

Morphological and morph metric study of the mandible in the local Rabbits (*Oryctolagus Cunicuius*)

Qismah Modhafar Salih

Department of Anatomy, College of Veterinary Medicine, Mosul University, Iraq.

E-mail: Qismah_m@yahoo.com

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Summary

Eleven adult local rabbits (6 female and 5 male) were used for this study. The mandible were prepared to study the gross anatomical features. The main gross characteristics feature of the local rabbits mandible the ramus forms a broad, thin and flat plate, the surface of the ramus is greatly increased in its posteroventral portion to form the angle or angular process. The articular surface is elongated and carry on its caudodorsal end a slightly oblique condyloid process, this process in rabbit is raised much above the planes of the molar table and has a prolonged aspect in a longitudinal plan. In front of the shallow mandibular notch, the coronoid process is short and blunt process situated in front of mandibular notch. In the rabbit mandible the alveoli for the canine teeth were absent resulting in a large diastema Mandibular foramen situated on the medial surface immediately behind the last molar. There is a large retroalveolar foramen. The female local rabbit showed significant greater measurement than the male.

Keywords: Morphology, Mandible, Rabbits.

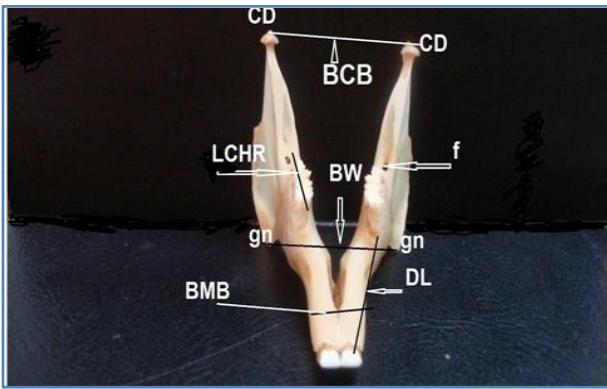
Introduction

The domestic rabbit is used for many purposes including biomedical research, meat and fur and there has recently been a marked increase in its popularity as a companion animal and it has become the third most popular mammalian pet in the U.K after dog and cat, consequently there has been an increase in level of the veterinary care demanded by owners for this species (1). The mandible or lower jaw bone is the largest and only mobile bone of the mammalian skull, it hold the lower teeth, the right and left half united at the mandibular symphysis (2). The masticators muscles are closely related to the mandible, so any changes as a result of intrinsic or extrinsic causes it will effect on muscles and bones and phenotypic properties of these tissues (3 and 4). The morphology of mandible amongst other factors affects preference made for different plant species (5). The regional (clinical) anatomy one of the most important branches of anatomy which helps the clinicians as well as surgeons to visualize details of structures relevant to case at hand (1 and 6). The mandible has been osteometrically examined and described in detail in different animals (6-12) they study the mandible of the ruminants, while (13 - 15) examined the mandible of mouse and rat, (16 and 17) in donkey and horse, in carnivores (18-20) in Ostrich (21).The studies on the

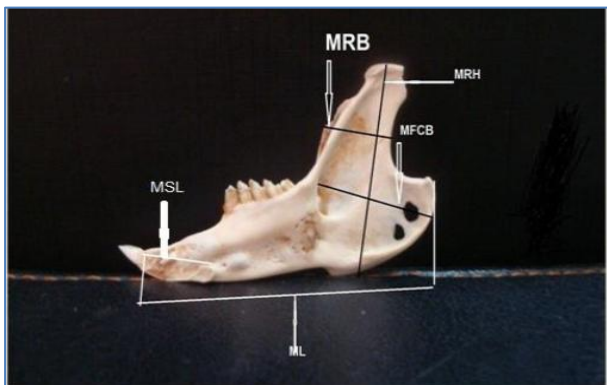
mandible of the local rabbits were scarce in the literature (15 and 22-28). The goal of the present study was to investigate the mandible in local breed rabbits and to contribute baseline research information of the species, and to evaluate some morph metric parameter and to ascertain presence of sexual dimorphism of the mandible of local rabbits.

Materials and Methods

Eleven adult rabbits without any apparent skeletal disorders were used (6 males and 5 females).The animals were slaughtered at the Atlanto-occipital joint and the mandible were prepared by using the Enzyme-active detergent technique (29). The mandibular measurement was carried out in 14 items with digital varinier caliper. The measurement and landmarks were based on (28 and 30). The measurements, abbreviation and definition were arranged in Table (1) and shown in (Fig. 1, 2 and 3). The nomenclatures in this study was adopted according to (Nomina Anatomica Veterinaria (2005) and (American Veterinary Dental Nomenclature (2012) AVDC Nomenclature Committee. The statistical analysis: the paired samples T-test analyzing method was used with programs of statistical analysis system (SAS).



Figure, 1: The mandible bone of the local rabbit showing the measurements which reported in (Table, 1). (f): retroaleolar foramen. Gonion (GN) a point along the rounded postero-inferior corner of the mandible between the ramus and the body. Gonydilion (CD): the most lateral point on mandibular condyole (paired). Breadth of the mandibular body: (BMB) maximum breadth measured in the region of the mental foramen. Bigonial width (BW): direct distance between right and left gonion (gn). Bicondylar breadth (BCB): direct distance between the most lateral points on the two condyles (CD). Distal length (DL): distance between the incisors to the first molar. Length of cheek teeth row (LCHR).



Figure, 2: the medial surface of the mandible of the local rabbit showing the measurements which reported in (Table, 1). Minimum ramus breadth (MRB): least breadth of the mandibular ramus. Mandibular symphysis length (MSL). Mandibular foramen caudal border (MFCB): the distance between mandibular foramen and caudal border. Mandibular length (ML): distance of the anterior of the alveoli of incisor to the posterior border of the ramus. Ramus height (MRH): direct distance from the highest point on the mandibular condyle. to the gonion (gn).



Figure, 3: The lateral surface of mandible of local rabbit showing the measurements reported in (Table, 1). Distal thickness (DTH): Distance between the dorsal and ventral Distal border. Mandibular foramen caudal border (MFCB): the distance between mandibular foramen and caudal border. Incisor-mental F. (IMF): Shortest distance from incisor to mental F.

Results and Discussion

Grossly, the mandible composed of two portions united interiorly by the symphysis each half comprises a horizontal portion, the body of the mandible and a posterior vertical portion the ramus. The body bears on its dorsal margin the alveoli of lower teeth (interiorly pair incisor and five alveoli for molar teeth (two premolars and three molar teeth)). The mandible of the local rabbit characterized by having long diastema. The ramus forms a broad, thin and flat plate, (Fig. 4, e) the surface of the ramus is greatly increased in its postero ventral portion to form the angle or angular process (Fig. 4, d). This results is in agreement with (27) in rabbit, (14) also mention that the angular process was present in African giant rat, (16) in Golden Jackal and (20) in cat. The articular surface is elongated and carry on its caudodorsal end a slightly oblique condyloid process (Fig. 4, a), this process in rabbit raised much above the planes of the molar table and has prolonged aspect in a longitudinal plan .In front of the shallow mandibular notch (Fig. 4, f), the coronoid process is short and blunt process situated in front of mandibular notch (Fig. 4,b), this result was in agreement (15 and 27).

In accordance with (27) in the rabbit mandible the alveoli for the canine teeth were absent resulting in a large diastema. On other hands (7) mentioned that the coronoid process and the angle of the mandible were not well developed in Lesser Mouse Deer. The mandibular foramen immediately behind the last molar tooth at the medial surface, there is a large retroalveolar foramen passes from the dorsal border to the medial surface of the mandible (Fig. 1, f). The researchers (27) were agreed with our results that the retroaleovler foramen peculiar to rabbit mandible which situated on the cranial border of the ramus just caudal to the last tooth.

The morphmetrical results: The mean value and standard deviation of measurement of the mandible were arranged in (Table, 1). The (BMB, BW, HMB, BCB, MRB, MAD, IMF, MCB, MSL, DTH) measurement of the mandible show no significant difference between male and female local rabbits. The significant sexual differences of the local rabbit mandible appear in (ML, MRH, DL) at

5% and (MFCB) at 1% measurements, the female showed significantly greater value than the male.

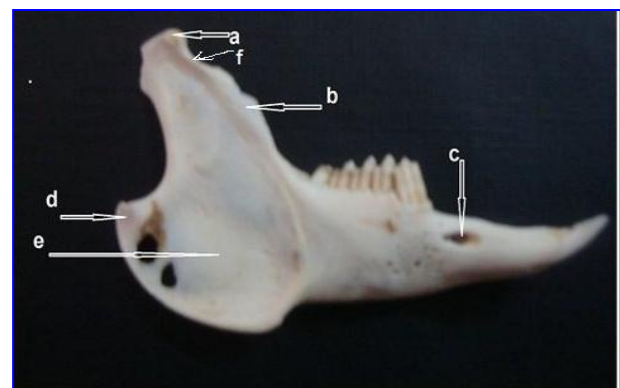
Table, 1: The measurements of the mandible of the local rabbits.

Measurements	Gender	Mean ±S.E	Sig. (2-tailed)
M.L	Male	4.648 ±0.153	0.011**
	Female	5.248 ±0.133	
BMB	Male	0.955 ±0.143	0.471
	Female	1.068 ±0.140	
BW	Male	2.910 ±0.173	0.473
	Female	3.174 ±0.084	
HMB	Male	1.215 ±0.476	0.126
	Female	1.320 ±0.589	
BCB	Male	2.695 ±0.938	0.137
	Female	2.968 ±0.079	
MRB	Male	1.246 ±0.053	0.219
	Female	1.330 ±0.463	
MRH	Male	2.881 ±0.089	0.02**
	Female	3.252 ±0.020	
MAD	Male	1.363 ±0.070	0.836
	Female	1.358 ±0.035	
IMF	Male	1.201 ±0.017	0.777
	Female	1.202 ±0.032	
MCB	Male	3.733 ±0.118	0.339
	Female	3.490 ±0.060	
DL	Male	1.485 ±0.022	0.017**
	Female	1.584 ±0.043	
MFCB	Male	1.655 ±0.109	0.042*
	Female	2.178 ±0.098	
MSL	Male	0.780 ±0.043	0.194
	Female	0.838 ±0.021	
DTH	Male	0.536 ±0.022	0.554
	Female	0.950 ±0.015	

Mandibular length (ML): distance of the anterior of the alveoli of incisor to the posterior border of the ramus. Breadth of the mandibular body (BMB): maximum breadth measured in the region of the mental foramen. Bigonial width (BW): direct distance between right and left gonion (gn). Height of the mandibular body (HMB): direct distance from the alveolar process of the molar to the ventral border of the mandible. Bicondylar breadth (BCB): direct distance between the most lateral points on the two condyles (CD). Minimum ramus breadth (MRB): least breadth of the mandibular ramus. Ramus height (MRH): direct distance from the highest point on the mandibular condyle to the gonion (gn). Molar arch distance (MAD): distance from the anterior to posterior molar. Incisor- mental (IMF): shortest distance from incisor to mental F. Mental –caudal mandibular border (MCB): distance from mental F.to caudal border. Distal length (DL): distance between the incisors to the first molar. Mandibular foramen caudal border (MFCB): the distance between mandibular foramen and caudal border. Mandibular symphysis length (MSL). Distal thickness (DTH): Distance between the dorsal and ventral Distal border.

Other authors (12) studied the mandible of camel in different region of north Nigeria and

reported that no significant differences observed in most mandibular indices in adult camels between sexes, and (28) provide a mandible measurement of New Zealand white rabbit which were similar to the results of domestic rabbits, also (16) reported that the mandibular data of Iranian native donkeys were lower than the data obtained for horse. The anatomy of Persian cat mandible and reported that data of this cat were similar to the cat with round-shaped skull but were relatively different from findings on the cats with triangular or cuneiform skulls (18). In Iraqi sheep (9) reported that there were a significant variation present between the three Iraqi sheep in diastema length, diastema height, notch height, body height, jaw length. While (30) study the mandible in Indian population and confirm that the mandible ramus can be used for sexing, while (10) predicated that the mandibular corpus bone can be used to compare between strains, also (22) used mandible to identify the strains of the rabbits and (31) used the mandibular canines in sex determination.



Figure, 4: The lateral surface of the mandible of the local rabbit. (a) condyloid process (b) coronoid process (c) mental foramen (d) angular process (e) ramus (f) mandibular notch.

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دراسة شكلية وقياسية لعظم الفك في الأرانب المحلية

قسمة مظفر صالح

فرع التشريح، كلية الطب البيطري، جامعة الموصل، العراق.

E-mail: Qismah_m@yahoo.com

الخلاصة

استعمل في هذه الدراسة أحد عشر أرنب محلي (6 إناث و5 ذكور) بالغة. حُضِرَ الفك للدراسة التشريحية العيانية والقياسات الخطية. أظهرت نتائج الدراسة العيانية بتميز عظم الفك في الأرنب وذلك بوجود النتوء الزاوي وكذلك وجود الثقب خلف السنخي. كما أنّ فرعي الفك السفلي يشكلان صفيحة مسطحة رقيقة وعريضة ولوحظ زيادة توسع في سطح الفك باتجاه خلفي بطني ليشكل مايعرف بالنتوء الزاوي للفك. السطح التمثلي ممطوط ويحمل على نهايته الخلفية الظهرية النتوء اللقمي الذي يكون مائل قليلاً وهذا النتوء يرتفع بصورة واضحة فوق مستوى الطواحن وله حافة طويلة في المستوى الطولاني. أمام الثلمة الفكية الضحلة يوجد النتوء التاجي الذي يكون قصير وغير مدبب. لوحظ أيضاً عدم وجود اسناخ الأنياب في الفك السفلي للأرنب مما أدى الى تكوين فلج كبير. أظهرت نتائج القياسات الخطية وجود فروق معنوية بين الذكور والإناث حيث تفوقت الإناث في بعض القياسات على ذكور الأرانب المحلية.

الكلمات المفتاحية: شكلية، الفك، الأرانب.