



## A Study of Dental Abnormalities of Camels in Nigeria

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### SUMMARY

Adaptation feature of the camel include its ability to feed without discretion on desert and semi desert vegetation, and to browse trees and shrubs beyond the reach of other animals. We decided to investigate if these voracious and liberal feeding skills could be at the expense of a healthy dental profile. We looked at the macerated skull of 29 camels from three different regions comprising of 15 females and 14 males. A total of 10 different types of dental and related osteologic pathologies were identified; these were attrition, gingival recession, fractured tooth, carious tooth, dental abrasion, stains, bone recession, erosions, split tooth and bone. The prevalence of attrition and gingival recession was 100%. Sexual dimorphism was seen in the expression of dental abnormalities in the camels with evidence that the abnormalities progressed more in the males. In addition regional geographical variation was observed in the severity of dental profile and this could be related to a more harsh climatic condition in Nigeria's extreme North West, and tougher dry matter content of the vegetation due. In conclusion, our study has shown a high prevalence rate of dental abnormalities in camels in Nigeria and we suggest that more attention be given to their oral health.

**KEY WORDS:** Camel, dental abnormalities, sex difference, geographical variation

### INTRODUCTION

There has been an increase in camel population in Nigeria from about 18,000 in 1978, to about 90,000 in 1994 (Bourn *et al.*, 1994). This sharp increase is not unconnected with increased consumption of camel meat in some parts of the country due to a decline in supply of cattle after the outbreak of rinderpest in 1983 in Nigeria to which camel is relatively resistant (Abubakar *et al.*, 2010).

The camel is well adapted to life and thrives in

the desert and the semi-desert climates where other animal species perform far less. Adaptation features of the camel include body insulation and diurnal heat storage; extreme economic use of water, low urine output and fecal water content, efficient physiology of sweating and maintenance of blood stream and fluid volume after water deprivation, efficient capacity to rapid and complete rehydration and ability of sustenance on anything that grows in the desert (McKnight, 1969; Kuthe, 1977; Ghaji and Adegwa, 1986).

The camel feeds without discretion on desert and semi desert vegetation which has evolved characteristics like thorns, odours and secretions which most other species cannot survive on. In Sokoto, it has been evaluated that the feeding costs were lower for one camel than for one pair of oxen (Mohammed and Hoffman, 2006). In addition, camels by virtue of height are able to browse trees and shrubs beyond the reach of other animals (Knoess, 1977). It is however speculative to suggest that this voracious and liberal feeding skills could be at the expense of a healthy dental profile. The aim of this study is to investigate the occurrence and types of dental abnormalities of camels in Nigeria.

### MATERIALS AND METHODS

We purchased 29 heads of adult camels from three different abattoirs in Nigeria; ten adults each of equal sexes from Sokoto (extreme North West) and Maiduguri (North East), and nine adults (5 females and 4 males) from Kano (North West). All animals were estimated to be above five years old based on works of Wilson (1984). The skulls were macerated as described by Olopade *et al.* (2006) and the mandibles separated from the upper skull so that a full view of the dental profile could be assessed. A systematic study of the dental abnormalities in the upper and lower jaw was done in the skull

and recorded as done by Kene and Agbo (1998) and Kene and Uwagie-Ero (2001). A Sony( 14 megapixel) digital camera was used to record pictures of the abnormalities. Three of the authors in a blinded fashion were involved in the identification of the types and scoring of the severity (+ as 1, ++ as 2 or +++ as 3) of the dental abnormalities. The number and types of the abnormality and severity score were multiplied together to obtain a total dental abnormality score. The score below 40 was scored as mild, 41-60 was scored as bad, 61-80 as very bad while 81 and above was scored as severe.

Percentage prevalence was calculated as percentage occurrence of an abnormality per animal amongst the total number of animals observed.

**RESULTS**

All the animals that we observed had dental abnormalities. A total of 10 different types of dental and related osteologic pathologies were identified; these were attrition, gingival recession, fractured tooth, carious tooth, dental abrasion, stains, bone recession, erosions, split tooth and bone. The details are seen in Table I-IV with some shown in Figures 1-6.

Table I: Prevalence level of some dental abnormalities in Nigerian Camels

Dental Pathology	%Prevalence	Dental Pathology	%Prevalence
Split Tooth	17.2	Fractured tooth	37.9
Attrition	100	Caries	34.5
Gingival Recession	100	Abrasion	6.8
Stains	79.9	Bone Recession	3.4
Erosions	68.9	Splint	3.4

Table II. Prevalence and severity of dental abnormalities in Camels from Sokoto, North West Nigeria

Skull ID	SPLIT TOOTH	ATTRITION	GR	STAINS	EROSION	FRAC. TOOTH	CARIES	ABRASION	B.R.	SPLIT BONE	Score
SKF1U		+	+++	++	+						60
SKF1L		+++	++	++	+						
SKF2U		+	++	++							40
SKF2L		+	+	++		+					
SKF3U		+	++				+				36
SKF3L		+	++	++							
SKF4U		++	++				+				91
SKF4L	+	+++		+	+			++			
SKF5U		+	++						+		40
SKF5L		+++					+++				
SKM1U		+		+++	+						60
SKM1L		++	++	++		+					
SKM2U		+		+++	+						36
SKM2L			++	+++		+					
SKM3U		+	+	+++		+					80
SKM3L		++	+++	+++	+	+					
SKM4U		+	++	+++	+						68
SKM4L		+++	++	++	+++						
SKM5U	+	+	+	++	+	+					90
SKM5L		++	++	+	+++						

Keys: SK: Sokoto, M: Male, F: Female, U: Upper jaw, L: Lower jaw

Table III. Prevalence and severity of dental abnormalities in Camels from Kano, North West Nigeria.

Skull ID	Split Tooth	Attrition	GR	Stains	Erosion	Frac.Tooth	Caries	Abrasion	B.R.	Split Bone	Score
KNF1U		+	++				+				60
KNF1L		+++	+++	+	+						
KNF2U		+++	+	+			++	+			70
KNF2L		++	++	+			+				
KNF3U		++		+							24
KNF3L		+++	++								
KNF4U		+++		+	+		+				72
KNF4L	+	++	++		+						
KNF5U		+++	+++	+	+++						64
KNF5L		+	++	+++							
KNM1U		+	++				+				66
KNM1L		+	+++	+	+	+					
KNM2U		++	+		+						36
KNM2L		+++	++		+++						
KNM3U		+	++								40
KNM3L		+	++	+	+++						
KNM4U		+	++	+							32
KNM4L		+		+	++						

Keys: KN: Kano, M: Male, F: Female, U: Upper jaw, L: Lower jaw

Table IV. Prevalence and severity of dental abnormalities in Camels from Maiduguri, North East Nigeria.

Skull ID	Split Tooth	Attrition	GR	Stains	Erosion	Frac. Tooth	Caries	Abrasion	B.R.	Split Bone	Score
MDF1U		+	++	++	+		+				80
MDF1L		+++	++	+	+++						
MDF2U		+	++	+	+		++				55
MDF2L		+++	+								
MDF3U		+	++								12
MDF3L		+++									
MDF4U		+		++	+						32
MDF4L		+++	+								
MDF5U		+	++		+						28
MDF5L	+	+	+								
MDM1U		+	++		+	+					60
MDM1L	+	++			+++	+					
MDM2U		+	+	+		+	+				54
MDM2 L			+		+	++					
MDM3U		+	++			+					32
MDM3L		+++		+		++					
MDM4U		+	++	++		+					48
MDM4L		+	++	+++		++					
MDM5U		+		+		+					45
MDM5L		+++	++							+	

Keys: Maiduguri, M: Male, F: Female, U: Upper jaw, L: Lower jaw

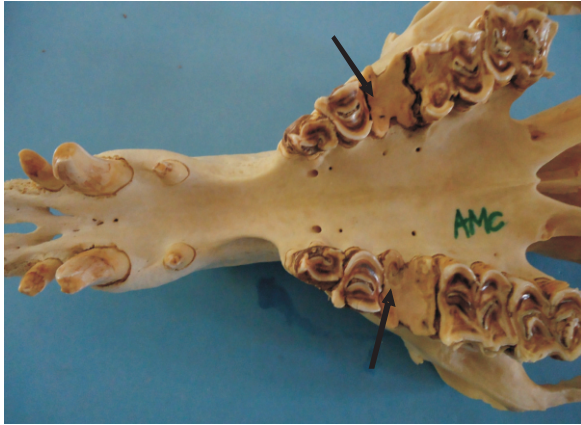


Fig 1. Upper dental row of adult camel in Nigeria showing erosions (arrows)



Fig 2. Upper dental row of adult camel in Nigeria showing attrition (arrows)



Fig 3. Upper dental row of adult camel in Nigeria showing gingival recession (arrows)



Fig 4. Upper dental row of adult camel in Nigeria showing bone recession (arrow)



Fig 5. Lower dental row of adult camel in Nigeria showing tooth fracture (clobs) and stains (arrows)



Fig 6. Lower dental row of adult camel in Nigeria showing split tooth (arrow).

## DISCUSSION

The animals used in this study were over five years old. Camels normally eat from high trees and tough desert plants and 5 years is presumably sufficient time to get an assessment of eating habits on the dental profile. It is thus not surprising that every single camel had a minimum of three dental pathologies particularly when one takes into account that pet animals like the dog had dental alterations of

over 85% in the observed population (Kyllar and Witter, 2005). The abnormalities seen in the camels in this study included and surpassed those seen in goats by Kene and Agbo (1998); Olopade and Onwuka, (2006) and in cattle Kene and Uwagie- Ero (2001) who also observed marked attrition of occlusal surfaces, deposition of dental calculus, missing teeth, or tooth fractures. Recently, Olusa and Akinrinmade (2009) reported a dental abnormality profile of

horses in Nigeria with dental attrition and gingivitis having the highest prevalence; coinciding with our observation in this study on the camel. Similarly, Jalaleddin and Ramezani (2009) reported a 98% prevalence of gingivitis amongst children.

Sexual dimorphism was seen in the expression of dental abnormalities. In the mild group, 64% were females, and 34% were males however, in the bad, very bad and severe groups, 44% were females and 54% were males suggesting that the abnormalities progressed more in the males.

Regional geographical variation also played a part in the pattern of the severity of dental profile. For camels of the dental abnormality scale of very bad and severe, 44% were from Sokoto, 33% were from Kano while 23% were from Maiduguri. Kano though North Western, is geographically more central than Sokoto and Maiduguri. The lower incidence of dental abnormalities of higher severity scales seen in Maiduguri camels also follow the pattern seen in goats and cattle. Olopade and Onwuka (2009) reported a relative lack of dental pathologies in the Sahel goats from Maiduguri (North East) but a predominance of the same in the Red Sokoto goats raised in Sokoto. Likewise Kene and Uwagie-Ero (2001) found more dental abnormalities in the Sokoto Gudali cattle than in the Adamawa cattle from the northeast. The latter authors attributed this occurrence to a more harsh climatic condition in Sokoto area, and tougher dry matter content of the vegetation due to scarcity of fresh vegetation which is most serious in the extreme north western part of Nigeria where the Sokoto Gudali cattle is raised. It would be interesting to see how these dental demographics would be expressed in humans.

It is estimated that 60% of camels in Nigeria are found in Sokoto state where they reach expected market weight with profitable sales after slaughter (Mohammed and Hoffman, 2006). Though dental abnormalities could result in weight loss in llamas (Sivasanker, 1999) and have been known to alter masticatory pattern with direct effect on forestomach physiology in sheep (Ruckebusch, 1970), it is suggestive that camels can continue feeding and putting on weight in the presence of dental pathologies although the outcome could be a progressively

worsened dental profile in old age.

In conclusion however, our study has shown a high prevalence rate of dental abnormalities in camels in Nigeria and we suggest that more attention to their oral health by camel farmers, handlers and veterinarians can further boost their productivity. In addition, we call for worldwide interest on the study of dental abnormalities in camels, since to the best of our knowledge little is seen on prevalence and types of dental abnormalities of these animal species in the literature.

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