
MORPHOMETRY OF THE MANDIBLE AND UPPER JAW OF THE NATIVE DOGS OF TIRUNELVELI DISTRICT AND ITS CLINICAL VALUE DURING REGIONAL ANAESTHESIA

S. Rajathi* and S. Muthukrishnan¹

*Department of Veterinary Anatomy,
Veterinary College and Research Institute, Tirunelveli – 627 358
Tamil Nadu Veterinary and Animal Sciences University*

Clinical anatomy is one of the principles of the clinical and surgical practice because it enables the clinician to visualize details of structures (Ommer and Harsahan, 1995). Morphologic and morphometric studies of the upper jaw and mandible not only reflect contribution of genetics and environmental components to individual development and describe the genetic and phenotypic variations but also are the foundation of clinical and surgical practices (Karimi *et al.*, 2011). The direction of the cranial nerves and their passages from different foramina in the upper jaw and mandible were of clinical importance in the regional anaesthesia of the head (Hall *et al.*, 2000).

The form and size of the skull shows breed and individual variation. The shape of the skull and the mandible is the most important criteria in the determination of dog breeds. However, there is a lack of information on the morphometric measurements of the upper jaw and mandible of native dogs of Tirunelveli

district and its clinical value during regional anaesthesia. Therefore the work was taken to provide morphometry of the dog upper jaw and mandible and its application for the head regional anaesthesia.

The study was conducted on the upper jaw and mandibles without any apparent skeletal disorders of six adult native dogs (Non Descript breed) bones which were available at the Department of Veterinary Anatomy, Veterinary College and Research Institute, Tirunelveli. The following morphometric measurements were done in the upper jaw and mandibles using scale and vernier callipers.

Skull length – from the dorsal nasal cartilage to the external occipital protuberance and was subdivided into cranial and nasal length

Cranial length

Nasal length

Cranial width

Cranial index = $\frac{\text{Cranial width} \times 100}{\text{Cranial length}}$

Distance from the root of the premolar tooth to the midlevel of the infraorbital canal

Address for correspondence :

*S. Rajathi, Assistant Professor,
Department of Veterinary Anatomy,
Veterinary College and Research Institute,
Tirunelveli – 627 358
srajathi9936@yahoo.in

¹. Professor, Dept. of Veterinary Anatomy, VCRI,
Orathanadu

Distance from the midlevel of the infrorbital canal to the root of the canine tooth

Mandibular length – from the level of cranial extremity of the alveolar root of the incisor to the level of the caudal border of the mandible

Distance from the lateral alveolar root to the mental foramen

Distance from the mental foramen to the caudal mandibular border

Distance from the mandibular foramen to the base of the mandible

Distance from the caudal border of the mandible to below of the mandibular foramen

Distance from the condyloid fossa to the height of the mandible

Distance from the condyloid fossa to the base of the mandible

Maximum mandibular height – from the base of the mandible to the highest level of the coronoid process

Distance from the caudal border of the mandible to the level of mandibular foramen

Distance from the mandibular foramen to the mandibular angle.

The values were measured (Mean \pm SE) and data obtained were analysed statistically (Snedecor and Cochran, 1994) and the results were presented in the Table I.

In the present study, the skull length, cranial length, nasal length and cranial width of the native adult dogs were 18.2 ± 0.21 cm, 10.7 ± 0.35 cm, 7.5 ± 0.02 cm and 7.0 ± 0.56 cm, respectively. The cranial index was 65.42. (Table I, Fig. 1). The above values were similar to the results on the adult Kangal dogs (Onar *et al.*, 2001) and Iranian adult dogs (Monfared, 2013) but were relatively different from the findings on the German Shepherd puppies (Onar, 1999). It may be due to the existence of significant differences in the skull shape and size between various breeds.

In adult native dogs, the distance from the root of the premolar tooth to the infrorbital canal and from the latter to the root of the canine tooth was 0.9 ± 0.85 cm and 2.8 ± 0.44 cm, respectively (Table I). The infraorbital foramen in the dog was over the alveolus of the third premolar tooth and infraorbital nerve emerge from this foramen. So this data was useful for tracking the infraorbital nerve and necessary for the desensitization of the skin of the upper lip, nostril and face on that side of the foramen (Ommer and Harshan, 1995). The injection of the local anaesthetic agents within the canal via the infraorbital foramen would lead to analgesia of the incisor, canine and first three premolars.

In this study, the distance from the lateral alveolar root to the mental foramen was 2.0 ± 0.66 cm (Fig. 2). This value was a guide in detection of the location of the mental nerve for regional nerve block in the adult dogs for lower lip. The injection of the local anaesthetic agents was to

be administered in the rostral aspect of the mandibular canal through the mental foramen for mandibular nerve block.

The mandibular length and height in the adult native dogs was 12.8 ± 0.12 cm and 6.1 ± 0.55 cm (Fig. 2) respectively which were greater than the values of German Shepherd puppies (Onar, 1999) but lesser than the values of Iranian adult dogs (Malfared, 2013).

The caudal border of the mandible to below of the mandibular foramen was 1.4 ± 0.33 cm in adult dogs. In addition the distance from the caudal border of the mandible to the level of the mandibular foramen and from the latter to the border of the mandibular angle was 1.5 ± 0.21 cm and 1.1 ± 0.66 cm (Fig. 3) respectively. This data was necessary for achieving the regional anaesthesia of the mandibular nerve effectively for desensitization of all the teeth in the lower jaw.

In conclusion, the morphometric values of the skull and the clinical anatomy of the head region of the native adult dogs provide an important baseline for further research in this field.

REFERENCES

- Hall, L. W., Clarke, K. W. and Trim, C. M. (2000). Wright's Veterinary anaesthesia and analgesia, 10th edn. London. ELBS and Bailliere Tindall.
- Karimi, I., Onar, V., Pazvant, G., Hadipur, M. and Mazaheri, Y. (2011). The cranial morphometric and morphologic characteristics of Mehraban sheep in western Iran. *Global Veterinaria*. **6(2)**: 111-117.
- Monfared, A. L. (2013). Anatomical study of the skull of the adult dogs and its clinical value during regional anaesthesia. *Global Veterinaria*. **10(4)**: 459-463.
- Ommer, P. A. and Harshan, K. R. (1995). Applied Anatomy of domestic animals. 1st edn. Jaypee brothers medical publisher, India.
- Onar, V., Ozcan, S. and Pazvant, G. (2001). Skull typology of adult male kangal dogs. *Anatomia, Histologia. Embryologia*, **30(1)**: 41-48.
- Onar, V., (1999). A morphometric study on the skull of the German Shepherd dog (Alsatian). *Anatomia, Histologia. Embryologia*. **28**: 253-256.
- Snedecor, G. W., & Cochran, W. G. (1994). *Statistical methods (eighth edition)*. Oxford & IBH Publishing Co., Calcutta, India

Table I: Morphometrical parameters of mandibles and upper jaws of native adult dogs of Tirunelveli district

S. No.	Parameters	Mean \pm SE (cm)
A	Skull length	18.2 \pm 0.21
B	Cranial length	10.7 \pm 0.35
C	Nasal length	7.5 \pm 0.02
D	Cranial width	7.0 \pm 0.56
E	Cranial index	65.42
F	Root of the premolar tooth to midlevel of infraorbital canal	0.9 \pm 0.85
G	Midlevel of infraorbital canal to root of canine tooth	2.8 \pm 0.44
H	Mandibular length	12.8 \pm 0.12
I	Lateral alveolar root to mental foramen	2.0 \pm 0.66
J	From the level of mental foramen to the extreme caudal border of the mandible	10.5 \pm 0.89
K	Mandibular foramen to base of mandible	1.1 \pm 0.75
L	Caudal border of the mandible to below of the mandibular foramen	1.4 \pm 0.33
M	Condylod fossa to the height of the mandible	2.6 \pm 0.05
N	Condylod fossa to the base of the mandible	3.4 \pm 0.88
O	Maximum mandibular height	6.1 \pm 0.55
P	Caudal border of mandible to the level of the mandibular foramen	1.5 \pm 0.21
Q	Mandibular foramen to mandibular angle	1.1 \pm 0.66

FIGURES

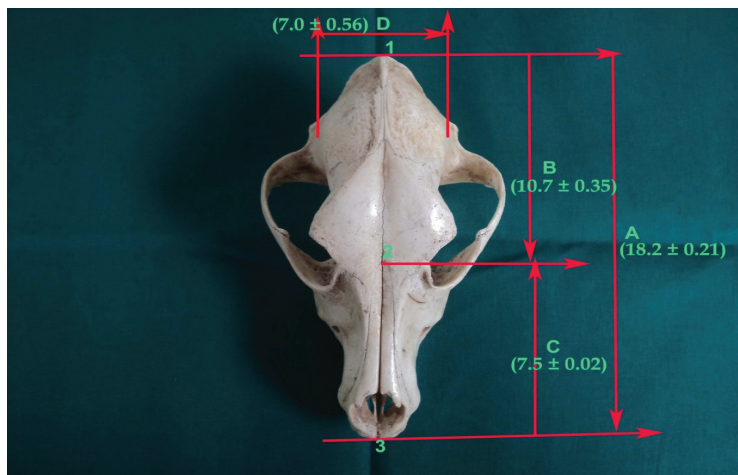


Fig. 1: Measurement of the cranium (Dorsal view) of native dogs of Tirunelveli district

1 – Central surface point of external occipital protuberance

2 – Junction of median plane of the right and left nasofrontal sutures

3 - Anterior end of interincisive suture

A. Skull length B. Cranial length C. Nasal length D. Cranial width

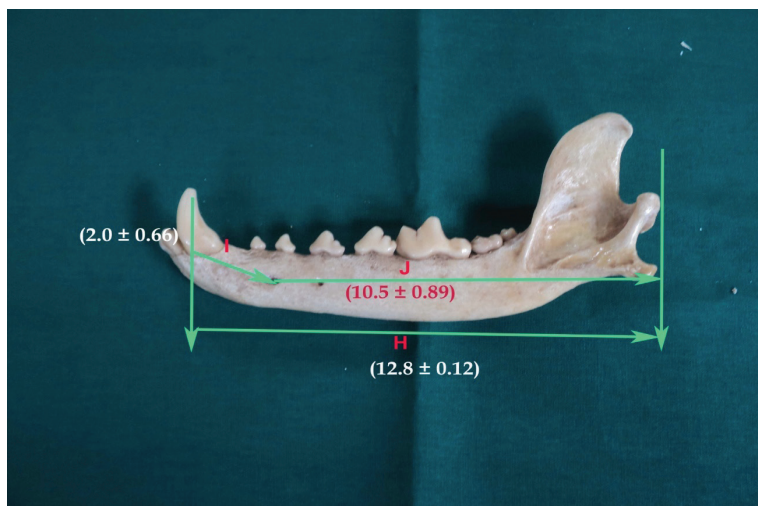


Fig. 2: Lateral aspect of the mandible showing distances

H- Mandibular length

I - Lateral alveolar root to mental foramen

J - From the level of mental foramen to the extreme caudal border of the mandible

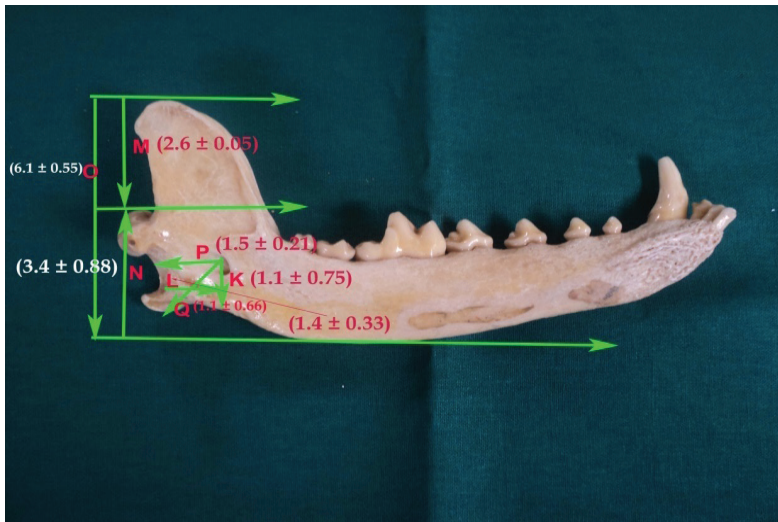


Fig. 3: Medial aspect of the mandible showing distances

- K - Mandibular foramen to base of mandible
- L - Caudal border of mandible to below of the mandibular foramen
- M - height of the mandible to condyloid fossa
- N - Condyloid fossa to the base of the mandible
- O - Maximum mandibular height
- P - Caudal border of mandible to the level of mandibular foramen
- Q- Mandibular foramen to mandibular angle