clinical Research*. 2018;6(4):155-161.
11. Natwar Lal Gaur, Amit Kumar Saxena, Vivek Parashar. Anatomical study of various shapes of the coronoid process of human mandible. *International Journal of Recent Scientific Research* 2019;10 (01C): 30332-34.
12. Kausar H, Tripathi A, Raizaday S, et al. Morphology and morphometry of coronoid process of dry mandible- a comprehensive study. *J. Evid. Based Med. Healthc.* 2020; 7(15), 773-776. DOI: 10.18410/jebmh/2020/168.
13. Gaharwar A, Tewari V. Morphological Study of the Coronoid Process of Mandible in North Indian Population. *Acad. Anat. Int.* 2019;5(1):108-111. DOI: dx.doi.org/10.21276/aanat.2019.5.1.26.
14. Saurjya Ranjan Das, Niharika Padhy, Sreepreeti Champatyray, Gyanaranjan Nayak, Pratima Baisakh, Sitansu Kumar Panda. Variations in morphological appearance of the coronoid process of the mandible in eastern odisha population. *European Journal of Molecular & Clinical Medicine* 2020; 7.(11), 4894-4903

Table 1. Morphological variation within sample

Type	Bilateral	Only-Right	Only-Left	Total
Triangular	66	3	4	73 (40.55%)
Round	42	2	6	50 (27.78%)
Hooked	48	7	2	57 (31.67%)
Total				180 (100%)

Table 2. Morphological variation between gender

Type	Male				Female			
	Bilateral	Only-Right	Only-Left	Total	Bilateral	Only-Right	Only-Left	Total
Triangular	40	3	2	45 (25%)	26	0	2	28 (15%)
Round	32	2	5	39 (21.67%)	10	1	0	11 (6.12%)

Hooked	34	6	2	42 (23.33%)	14	1	0	15 (8.33%)
--------	----	---	---	----------------	----	---	---	---------------

Table 3: Morphological variation between sides.

Type	Right	Left	Total
Triangular	36 (20%)	37 (20.56%)	73 (40.55%)
Round	23 (12.78%)	27 (15%)	50 (27.78%)
Hooked	31 (17.22%)	26 (14.44%)	57 (31.67%)

Table 4 : Comparison of shapes between various populations

Author	Year	Place	Sample size	Triangular (%)	Round (%)	Hooked (%)
PA Kasat, PS Bhuiyan[5]	2016	Maharastra	100	23.5	17	54.5
B Lalitha, NS Sridevi[3]	2016	Karnataka	73	58.79	28.08	17.12
Dhanaji S Yadhav, Shashank B Vedpathak[4]	2017	Maharastra	130	60.76	15.38	23.84
A Priyadarshini Gouthaman et al[6]	2017	Tamil Nadu	100	38	26	36
Kanwar R, Agrawal R[7]	2018	Madhya Pradesh	52	48.68	19.23	32.69
Modasiya Umesh P, Kanani Sanjakumar D[8]	2018	Gujarat	110	33.63	42.73	23.64
Meril Ann Soman, Rani Nallathamby[9]	2018	Kerala	100	23	32	45
Sufia Parveen et al[10]	2018	Bihar	264	66.10	11.93	21.97
Natwar Lal Gaur et al[11]	2019	Uttar Pradesh	64	62.51	28.12	9.37
Hina Kausar et al[12]	2020	Uttar Pradesh	110	60	11	29
Das et al[14]	2020	odisha	84	61.9	14.30	23.8
Present Study	2021	Odisha	90 (180 sides)	40.55	27.78	31.67

Table 5: Comparison of shapes between gender

Author	Year	Place	Sample Size	Triangular		Rounded		Hooked	
				Male	Female	Male	Female	Male	Female
B Lalitha, NS Sridevi[3]	2016	Karnataka	73	68.18	34.98	20.45	39.65	11.36	25.86
Dhanaji Yadhav, Shashank B Vedpathak[4]	2017	Maharashtra	130	41.5	19.23	13.46	1.92	15.76	8.07
Maria Kala et al	2017	Telangana	100	49.35	63.63	41.02	27.27	9.61	9.09
Kanwar R, Agrawal R[7]	2018	Madhya Pradesh	52	36.21	63.04	22.41	15.22	41.37	21.74
Modasiya Umesh P, Kanani Sanjakumar D[8]	2018	Gujarat	110	35.71	30	41.43	45	22.86	25
Meril Ann Soman, Rani Nallathamby[9]	2018	Kerala	100	23.4	22.4	26.6	40.8	50	36.8
Sufia Parveen et al[10]	2018	Bihar	264	34.97	31.63	8.33	3.60	11.75	10.22
Anamika Gaharwar, Vineeta Tewari[13]	2019	Uttar Pradesh	100	32	36	4	6	14	8
Natwar Lal Gaur et al[11]	2019	Uttar Pradesh	64	74.28	48.27	14.28	44.82	11.42	6.89
Hina Kausar et al[12]	2020	Uttar Pradesh	110	78	56	10	14	34	28
Present Study	2021	Odisha	90 (180 sides)	25	15	21.67	6.12	23.33	8.33



Figure 1. Triangular shaped coronoid process.



Figure 2. Rounded Coronoid process.



Figure 3. Hook shaped coronoid process



Figure 4. Sample size in Anatomy Department, KIMS