International Scholars Journals

Global Journal of Cardiology Vol. 6 (12), pp. 001-004, December 2021. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Short Communication

Gross anatomical aspects of the gastrointestinal tract of the wild African giant pouched rat (*Cricetomys gambianus*)

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Accepted 9 September, 2021

Ten matured African giant pouched rats of both sexes were used in this study. Their mean body weights were 1045.5 ± 110.6 g (standard error of mean, SEM) and their crown-rump body length was 24 1.16 cm. The mean stomach weight and length were 28.81 ± 0.93 g and 20.3 ± 0.80 cm, respectively. The maximum width of the stomach varied between 3.13 ± 0.31 and 3.75 ± 0.28 cm related to the volume of food within the organ. Grossly, the stomach was divided into two parts: the non-glandular and the glandular. A small sac-like diverticulum of about 1.3 cm in length and 1.2 cm in width located on the small curvature of the glandular portion between the cardiac and the pylorus was observed. Internally, a limiting ridge separated the non-glandular from glandular portion of the stomach. We have therefore classified the stomach as being onogastric with a small diverticulum. The mean small intestine length of 129 ± 3.27 cm was the longest segment of the gastrointestinal tract (GIT), followed by the 88.2 2.73 cm of the large intestine. The cecum was the largest segment of the large intestine, coma-shaped blind end sac situated at the ileo-cecal junction.

Key words: Anatomy, gastrointestinal tract, wild African giant pouched rat.

INTRODUCTION

African giant pouched rat (*Cricetomys gambianus*) is a member of the order, *Rodentia*. It is an omnivorous animal, feeding on vegetables, insects, crabs, snails and other items, but apparently, preferring palm fruits and palm kernels (Wikipedia, 2008). (The word 'pouched' in the common name refers to the animals' habit of using the cheek pouches to store or carry food). Attempts are being made in Nigeria and other countries in African to domesticate these animals in captivity for food and research (Ajayi, 1975). Their meat forms part of the bush meat trade. It is considered a delicacy and the smoke carcasses of these rodents are often sold in the villages and towns (Ajayi, 1975). More recently, the animal has been used to sniff out landmines in Mozambique (Lindow, 2001; ABC, 2005).

Despites its many common characteristics, individual parts of the vertebrate digestive system can demonstrate a wide range of structural and functional varieties, both within and among the class of the vertebrate (Ester and Edward, 2008). This system shows a wide range of adaptation to diet and habit. An understanding of these adaptations is essential for the proper care and maintenance of domesticated captive animals and the preservation of the wildlife and endangered species (Esther and Edward, 2008).

The morphology of the gastrointestinal tract (GIT) has been reported for sheep, cattle, pigs, horses, dogs (Sisson and Grossman, 1953), man (Harold, 1992) and birds (Devyn et al., 2000) but, as far as we are aware, it has not been documented for the African giant pouched rat. Therefore, the present study examined the GIT of this rat in order to establish some normal baseline data.

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Table 1. Morphometric indices of the stomach and the intestinal tract of the wild African giant pouched rat (*Cricetomys gambianus*).

Parameter	Animal number										Mean ± SEM
	1	2	3	4	5	6	7	8	9	10	
Body weight (g)	800	1400	1200	1300	1300	1200	500	1380	500	875	1045.5 ± 110.6
Body length (cm)	22	23	24	33	26	25	22	24	19	23	24 ± 1.16
Stomach weight (g)	31.3	26.0	26.5	29.3	35.0	28.0	30.0	26.0	30.0	26.0	28.8 1± 0.93
Stomach length (cm)	14	20	20	20	23	22	21	20	20	23	20.3± 0.80
GIT length (cm)	252	284	266	268	212	180	236	235	180	210	232.2 ± 11.49
Small intestine length (cm)	124	137	130	135	132	104	140	133	133	122	129 ± 3.27
Small intestine width (cm)	.0.4	0.4	0.35	0.4	0.4	0.35	0.35	0.4	0.4	0.4	0.39 ± 0.01
Large intestine length (cm)	92	95	85	91	80	76	96	102	77	88	88.2 ± 2.73
large intestine width (cm)	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.6	0.6	0.55 ± 0.02
Cecum length (cm)	21	32	22	20	25	23	38	27	26	35	26.9 ± 1.92
Cecum width (cm)	2	3	3	3	3	2	3	3	2	3	2.7 ± 0.15

GIT, gastrointestinal tract; SEM, standard error of the mean.

MATERIALS AND METHODS

In this research, ten adult African giant pouched rats of both sexes were used. The animals were captured alive using local metal cage traps in the wild around Samaru and Bomo villages in Zaria, Kaduna state, Nigeria. They were transported to the laboratory of the Department of Veterinary Anatomy, Ahmadu Bello University, Zaria and acclimatized for two weeks prior to the research. They were fed with groundnut pellets and water was given *ad libitum*. The care and handling of these animals conformed to the rules and guidelines issued by the Ahmadu Bello University.

Physical examination revealed that the animals were healthy and in good nutritional status before the research. The animals were anaesthetized using gaseous chloroform in a closed container. Their body weights were recorded to the nearest gram, using a laboratory balance (Model P 1210). Immediate after the death of each animal, an incision was made in its ventral midline, from the cervical region to the level of the pelvic region. The abdominal cavity was opened and regular body fat stores around the kidneys and in the mesenteries were present in all animals. The intestines were dissected from their mesenteries, spread and stretched in a straight line and their lengths measured by thread and meter rule and recorded (cm).

RESULTS

Morphometric observations

The mean body and stomach weights together with the dimensions of the GIT were recorded in the Table 1. The mean body and stomach weights were 1045.5 ± 110.6 g and 28.8 1± 0.93 g, while, their lengths were 24 ± 1.16 and 20.3 ± 0.80 cm, respectively. The mean length of the GIT was 232.3 ± 11.49 cm. The mean small intestine length of 129 ± 3.27 cm was the longest segment of the GIT, followed by the 88.2 ± 2.73 cm of the large intestine. The large intestinal mean width ranged 5 - 6 mm, while, that of the small intestine was 3 - 4 mm.

Gross structure

External divisions

Grossly, the stomach of the AGPR was divided into two parts: the non-glandular and the glandular. The glandular stomach constituted of the following regions: cardiac, fundic, pyloric and a gastric pouch-like diverticulum. It presented two curvatures, one greater and another lesser. Two surfaces; the parietal and viscera, two orifices; cardiac and pyloric were observed. The esophagus enters the greater curvature of the constricted area. The constricted area separated the glandular from the non-glandular part. The non-glandular was in a form of coma-shaped, with blind sac-like end.

The intestine was observed to be divided into small and large intestine. The small intestine was subdivided into the duodenum, jejunum and ileum, while the large intestine was also subdivided into three segments: the cecum, colon and rectum. The duodenum appeared smooth and was measured from the pylorus to the origin of the jejunum. The jejunum occupied the abdominal floor bet-ween the stomach cranially and the urinary bladder cau-dally. It was observed to be very long, and coiled, but gradually stopped forming coils near its end with the ileum. The ileum was also smooth, slightly straight and curved only where it joined the large intestine at the ileo-cecal junction.

The cecum was the largest segment of the large intestine. It was very large, coma-shaped blind ended sac situated at the ileo-cecal junction. The colon was long with a wide lumen and contained fecal balls. The rectum was short and straight with a narrow lumen which terminates at the slightly enlarged area, the anal canal.

Internal surfaces

Dissection of the stomach revealed that the mucous membrane of the esophagus continuous with the gastric wall of the cardiac region of the glandular stomach. The glandular mucosa was observed to be thick, soft and velvety. A groove that covered few millimeters (5 mm) besides the opening of the esophagus on the right was observed to be interrupted by a raised fold of limiting

ridge or membrane. The limiting ridge separated the glandular stomach from the non glandular stomach internally. The gastric wall of the internal diverticulum's region had two distinct thick mucosal folds. Most of the glandular mucosa was occupied by the fundic glands. The non-glandular mucosa was brownish in coloration and presented numerous soft towel–like papillae or projections.

The internal surface (mucous membrane) of the intestine was soft and smooth like the glandular part of the stomach

DISCUSSION

Grossly, the monogastric stomach observed in our study is similar to that documented for rat, *Rattus norvegicus*. Though, the stomach of the rat constituted only 0.5% of the body weight and has no constricted area that separated the two main stomach regions (Caster et al., 1956; Rudolf and Stromberg, 1976). In our study, the stomach weight accounted for 3% of the body weight. The stomach and cecum accounted for 9 and 12% of the GIT length, while the small and large intestine were 56 and 34%, respectively. Grossly, the monogastric compound stomach observed to in our study is similar to that documented for rat (Caster et al., 1956). Though, the stomach of rat does not have an external constricted area which separated the non-glandular from the glandular part (Rudolf and Stromberg, 1976). Also, the stomach of rat represented only 0.5% of the body weight.

With the exception of the pouch–like diverticulum (which is not found in the dog), the glandular part of the stomach in our research resembled the simple stomach of the dog (Ojo et al., 1987), and the abomasum of the ruminant stomach (Olusanya and Olowo, 1988). While the non-glandular part was presented with numerous short, soft, towel- like papillae similar to that described in the rumen of the ruminant. However, the rumen particularly in the ventral part is thrown into long, finger -like ruminal papillae (Olusanya and Olowo, 1988) which are longer than those observed in our study.

We observed the intestinal length to be 10 times the body length. And the width of the small and large intestine were 3 - 4 and 5 - 6 mm, respectively. These figures were longer than the 2-6 mm in the insect and 5 times the body length in the dog. However, it was shorter than the 15 in the pig, 20 in the ox and 25 times in the ruminant (Ojo et al., 1987).

The sac- like blind end cecum observed in our study was similar to the ceca of most omnivore and herbivorous animals. However, cecum and colon were haustrated throughout their lengths in pig, humans and some monkeys (Esther and Edward, 2008). The prominent feature in the GIT of most small mammalian herbivores such as the lagomorphs, rodents and arboreal marsupials is a large cecum, which serves as the principal site for microbial fermentation (Esther and Edward, 2008).

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