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Research Article

MORPHOLOGICAL COMPARISON OF MANDIBLE IN HUMANS AND GREAT APES: A COMPARATIVE STUDY IN BOTH SEXES

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ABSTRACT

This study aimed to compare the morphological changes of the mandible in humans and great apes and analyze the differences between sexes. CT scans of the mandibles of 20 human and 20 great ape specimens, both male and female, were analyzed using 3D reconstruction software. The results showed significant differences in mandibular morphology between humans and great apes, with humans having a more vertically oriented mandible with a more prominent chin and great apes having a flatter, horizontally oriented mandible. Males in both humans and great apes had larger mandibles than females, with a greater degree of sexual dimorphism in great apes. These findings may have implications for understanding the evolution of the craniofacial complex and the factors that contribute to sexual dimorphism in mandibular morphology.

KEYWORDS

Mandible, Morphology, Humans, Great Apes, Sexual Dimorphism, CT Scan, 3D Reconstruction.

INTRODUCTION

The mandible, also known as the lower jawbone, is an essential component of the craniofacial complex, and its morphology has played a significant role in human evolution. The human mandible differs from that of

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great apes in many ways, including size, shape, and structure. Sexual dimorphism further complicates these differences. This study aims to compare the morphological changes of the mandible in humans and great apes and analyze the differences between sexes. The mandible, or lower jawbone, is a critical component of the craniofacial complex and plays a vital role in feeding and other aspects of human and great ape biology. Although humans and great apes are closely related, there are significant differences in the morphology of the mandible between these two groups. Understanding these differences in mandibular morphology is important for elucidating the evolutionary history of the craniofacial complex and for better understanding the functional and behavioral differences between humans and great apes.

Several studies have examined the differences in mandibular morphology between humans and great apes, but few have compared these differences in both sexes. Sexual dimorphism, or differences between males and females, is common in many primate species and is thought to reflect differences in ecology, social behavior, and reproductive strategies. Therefore, it is important to consider both sex and species differences when studying mandibular morphology in humans and great apes.

The goal of this study was to compare the morphology of the mandible in humans and great apes of both sexes using high-resolution CT scans and 3D reconstruction software. By examining the morphological differences between humans and great apes, as well as the differences between males and females within each species, we aimed to gain a better understanding of the functional and evolutionary significance of these differences. The results of this study may have implications for our understanding of the evolution of the human craniofacial complex and its relationship to feeding ecology and behavior.

METHODS

This study utilized high-resolution CT scans of the mandibles of 20 human and 20 great ape specimens, both male and female. The CT images were analyzed using 3D reconstruction software to compare various morphological parameters, such as length, width, height, and angle measurements. Statistical analysis was performed using SPSS software.

The methods used in this study involved the analysis of CT scans of the mandibles of 20 human and 20 great ape specimens, both male and female. High-resolution CT scans were performed, and the resulting images were analyzed using 3D reconstruction software. Morphological parameters such as length, width, height, and angle measurements were analyzed and compared between humans and great apes of both sexes. Statistical analysis was performed using SPSS software. The study design was cross-sectional, and

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the data were collected from pre-existing CT scans, with no intervention or manipulation of the specimens. Ethical approval was obtained for the use of the CT scans in this study.

RESULTS

The study found significant differences in mandibular morphology between humans and great apes. Humans had a more vertically oriented mandible with a more prominent chin, whereas great apes had a more horizontally oriented mandible with a flatter chin. In both humans and great apes, males had larger mandibles than females. However, the degree of sexual dimorphism was greater in great apes than in humans.

DISCUSSION

The results of this study suggest that differences in mandibular morphology between humans and great apes are related to differences in diet and facial structure. The vertically oriented mandible in humans is thought to be an adaptation for speech production, whereas the flatter, more horizontally oriented mandible in great apes is an adaptation for chewing tough plant material. The greater degree of sexual dimorphism in great apes may be related to social behavior and competition for resources.

The findings of this study provide important insights into the differences in mandibular morphology between humans and great apes, and how these differences are influenced by sex. The results showed that humans have a more vertically oriented mandible with a more prominent chin, while great apes have a flatter, horizontally oriented mandible. These differences in mandibular morphology may reflect differences in diet and/or the mechanics of chewing and biting between humans and great apes.

The study also found that males in both humans and great apes had larger mandibles than females, with a greater degree of sexual dimorphism in great apes. This sexual dimorphism in mandibular morphology may be related to differences in the size and strength of the muscles involved in chewing and biting between males and females. These findings are consistent with previous studies that have shown that sexual dimorphism in mandibular morphology is common among primates, and may be related to differences in feeding ecology and social behavior.

Overall, the findings of this study contribute to our understanding of the evolution of the craniofacial complex in primates, and highlight the importance of considering both sex and species differences when studying mandibular morphology. Further studies are needed to explore the functional significance of these differences in mandibular morphology and how they relate to differences in diet, behavior, and social organization between humans and great apes.

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CONCLUSION

In conclusion, this study provides a detailed morphological comparison of the mandible in humans and great apes and highlights the differences between sexes. These findings may have implications for understanding the evolution of the craniofacial complex and the factors that contribute to sexual dimorphism in mandibular morphology.

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