

# A COMPARATIVE STUDY OF THE DENTITION AND TEMPOROMANDIBULAR JOINT ANATOMY AND HISTOLOGY ADULT DOGS

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## Introduction:

Dogs have been used for ages in surgical research, drug testing and in researching dog's disorders that are similar to human diseases. <sup>[1]</sup> It has been used as a model for many human conditions as cardiovascular research, diabetes mellitus, ulcerative colitis, open-heart surgery, organ transplantation, pharmacology and toxicology. <sup>[2]</sup> Dogs are "diphyodont" having two sets of teeth, "28 deciduous teeth" being shed and replaced by a "42 permanent ones" set. <sup>[3]</sup> Dogs have no deciduous precursor for the first premolar a single tooth erupts here at about 5 months. <sup>[4]</sup>

The temporomandibular joint is a group of anatomic structures that, with a special group of muscles, is responsible for the movement of the mandible during mastication. <sup>[5]</sup> It is classified as a hinge-sliding joint; it has a unique structure and function. It consists of the condylar process of the mandibular ramus, the mandibular fossa of the temporal bone, a thin articular disc, and a loose joint capsule, which is strengthened by a fibrous lateral ligament. <sup>[6]</sup> TMJ is a cardinal feature that defines the class Mammalia and separates mammals from other vertebrates <sup>[7]</sup>, its structure is interesting because of its constituent bones, the mandible and the squamous temporal, are intramembranous in origin. Thus, the tissue that covers each articulating surface is a secondary cartilage with a fibrous skin, derived from the periosteum

**Purpose:** To describe and evaluate normal adult dog dentition and temporomandibular joint anatomically and histologically in comparison to humans.

## Results:

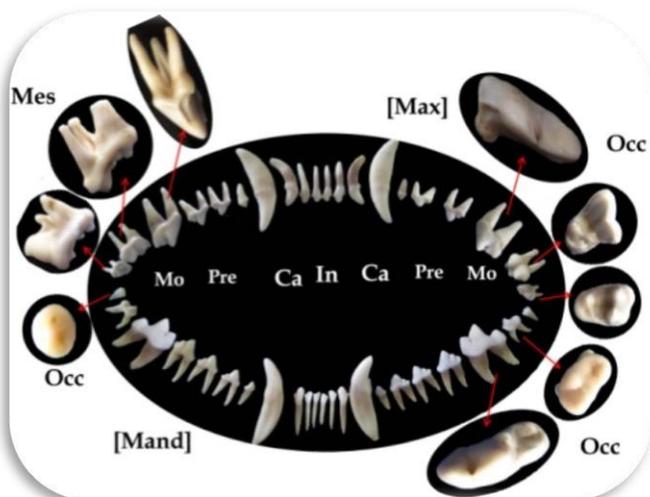
### **I] Gross Anatomy of teeth and TMJ of adult dog:**

Our observations revealed the following:

#### **a) Dental features:**

Teeth are large in size with the roots being much longer than the crowns, and the root trunk in premolars and molars is almost not present.

Incisors are small, short and the incisal surface is formed of three rounded elevations. The roots are straight and have very narrow apices. Canines are the longest teeth in the arch and the root is broad mesiodistally and ends with a round blunt apex. Premolars vary in size and shape. The crowns are broad mesiodistally and very narrow buccolingually. Maxillary molars are triangular in shape while mandibular are similar to premolars but larger in size.



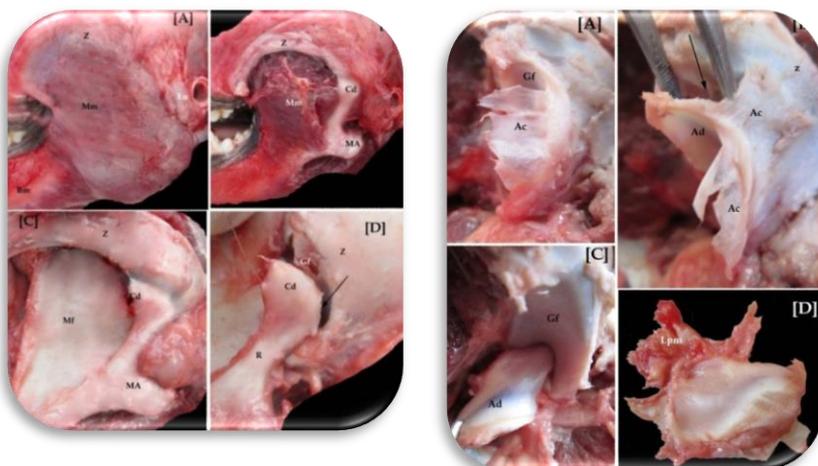
#### **b) Bony components of TMJ of adult dog and their relations to each other:**

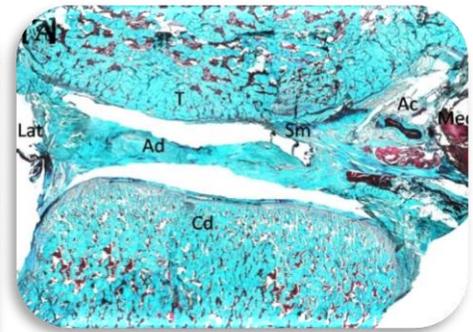
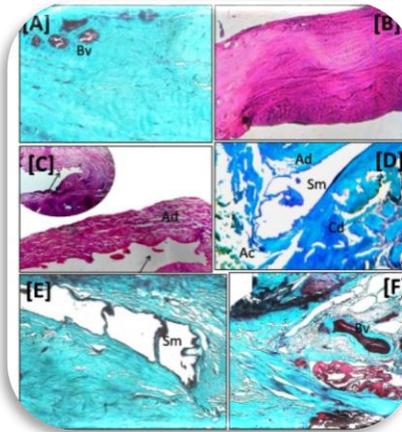
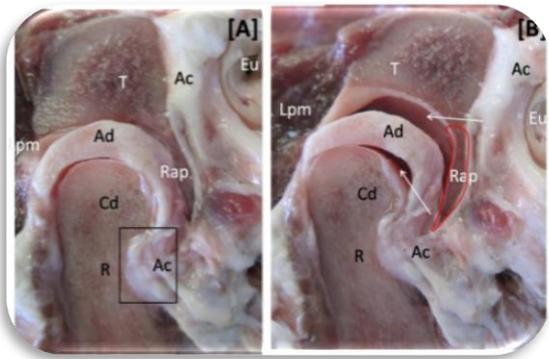
The glenoid fossa in which the condylar head articulates is oval in shape with a retroarticular process and directed mediolaterally. The condylar head is smooth, narrow anteroposteriorly and wide mediolaterally. It is perpendicular to the occlusal plane of teeth and slightly angulated in relation to the coronoid process.



#### **c) Soft tissue components of TMJ of adult dog:**

The joint is fully covered by the articulating capsule which is hard, thin fibrous tissue attached to the zygomatic arch and the head of the condyle. The articular disc is attached to the lateral pterygoid muscle anterior-medially. It is oval in shape and has a thick periphery and thin central portion

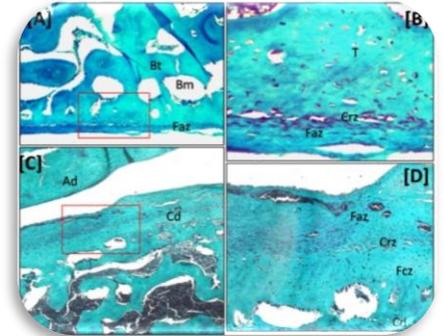




## II] Histological structure of TMJ of adult dog:

The articular surface of adult dog's condyle is covered by a broad fibrous layer, followed by a layer of fibroblast-like proliferative cells (cell-rich zone) where the cells run mostly parallel to the articular surface. The third layer mostly exhibited fibrocartilaginous character followed by a narrow zone of hypertrophied chondrocytes that could not be traced in all sections followed by the zone of cartilaginous maturation. The surface coverings of the articular temporal bone showed no obvious regional variation. The **Articular disc** appeared as a dense, fibrous structure

**Articular capsule** appeared loose collagenous membrane that attaches to the borders of the articular surfaces.



## Discussion:

**Dentition:** Dog and human dentitions are diphyodont, brachydont [8], Dogs have 6 small incisors, 2 long strong pointed canines, 8 premolars in each arch and 4 molars in the upper and 6 molars in lower jaw, their morphology is quite different than those of man and the Carnassials are a characteristic feature of dogs which slice up meat like a pair of scissors. [9, 10] In our study, we noticed that mandibular suture of dog is firm. However for humans this suture is completely fused.

The temporomandibular joint is critical for normal mouth function, and plays a role in chewing, swallowing, speaking, oral health, and nutrition. The TMJ is unique to mammals Our observation confirmed that the anatomical structure of dog's TMJ are different mainly in the shape and direction of both of the glenoid fossa and condyle and both are different from those of human. TMJ of dogs is a plain hinge joint that permits only opening and closing movement without lateral excursion, there is little or no actual mastication of food. The condyle and the mandibular fossa are elongated laterally and provide a strong hinge joint. [31] The TMJ of man is a modified synovial joint divided by an articular disk it allows hinge and sliding movements. [11]

## Histological study:

Generally, in histological sections, the TMJ is composed of different tissues that include the condylar head, mandibular fossa, fibrocartilaginous disc, and fibrous capsule. [11, 12, 13] Based on the results of our study it is possible to say that, with regard to the histological features, there is a great similarity between dog's, and human's TMJ.

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