

# [Abstract colleges. the size of the process was](https://assignbuster.com/abstract-colleges-the-size-of-the-process-was/)

AbstractBackground-The coronoid process  derived from aGreek word ‘ korone’ is a flat piece of triangular bone projecting upwards fromthe anterior margin of the mandible ramus. The coronoid process of the mandibleis being used as a graft material in reconstructive craniomaxillofacialsurgeries and as a non metric skull variant in assessment of age, sex, race andspecies.

Hence the present study wasundertaken to assess the size of the coronoid process existing in south Indianadult population on both sides and to assess the feasibility of using thisknowledge in identification of sex. Materialand methods- The study includes 30 male and 30 female mandibles which werecollected from various medical colleges. The size of the process was assessedby measuring the height and widths of the coronoid process at its base. Totallength of the ramus at the coronoid process was also measured. Results weretabulated and statistically analysed using student paired T test with p? 0.

05. Results-The height of coronoid processand the length of the ramus at the coronoid process have significant differenceson right and left sides in males and female mandibles and can thus be used asmetric variants in determination of sex. Key words  -coronoid process ; mandible ; size ; sex determinationIntroductionThe mandible is the largest, strongest and the onlymovable bone of the skull with slow resorption rate. As such it is a frequententity found in long standing skeletal remains and forms an important marker inidentification. It has an arched body with two ascending rami ending in twoprocesses namely the condylar  and coronoidprocesses. The coronoid process derived from a Greek word ‘ korone’ (meaningcrow’s beak/crown) is a triangular flat piece of bone projecting upwards fromthe anterior margin of the mandibular ramus. It receives the insertion of thetemporalis on its medial surface, anterior margin, apex and massetter on itslateral surface. These two are important muscles of mastication which show functionalas well as morhpological dependence 1.

The shape of ramus is species specific amongst primates.  Human ramus resembles that of a chimp withrelatively slender coronoid process (particularly at its tip), shorter inheight, separated from the condylar process by a deep notch.  Several other primates resemble gorillashaving a broad coronoid process and separated by a shallow mandibular notch2.

Recently many authors like  Isaac, Narayana and M subbaramaiah havedescribed  various forms of coronoidprocess that are evident in human mandibles like triangular, rounded, hookshaped, rectangular, flattened etc3, 4, 5. The various forms of coronoid process help in determinationage and sex to a large extent4, 5. The coronoidprocess is large and projects above the level of condyle at birth. Graduallywith the growth of the neck of the mandible, condyles almost reach the sameheight as coronoid process at adulthood. Further age increase is associatedwith resorption of the alveolar processes and coronoid process once againbecomes taller1. Bilateral elongation of the coronoids of themandible made of histologically normal bone goes more in favour of it beinghyperplasic.

Elongated coronoid process leads to a progressive, painlessdifficulty in opening the mouth; due to contact of coronoid process with thetemporal surface of the zygomatic bone or medial surface of the zygomatic arch. Coronoidprocess enlargement may be also seen in some pathological conditions likeosteochondroma, exostosis, osteoma and other developmental anomalies6. Hernandez-Alfaro noticed a new joint inbetween the enlarged coronoid processand the zygomatic bone (Jacob’s disease) which causes restriction during mouthopening7. The coronoid process of the mandible is gainingvital importance as a graft material in all aspects of reconstructivecraniomaxillofacial surgeries like orbital floor reconstruction, paranasalaugmentation and  temperomandibular jointankylosis due to its close proximity , slow resorption rate and easyaccessibility8, 9, 10.  Coronoid process is also being used as a nonmetric skull variant in assessment of age, sex, race and species2.

The clinical applicationsof coronoid morphology in the field of craniofacial reconstructive surgery hasalready been well documented in literature5.  The present study was under taken to assessthe size of the coronoid process existing in Indian adult population on bothsides and to assess the feasibility of using this knowledge of coronoidmorphology in identification of sex. Material and methodsThe mandibles were collected from departments of anatomyin and around Bangalore. 30 male and 30 female mandibles were retrieved duringroutine cadaver dissection for undergraduate M.

B. B. S students, and assessedregarding the size of the coronoid process on right and left sides.  Mandibles of adult age group were included inthe study.

The mandibles in which the coronoid  process was damaged or deformed were excludedfrom the study. The basal point of mandibular notch was marked as areference point. The height and width of coronoid process were measured fromthe reference point using vernier callipers. Total length of the ramus at thecoronoid process was also measured (Photographs A and B).

Results weretabulated. The data was statistically analysed for the purpose of comparisonand correlation by calculating the mean, range and standard deviation of width, height of coronoid process and length of ramus at coronoid process. Student’spaired t-test with two-tailed distribution was applied for comparison of the differentparameters on both sides in male and female mandibles. P-value ? 0. 05 wasconsidered as statistically significant. ResultsFrom the present study it was noted that the lengthof the ramus at the coronoid process and the height of coronoid process havesignificant differences on right and left sides in males and female mandibles.

(Tableand Graph)Coronoid height – Average height of coronoid processin Indian population -1. 39±0. 34cm (0. 6-2.

2cm). Average height of coronoid process was greater on right side by 0. 21cm. Difference is statistically significant(p-value 0. 046). No significantvariation in height of coronoid process between male and female mandibles.  However when side was taken intoconsideration female mandibles showed higher variation. Coronoid width – Average width of coronoid processin Indian population -1.

67±0. 23cm (1. 1-2. 2cm).

No significant variation inwidth of coronoid process between male and female mandibles on right and leftsides. However when sex was taken into consideration male mandibles showedhigher variation between right and left sides. Ramus length at coronoid process-Average length oframus at coronoid process in Indian population -5. 89±0. 51cm (4. 4-7.

1cm). Averagelength of ramus at coronoid process was greater on left side. Significantvariation was seen in length of ramus at coronoid process between male andfemale mandibles (p-value 0. 038).  Whenside was taken into consideration male mandibles showed greater length on leftside. Thus from the present study it was noted that thelength of the ramus at the coronoid process and the height of coronoid processhave significant differences with respect to laterality and sex of the mandible.

DiscussionThe mandibular coronoid process derived from a Greekword ‘ korone’ meaning crow’s beak or crown is a flat piece of triangular boneprojecting upwards from the anterior margin of the mandibular ramus 1.   Initially development of coronoid processbegins on the 55th day of intrauterine life (24mm stage) in membranousform. At about the 70th day of intrauterine life (43mm stage) two bonyprocesses are mapped out.

At 13thweek of intrauterine life, a strip of cartilage appears along the anteriorborder of coronoid process which is later displaced by the membrane bone. Thiscartilage usually disappears before birth but can persist as subcoronoid sutures. Furtherdevelopment of coronoid process is associated with much variation in morphologyand morphometry of the coronoid process. This can be attributed to variousfactors like- a) sociodemographic profile of the individuals (eating habits , occupation) which has adirect or indirect affect on the size of the temporalis muscle altering thesize ansd shape of the coronoid process . b) Diet as we know has a vital role in affecting themuscular pull on the bony process thereby altering the final  shape and size of the process 11, 12. c) Masseter-Temporalis (M-T) component is active inthe robust vertical thrust during mastication. The functional factorsnecessitate the right coronoid process to be longer than the left as mostpeople tend to chew on the right side. This is vindicated by the data ofprevious studies in the dentulous mandibles.

Lateralization of the M-T-levereffect largely depends upon the individual masticatory behavior. . This is alsoreflected in the shape of the coronoid process as larger stress helps it to getremodeled as triangular with pointed tip, less stress for rounded and furtherless being the hooked coronoid process. d) Male hormonal impact on muscle growth, boneremodelling and psychology probably lead to enhanced functional stress on themandible due to mastication as compared to that of females13. Hookshaped coronoid process goes in favour of female mandibles5. e) Genetic impact also play a role in remodelling ofthe coronoid process13.

As such samples taken from differentpopulation may lead to variation in size and form of the process. The final form and size of coronoid process dependson all the above factors. According to S. Nayak et al.  the size of coronoid process was found to beapproximately 1. 5 mm longer on the right side than on the left side. Triangularcoronoid process was found to be the longest followed by round and then hookshaped14. The findings of thepresent study are consistent with most other previous studies done, the size ofthe right coronoid process being greater than the left.

This difference waseven more marked when sex was taken into consideration. However the actualheight, width of the coronoid process and length of ramus at coronoid showedvariation which could be due to any of the above factors or due to samplevariation. Thus larger population needs to be included in order to generalisethe data14, 15, 16.

ConclusionsThe coronoid process is a membranous bone showingless resorption and remains unaltered for a long time and can serve as a veryuseful anthropological marker.  From thepresent study it can be said that coronoid process exists in many sizes. Numerous factors either directly or indirectly affect the final appearance ofthe coronoid process. The data of size of the mandibular coronoid process asseen from the study can be utilised for comparison  of anthropometric results from differentpopulation.

The height of coronoid process and the length of the ramus at thecoronoid process have significant differences on right and left sides in malesand female mandibles and can thus be used as metric variants in determinationof sex. The data will also help the dental and maxillo-facial surgeons inplanning graft implants and reconstructive surgeries.