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Biometric and morphologic studies of the female reproductive organs of the African giant rat (*Cricetomys gambianus*: Waterhouse)

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Different segments of the reproductive tract of 100 adult, non-pregnant, female African giant rats (AGR) were carefully examined, weighed, and measured. The ovaries were observed to be small, pinkish, and kidney-shaped. The uterus of the AGR was found to be uterus duplex. The live weight of the AGR was 999.7 ± 16.86 g. The weight, length, and width of the ovary were 0.095 ± 0.003 g, 0.750 ± 0.01 cm, and 0.01± 0.02 cm, respectively. The length of the oviduct, uterus, and vagina/vestibule were 4.44 ± 0.06 cm, 4.877 ± 0.11 cm, and 4.345 ± 0.07 cm, respectively. The weight and length of the entire tubular organs were 3.171 ± 0.01 g and 13.559 ± 0.18 cm with corresponding range values of 1.61–7.10 g and 7.80–17.40 cm, respectively. (Folia Morphol 2010; 69, 4: 213–215)

Key words: morphology, biometry, reproductive organs, female and African giant rat

INTRODUCTION

The African giant rat (*Cricetomys ganbianus,* Waterhouse) (AGR) is a representative of the *Muridae* family [11], which constitutes a group of the *Rodentia* order of mammals. The AGR is also known as the Giambian rat, fancy rat, or comic rat. They are found in Central and West African countries, including Nigeria [1, 6]. The biggest economic impact of the AGR is that they are a good source of meat. They are considered rather tasty and are even raised for their meat. This has led to a significant drop in the AGR population, which now poses a threat to their ultimate survival. Pioneering efforts and attempts to study the male reproductive biology [8], morphometry study of the male reproductive organs [7], studies on the epididymis [8, 9], and an overview report of the male accessory organs of reproduction, including the coagulation glands [10] have been carried out in Nigeria. Little work has been done on the anatomy of the female reproductive system in the Northern Guinea Savannah zone of Nigeria, where Zaria is located. The results of such a study may further contribute to the current understanding of the biology of the female AGR.

The aim of the study was to obtain basic anatomical data on the female reproductive organs. Such data, if available, may be of value in the understanding of the physiology of reproduction in the AGR, which may facilitate the domestication, breeding, and production of the rat.

MATERIAL AND METHODS

Animals

A total of 100 adult, non-gravid, female AGRs were used for this study. The animals were caught alive from surrounding villages around Zaria, Kaduna State, Nigeria. They were housed in metal cages

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Table 1. Body weight and weights [g] of the reproductive organ of the African giant rat (mean ± SEM)

Parameter	Mean ± SEM	Minimum	Maximum
Body weight	996.74 ± 16.86	600	1500
Ovary	0.09 ± 0.003	0.01	0.17
Oviduct and uterus	0.711 ± 0.03	0.42	1.65
Vagina and vestibule	2.467 ± 0.08	1.13	5.45
Weight of the tubular organs	3.171 ± 0.10	1.61	7.10

in the Experimental Animal Unit of the Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Ahmadu Bello University Zaria, and allowed to acclimatize for two to three days. They were fed with palm kernel fruits, pawpaw, yam, and cassava tubers and partially dry maize and water was given *ad libitum.*

Collection of organs

The animals were lightly anaesthetised using chloroform and weighed alive using a weighing balance (Ohaus scale crop) with a sensitivity of 0.1 g and then sacrificed by severing the jugular vein. The animals were then placed on a dorsal recumbency and a midline incision was made, starting from the xiphoid cartilage and extending to the pubic symphysis. The peritoneum was reflected and the intestine displaced to gain access to the reproductive organs. The organs were examined *in situ* and exteriorised.

The length, weight, and width of the reproductive organs were measured using ruler and thread, weighing balance, and vernier callipers, respectively. The organs were weighed using a Mettler balance P1210 (Mettler Instruments AG, Switzerland) with a sensitivity of 0.01 g. The ovarian length was measured from pole to pole, and the diameter was calculated from the circumference.

The data obtained were expressed as mean ± ± standard error of the mean (mean ± SEM). Values of $p < 0.05$ were considered significant.

RESULTS

The ovaries of the AGR were observed to be small, pinkish, kidney-shaped, and buried in a mass of fat and connective tissue. They were located caudal to the kidneys, with the right ovary being situated more anteriorly than the left, and were connected by proper ligament to the lumbar muscle cranial to the kidney. Each ovary had a lateral and a medial surface, mesovarian border, a free border, and a hilus. The free border was convex, while the mesovarian border was concave and indented at the hilus. The hilus had two extremities, a tubal extremity which was cranial and located close to the fimbriated end of the uterine horn, and a uterine extremity caudally located and connected to the uterine tube by the mesovarium. The oviduct of the AGR was convoluted and wound around the ovary from the median to the caudal aspect. The infundibulum projected dorsolaterally into the ovarian bursa. The oviduct, which was suspended by the mesosalpinx, opened into the uterus at the ventrolateral side. The oviduct was composed of three distinctive segments: The widened ampulla starting at the ovarian bursa, the narrow isthmus, and the uterine intramural portion.

The uterus of the AGR was classified as *uterus duplex*, the two uteri joining to form the median vagina lying below the dorsally placed rectum and leading to an external opening between the clitoris and the anus.

The live weight of the AGR was 999.7 ± 16.86 g, while the weight of the ovary was 0.095 ± 0.003 g with a range of 0.01–0.17 g. The length and width of the ovary were 0.750 ± 0.01 cm and 0.01 ± 0.02 cm, respectively, with a range of 0.61–0.83 cm for the length. The mean length of the oviduct and uterus was 4.44 ± 0.06 cm and 4.877 ± 0.11 cm with range values of about 3.10–5.50 cm and 2.30–6.8 cm, respectively (Tables 1, 2).

DISCUSSION

The shape of the AGR ovary observed in this study was similar to that reported for the Mongolian gerbil [3]. The AGR ovaries were kidney-shaped with two distinct poles (cranial and caudal), but in the laboratory rat, the ovary is a follicular mass with an irregular nodular surface [5]. The weight (0.095 ± ± 0.00 g) of the ovary obtained in this study varied

Table 2. Length of the reproductive organs [cm] of the African giant rat (mean ± SEM)

Parameter	Mean ± SEM	Minimum	Maximum
Ovary	0.750 ± 0.01	0.61	0.83
Oviduct	4.444 ± 0.06	3.10	5.50
Uterus	4.877 ± 0.11	2.30	6.80
Vagina and vestibule	4.345 ± 0.07	1.90	6.40
Length of the tubular organs	13.559 ± 0.18	7.80	17.40

considerably when compared with those of the laboratory rat (0.06 g) reported by Hebel and Stromberg [5], and the rabbit (0.229 ± 0.022 g) as presented by Bitto et al. [2]. The length (0.750 ± 0.01 cm) of the ovary obtained in this study was less than that of the rabbit (1.90 ± 0.163 cm) as reported by Bitto et al. [2].

The fact that the oviduct of the AGR was highly convoluted and wound around the medial and the caudal aspect of the ovary agreed with similar observations obtained in the gerbil rat [13] and in the laboratory rat [5]. The length of the oviduct (4.444 ± ± 0.06 cm) obtained in the present study differed from those of the rabbit (6.00 ± 0.794 cm) reported by Bitto et al. [2] and the laboratory rat (2.4 cm) according to Hebel and Stromberg [5]. In the present study, the AGR had one vagina and two uteri. Each uterus had a separate and distinct opening into the vagina. This finding is in agreement with the observation in the laboratory rat [5] and the rabbit [12] as well as the Mongolian gerbil [3]. However, the body of the uterus in the mouse was composed of a cranial portion, which contained two cavities separated by a median septum, and a caudal portion, the cervix, which was undivided [4]. Hebel and Stromberg [5] reported that the mean lengths of the uterus and the vagina in the rat were 3.9 cm and 1.75 cm, respectively. The figures were slightly lower than those obtained in the present study (4.877 ± 0.011 cm and 4.345 ± 0.07 cm) for the uterus and vagina, respectively. Bitto et al. [2] reported that the length of the rabbit uterus was 8.07 ± 0.409 cm and that this value was similar to the mean value of 7.0 cm reported by Praag [12] in the rabbit. The difference in dimensions obtained above may be due to the variation in the size of the animals.

CONCLUSIONS

Baseline anatomical data of the female reproductive system of the AGR have been obtained in the present study. The data may be of value in the understanding of the biology of the female AGR, which may further facilitate its domestication, breeding, and production.

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