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Histological Effect of Hydrocortisone and Zinc Acetate in Kidney of Mice Males

Mahmood Nawfal Mustafa[1], Shaymaa Abdalkader Mahdy[1], Rashid Khamees Shaban[2]
[1] *College of dentistry, Tikrit University, Tikrit, Iraq.*
[2] *College of Education for pure science, Tikrit University, Tikrit, Iraq.*
mahmood_nawfal@tu.edu.iq

ABSTRACT
The aim of this study is to identify the histological effects in kidney which induced by hydrocortisone and treating it via zinc acetate. 20 male of *Mus musculus* were distributed into four groups, first group (G1) was the control group, which was administerd with distilled water, second group (G2) was injected by 1mg/kg of hydrocortisone in thigh muscle for 10 days, third group (G3) was injected by 1mg/kg of hydrocortisone in thigh muscle for 10 days, then administerd via oral dosage 0.21ml/kg of zinc acetate for 10 days, and fourth group (G4) group was injected by 1mg/kg of hydrocortisone in thigh muscle, and in the same time they administerd via oral dosage 0.21ml/kg of zinc acetate for 10 days.
The results of microscopic examination showed changes in kidney tissue of the animals in the second, third and fourth groups, represented by presence of fibrosis and fibroblasts around congested blood vessels, as well as hemorrhage within renal tissue and inside the lumen of urinary tubules which were also swelled, and atrophy of some glomeruli with expansion in the urinary space around them, in addition to hypertrophy in an other some of glomeruli. While kidneys of the third group showed good response for treated, that represented by returning most of glomeruli and urinary tubules to their normal state, with absence of fibroblasts and fibrosis, as well as disappearing of hemorrhage and congestion. Kidneys of fourth group showed response for treated but not as in third group, so fibrosis, hemorrhage and congestion were disappeared with presence of some degeneration in epithelial cells that lined urinary tubules.
Keywords : Hydrocortisone, Zinc acetate, kidney

Introduction
Zinc is an essential component of biological importance in general, health in particular, and for regard to prenatal and postnatal growth. Presence of this element in plants varies depending on its levels in the soil. Some of these plants contain significant amounts of zinc such as wheat and various seeds (sesame, alfalfa, celery and mustard). It is also found in beans, nuts, almonds, pumpkin seeds, sunflower seeds and black currant [1]. In humans, zinc plays important biological roles and interacts with a wide range of ligands [2]. It has a role in RNA metabolism, RNA transfusion and gene expression [3].
The body contains (1.5-2.5) g of zinc, and it is one of the most important components of the living cell, its participate in the structure and function of cellular enzymes, so it is important in the immune function, cell growth, gene expressions, protein metabolism, hemoglobin activity and even night vision [4]. Low amounts of zinc in the body cause health and developmental problems for children and women. Recent studies have shown that zinc deficiency causes hyperactivity disorder, attention deficit hyperactivity disorder (ADHD) in children, and depression in women [5], while increasing the level of zinc with drug therapy according to studies help to solve this problem [6].
Corticosteroids are chemical compounds of a hormonal nature derived from cholesterol. Their biological effectiveness depends on the chemical composition, and because of the wonderful anti-inflammatory and immunological activities of corticosteroids, they have been used as a first solution in the treatment of various diseases, sometimes they may be used as a drug in daily patron [7].
Hydrocortisone is a rapid, short term-acting glucocorticoid used to management adrenal insufficiency, allergic and inflammatory diseases. Hydrocortisone possess the same chemical formula as cortisol and that why it is very similar to the human adrenal hormone [8].
Hydrocortisone considered as one of the therapeutic family that called corticosteroids, inters the cell and binds with a certain receptors in the cytoplasm to be a complex of treatment and receptors which moves into

the nucleus and binds with the DNA that responds and copies a particular mRNA produces the desired action in the cytoplasm [9]. Despite the importance of hydrocortisone in many medical treatments, certainly there are a number of Harmful effects resulting from the usage of this drug on body systems in general [7].

Material and methods

Hydrocortisone bought from local pharmacies and zinc acetate obtained from the store of chemical materials of college of Education of pure sciences / university of Tikrit .

The animals were obtained from the Animal House of college of Veterinary Medicine / University of Tikrit, and the experiment was accomplished there. Twenty healthy males mice were used in this study, their weights ranged between (30-35) g and their age about (11-12) weeks distributed into four groups with five animals per group.

G1: control group was administerd by 1ml distilled water for 10 days.

G2: 2nd group was injected by 1mg/kg of hydrocortisone in thigh muscle for 10 days [10].

G3: 3rd group was injected by 1mg/kg of hydrocortisone in thigh muscle for 10 days, then administerd via oral dosage 0.21ml/kg of zinc acetate for 10 days [11] .

G4: 4th group was injected by 1mg/kg of hydrocortisone in thigh muscle, and in the same time they administerd via oral dosage 0.21ml/kg of zinc acetate for 10 days.

After administration and treatment were completed, the animals were starved for 24h and then dissected to obtain kidneys and prepared the histological sections [11].

Results

Control group: (G1) Histological examination of kidney tissue in animals of this group showed the normal structure of kidney tissue, where renal glomeruli surrounded by urinary space around them, proximal and distal convoluted tubules as well as collecting tubules were observed (Fig. 1).

Group II: (G2) Through histological examination of kidney tissues in this group, observed a clear fibrosis within the kidney tissue, with the possibility of observing fibroblasts and the presence of an infiltration of inflammatory cells, as well as hemorrhage through the kidney tissue and within the lumen of some urinary tubules, as can be seen a degeneration of endothelial cells of others (Fig. 2,3).

Group III: (G3) After histological examination of kidney tissues in animals of this group, it was noted that most of the renal tissue returned to normal state, where it was possible to observe renal glomeruli as well as epithelial cells and urinary tubules in their normal form (Fig. 4, 5).

Group IV: (G4) Through histological examination of kidney tissues in animals of this group, it was noted that the renal tissue partially returned to normal state, where some renal glomeruli and some urinary tubules have returned to normal form, with the possibility of observing the presence of cellular degeneration of endothelial cells in some urinary tubules (Fig. 6.7).

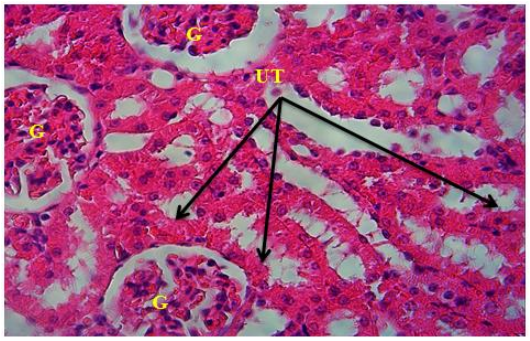

Fig. (1): G1 control group shows normal state of glomerulus (G) and urinary tubules (UT) H&E 400x.

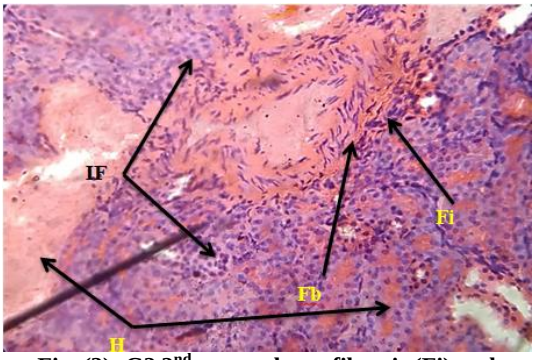

Fig. (2): G2 2nd group shows fibrosis (Fi) and Fibroblasts (Fb), Hemorrhage (H), inflammatory cells infiltration (IF). H&E 400x.

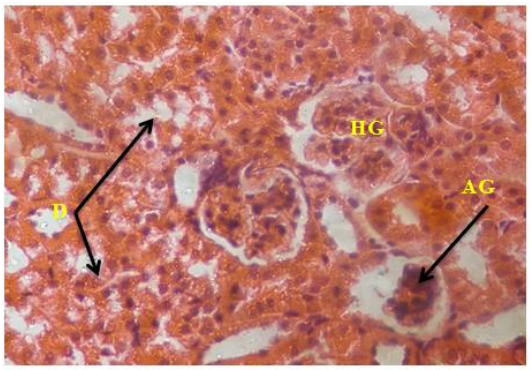

Fig. (3): G2 2nd group shows hypertrophy glomerulus (HG) atrophy glomerulus (AG) and degeneration (D) in epithelial cells of urinary tubules. H&E 400x.

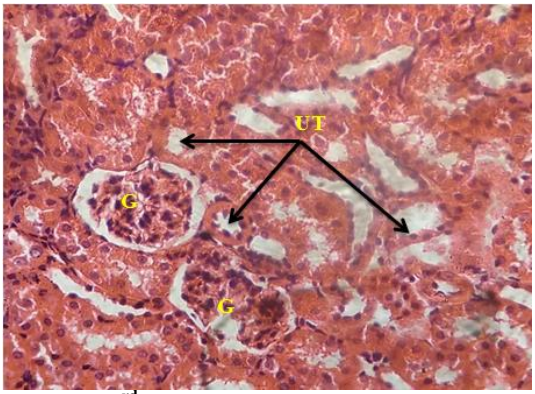

Fig. (4): G3 3rd group shows returning of glomeruli (G) and urinary tubules (UT) to normal states H&E 400x.

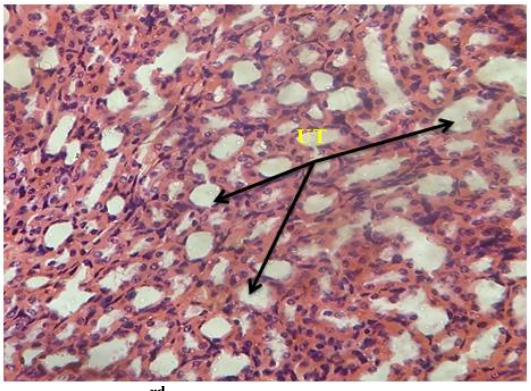

Fig. (5): G3 3rd group shows returning of urinary tubules (UT) to normal state. H&E 400x.

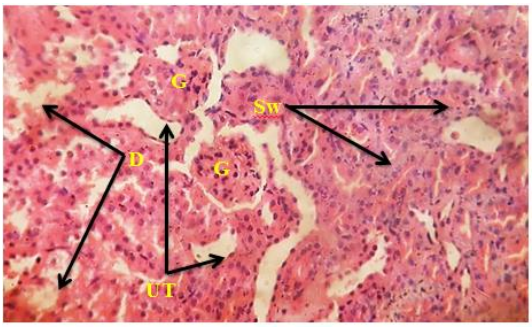

Fig. (6): G4 4th group shows returning of glomeruli (G) and some urinary tubules (UT) to normal state, with remaining of degeneration in other tubule cells (D) with swelling (Sw) of others. H&E 400x.

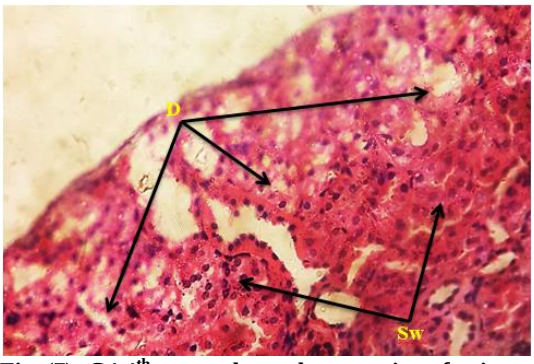

Fig. (7): G4 4th group shows degeneration of urinary tubule cells (D) and swelling (Sw) in others. H&E 400x.

Discussion

The results of microscopic examination of kidneys at the second group were agree with another study reported an increase in kidney weights and glomerular size in mice treated with theraputic doses of dexamethasone (a member of glucocorticoid family), with presence of swelling and degeneration in epithelia of urinary tubules, in addition to hemorrhage in kidney tissue and congestion in blood vessels [12]. Renal tubules injury as a result of poisoning causes death of tubular cells due to inadequate oxygen, as their metabolic activity depends on the oxygen supplied by the blood vessels, so any damage to the blood vessels such as necrosis or narrowing of the renal artery leads to poor blood flow and therefore lack of providing oxygen to the cells[13].

Appearance of degeneration lesions may be due to a defect in the sodium pumps, resulting in a decrease in the energy production required for proteins synthesis, which leads to deficiency of the important protein for the intact cell, and the injection of hydrocortisone leads to damage and necrosis in the liver cells, and this in turn attracts inflammatory cells, hydrocortisone causes inhibiting oxidative stress enzymes in cells that lead to presence of cell damage. [8].

Zinc in repairing tissues was explained by anti-oxidant effect, and function of zinc metalloenzymes, such as zinc finger proteins and matrix metalloproteinases (MMPs) [14]. Zinc finger proteins play an important role in gene expression, as they regulate genes responsible for production of growth factors in injury healing [15].

Zinc protects the cells against reactive oxygen species (ROS) by the zinc finger-trans activating protein A, it increases the activation of antioxidant, such as glutathione, catalase and superoxide dismutase. It also reduces the activities of oxidant-promoting enzymes like nicotinamide adenine dinucleotide phosphate (NADPH) and inhibits the lipid peroxidation products [16].

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التاثير النسجي لعقار الهيدروكورتيزون وخلات الخارصين على كلى ذكور الفئران البيض

محمود نوفل مصطفى[1] ، شيماء عبدالقادر مهدي[1] ، راشد خميس شعبان[2]

[1] كلية طب الأسنان ، جامعة تكريت ، تكريت ، العراق.

[2] كلية التربية للعلوم الصرفة ، جامعة تكريت ، تكريت ، العراق.

الملخص

كان الهدف من هذه الدراسة هو تحديد التاثير النسجي المستحث بعقار الهدروكورتيزون ومعالجته باستعمال خلات الخارصين. واستعمل 20 ذكر من الفئران البيض جنس *Mus musculus* اذ وزعت بشكل الى اربع مجموعات، المجموعة الأولى (G1) كانت مجموعة السيطرة، والتي جرعت الماء المقطر ، المجموعة الثانية (G2) حقنت بـ 1ملغم/ كغم من العقار في عضلة الفخذ ولمدة عشرة أيام، المجموعة الثالثة (G3) حقنت بـ 1ملغم/ كغم من العقار في عضلة الفخذ ولمدة عشرة أيام وبعدها اعطيت جرعة 0,21ملغم/كغم من خلات الخارصين عن طريق الفم ولمدة عشرة أيام، أما المجموعة الرابعة (G4) فقد حقنت بـ 1ملغم/ كغم من العقار في عضلة الفخذ وفي الوقت نفسه اعطيت جرعة 0,21ملغم/كغم من خلات الخارصين عن طريق الفم ولمدة عشرة أيام أيضاً.

أظهرت نتائج الفحص المجهري وجود تغير في نسيج كلى حيوانات المجاميع التجريبية الثانية ، الثالثة والرابعة. كلى حيوانات المجموعة الثانية، تمثلت بوجود تليف وخلايا مولدة للألياف حول الأوعية الدموية المحتقنة، ونزف ضمن النسيج الكلوي وداخل تجويف النبيبات البولية والتي بدورها كانت منتفخة، وكذلك ظهر ضمور في بعض الكبيبات وتوسع الفسح البولية حولها، فضلاً عن التضخم في كبيبات اخرى. بينما أظهرت كلى حيوانات المجموعة الثالثة استجابة جيدة للعلاج تمثلت بعودة معظم الكبيبات والنبيبات البولية الى وضعها الطبيعي، مع وزوال التليف والخلايا المولدة للألياف، علاوة على اختفاء النزف والاحتقان. كانت هناك استجابة في كلى حيوانات المجموعة الرابعة لكن ليست كما هي عليه في المجموعة الثالثة، لذلك لم يلاحظ وجود كل من التليف، الزنف والاحتقان الدموي، مع بقاء بعض التنكس في مجموعة من الخلايا الظهارية المبطنة للنبيبات البولية.