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MORPHOLOGICAL AND BIOMETRICAL OBSERVATIONS ON THE ORBITS OF INDIAN ONE HORNED RHINOCEROS

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Indian one horned (*Rhinoceros unicornis*) has its habitat in few wild life sanctuaries of Assam, particularly in Kaziranga National Park and is surviving under intense biotic pressure in their endemic wild habitat. Paucity of information on anatomical details on this animal encouraged this present study on the morphological and biometrical details pertaining to the orbit of this species.

Materials and Methods

The study was conducted on the orbits of four adult rhinoceros (irrespective of sex). After noting the salient morphological features, the various biometrical measurements were recorded separately for the left and right orbits using silk thread, Vernier callipers, measuring scale and graduated measuring cylinder. All the measurements were recorded as per Sharma and Gupta (1990) and Archana *et al.* (1998). The data obtained were subsequently subjected to analysis by standard statistical method (Snedecor and Cochran, 1967).

Results and Discussion

The orbit of the Indian one horned Rhinoceros was constituted by the orbital surface of the lacrimal, orbital wing of the sphenoid, orbital plate of the frontal and the frontal process of the zygomatic bones, the greater part the orbit being formed by the orbital plate of the frontals. Similar construction of the orbital rim was reported in ox (Raghavan, 1964; Getty, 1975), buffalo (Gupta *et al.,* 1991) Indian ass (Archana and Sharma, 2000) and mithun (Borthakur *et al.,* 2000); the frontals provide the largest contribution for the formation of orbit in bovines (Malik *et al.,* 1993). The orbit was formed by frontal, zygomatic and caudal border of the maxillary bones in leopard cat (Sarma *et al.,* 2002). The orbits were directed laterally as in other large domestic animals while rostrally directed orbits are observed in domestic cat and Indian leopard (Kalita *et al.,* 2002).

The mean values for various orbitometrical parameters along with their standard errors and ranges have been depicted in Table. All the parameters pertaining to the present study revealed minor variations in their values among the two orbits. Moreover, the right and left orbits showed no bilateral variations in camel (Sandhu and Dhingra, 1986) and bovines

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Table - Means along with their standard errors pertaining to the various measurements of orbital parameters in adult Indian one horned Rhinoceros

S.No.	Parameters		Mean	SE	CV%	Range	Overall		
							Mean	S.E	CV%
1.	Orbital length (cm)	R	6.75	0.05	2.32	6.32-6.81	6.72	0.07	3.12
		L	6.69	0.06	2.59	6.29-6.78			
2.	Orbital height (cm)	R	6.71	0.09	2.75	6.45-6.79	6.69	0.10	1.29
		L	6.68	0.08	2.67	6.42-6.82			
3.	Orbital index	R	99.40	1.31	1.89	94.33-100.00	99.63	1.69	4.35
		L	99.85	1.20	2.55	98.85-100.00			
4.	Orbital depth (cm)	R	8.25	0.09	1.57	8.10-8.39	8.26	1.23	1.88
		L	8.27	0.08	1.41	8.15-8.41			
5.	Orbital capacity (cm^3)	R	126.50	0.79	0.97	124.39-132.04	127.18	0.69	1.15
		L	127.85	0.53	1.38	125.32-133.39			
6.	Orbital	R	25.25	0.36	3.86	23.21-28.11	25.10	1.12	2.39
	circumference (cm)	L	24.95	0.45	2.24	21.78-27.89			
7.	Orbital area (cm^2)	R	35.50	0.54	3.61	33.07-38.23	35.29	0.80	2.05
		L	35.08	0.45	2.42	33.95-38.01			

* R = Right; L = Left

(Rao *et al.*, 1968; Gupta and Sharma, 1990).

The orbital height recorded in Indian one horned rhinoceros was lesser than the orbital length (Table), which revealed a slightly elongated orbital rim as in dog (Miller *et al.*, 1964), leopard cat (Sarma *et al., loc. cit.)* and dum pig (Sarma and Sarma, 2002). However, circular orbital rim was reported in Indian ass (Archana and Sharma, *loc. cit).* The orbital indices of both the orbits in rhinoceros did not vary considerably with the overall value being 99.63±1.69 which can be comparable to same in Indian ass (99.69±3.5) reported by Archana and Sharma (*loc. cit.*). The same values recorded in large ruminants such as cattle (83.47 ±1.47) and buffalo (88.81±1.02) by Gupta and Sharma (*loc. cit.*) and Gupta *et al.*, (*loc. cit.*) respectively were lesser than present values.

The overall orbital depth recorded in this study (8.26±23cm) was lesser than that of cattle (11.72±19cm) and buffalo (10.86± 0.41cm) reported earlier by Gupta and Sharma (*loc. cit.*) and Gupta *et al. (loc. cit.)* respectively. Also, the overall orbital capacity recorded (127.18±69cm^3) was more than double the value (51.10±0.68cm^3) recorded in Indian ass (Archana and Sharma (*loc. cit).* All these facts indicate a roomy orbital cavity in Indian one horned Rhinoceros inspite of possessing a shorter orbital depth.

The overall orbital circumference and orbital area were 25.10±1.12cm and 35.29± 0.80cm^2, respectivley.

Summary

Skulls of four adult rhinoceros were utilized in this study. The orbit was laterally

directed and formed by the frontal, lacrimal, orbital wing of sphenoid and zygomatic bones. Minor bilateral variations in the orbitometrical parameters were noticed. The orbits were elongated and the orbital cavity was roomy with a shorter orbital depth.

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