



EFFECT OF AQUEOUS EXTRACT OF CYPERUS ESCULENTUS TUBERS AND DAPAGLIFLOZIN ON THE KIDNEYS IN FEMALE RATS WITH RENAL FAILURE INDUCED BY CARBON TETRACHLORIDE CCL4

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Abstract:

The study was conducted on 16 female rats at the age of 8 weeks and weighing 200-225 grams were randomly distributed into 4 groups The experiment was designed as follows: The first group included the group of natural standard animals (control) G1, and the second group included the group of animals infected with carbon tetrachloride compound CCL4 that was injected at a dose of 0.1 ml / 100 g of animal weight for 30 days through the proton membrane and by Two rows per week and left untreated positive control sample G2 and the third group included the group of animals injected with carbon tetrachloride compound ccl4 and was treated with chemical drugs (Dapagliflozin) G3 and the fourth group included the group of animals injected with carbon tetrachloride compound ccl4 It was treated with aqueous extract of Cyperus esculentus tubers. .

Keywords: Cyperus esculentus , CCl4 , kidney function , Dapagliflozin

INTRODUCTION:

Chronic Renal Failure (CRF) is a common health problem worldwide, and this is confirmed by the World Health Organization, as kidney and urinary tract diseases contribute to nearly 850,000 deaths, and more than 115 million cases of disability globally, and is classified (CRF) as the twelfth cause of death and the seventeenth cause of disability, as data published by the World Health Organization showed that the prevalence rate of (CKD) Chronic Kidney Disease globally has reached 282 patients per million population, and the total number of patients with (CKD) In the Middle East, there are about 100,000 patients with a prevalence rate of 430 patients per million population (World Health Organization, 2015). Despite the use of medicines and medical drugs in the treatment of these diseases and tumors, they have harmful side effects on the body during treatment, and therefore the use of medicinal plants has spread greatly at the present time as they treat many diseases and are almost free of harmful side effects. (Muhammad, 2017) At present, many developed

countries have noticed the importance of herbal medicine, as in America 25% of medicines are herbs and herbal treatment has become accepted by people and specialists in medicines and herbs in particular. And use the cyperus is the fruits of a tree plant similar in shape to pomegranate plant, its leaves are white to gray and the branches are long tending to be red in color, and the tree bears round fruits in the size of large chickpeas, which is soft in texture, viscous and sweet in taste. It is known by another name, "Al-Zalam grass", and is scientifically known as *Cyperus esculentus*. (Al-asadi, 2018)

MATERIALS AND METHODS

The study was conducted in the animal house in the College of Veterinary Medicine, University of Tikrit, for the period from 1/4/2022 to 29/4/2022 and was done through the following

1- Sample collection and preparation

Cyperus esculentus samples were purchased from the local markets of Kirkuk province and were diagnosed by specialized professors in the Faculty of Agriculture



- Department of Horticulture and the samples were dry and ground by a Chinese electric mixer to obtain a fine powder

2- Preparation of the extract

10 g of dried and ground *Cyperus esculentus* powder was added to 100ml of distilled water. The solution was filtered using medical gauze, then the suspension was deposited using a centrifuge at 5000cycles for 10 minutes twice in a row, then the floating liquid was collected and evaporated. Water from the extract at room temperature for drying and then collecting the resulting extract (Abu Al-Qasim et al., 2016) prepared the required weights in the study.

3- Animals used in the study

The animals were obtained from the animal house of the Faculty of Veterinary Medicine, University of Tikrit, at the age of 8 weeks, weighing 200-225 g, and they were placed in special cages with dimensions (19x25x21 cm) and the floor of the cage was covered with sawdust, taking care of cleaning and sterilizing the cages with switching every two days. The animals were exposed to good laboratory conditions of a light cycle divided into 12 light hours and 12 hours of darkness. The temperature was set to 24±2 ° C. Nutrition and water were standard. Length of study

4- Design Experience

16 experimental animals were randomly divided into four groups with four female rats per group and were injected through the protean membrane at a dose of 0.1 ml / 100 g of animal body weight with carbon tetrachloride compound CCL4 and as follows :

- Group 1 (G1): Natural control group (control) without injection or dosing.
- Group 2 (G2): Animals dosed with carbon tetrachloride 0.1 / 100 g of body weight twice a week for a period of 30 days.
- Group III (G3) Animals dosed daily with chemotherapy Dapagliflozin for 30 days.
- Group IV (G4): Animals dosed daily with aqueous extract of *Cyperus esculentus* tubers at a concentration of 300 mg/kg body weight per day For 30 days

5- Collecting blood samples:

After 30 days, the animals were starved for 12 hours, then weighed and anesthetized with chloroform. Then the blood samples were collected by drawing blood directly from the heart. Anticoagulant-free tubes are tested and left for about a quarter of an hour in a water bath at 37 ° C until coagulation and then placed in a centrifuge for 15 minutes at 3000 cycles / min, the serum was withdrawn by a small pipette and placed in new plastic tubes and cleaned (Planar tubes) and kept at -20 ° C until special biochemical tests are carried out involving urea, uric acid, creatinine, total protein, Albumin and using several standard solutions (groups) manufactured by Biolabo SA, France (Harborne,1984). Blood globulin was estimated according to the following equation (Tietz,1987).

$$\text{Globulin concentration (g/dl)} = \text{Total protein Conc.} - \text{Albumin Conc.}$$

To measure the rate of glomerular filtration GFR, the following equation was used according to the Cockcroft-Gault formula (Cockcroft-Gault ,1976) .

$$\text{eGFR} = \frac{(140 - \text{age}) \times \text{weight (Kg)}}{72 \times \text{s.cr}}$$

* s.cr= serum Creatinin clearance
 age=Weeks
 weight= (Kg)

Statistical Analysis:

The results were analyzed statistically and using SAS, 2001, according to a one-way analysis of variance. The mean of the coefficients was tested using the Duncun multi rang test at a significant level (0.05) to determine the significant differences between the totals

RESULTS AND DISCUSSION

Table (1) Effect of oral dosing of study parameters on urea, creatinine, uric acid and glomerular filtration rate of female rats

Measured Standards (mg/dl)	Blood urea	Cryatinine	Uric	Lion	Glomerular
	mg/dl	mg/dl	mg/dl		filtration mg/dl
Type of transaction					
Sample control G1	37 ±6.11 e	0.2 ±0.071 B	1.4 ±0.59 c		1.95 ±0.89 a
Infected without treatment	86	0.9	2.2		0.44



G2	±9.47 a	±0.27 A	±0.76 b	±0.06 d
Patients treated with the chemotherapy drug dapagliflozin G3	71 ±7.33 b	0.30 ±0.09 B	3.2 ±1.18 a	1.10 ±0.09 c
Infected treated with Cyperus esculentus extract G4	43 ±5.11 d	0.23 ±0.061 b	2.0 ±0.91 b	1.32 ±0.76 bc

Similar letters in one column mean that there are no significant differences between them

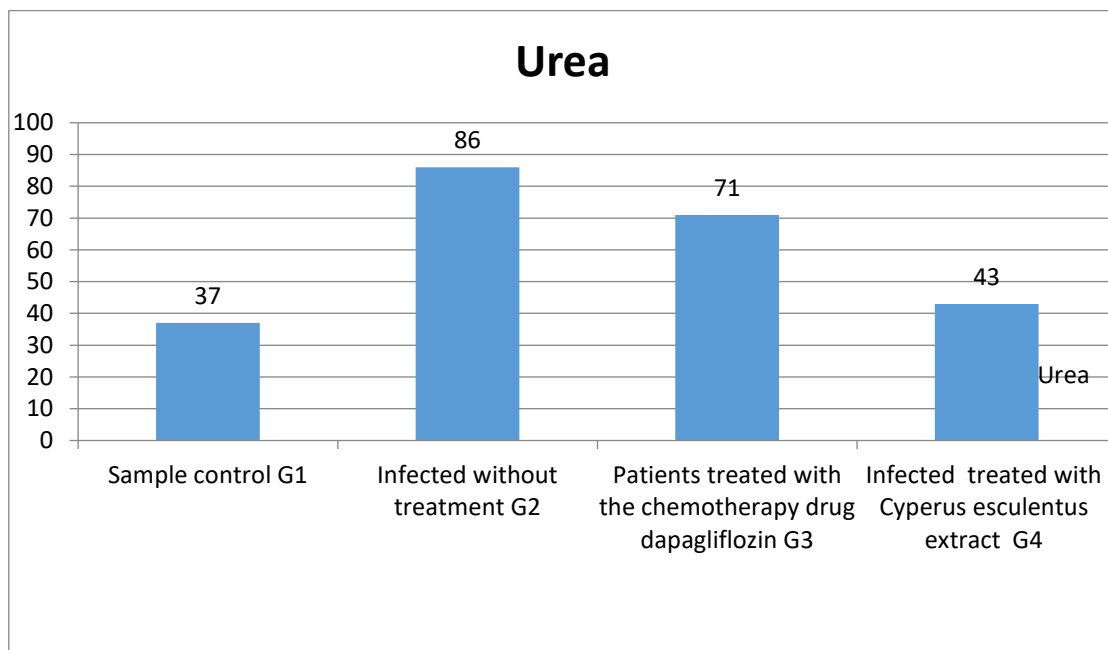


Figure 1: Urea concentration in study animal samples

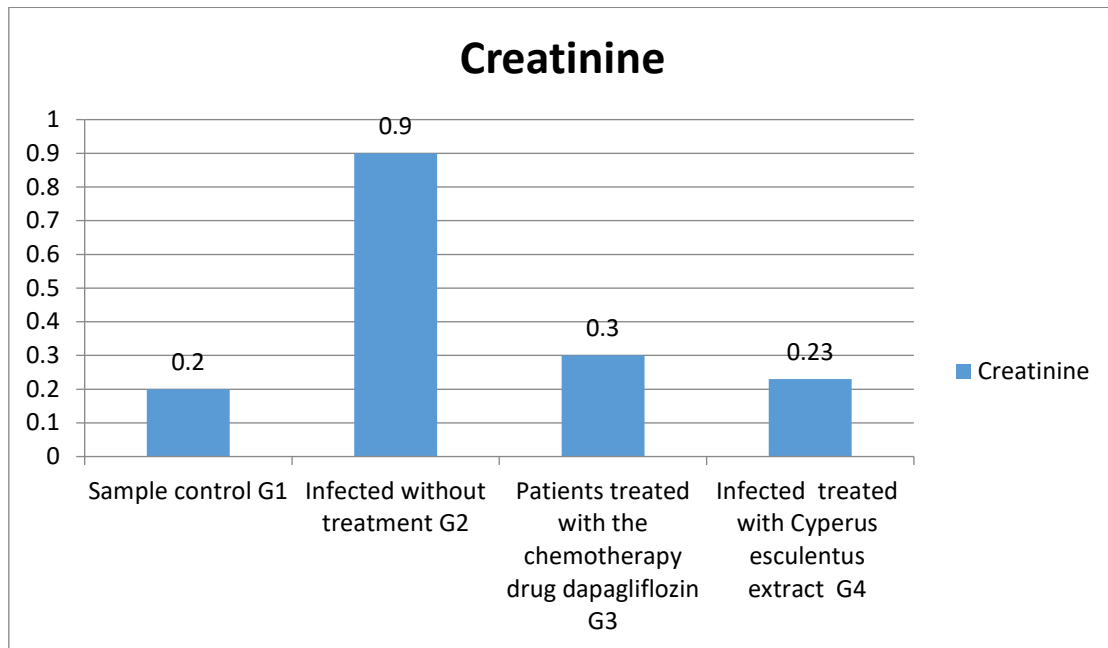


Figure 2: Creatinine concentration in study animal samples

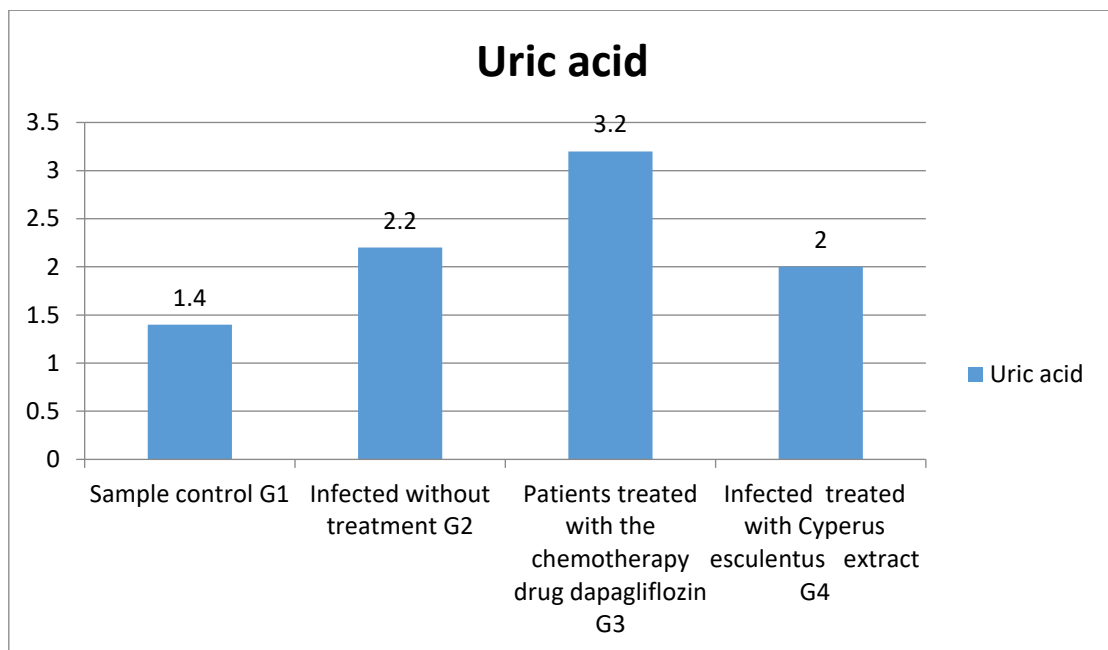


Figure 3: Uric acid concentration in study animal samples

The results of the current study showed through the biochemical results of Table (1) and figures (1, 2, 3) a significant increase of $P > 0.05$ for each of the criteria of urea, creatinine and uric acid for the group of infected animals without treatment (G2) compared to other groups and that the rise of these criteria indicates a defect in the work of the kidney, as these

standards are the basic indicator of the work of the kidneys, as the results of a significant decrease showed $P > 0.05$ For urea, creatinine and uric acid for the animal group that was dosed orally with the aqueous extract of *Cyperus esculentus* (G4), where the results of urea, creatinine and uric acid were close to normal as follows (2.0, 0.23, 43) respectively



compared to the infected group without treatment (G2)

The increase in urea may be due to increased concentrations of free radicals in the body, the occurrence of oxidative stress and the oxidation of proteins and amino acids and thus an increase in urea as a by-product (Manna et al,2005). The increase can be due to an increase in purines, which are the essential substances for the formation of uric acid, which may result from the destruction of nucleic acids. The results converge with their findings (Mahmod and Sabry, 2021) to the effectiveness of Tiger Nut (Cyperus esculentus L.) At a concentration of 10% in reducing the concentration of urea, creatinine and uric acid in the blood serum of rats, the results were (38.40, 0.81 , 4.30) respectively.

The results obtained proved the therapeutic and prophylactic efficacy of cyperus esculentus by decreasing the levels of (creatinine, urea, uric acid) and returning to

It approximates its normal levels in the body because it contains unsaturated fats in abundance, whose main

function is to maintain the filtration property of the glomerulus, These unsaturated fats are of great importance in maintaining normal kidney function . Nwawuba and Okechukwu (2018) have shown that cyperus esculentus plant oil It is of great importance in improving the functions of the liver and kidney because it contains phytosterols , vitamin E and beta-carotene, and these substances are effective antioxidants and improve the work of important organs in the body (brain, heart, liver and kidney).

Glomerular Filtration Rate(GFR) is the most commonly used criterion for qualitative and quantitative evaluation of secretory capacity.or nephrotoxicity and is obtained more accurately in clinical practice than creatinine filtration Based on the urine sample collected during24 hours, the results of Table (1) and Figure (4) indicate a decrease in glomerular filtration GFR for the group of infected animals without treatment, where a significant decrease of $P > 0.05$ amounted to (0.44) compared to other groups.

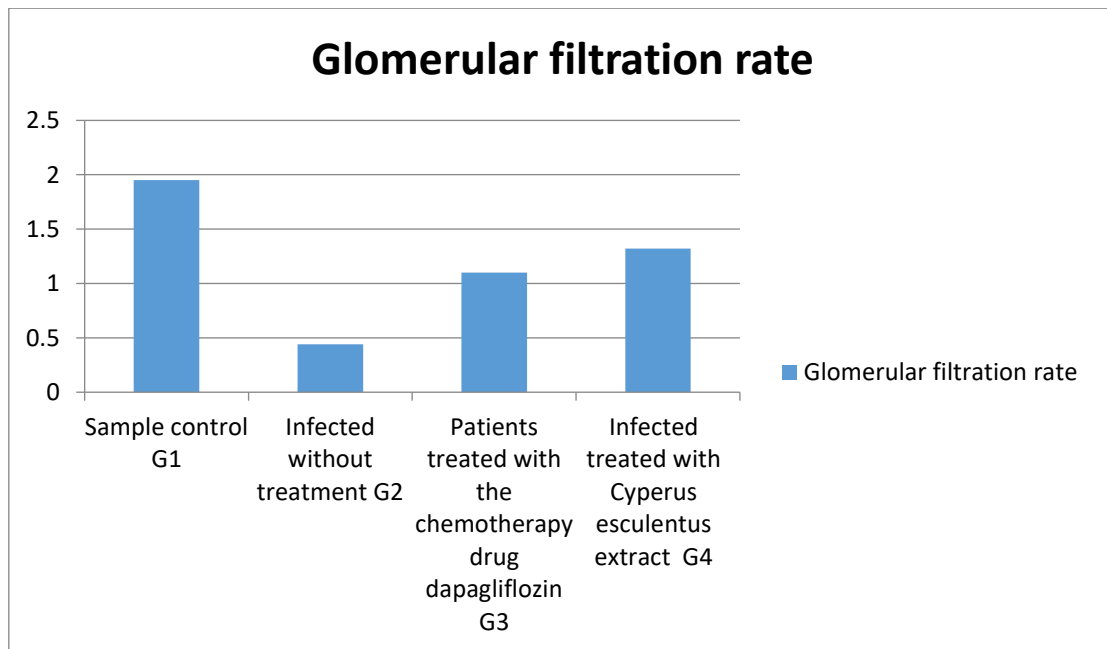


Figure 4:Glomerular filtration rate in study animal samples

Table (2) Effect of oral dosing of study parameters Blood proteins (females)

Measured Standards (mg/dl)	Total protein	Albumin	Globulin
Type of transaction			
Sample control G1	6.9 ±2.08 a	4.4 ±1.48 a	2.5 ±0.99 a
Infected without treatment G2	5.6 ±1.41 c	3.5 ±1.28 b	2.1 ±0.68 a
Patients treated with the chemotherapy drug dapagliflozin G3	5.6 ±1.66 c	3.2 ±1.11 b	2.4 ±0.89 a
Infected treated with Cyperus esculentus extract G4	6.7 ±1.78 a	3.6 ±1.46 b	3.1 ±1.33 a

Similar letters in one column mean that there are no significant differences between them

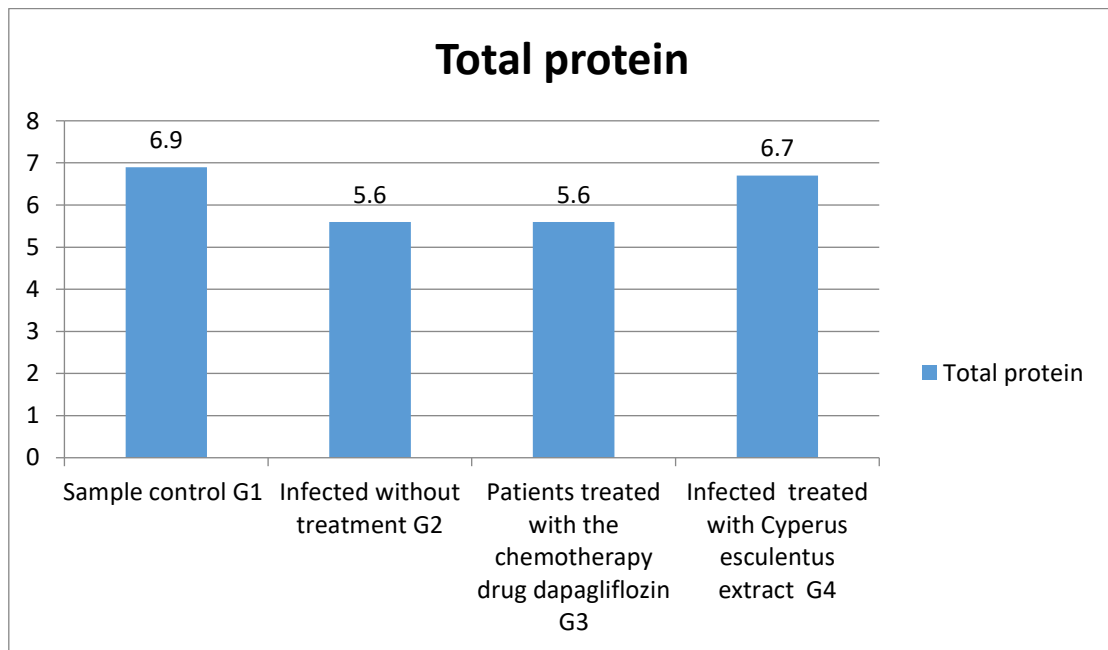


Figure (5) Total protein in the blood serum of study animals

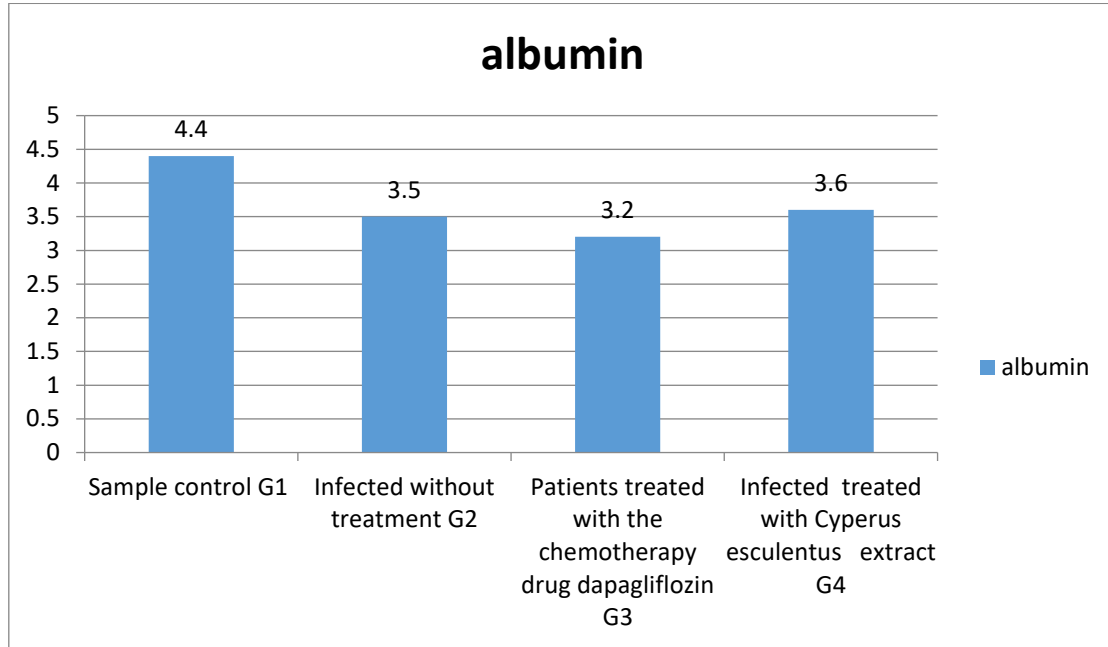


Figure 6 Albumin in the blood serum of study animals

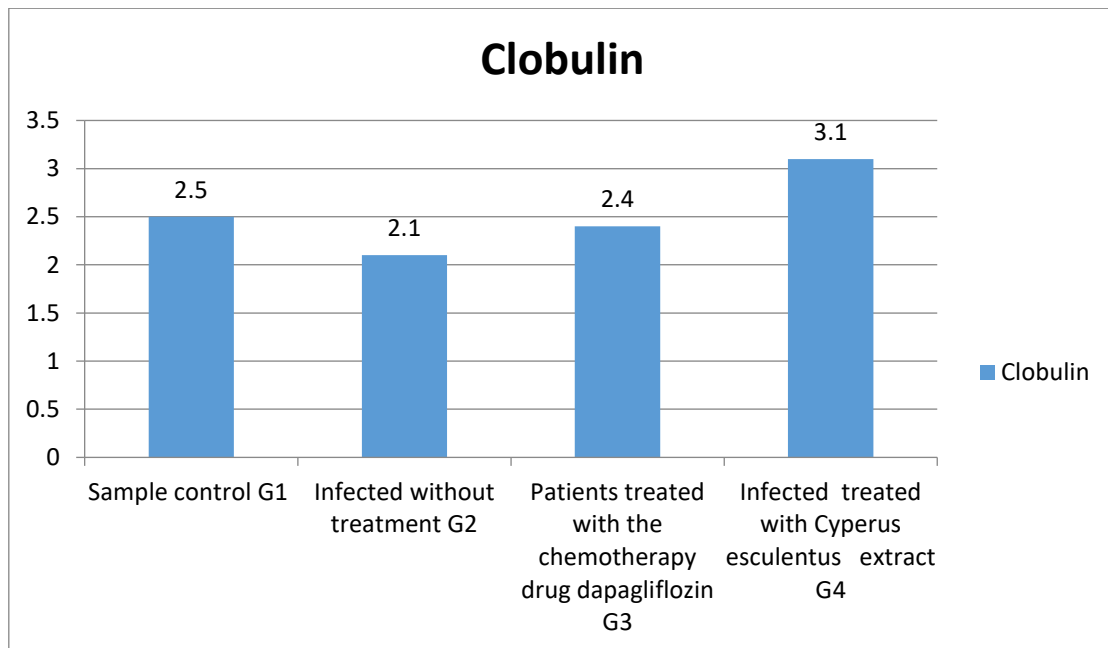


Figure (7) Clobulin in the blood serum of study animals

The results of Table (2), Figure (5), (6) and (7) indicate a $p_0 < 0.05$ significant decrease in the level of total protein, albumin and globulin in the group of infected animals without treatment that were injected with carbon tetrachloride through the protonic membrane (G2) and the reason for the decrease may be due to the toxicity of carbon tetrachloride

compound (CCL4). Which leads to a defect in protein metabolism, which leads to rapid destruction of proteins, an increase in the rate of free amino acids and a decrease in the rate of protein turnover, and the decrease in proteins may be due to oxidative stress of the kidney, which is characterized by the loss of kidney proteins. Oral dosing of rats with cyperus esculentus



seed extract improved total protein, albumin and globulin levels in infected rats.

The results of the study agreed with the study of (El-Hashash et al, 2020), which showed in his study an improvement in the levels of kidney proteins, globulin and albumin in rats that ate 5 % per day of cress seed powder in the diet induced oxidative stress by carbon tetrachloride (CCL4) This improvement may be attributed to the presence of phenolic compounds, dietary fiber and polyunsaturated fatty acids and thus an increase in the level of total protein and albumin And globulin in rat blood serum

CONCLUSIONS

Through the study, it was concluded that oral dosing of rats with renal failure with aqueous extract of cyperus esculentus led to improved levels of urea, creatinine, uric acid and glomerular filtration of rats, as well as improved total protein, albumin and globulin, and taking Dapagliflozin to improve kidney function and kidney proteins, but less than plant extract.

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