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Histochemical Study of the Effect of Glycerol on the Kidney of Male Albino Rats Treated with Gum Arabic

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Abstract

Kidney diseases are common health problems around the world and have different causes. Therefore, the study was based on glycerol because it is used extensively to determine the extent of the effect on the kidneys. Gum Arabic was chosen as a preventive treatment to reduce inflammation. The experiment was carried out on 70 male Albino rat, with a weight of 200-250 g. To verify kidney efficiency, pyramphenol blue dye was used to detect the level of proteins in the kidney. Also, a shif detector was used to explain the proportion of sugars in the kidney. The rats were divided into four groups; the first one was the standard (10): food and water were given only daily. The second group: treatment with glycerol for 4 weeks (20) with a dose of 10 ml / km. The third one: treated with glycerol for 8 weeks (20) at a dose of 10 ml / km. The fourth group: treatment with gum extract in the dose of 3 ml / km for 4 weeks (20). The serum was obtained to study the level of creatinine, and its increase was recorded in rats treated with glycerol and the low rate of treatment with Arabic gum. The results of the study of the kidneys in the groups treated with glycerol showed sharp changes in the cortex where there is enlargement and atrophy of some glomeruli, dissolution and dissociation in the capillaries of the capillaries and the broadening of the urinary cavity of the glomeruli. The color of the paramphenol blue and the shif is clearly shown as a result of the accumulation of proteins and sugars in the kidney. The Kidney failure and kidney dysfunction slight improvement was observed in the form of glomeruli and renal tubules, a lack of deformities in the nuclei and a decrease in hemorrhage between the tubes. The Arab gum treatment reduces the severity of kidney inflammation if used at the beginning of the discovery of inflammation.

Keywords: Glycerol. kidney. Acute renal failure. Chronic renal failure. Gum Arabic.

Introduction

The kidney is a member of the urinary system that performs essential functions in the process of filtering blood urine, maintaining the total volume of body fluids, regulating the concentration of dissolved substances such as sodium ions, potassium, calcium, regulating the concentration of hydrogen ion in the blood and putting waste, toxins and medical drugs, where it releases some hormones such as renin, which controls the production of angiotensin and the hormone erythropoietin, which controls the production of red blood cells, which is related to the internal balance of calcium ion, and activates its absorption in the blood (Swaida, 2010). The Kidney inflammation is one of the most common health problems in the world, which starts with the stage of simple inflammation and develops to late stages of chronic renal failure, which leads to harmful results on the body organs such as cardiovascular disease leading to early death. Statistics indicate that the increase in the proportion of people with kidney disease in the world, especially in Saudi Arabia is directly linked to increase the rate of obesity, diabetes and hypertension. The important factor of kidney failure is diabetes, where studies indicate that the onset of diabetes in Saudi Arabia is between 20 and 25% (Civil and Shaheen, 2012). According to the World Health Organization (WHO) in 2006, the number of diabetic people are around 171 million, and the disease is expected to double by 2030. Saudi Arabia is one of the countries with highest rate of this disease, which over time leads to renal disease.

The body produces glycerol naturally with triglycerides which are a type of fat, and are represented in three glycerol which is a component of the fatty tissue in the body where 90% of the food is consumed. The body needs energy, but if it's less than normal, it increases the chance of developing various diseases. Several studies have shown that glycerol has a detrimental effect on the kidneys such as nearby corneal deformities, distant coiled tubes, and large glomerular malformations, resulting in a malfunction in the absorption process (Assali and Westersten, 1961)

Therefore, it is important to know the substance of glycerol, properties, uses, the seriousness of the kidneys and adrenal glands if are not controlled, resistant and resort to as much as possible to natural treatment. The world now is heading for medicinal plants after realizing the risks of manufactured drugs and suffered from the side effects of these substances. Also, there is increasing interest in fruits and vegetables by consumers which will increase knowledge about the content of foods that promotes health. (Oguzhan, 2015)

Recent studies also suggest that fiber intake significantly benefits to the patients with chronic kidney disease (Krishnamurthy et al.,

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2012). Eating large amounts of dietary fiber is associated with many health benefits. Taking probiotic products is important to stop unhealthy fermentation in the human intestines and activating ferments that provide many health effects aimed to improve human health and preventing disease (Tiger and Awad, 2005). gum is rich in fiber, edible, and has been classified by the Food and Drug Administration (FDA) in the United States as a safe dietary fiber (RashaBabiker et al., 2012)

With the increasing number of people with renal infections, the current study is directed to study the therapeutic effect of Arabic Gum by studying the chemistry of the kidneys.

The study Problem

Kidney failure affects the kidneys, and is a public health problem around the world.

Statistics indicate an increase in the percentage of people with kidney disease worldwide, especially in Saudi Arabia. This is directly related to the increase in the rate of obesity, diabetes and hypertension (civil and Shaheen, 2012). In this study we brought the disease with glycerol (a transparent liquid), which is used in the pharmaceutical, food and cosmetic industries.

Materials and Methods

Experimental animals

In the current study, 70 male Swiss albino rats, ranging from 200 to 250 g, obtained from the Animal House at the King Fahd Medical Research Center of King Abdul Aziz University in Jeddah, were used to adapt for a week: The first group include 10 rats with standard daily meal. Group (2) treatment includes 20 rats given daily glycerol dose of 10 ml / km for 4 weeks.

Group (3) treatment includes 20 rats given daily glycerol dose of 10 ml / km for 8 weeks. Group (4) treatment includes 20 rats given daily glycerol dose of 10 ml / km for 4 weeks and oral injection was treated with gum arabic by 3 ml / kg for 4 weeks. During the experiment, the weights of the mice were measured every week, the anatomy of selected mice in weeks 4, 6, 7 were studied; the blood was collection from the cavity of the eye with fine capillary tubes and then placed in the centrifuge at 360 ° F / min at a temperature of 4 °C for 14 min. Serum was analyzed in small tubes for the analysis of keratin in the laboratories of the tower.

Chemicals:

1. *Glycerol.*

Its concentration was reduced by distilled water to 50% and rats were injected daily in the hind muscle

2. *Arabic Gum (Acacia Senegal*

The Arabic gum was obtained from the Arab Republic of Egypt in form of pure gum. It was prepared with a concentration of 15% dissolved in distilled water in a final volume of 500 ml and placed at low temperature until it was heated to room temperature for two hours to inject mice by mouth.

Staining

Hematoxylin and Iocene (Bancroft and Gamble, 2002) were used because they gave a clear differentiation of cytoplasm and nucleus. They also gave a good view of the histological structure of the sample studied and revealed largely the histological changes (Al-Khalifa and Al-Saleh, 1995).

Mercury permanganol blue Proteins are shown to colorize protein components in tissues in blue.

Method of pyridic acid chev: This method is one of the most famous methods used in chemical chemistry to detect many substances (carbohydrates) (Bancroft and Stevens 1996).

Results

First group

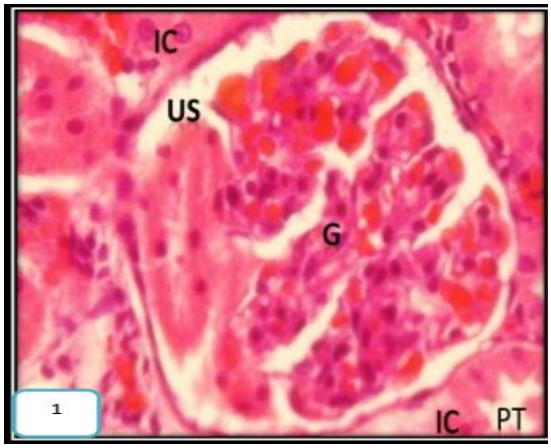

Figure 1: Photocopy of the optical microscope showing the structure of the glomerulus and the urinary Glomerulars (H&E X400)

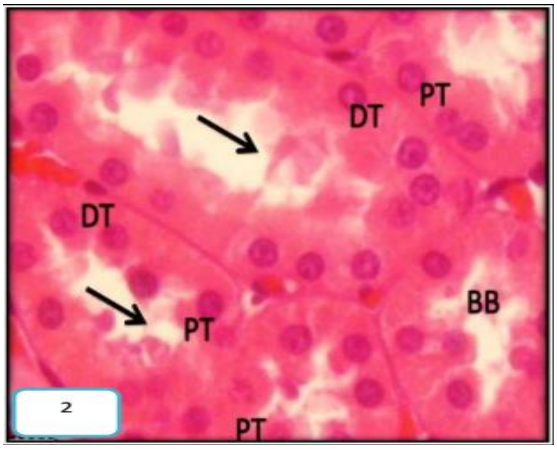

Figure 2: Image of the optical microscope showing the nearby winding tubes (H&E X400)

Second group

Treatment with glycerol for 4 weeks using pyrodic acid (PAS)

Figure 3: Glomerular glomeruli and the expansion of the vacuum polycarbonate and the color of its identity with the color of periodic dark color cheve as evidence of the presence of sugars(X400 PAS)

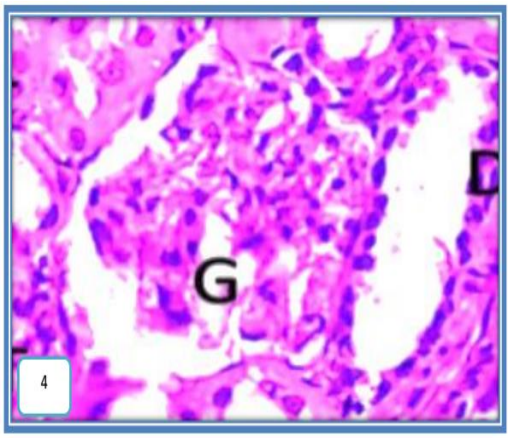

Figure 4: The degradation and deformation of the glomerulus, and the coagulation of the distant coiled tubing and the spermatozoa and the severity of their pigmentation (PAS X400)

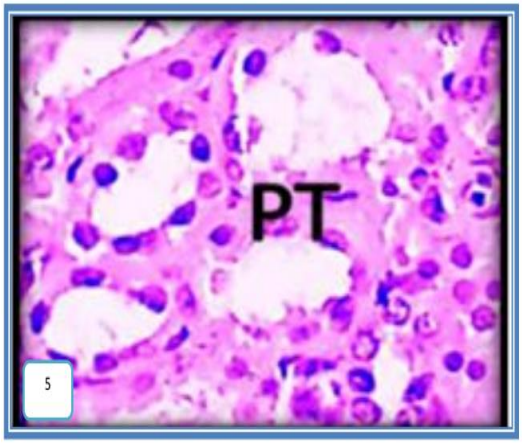

Figure 5: The disappearance of the vulvar edges of the far-flung tubes and degradation of the tissue (PAS X400)

Treatment with glycerol for 4 weeks using Bromofenol blue (BM)

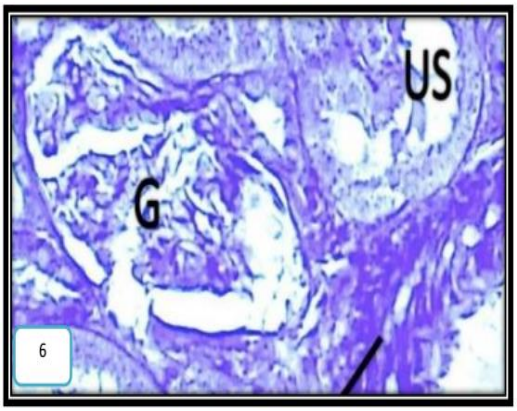

Figure 6: Photocopy of the optical microscope showing rupture of the glomeruli and fibrosis in the blood-forming membrane (B M X400)

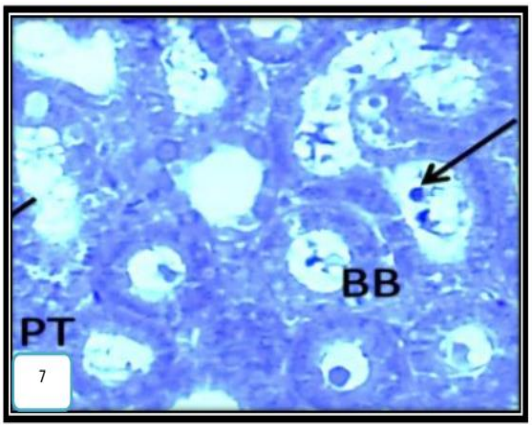

Figure 7: Photovoltaic image We notice the presence of cells crusted inside the tubes and the disappearance of the edges of the foam (B M X100)

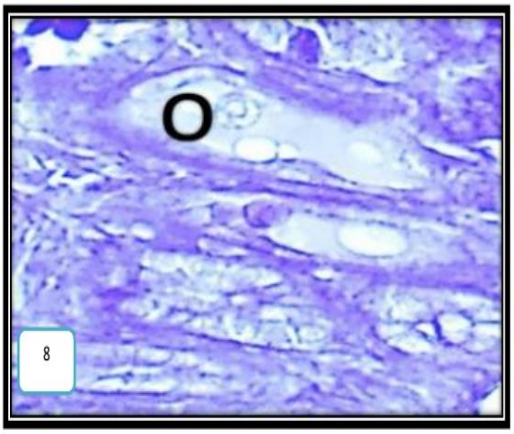

Figure 8: Photocopy of light microscopy noting the presence of osmosis dimmed pigmentation and decomposition in the tubes (B M X400)

Group Three

Treatment with glycerol for 8 weeks (PAS)

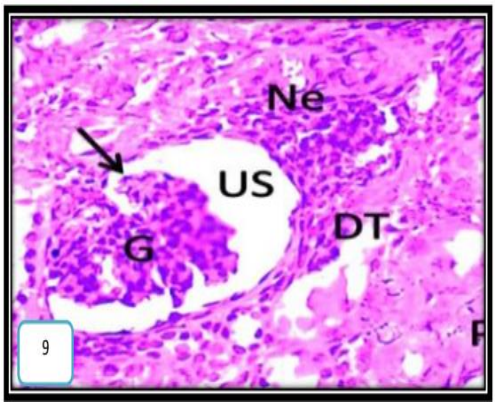

Figure 9: Image of the optical microscope shows the severity of atrophy of glomeruli and the severity of pigmentation dark color with the presence of sugars, which reduces the work of kidney efficiency and shows nucleation of nuclei and cell death near the glomerular (PAS X400)

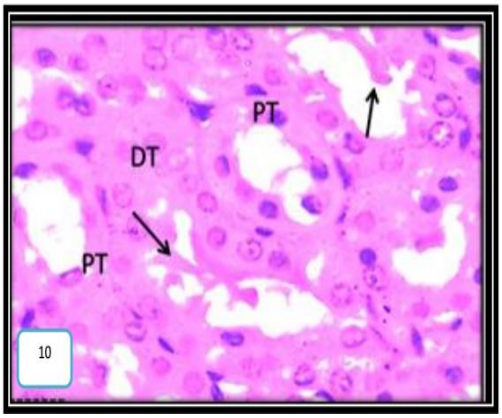

Figure 10: Photocopy of the image showing the disappearance of the vulvar edges of the long-wrapped tubes and the enlargement of the nuclei (PAS X100)

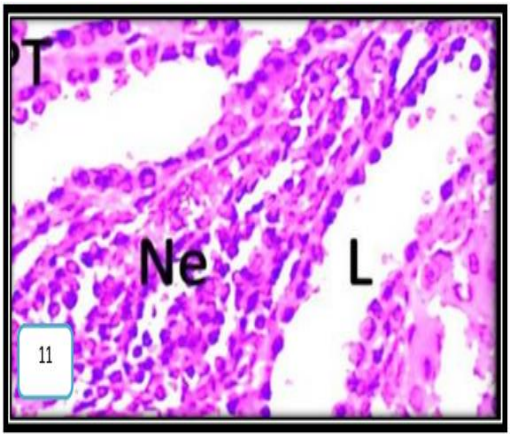

Figure 11: Photocopy of light microscopy note the breadth of the far-flung tubes and decomposition of the walls and nucleic acids and the intensity (PAS X400)

Group 3

Treatment with glycerol for 8 weeks using Brmophenol blue (BM)

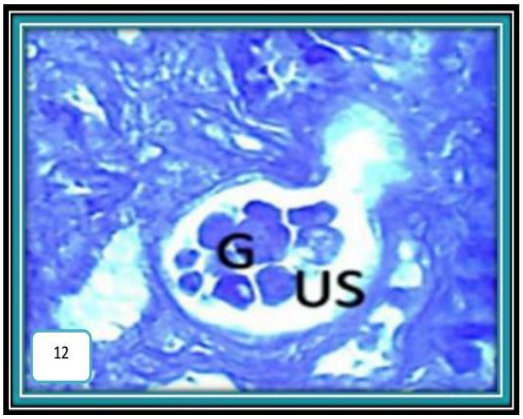

Figure 12: clear cleavage in the glomerulus and the separation of the capillaries of the capillaries, the severity of the pigmentation of the abundance of protein content and the sharp expansion in the vacuum and urinary incontinence (B M X400)

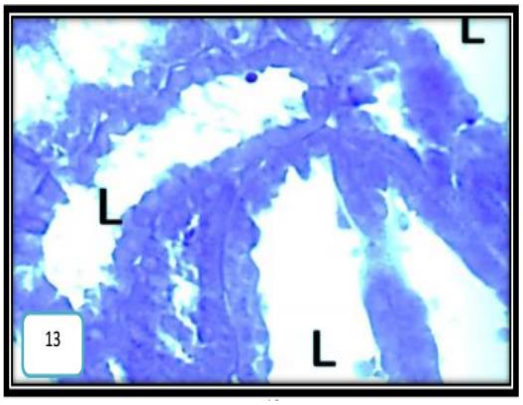

Figure 13: Image of the optical microscope shows clear tissue decay in the tubes wrapped far and wide to the cavity and peel cells (B M X400)

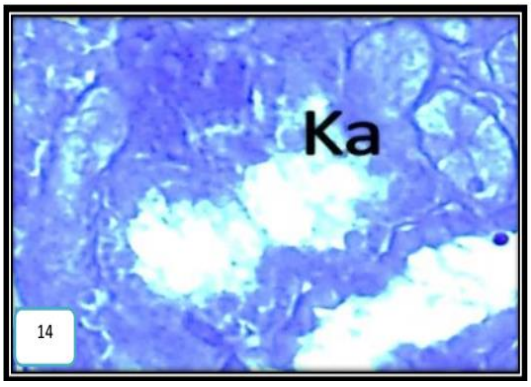

Figure 14: Image of the light microscope. We observe the degradation of cells and their integration and the intimacy and the severity of pigmentation of the tubes wrapped close and widening of the cavity (B M X400)

Group 4

Gum treatment group for 4 weeks after treatment with glycerol for 4 weeks using pyridic acid chev

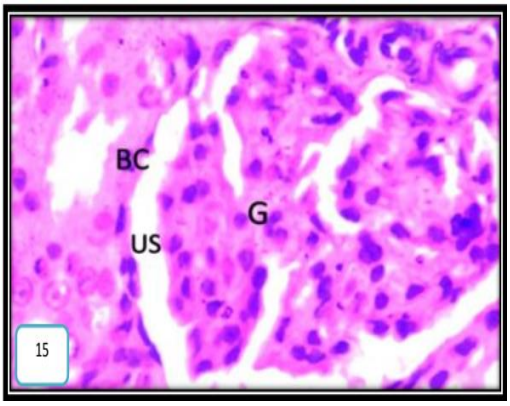

Figure 15: A magnified image of the optical microscope showing clear improvement in the glomerulus and restoration of the basal membrane of the urinary vacuum where we observe the regularity of the Bowman bag and the vacuum and polycystic differentiation of the parietal layer of the visceral layer as well as the glomerular neutral pigment (PAS X400)

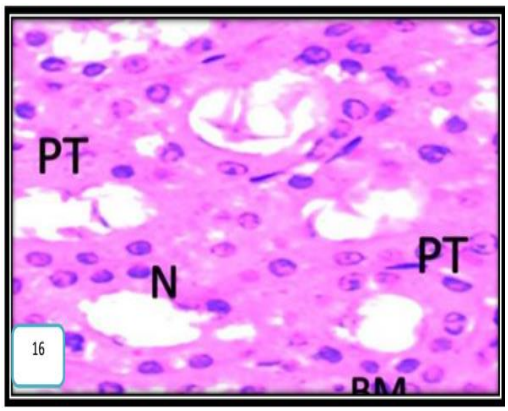

Figure 16: Image of the optical microscope of the cortex showing a slight improvement in the nearby coiled tubes where the membrane and the base of the nuclei are clear (PAS X100)

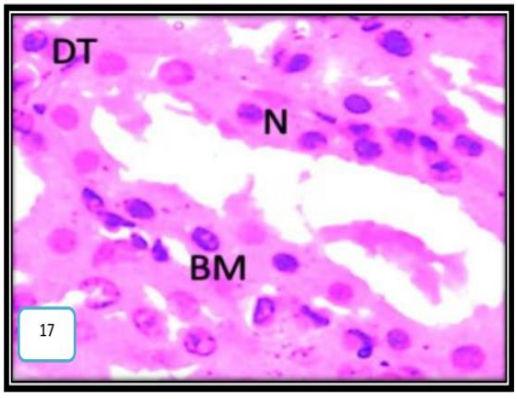

Figure 17: Photocopy of the cortical area of the cortex showing a slight improvement in the far-flung tubes where the basal membrane and nuclei are organized (PAS X400)

Group 4

Gum treatment for 4 weeks after being treated with glycerol for 4 weeks using Brmophenol blue BM

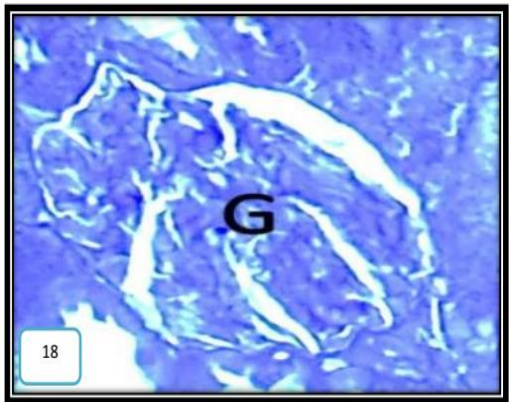

Figure 18: A clear improvement in glomerular, where we note the restoration of its semi-natural form and became neutral dyes and the lack of breadth of the vacuum (B M X400)

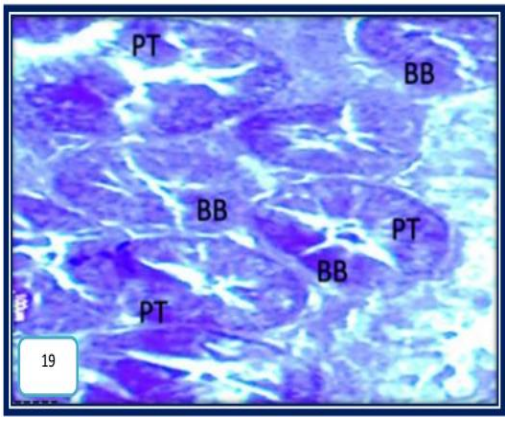

Figure 19: Shows the shape of the nearby coiled tubes and the restoration of the formation of the edges of the purple; this is a guide to the beginning of kidney efficiency and shows the basement membrane dark pigments (B M X400)

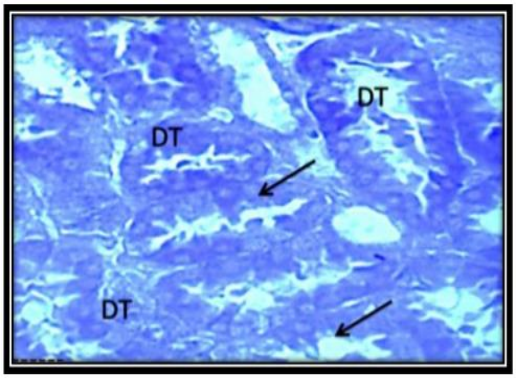

Figure 20: Image of the optical microscope appears to be improved in the recovery of the shape of the pipes wrapped far away and restore the composition of the internal wall is equivalent (B M X400)

Discussion

Glycerol is one of the most commonly used substances in the food industry. It is widely used in medical products and medicines as a cough and sputum. It is used in the manufacture of tooth paste and cosmetics such as hair care, skin, softness and moisturizing. It is widely used as a laxative and has harmful effects on kidneys. It leads to acute inflammation of the kidneys from the large number of daily uses.

Gum Arabic is a preventative treatment for total inflammation, widespread in African countries and is widely used for dietary fiber. It is a fiber-rich substance that reduces kidney damage and improves inflammation and reduces inflammation if used early in the disease. Kidney inflammation, kidney stones, kidney failure in the final stage lead to chronic kidney failure. There are many causes of renal failure such as regular use of drugs, antibiotics and harmful chemicals taken in the wrong way without knowing the extent of damage to the body in general and kidneys in particular (Swaida, 2010). This study aimed to study effects of glycerol and the study of the therapeutic effect of gum arabic on kidneys. This study used glycerol at a concentration of 50% and a dose of 10 ml / kg bw. This is consistent with Donald et al. (1966) and Agarwal et al. (1995). Blood samples were obtained from rats to study creatinine rate for measuring the level of renal injury. Perrone et al. (1992), Kim et al. (1969) and Sellares et al. (2012) have confirmed creatinine as the most important determinant of renal function.

A decrease in body weight (13.14), an increase in kidney weight (0.37) and an increase in the rate of creatinine (17.53) were observed at the end of the experiment. This is consistent with Carroll & Camerom (1965). In the end of the experiment, the group was treated with glycerol for 8 weeks, a decrease in body weight by (26.50-) and a percentage of kidney weight (19.25) and creatinine in the blood (16.47). This may indicate the apparent decomposition of creatinine in the muscles, muscle weakness and thinning. This is the result of the lack of creatinine in the muscle. Severe lesions has been observed in the hind muscles of the leg and the mice were unable to walk easily. On the other hand, the color of the serum was red and the lack of urination was noted. This is an indication of kidney failure, as in the study by Donald et al. (1966), Wolfert and Oken (1989), and Vlahovic et al. (2007). We conclude that increasing the rate of creatinine in the blood, which is decomposed from the muscles, increases its concentration in serum, which has become a red color for the appearance of hemoglobin in the blood. This was confirmed by Carroll (1965) and Camerom (1956). A high level of creatinine was observed at the beginning of the experiment for rats treated with gum arabic. In the first week it was 36.00. At the end of the fourth week experiment, the ratio of creatinine was 11.16.

A decrease in body weight was recorded in the first week of the experiment (12.05) and the end of the experiment in the fourth week (2.75).

The histological study of the cortex area in male rats treated with glycerol for 4 weeks showed histological changes in terms of glomerular hyperplasia, atrophy of some of them, broadening of the urinary cavity and separation of the capillary capillaries.

Acute tubular necrosis, which caused acute deformities in the renal tubes, cell flaking and blood stasis, caused a major defect in kidney function leading to acute kidney failure. The study also showed that the rate of hemorrhagic hemorrhage increased in the renal tissue in the cortex where the blood clotting and congestion between the renal tubes was clearly demonstrated, which hindered the filtration process. Liano and Pascual (1996) The severity of blood leakage between the tubes and distortions inside the tubes, as indicated (Zager, 1992) and expanded the spaces Alb (1998); Assul, (1961), and the absence of the hypodermic spacing of the nearby coiled tubes, which reduced the efficiency of urinary tubes to urinate the bloodstream.

The accumulation of mucosal sugars and protein substances has been seen in the tubes. This confirms the inefficiency of the renal tubular operation, the low flow of fluid in the tubes and the retention of blood. This was consistent with Thompson & He (2006). The study showed that in the treatment of kidney for 8 weeks the severity of the abnormalities was increased in the form of glomeruli, acute atrophy, disintegration of the nuclei, and the enlargement of the nuclei of the tubes near and far and some sectors, increase in the expansion of the tubes and their necrosis and shrinkage of some of them, the occurrence of deposits within the cavities, and inflammatory infiltration in the interstitial tissue which is confirmed to impede the work of renal tubes for filtration. This is explained by oztaurk et al. (2003) who stated that cystic fibrosis is evident in blood vessels and glomeruli from the severity of inflammation and loss of the vulvar edges, which is one of the main causes of renal failure; this is consistent with Mastumoto et al. (2006) and Rossmann et al. (1993).

Also, in vascular changes, vascular cirrhosis and accumulation of red blood cells appear to confirm that the incidence of inflammation and tissue degradation has reduced the efficacy of kidney function (Wolfert and Oken, 1989)

In the current study, when gum extract was used for 4 weeks at a dose of 3 ml / kg daily, there was a slight improvement in glomerular shape, decreased urinary volume, slight change in the shape of the tubes and their return to normal condition. This confirms that gum arabic is closely related to reducing inflammation of kidneys, as gum arabic contains valuable dietary fiber. This is confirmed by scientists (Lee, 1982).

Blood hemorrhage and irregularity of the adrenal glands were also observed in glycerol-treated aggregates. This is consistent with Piato et al. (2008).

The current study has demonstrated the clear effect of gum extract on the renal glands, where blood hemorrhage between cells, cell necrosis and cell death have stopped. There are no previous studies regarding similar results.

The gum extract was effective on the adrenal gland, but there are many studies indicating that the intake of fiber-rich gum extracts

reduces and accelerates the progression of kidney infections, such as the study by Wyatt et al. (1986).

A study confirms the efficacy of gum arabic and its close association with health because it contains many dietary fibers.

Conclusion

The use of glycerol at 10 ml / kg resulted in very severe inflammation of the kidneys and was confirmed by the study of chemistry using a blue dye of permophenol, which is used to detect the presence of proteins; a detector was used to detect the presence of sugars. There is a general call to move away from the use of substances containing glycerol because it may deteriorate to kidney infections over time.

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