

Histological study for the identification and distribution of medullary (chromaffin) cells in the adrenal gland of camel.

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Abstract

In order to study the differentiation and distribution of the chromaffin cells in the adrenal medulla of camel. Thirty specimens of adrenal glands of male and female were fixed using two concentrations of Regaud's solution. Fifteen specimens were fixed in Regaud's solution containing 3% of potassium dichromate for 24 hours, and the other 15 specimens were fixed by same solution containing 8% of potassium dichromate for two weeks. Routinely processed by using histological technique and studied by light microscope, the results demonstrated that the adrenal medulla included columnar cells its mean length was (22)µm and its cytoplasm stained brownish color and these are secreting adrenaline, and arranged in outer zone, and an inner zone of small polyhedral cells, its mean length (9.5) µm and its cytoplasm stained yellowish and secreting nor-adrenaline. The central vein of the adrenal medulla contained smooth muscle fibers in its wall, which was not mentioned by other investigators in camel.

Introduction

The adrenal glands of the animals are pair of endocrine gland containing two different tissues differs in the structure and function (1). The cortex is derived from the mesoderm and the medulla is derived from ectoderm (2). The adrenal medulla consists of chromaffin cells which secrete epinephrine and nor-epinephrine under the influence of hypothalamus via the preganglionic sympathetic neurons and the release of these hormones in cases of fear, fight, stress pain, and the decrease of level of glucose in the blood (3).

The present study confined on the identification and distribution of the medullary cells (chromaffin cells) in the adrenal medulla of the one humped camel.

Literature Review

The medullary cells of the adrenal medulla of horse are polygonal in shape with brown granules in the cytoplasm, the medullary cells are positive reaction for chromium salts (4). In the sheep (5), described the morphology of the chromaffin cells in the sheep, as Columnar cells; while in other animals polygonal, and the medullary vein is devoid of smooth muscle fibers in its wall; while Jamdar and Ema (6), described the medullary cells in equines as columnar and their dimensions (24×7.5)µm and that there are polygonal cells in the center of medulla.

In buffalo, (7) demonstrated the columnar cells of the medulla of adrenal gland and spherical small cells in the center of the medulla.

In the human, (8) attributed that chromaffin cells of adrenal medulla is innervated by preganglionic sympathetic fibers.

The identification of epinephrine and nor epinephrine cells of adrenal medulla in the cat, rabbit and Syrian hamster was done by using chromium salts as fixative (9).

In the laying hens, the adrenaline and nor adrenaline cells are intermingled with the cortical tissue of the adrenal gland (10).

In the camel (11) demonstrated that the medullary cells of the adrenal medulla present in the form of oval groups formed by cuboidal cells in the form of long strands with columnar cells.

Materials and methods

Thirty adrenal glands of both sexes of camels were collected. The Adrenal glands were sectioned, and fifteen specimens of adrenal medulla were fixed in Regaud's solution which containing potassium dichromate 3% for 24 hours, and another fifteen specimens were put in Regaud's solution 8% potassium dichromate for two weeks (12). The specimens after its fixation put in graded alcohol series, clearing with xylene and embedding was done by paraffin wax with melting point 58 C° and other histological technique including the staining was done included haematoxylin and eosin and van Gieson for collagen fibers (13). Statistical parameters were achieved by using ocular micrometer for measuring the length and width of 100 cells in the adrenal medulla, (14), and the mean of each parameter was calculated and t-test was applied to show the statistical significance (15).

Results

The medulla of the adrenal gland showed the presence of endocrine medullary cells arranged in the form of spherical or oval groups consist of (10-20) cells in each group, surrounded from outside by the basement membrane, the sinusoidal capillaries pass through these groups (fig1). There was two types of cells, the first type which was present in the central part of medulla found in the form of polyhedral cells with central nuclei with euochromatin and one nucleoli in each nucleus.

The second type of cells were present in the periphery of medulla consist of columnar cells with oval nuclei and euochromatin with one-two nucleoli (fig 2). The color of the cytoplasm of cells in the central part of medulla was yellowish and the cytoplasm of cell in the periphery of medulla was brownish (fig 3), this case was demonstrated after two weeks of fixation with chromium salts. While fixation for 24 hour, revealed the staining of peripheral cells only. The medullary central vein showed the presence of smooth muscle fibers in the tunica media of it (5-10) layers. The mean length of columnar cells in the periphery of adrenal medulla was 22 µm and the length of polyhedral cell in the center was 9.5 µm.

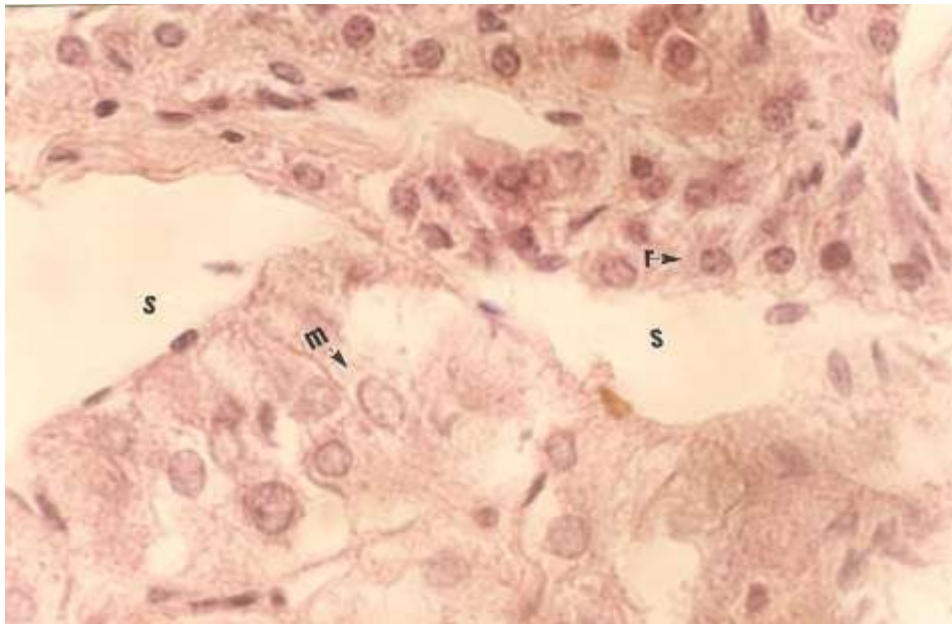
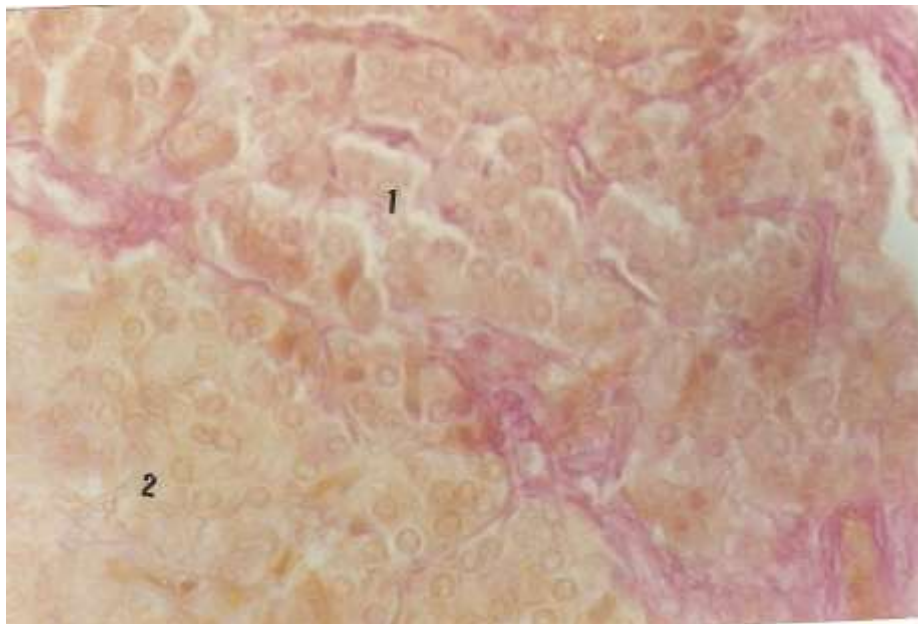
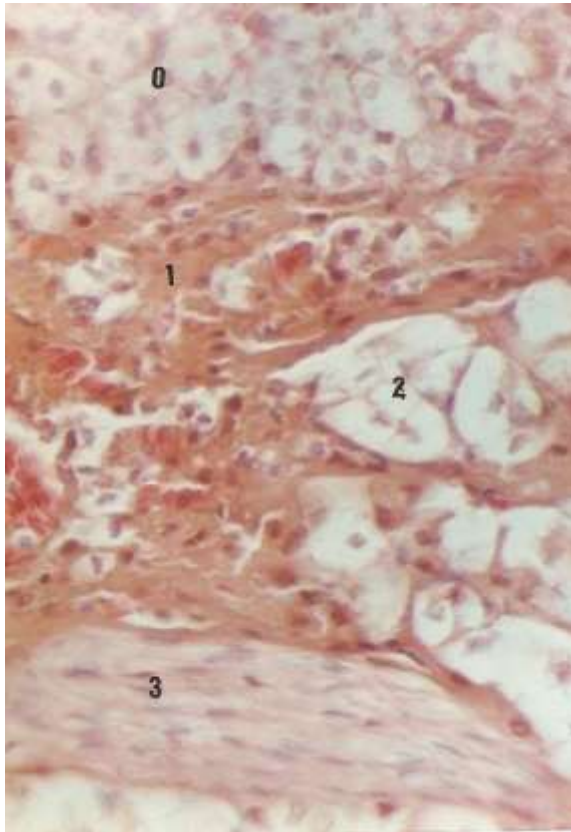


Fig (1) showing
 r – zona reticularis
 m- peripheral cells of medulla
 s- sinusoidal capillaries
 (Hematotoxylin and Eosin 1250X)



Fig(2) showing the chromaffin cells after fixation with
 chromium salts 8% for 2 weeks
 1-Epinephrine cells
 2-Nor epinephrine cells
 (Hematotoxylin and Eosin 500X)



Fig(3) showing
demonstrating the cells of
adrenal medulla after
fixation in chromium salts
3% for 24 h

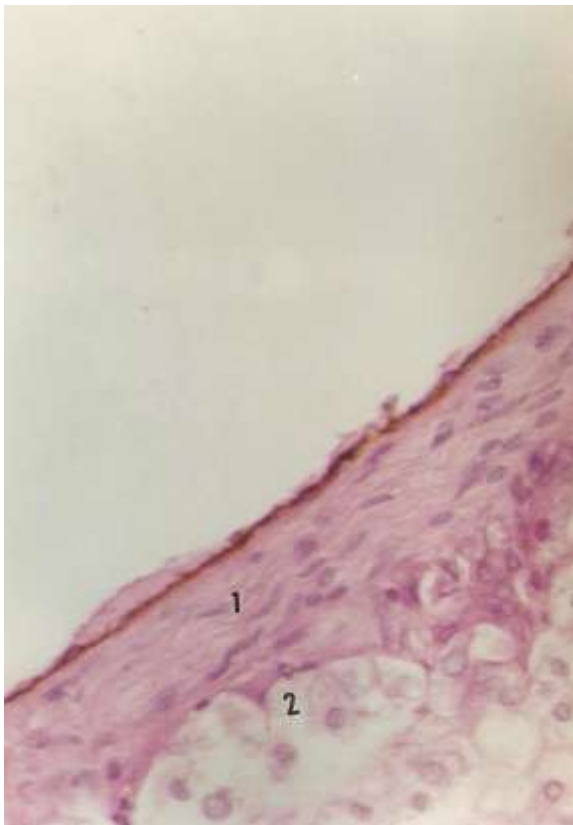
0-Zona reticularis of
cortex

1-Epinephrin cells

2-Nor epinephrine cells

3-Myelinated nerve
bundle

(P.A.S. 500x)



Fig(4) Cross section of
adrenal medulla showing

1-Smooth muscle fibers in
the wall of central vein

2-Nor epinephrine cells

(H & E 500x)

Discussion

The present study was indicated the presence of columnar cells arranged in the periphery of the adrenal medulla and small polyhedral cells in the center and this was agree with (16) in there description of chromaffin cells in the ruminants, otherwise (17) described the presence of columnar cells only in the adrenal medulla of camel. The presence of adrenaline cells in the periphery which stained brownish color and nor-adrenaline which was stained yellowish color and present in the center of

medulla was corresponding to the concept of (9) in the adrenal medulla of cat , rat , mice and Syrian hamster also (16) in the other ruminants (ox, sheep and goat), The histological technique of the present study demand two weeks and 8% of potassium dichromate to stain the nor-adrenaline cells. The presence of smooth muscle fibers in the wall of the central vein in the adrenal medulla (5-10) layers was not mentioned by (17) in the camel , and the present study in regard smooth muscle in the central vein was agree in human with(8).

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دراسة نسيجية لتشخيص وتوزيع الخلايا النخاعية (أليفة الكروم) في نخاع الغدة الكظرية للجمال

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المخلص

لغرض دراسة تمييز وتوزيع الخلايا أليفة الكروم في نخاع الغدة الكظرية في الجمال، استخدمت ثلاثون عينة لغدد كظرية لجمال بالغة سليمة من الإناث والذكور خمسة عشر عينة من نخاع الغدد الكظرية ثبتت باستخدام محلول ريكارد الحاوي على ٣% من البوتاسيوم ثنائي الكروم لمدة ٢٤ ساعة وخمسة عشر عينة أخرى ثبتت باستخدام نفس المحلول الحاوي على ٨% من البوتاسيوم ثنائي الكروم لمدة اسبوعين. تم استخدام الطرق التقنية النسيجية لدراستها بالمجهر الضوئي، بينت النتائج أن نخاع الغدة الكظرية احتوى على خلايا عمودية بمعدل طول ٢٢ مايكروميتر وهايولها اصطبغ بلون بني وهي خلايا فارزة للأدرينالين وترتبت بهيئة نطاق خارجي وخلايا مضلعة صغيرة بمعدل طول ٩,٥ مايكروميتر وهايولها اصطبغ بلون اصفر. (وهي خلايا النورادرينالين) ترتبت بهيئة نطاق داخلي.

الوريد المركزي في النخاع احتوى على الألياف العضلية الملساء في جداره والذي لم يذكر من قبل باحثين آخرين في الجمال.