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Impact Of Hypericum Perforatum Extract On Histological Stracture And Some Physiological Parameters With Ameliorating Effect Of Omega-3 On Kidney Of Albino Rats

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ABSTRACT

St. John's wort Hypericum perforatum is a flowering plant and its have various medicinal and therapeutic uses. The current study aimed to diagnose the histological changes in the structure of the kidney resulting from the use of Hypericum perforatum extract at 300 mg/kg and Omeca-3 at a concentration of 25 mg/kg, and aimed to study the physiological effects of kidney function by level of urea and creatinine in the blood serum. This study used 20 male rats who were divided into four groups, 5 rats per group the first group which is the control group in the experiment. Second group (G2) was dosed with a concentration of 300 mg/kg of the extract of Hypericum perforatum. Third group (G3) was treated with a solution of Omega-3 at a concentration of 25 mg/kg. Fourth group (G4) was treated with the extract of Hypericum perforatum, and after two hours it was treated with the Omega-3 at the same concentrations as before. The dosage continued for 15 days, and after that physiological tests were performed on the blood serum, as well as tissue sections were prepared to microscopic examination. The current study showed the presence of a group of abnormal histological changes in the three groups of the experiment compared to the control group. These changes varied between enlargement of renal tubular cells, necrosis, and apparent expansion of Bowman's capsule. This study concludes that some tissue damage lead to functional changes in kidney tissue.

1. Introduction

Hypericaceae is a family, which St. John's Wort, or Hypericum perforatum, is a flowering plant that is a member of the hypericaceae family, which has around 55 genera and over 1,000 species (1). Because the St. John's wort flower is thought to have a rich source of bioactive chemicals, including naphthoidiantrone, acylphloroglucinol, phenols, flavonoids, and essential oils, it has been used medicinally since ancient times. It has therefore gained popularity as a therapy for burns, wounds, anxiety, and depression. According to available research, this herb can effectively cure a variety of additional conditions, including cancer, bacterial and viral infections, inflammatory disorders, and kidney preservation in addition to acting as an antioxidant and vascular disease preventative (2, 3).

Because Hypericum perforatum inhibits the reabsorption of monoamine neurotransmitters, it is frequently used as an antidepressant. Since its first use, St. John's wort has been recognized for its ability to reduce pain (4). Numerous research' findings demonstrate the importance of St. John's wort extract in enhancing oxidative responses, programmed cell death, and cytokine levels (5).A glomerular filtration rate defect-related kidney illness is regarded as

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a risk factor for cardiovascular disease, chronic renal failure, and the death that follows (6,7). Worldwide, the prevalence of chronic kidney disease (CKD) is more than 20% in men and women aged 65–74 and 30% in those aged 75–84 (8).

Omega-3 fatty acids are long-chain polyunsaturated fatty acids originating from plants and marine life. Since the human body is unable to produce them, these fatty acids must be obtained from diet. Some plants, such hemp, walnuts, and flax, have seeds that are typically high in alpha-linolenic acid (ALA). The fatty acids docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) found in fish vary in quantity. Through metabolism, ALA can produce longer chain EPA and DHA. Numerous research, particularly in recent years, have examined the function of essential fatty acids in the human body. Findings suggest that fatty acids might be helpful in the treatment of a number of illnesses (9).

Material and Methoid

The current study was conducted in the laboratories of Tikrit University , College of Science , Department of Biology,Iraq. Hypericum perforatum flower samples were gathered from Salah al-Din Governorate in mid-June 2023. After allowing the samples to naturally dry in the shade and out of direct sunlight, the plant was crushed and ready for extraction. In this experiment, twenty male rats were divided into four groups, each with five male rats: The first group, known as the control group, received meals and distilled water for the duration of the experment. An aqueous extract of St. John's wort at a concentration of 300 mg/kg was administered to the second group (G 2). Omega-3 solution at a dose of 25 mg/kg was administered to the third group (G 3). The fourth group (G 4) after receiving treatment for two hours with the St. John's wort aqueous extract were treated with Omega-3 aqueous extract at the previously mentioned doses .

The experimental groups continued with treated for 15 days, after which the animals were anesthetized with appropriate amounts of chloroform to draw the blood needed to conduct physiological tests for kidney parameters (urea and creatinine). Then were. taken the kidney organs, which were washed and placed in 10% formalin, and the histological sections needed for the current valuation were prepared .

Plant extract

The plant extract of hypericum perforatum flowers was prepared using the method of Naik et al., 2015, which includes placing 5 grams of the ground plant in 250 ml of distilled water and then placing it in a Soxhlet extractor device for 72 hours at a temperature of 100 degrees Celsius (10) .

Histological preparations

Kidney tissues of experimental animals were prepared based on (11) and prepared for histological examination. After taking the kidney tissue, it was cutted into small parts and left in 10% formalin for 24 hours, then transferred to increasing concentrations of alcohol (70%, 80%, 90%, 100%) to remove water. Next to xylol, followed by a 62°C transfer to paraffin, which was then poured into molds, cut, and trimmed using a Microtome. So as to evaluate the sections using an Olympus light microscope with a digital camera, they were fixed onto glass slides and stained with hematoxylin and eosin stain.

Physiological parameters

The concentrations of urea and creatine in blood serum were determined by the usual method mentioned in the ready-made kit from the French manufacturer Bio-Labo.

Statistics analysis

The ANOVA test was used in SPSS version 21 to analyze and compare the results for the groups used in the current study.

3. Results and discussion

Histological examination

In the kidney tissue of the first group (Control group), the renal tubules appear in their normal condition, as well as the glomeruli and Bowman's capsule. as in fig.1.

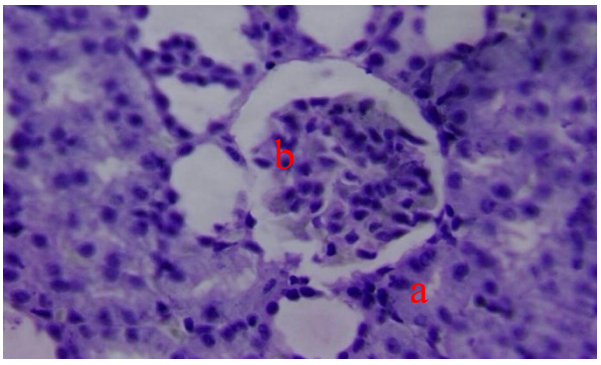

Fig (1). A section of the kidney tissue of the control group(Group1). It shows the renal tubules (a) and glomerulus (b). (H&E 40X)

The second group (G 2) of the current study showed some histological abnormality changes represented by expansion of Bowman's capsule, enlargement of a large number of renal tubule cells, and atrophy appear clearly in the glomeruli, as in (fig. 2).

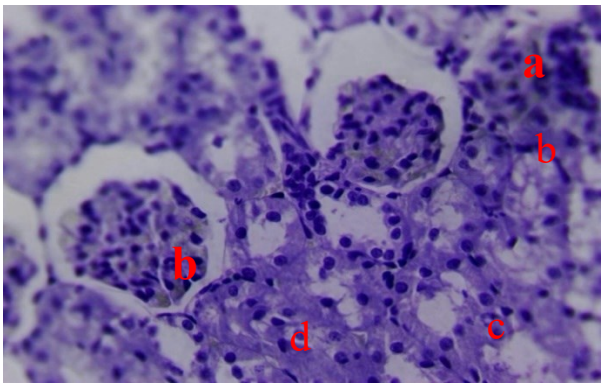

Fig (2). A section of kidney tissue from experimental animals of (Group 2) , dilatation of Bowman's capsule (a) glomerular atrophy (b) tubule cell necrosis (c) tubule cell hyperplasia (d) (H&E40X).

Histological sections of the kidneys of rats in the third group (Group 3) showed the presence of enlarged glomeruli with bleeding between the renal tubules and infiltration of inflammatory lymphocytes, with continued hypertrophy in the cells of the renal tubules, as in the (fig.3).

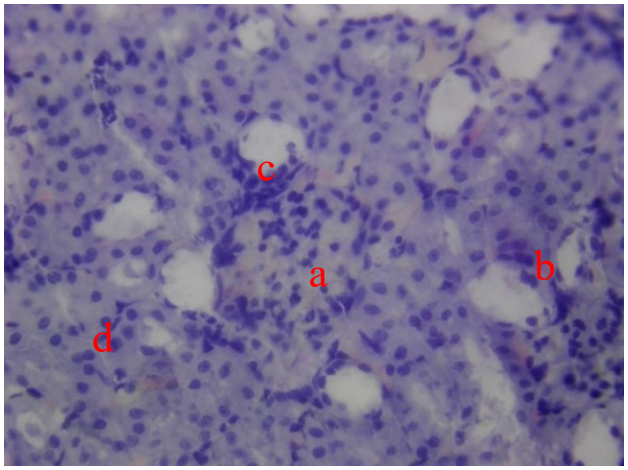

Fig.(3) A section of kidney tissue from the third group, showing enlargement of the renal glomerulus (a), bleeding (b), infiltration of inflammatory cells (c), and hypertrophy of renal tubule cells (d) (H&E40x).

In the fourth group (Group 4), A kidney tissue was disintegration of the glomerular structure , development of Bowman's capsule was detected**.**

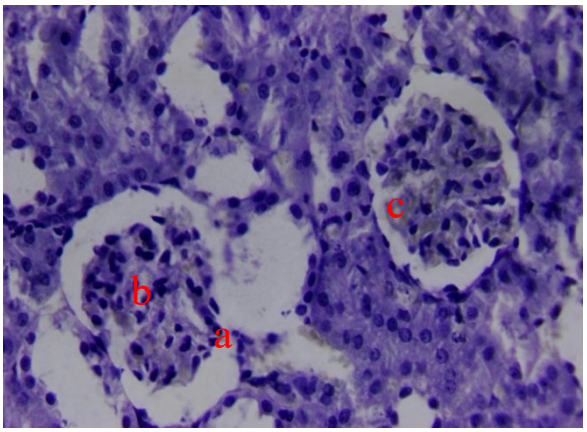

Fig.(4) Group 4 Capsular rupture (a) Dehiscence of the glomerular structure (b) Bowman's capsular dilatation (c) (H&E40x)

Physiological tests

In the current study, the third group in which the experimental animals were dosed with Omega-3 showed results similar to the results of the control group in terms of the concentrations of both urea and creatinine in the blood serum.

Table (1) Urea and creatinine levels in serum

Group	Urea mg\dl	Creatinine mg\dl
Group1	55.900±9.100	1.053±0.128
Group2	45.933±2.706	0.987±0.105
Group3	55.900±3.439	1.027±0.161
Group4	50.700±5.515	0.923±0.157

Group1 (control group), Group2 (plant extract dose), Group3 (omega-3 dose), Group4 (plant extract dose + omega-3).

The kidney is the important organ in maintaining balance in the internal environment of the organism because of its important and fundamental role in filtering the blood and reabsorption. Therefore, it is highly susceptible to contaminated elements and toxic substances, whether the organism is exposed to them orally or through inhalation (12). The results of the current study showed the presence of abnormal histological changes in the histological structure of the kidney in the experimental animals of the second, third and fourth groups. These changes result from the arrival of some harmful or toxic substances through the blood to the renal tubules, which resulted in abnormal or pathological changes in the histological structure of the renal glomerulus. and tubules compared to the control group. This may be due to excessive doses of the extracts, which lead to kidney functions weakness (13).

Also, the presence of infiltration of inflammatory lymphocytes resulting from the occurrence of infections and the summoning of inflammatory cytokines such as TGF-β1, which is a strong factor in causing renal glomerular hypertrophy in the third group of the current study compared with the control group (14). Urea and creatinine are important indicators of kidney damage in clinical diagnosis (15,16). They are widely used as sensitive markers for diagnosing kidney diseases . In the current study, blood urea and creatinine levels were measured to evaluate kidney damage. The results showed that an imbalance in the levels of urea and creatinine indicates a deterioration in kidney function, which was reflected in the histological structure as well. The third group of this study, which was dosed with Omega-3, and the fourth group, whose members were dosed with the Tibetan extract and Omega-3 together, gave results similar to the levels of urea and creatine in the control group.Group1, as a result of the antioxidant activity of Omega-3. Any imbalance in the levels of urea and creatinine in the blood are signs of kidney damage caused by the presence of oxidants, and this is consistent with the results of other previous studies (17, 18).

4. Conclusions

The abnormal histological changes in renal tissue following exposure to toxic factors, shows the relationship between tissue damage and functional changes in the kidney. That needed to elucidate the develop effective interventions for preventing and treating renal diseases.

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