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RESEARCH ARTICLE

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The Anatomy and Histochemistry of the Mandibular Salivary Glands of the African Giant Rat (*Cricetomys gambianus*, Waterhouse 1840)

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ABSTRACT

Forty African giant rats (AGRs), (*Cricetomys gambianus*) were used for the morphometric, morphologic, histologic and histochemical studies. The rats were sacrificed according to Adeyemo and Oke (1990) and the Mandibular Salivary glands were dissected out. The weight and length of the Mandibular Salivary gland were measured in grams and centimeter, respectively. Transverse sections of the mandibular salivary glands were stained with Haematoxylin and Eosin for normal histological studies. For histochemical studies, transverse sections were stained with Alcian Blue (AB), Periodic Acid Schiff (PAS) and Alcian Blue-Periodic Acid Schiff (AB-PAS) to determine the nature of their secretions. Grossly, the mandibular salivary glands were observed to be lobulated, paired, roughly square shaped and were located ventral to the parotid salivary glands. The mean weight and length of the mandibular salivary glands were 0.78 ± 0.02 g, and 1.68 ± 0.049 cm, respectively. The mandibular salivary glands were observed to have few serous acini with numerous mucous acini and were AB and PAS positive.

Keywords: Anatomy, Histochemistry, Mandibular Salivary Glands and African Giant Rats (*Cricetomys gambianus*-Waterhouse 1840).

INTRODUCTION

A range of histological and histochemical staining methods have been developed to identify the different cells of the salivary glands. Despite the wide range of methods available only three types of mucins can be recognized [1]. The anatomy and histochemistry of the salivary glands have been studied in various species including ruminants [2], humans [3], carnivores [4], primate [5] and some rodents.

Despite the features of the salivary glands of some rodents that have been studied, the mandibular salivary glands of the African giant rat (*Cricetomys gambianus*-Waterhouse) is yet to be fully investigated. The only work done on the mandibular salivary glands was done on a different species of this rodent (*Cricetomys emini*) in southern part of Nigeria. This work seeks to describe the morphometry, morphology, histology and Histochemistry of the mandibular salivary glands of the African giant rat.

MATERIALS AND METHODS

Animal Source

Forty adult African giant rats, (AGR) *Cricetomys gambianus*, of both sexes were captured alive in the wild around Samaru and Bomo villages in Zaria, Kaduna State, Nigeria from January to April 2009 using metal cage traps. They

were transferred into standard laboratory rat cages in the Department of Veterinary Anatomy, Ahmadu Bello University, Zaria and fed with commercial feed for a while before sacrifice. Water was given *ad libitum* during the period.

Gross Studies.

Forty of these rats were used for the morphometric study. Each rat was sacrificed according to [6] and placed on a lateral recumbency. The skin and fascia at the base of the ear and the caudal border of the mandibles were excised, mandibular salivary glands dissected out and its photograph taken. The weights and lengths were recorded in grams and centimeters, respectively. Photographs were taken later.

Histological studies

Tissues collected from the mandibular salivary glands were immediately fixed by complete immersion in 10% normal formalin, labeled and kept for two days. They were dehydrated through a series of graded alcohol (70%, 80%, 90%, 95% and 100%). They were later cleared in xylene and infiltrated with molten paraffin wax. Transverse sections of 5 μ thick were cut from the embedded tissues using disposable microtome knives. These sections were mounted on greasefree clean glass slides and stained at room temperature using Haematoxylin and Eosin (H and E) method for routine histological studies.

Histochemical studies

For histochemical studies, transverse sections from the embedded tissues were cut and stained with Alcian blue (AB), for acidic mucin identification, Periodic Acid-Schiff (PAS), for identification of neutral mucin and Alcian blue together with Periodic Acid-Schiff (AB-PAS) for the identification of both the neutral and acidic mucins were employed.

The slides were studied using light microscope (Olympus binocular microscope) at x40 x100, x250 and x1000 magnifications. Photographs of the prepared slides mounted on the binocular microscope were taken using a digital camera. These pictures taken were transferred to a computer and detailed studies were carried on them. Relevant areas and structures were labeled and printed.

Statistical Analysis.

Recorded weights and lengths studied were express as mean \pm standard error of mean (M \pm SEM) using statistical package for social sciences (SPSS) version 17.

RESULTS

Grossly, the mandibular salivary glands were lobulated, paired, roughly square in shape and were located ventral to the parotid salivary gland (Plate I). The mean weight and length of the mandibular salivary gland were 0.78 ± 0.02 g, and 1.68 ± 0.049 cm, respectively. Histologically, the mandibular salivary gland had few serous acini with numerous mucous acini (Plate II). These acini were located around the excretory duct and most acini cells stained well with both Alcan blue (AB) and Periodic acid Schiff (PAS) and were positive for AB and PAS indicating the presence of acidic and neutral mucins (Plates, III and IV).



Plate I: Lobulated Mandibular salivary gland. X10

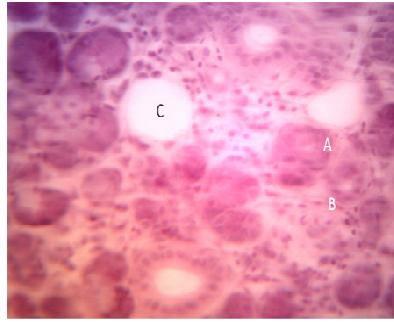


Plate II: Transverse section of the Mandibular gland showing the Serous acini (A), mucous acini (B), interlobular Duct (C). H&E,X40

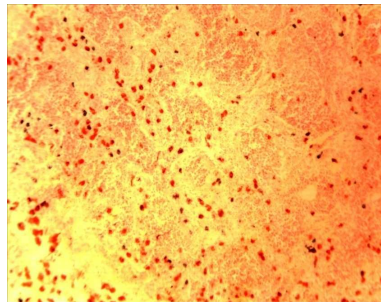


Plate III: Transverse section of the Mandibular Salivary Gland showing AB positive (black dots) x 40. H&E x 40

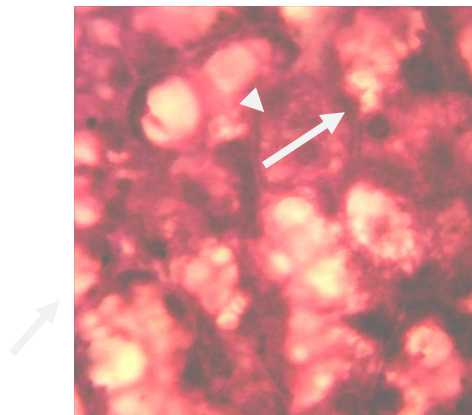


Plate IV: Transverse section of the Mandibular Salivary Gland showing the serous (arrow head) and mucous acini (arrow) x 100

DISCUSSION

Two salivary glands were observed, namely the parotid and mandibular salivary glands. The mandibular salivary glands were of great size and were located caudal to the parotid gland and each was lobulated. This finding was at variance with the observations of [7] and [8] who observed four salivary glands in the rabbit and the laboratory rat. In the present study, the classification of the salivary glands were done according to the contents of their mucus (neutral and acidic) as were determined by Alcian Blue (AB) and Periodic Acid Schiff (PAS) method. According to this classification the endpiece of secretion of the mandibular salivary glands were Seromucus and the gland was observed to be a compound branched tubulo-acinar gland and its morphology varies from specie to specie, but generally consisted of a tubular unit with an enlarged end piece. Most histological studies of the salivary glands have investigated the mandibular and parotid salivary glands. In all these investigations, most mandibular salivary glands were observed to contain Seromucous cells. Seromucus cells have also been observed in the squirrel monkey [5] and Rhesus monkeys [4]. Serous cells were reported in the mandibular salivary glands of common marmosets [9] and

Philippine macaques [10]. This observation was at variance with those of [11] who observed serous acini only in the mandibular glands of the AGR and Guinea pig.

In conclusion, this study was able to find out that the African Giant Rat had only the mandibular and parotid salivary glands and that the mandibular salivary glands were lobulated and had serous and mucous acini which were AB and PAS positive, respectively.

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