

The Lower Jawbone of Mehraban Sheep: A Descriptive Morphometric Approach

Isaac Karimi, Mohammadmehdi Hadipour, Parya Nikbakht, Shima Motamedi

Laboratory of Biochemistry and Physiology, Department of Basic Veterinary Sciences, School of Veterinary Medicine, Razi University, Kermanshah, Iran

*Corresponding author's email: isaac_karimi2000@yahoo.com

ABSTRACT

This study aimed to measure some clinically important landmarks useful for regional anesthesia in the mandibular regions of Mehraban sheep. The distance between the lateral ends of the alveolus of the incisor tooth to the mental foramen was 2.07 ± 0.45 cm. The length and maximum height of the mandibles were 15.76 ± 2.25 cm and 9.57 ± 2.71 cm, respectively. The distance from caudal border of mandible to beneath of mandibular foramen was 1.74 ± 0.33 cm, while the distance from the mandibular foramen to the base of the mandible and caudal border of mandible to the level of mandibular foramen were 4.14 ± 0.47 cm and 1.35 ± 0.29 cm, respectively and the length of diastema was measured 3.98 ± 0.48 cm.

KEY WORDS: Mandible, Mehraban sheep, Diastema, Morphometry

INTRODUCTION

Presence of vital organs and structures like brain, eyes, tongue as well as ears, teeth, nose and lips, horns and skull in the head makes the regional anatomy, one of the most important branches of anatomy which helps the clinicians as well as surgeons to visualize details of structures relevant to the case at hand (Dyce et al., 1996).

The regional anatomy of head region is needed for coordination of the body as well as for deglutition, olfaction and defense (Dyce et al., 1996; Olopade, 2003) especially the foramina in the skull are very important for clinical, surgical aspect and regional anesthesia around the head (Hall et al., 2000). Some previous work had been done on the heads of domestic animals including horse, ox, dog, West African dwarf (WAD) goat, black Bengal goat and Mehraban sheep (Getty, 1975; Dyce et al., 1996; Onar et al., 2001; Olopade and Onwuka, 2005, 2007; Uddin et al., 2009; Karimi et al., 2011).

Mehraban sheep, fat tail carpet wool breed, is one of the largest populations in western Iran that mostly adapted in poor range mountainous areas. As a result of large population of this breed there has been an increasing interest and necessity to have more information on regional anatomy. There is currently no published information on the morphometric and morphological characteristics of this breed except our previous report on morphometry and morphology of the skull (Karimi et al., 2011). The aim of this study was to evaluate clinically important parameters and landmarks of lower jawbone that give better approach to regional anesthesia that conducted in the lower jawbones (mandible) of the Mehraban sheep a native breed of Hamedan province of Iran.

MATERIAL AND METHODS

Animals

In this study a total of 8 pair jaws of Mehraban sheep were used. Jaws were providing from Hamadan slaughterhouse and they were intact without any skeletal deformation. Sex and age of prepared jaws were not considered. Heads were served at occipitoatlantal joint and processed according to hot water maceration technique (Karimi et al., 2011). Briefly, at first skin and most of the attaching muscles were separated. Then they put in polycaboxylate solution, anionic surfactant and soap chips and heated over 80°C for at least 30 minutes. Boiled jaws then put in running tap water and remaining muscles were separated with the aid of sharp knives. Further separation of muscles and ligaments was done and they put in detergent water, for about 30 minutes, which were then again subjected to removal of remaining muscles and

ligaments. Subsequently, the bones were kept in 1 N sodium hypochlorite solution 1%, for 24 hours and again separation of residual muscles and ligaments were done. Then they were left in the same solution for 48-72 hours and during this period, the solution was changed twice. Then, the jaws were taken out of the solution and allowed to dry.

Measurements

The measurements on the mandible were done with metric rules and the result presented as Mean \pm SD. The parameters measured of the upper and lower jawbones of the Mehraban sheep are described below and shown in Figures 1 and 2.

a/ Mandibular length: Distance between cranial extremity of the alveolar root of the incisor to the caudal border of the mandible.

b/ Lateral alveolar root to mental foramen: Shortest distance from the mental foramen to the lateral extent of the alveolar root of lower incisor.

c/ Mental foramen to the caudal mandibular border: From the level of the mental foramen to the extreme caudal border of the mandible.

d/ length of diastema: From caudal extend of lateral alveolar root to cranial border of first premolar tooth.

e/ Mandibular foramen to base of mandible: Vertical line from the ventral limit of the mandibular foramen to the base of the mandible.

f/ Caudal border of mandible to below mandibular foramen: Length from the caudal most border of the mandible to the vertical line produced by description of measurement of mandibular foramen to base of the mandible.

g/ Condylod fossa to height of mandible: From the maximum height of mandible to the condylod fossa.

h/ Condylod fossa to the base of the mandible.

i/ Maximum mandibular height: From the highest level of coronoid process to the base of mandible.

j/ Mandibular foramen to the caudal border of mandible.

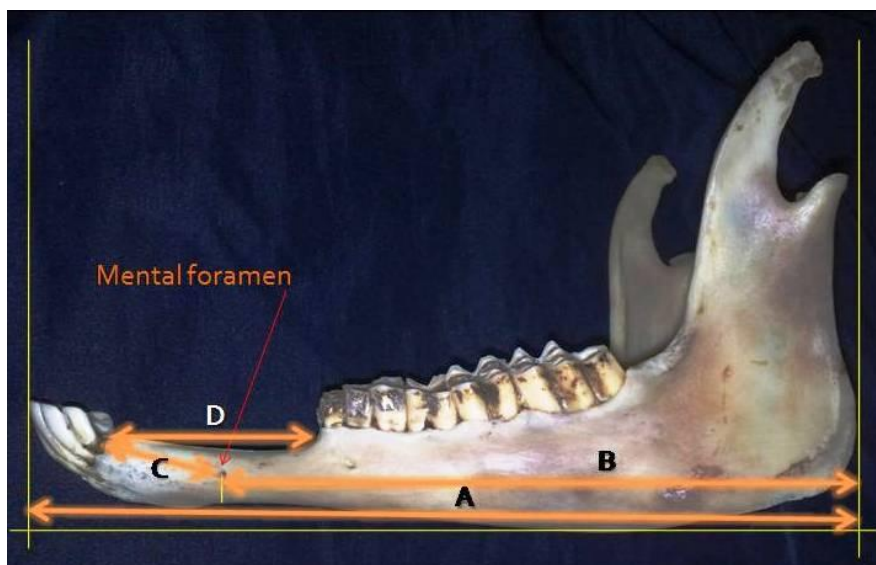


Figure 1. Photograph of the mandible of Mehraban sheep in lateral view: A. Mandibular length, B. Mental foramen to caudal base of mandible, C. Lateral alveolar root to mental foramen, and D. diastema.

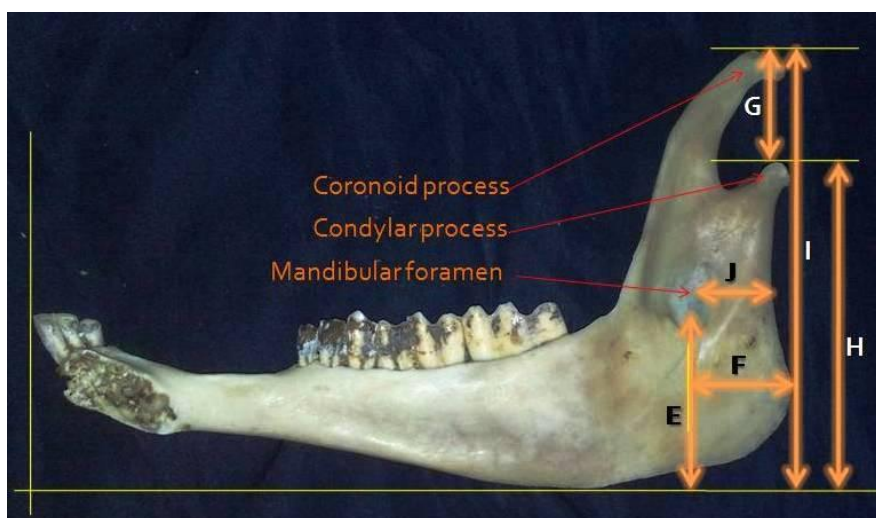


Figure 2. Photograph of the mandible of Mehraban sheep in medial view: E. Mandibular foramen to base of mandible, F. Caudal border of mandible to beneath of mandibular foramen, G. Condylod fossa to height of mandible, H. Condylod fossa to base of mandible, I. Maximum height of mandible, and J. Mandibular foramen to the caudal border of mandible.

RESULTS AND DISCUSSION

As shown in Table 1, the length and maximum high of mandible in Mehraban sheep were higher than the value obtained in WAD goat of Nigeria and Black Bengal goat of Bangladesh (Olopade and Onwuka, 2005; Uddin et al., 2009). Distance between lateral alveolar roots to mental foramen obtained in Mehraban sheep was longer than that of WAD goat but shorter than that of Black Bengal goat. The distance of mandibular foramen to the base of mandible in Mehraban sheep was longer as compared with WAD goat and Black Bengal goat (Olopade and Onwuka, 2005; Uddin et al., 2009). However, similar values were seen in distance of mental foramen to the caudal border of mandible, maximum height of mandible to condyloid fossa, condyloid fossa to the base of mandible and caudal border to vertical line downwards from the middle of mandibular foramen. Shorter distance of mandibular foramen to the caudal border of lower jaw was seen in black Bengal goat as compared with Mehraban sheep (Uddin et al., 2009).

Table 1. The measurements of the lower jaw of Mehraban sheep compared to WAD goat and Black Bengal goat (Olopade and Onwuka, 2005, Uddin et al., 2009)

Parameter (Mean ± SD (cm))	Mehraban sheep	WAD goat	Black Bengal goat
Mandibular length	15.76±2.25	12.00±1.89	14.21±0.98
Lateral alveolar root to mental foramen	2.07±0.45	1.56±0.22	2.11±0.17
Mental foramen to the caudal border	13.74±1.8	9.96±1.67	11.69±0.4
Mandibular foramen to the caudal border	1.35±0.29	-	0.9±0.15
Mandibular foramen to base of mandible	4.14±0.47	2.58±0.34	3.64±0.23
Caudal border to vertical line of mandible	1.74±0.33	1.57±0.44	1.47±0.25
Maximum height of mandible to condyloid fossa	2.95±0.41	2.21±0.37	2.36±0.23
Condyloid fossa to the base of mandible	7.75±0.96	2.68±0.45	6.38±0.51
Maximum mandible height	9.57±2.71	6.90±1.09	8.83±0.57
Width/height of mental foramen	2.25±0.22	-	-
Diastema	3.98±0.48	-	-

Length of diastema was measured in this study (Figure 1) that did not reported in previous studies. It has this potential to be considered as a model for study on therapeutic methodologies of diastema disorder (space between teeth) in human. This edentulous ovine diastema also represents an appropriate region for implantological research. The width/height ratio of mental foramen was obtained in our study that can be useful in determined most exact area of mental nerve trunk.

CONCLUSION

As earlier stated, there is no previous information on these parameters in Mehraban sheep, nor in any other domestic sheep breeds in Iran with which comparisons could be made. We therefore believe that the data mentioned above will form a package for future applied works.

ACKNOWLEDGEMENT

The authors would like to thank the farmers, bouchers, veterinary staff of the Hamadan slaughterhouse for providing material and lab facilities. This research was supported by Laboratory of Biochemistry and Physiology, Department of Basic Veterinary Sciences, School of Veterinary Medicine, Razi University, Kermanshah, Iran.

REFERENCES

- Dyce KM, Sack WO and Wensing CJG, 1996. Textbook of Veterinary Anatomy. 2th.Ed. Philadelphia, Saunders, ISBN 0-7216-1332-2.
- Getty R. 1975. Sisson and Grossman's The Anatomy of the Domestic Animals. 5th.Ed. Philadelphia, Saunders, ISBN-13: 978-0721641027.
- Hall LW, Clarke KW and Trim CM, 2000. Wright's Veterinary Anaesthesia and Analgesia. 10th Ed. London, ELBS and Bailliere Tindall, ISBN 13: 9780702003790.
- Karimi I, Onar V, Pazvant G, Hadipour MM and Mazaheri Y, 2011. The cranial morphometric and morphologic characteristics of Mehraban sheep in western Iran. *Global Veterinaria.*, 6 (2): 111-117.
- Olopade JO, 2003. The morphometry of the craniofacial and maxillofacial regions of the West African Dwarf goats (*Capra hircus*). M.Sc. thesis, Department of Veterinary Anatomy, University of Ibadan, Ibadan, Nigeria.

- Olopade JO and Onwuka SK, 2007. Osteometric studies of the red sokoto (Maradi) goats (*Capra hircus*): implication for regional anaesthesia of the head. *Int. J. Morphol.*, 25(2):407-10.
- Olopade JO and Onwuka SK, 2005. Some aspects of the clinical anatomy of the mandibular and maxillofacial regions of the west African dwarf goat in Nigeria. *Int. J. Morphol.*, 23(1):33-36, 2005.
- Onar V, Ozcan S, and Pazvant G, 2001. Skull typology of adult male Kangal dog. *Anat. Histol. Embryol.*, 30:41-8.
- Uddin MM, Uddin Ahmed SS, Islam KN and Islam MM, 2009. Clinical anatomy of the head region of the Black Bengal goat in Bangladesh. *Int. J. Morphol.*, 27(4):1269-1273.