

SHORT COMMUNICATION

An Osteometric Study of the Skull of the West African Dwarf Goat from South Eastern Nigeria. II: Mandibular and Maxillofacial features

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SUMMARY

The study involved the osteometric analysis of the mandibular and maxillofacial region of the WAD goat from southeastern Nigeria. A total of 21 parameters were analysed. The mandibular length and height were 11.81cm and 7.11cm respectively. The distance from the lateral alveolar root to the mental foramen, from the facial tuberosity to the external opening of the infraorbital canal and from the base of the mandible to the mandibular foramen were 1.84cm, 1.77cm and 1.55cm, respectively. The data were not only discussed in its relevance to regional anaesthesia around the head but also compared with data involving the same parameters in WAD goats from southwestern Nigeria.

KEY WORDS: Osteometry, Mandibular, Maxillofacial, West Africa Dwarf, Goats

INTRODUCTION

The study of skull types is of importance in clinical practice and research. Landmarks for regional anaesthesia, pathologic variations and the baselines for interpretations of the morphophysiology of mastication amongst others (Hall et, 2000; Terai et al, 1998; Olopade, 2003) can be obtained from morphometric data.

One of the least studied species amongst animals in relation to skull typology is the goat. Apart from recent reports on morphometric analysis and some aspects of the clinical anatomy of the WAD goat from southwestern Nigeria (Olopade and Onwuka 2005, a b), little exists in literature in this regard.

The aim of this work is to report the mandibular and maxillofacial osteometry of WAD goats from southeastern Nigeria (SE) as part of our efforts to perform an analysis of the skull osteometry of this breed.

MATERIALS AND METHODS

In this study, a total of 12 WAD skulls were used. The live animals were obtained from Nsukka and its environs and were examined at antimortem inspection for good health and absence of skeletal deformities. The goats after restraint were slaughtered and heads severed at the occipitoatlantal joint; thereafter the hot water technique according to the pattern of Onar et al 1997 was used for maceration to produce the skulls.

A total of 21 landmarks were obtained in the mandibles and the face of the skulls and are briefly described below and depicted on Fig.1-5. The data obtained was analysed using the SPSS 10 package and presented as Mean \pm S.D (Standard Deviation).

- **Facial tuberosity to infra-orbital canal (FTIC):** From the level of the most prominent bulging of the facial tuberosity to the mid-level of the infra-orbital canal
- **Lateral alveoli root to mental foramen (LAMF):** Shortest distance from the mental foramen to the lateral extent of the alveolar root of lower incisor.

- **Mental foramen to the caudal mandible border (MFMD):** From the level of the mental foramen to the extreme caudal border of the mandible.
- **Mandibular foramen to base of mandible (MFMB):** Vertical line from the ventral limit of the mandibular foramen to the base of the mandible.
- **Caudal border of mandible to below mandibular foramen (CBMF):** 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.
- **Condylod fossa to height of mandible (CFMH):** From the maximum height of mandible to the condylod fossa.
- **Condylod fossa to mandible base (CFMB):** From the condylod fossa to the base of the mandible.
- **Maximum mandibular height (MMH):** From the base of the mandible to the highest level of the coronoid process.
- **Height of mandibular body (HM1):** Height of the body of the mandible from root of alveolar tooth to mandibular base at Molar 1.
- **Mandibular (Symphyseal) length (SPL):** Length from rostral to caudal limits of the mandible symphysis.
- **Mandibular (Symphyseal) breadth (MSB):** Maximum breadth of mandible at the region of the symphysis (At caudal ends of the alveoli of the lateral incisors).
- **Diastemal length (LDG):** Length of the diastemal gap, from the lateral end of the alveolus of the lateral incisor (on the bony ridge) to the cranial border of the alveolus of the first premolar.
- **Diastemal breadth (DB1):** Breadth of mandible on the bony line at the cranial limit of the alveolus of Premolar 1. **(DB2):** Inter diastemal breadth at the mental foramen on the bony line.
- **Thickness of mandible:** The thickness of the mandible at Molar1 (**TM1**), at Molar 2 (**TM2**) and at Molar 3 (**TM3**).
- **Condylar breadth (BMCP1):** This is the breadth of the mandibles between the most medial points of the condylar process,

(BMCP2): taken between the most lateral ends of the condylar process.

- **Inter-mandibular breadth (IMB):** Maximum breadth between two halves of the caudal angle of the mandible.
- **Mandibular length (MDL):** The length of the lower jaw, from the top of the dentary bone to the caudal most projection of the angle.

RESULTS AND DISCUSSIONS

TABLE I: The results of some mandibular and maxillofacial measurements of WAD goat from southeastern Nigeria

	Mean(cm)	SD
FTIC	1.77	0.26
LAMF	1.84	0.76
MFMD	9.75	1.07
MFMB	3.04	0.29
CBMF	1.55	0.25
CFMH	1.83	0.28
CFMB	5.28	0.41
MMH	7.11	0.57
HM1	1.74	0.19
SPL	1.73	0.21

TABLE II: The results of some mandibular and maxillofacial measurements of WAD goat from southeastern Nigerian.

	Mean(cm)	SD
MDL	11.81	1.10
MSB	1.31	0.17
LDG	2.39	0.18
DB1	1.45	0.21
DB2	0.92	0.06
TM1	1.05	0.14
TM2	1.12	0.10
TM3	1.18	0.10
BMCP1	2.78	0.76
BMCP2	5.42	0.54
IMB	4.80	0.42

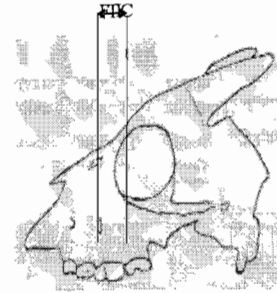


Fig 1: Schematic diagram of the skull of the goat (Lateral view).

The values of MDL (Fig.2) and MMH (Fig.3) at 11.81cm and 7.11cm were shorter than the 12.00cm but higher than the 6.90cm obtained in WAD goats from southwestern Nigeria (SW), respectively (Olopade and Onwuka 2005b). These values were not however far apart from each other when compared to significant differences in the osteometry of the mandibles observed between wild pigs in Iriomote and those of Taiwan and Japanese islands. Abe, 1989 has stated that the MDL is correlated with the head and body length in the wild pig. One may thus suggest that the WAD goat from SE may be slightly smaller in the external body size than those from SW.

The FTIC (Fig.1) in this study was 1.77cm. This could serve as a guide in tracking the infraorbital nerve for regional anaesthesia. The blocking of this nerve ensures the desensitization of the skin of the lip, nostril and face at the level of the foramen, and could include the skin as high as the level of the inner canthus of the eye (Hall et al 2000). The distance between the facial tuberosity and the infraorbital nerve in WAD goats from SW was at a range of 1.6-1.8 cm (Olopade and Onwuka, 2005b); thus this landmark distance for regional anaesthesia could be standardized for both groups of WAD goats.

The LAMF, MFMD, MFMB, CBMF (Fig.2,3) in this study were 1.84cm, 9.75cm, 3.04cm and 1.55cm respectively. These values are of importance in determining clinically important metric landmarks for blocking the mental and mandibular nerves. While the

mental nerve block ensues analgesia of the lower lip on its side; the mandibular block though difficult and uncertain will desensitize the lower jaw and all the teeth on its side. The equivalent values for the data obtained above in Wad goat from SW were 1.6cm, 9.9cm, 2.6cm and 1.6cm respectively. This show that there is a similarity in most of these landmarks in the WAD goats obtained from two different environments and thus clinically metric data to aid in regional anaesthesia around the head can be standardized for WAD goats.

The data of mandibular thickness at Molar 1-3(TM1-TM3) revealed that the mandible had

the least thickness at TM1. Incidentally, this is the portion of the mandible that will be assessed during oral examination and other clinical procedures like oral administration of drugs than at Molars 2 and 3. This study thus suggest that caution be taken during these procedures because of the relative weakness of the mandible at Molar 1

The results obtained in this study is an added value to the skull osteometric data being compiled for the WAD goat and can be used as comparative data for the related dwarf and pygmy goats found in western countries, and for the other breeds of goats particularly with those in Nigeria.

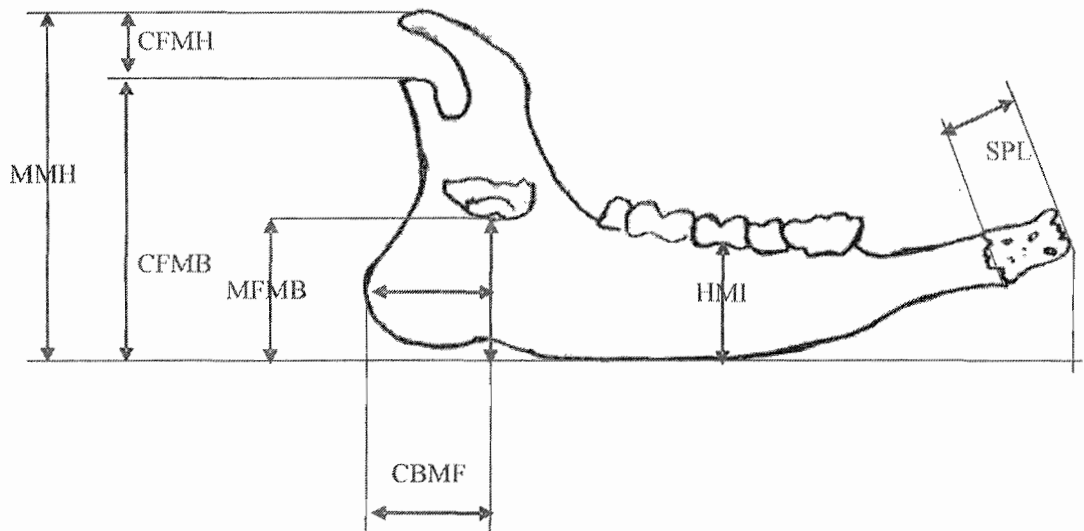


Fig 2: Schematic diagram of the mandible of the goat (Median view).

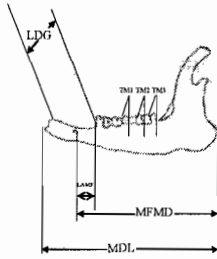


Fig 3: Schematic diagram of the mandible of the goat (Lateral view).

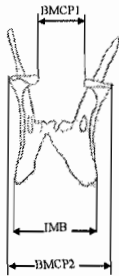


Fig 4: Schematic diagram of the mandible of the goat (Caudal view).



Fig 5: Schematic diagram of the cranial aspect of the mandible of the goat (Dorsal view).

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