The Therapeutic Effect of Corn Silk on Rats with Kidney Stones.

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The Therapeutic Effect of Corn Silk on Rats with Kidney Stones.

Abstract:

Study carry out to evaluate the therapeutic effect of corn silk on rats with kidney stones. Twenty- five rats were chosen (weighing140±10g) and divided into two groups. The first group (5 rats) fed on a basal diet and used as a negative control group. We gave the second group 0.75% ethylene glycol in the drinking water for 28 days to stimulate kidney stones, Infected rats with kidney stones were divided into four subgroups (n= 5) as following :Subgroup (2): Fed on a basal diet as a positive control group. Subgroup (3): Fed on a basal diet containing 5% corn silk powder. Subgroup (4): Fed on a basal diet containing 10 % corn silk powder .Subgroup (5): Fed on a basal diet containing 15% corn silk powder, respectively for 30 days. The initial and final body weights were recorded at the end of the experiment; the last 24 hr. Blood samples were collected for estimating serum glucose, liver function, and kidney function. All kidneys were dissected and weighed. The rats were given ethylene glycol, which increased the level of serum glucose, liver function; kidney function. The groups treated by fortified diet with corn silk have improved in all previous indications. There were also great improvements in kidneys in histopathological examination.

Keywords:

Kidney Stones, corn silk, Biochemical analysis, histopathological examination.

Introduction:

Kidney stones (calculi) are minerals and salts in the renal calyces and pelvis. They are formed when the urine becomes excessively supersaturated with respect to a mineral, leading to crystal formation, growth, aggregation and retention within the kidney **(Saeed *et al*.,2016).** The global of kidney stone disease in a recent study showed that 10.6% in males and 7.1% in females so, 1 in 11 individuals in the US had a history of kidney stones in contrast to 1 in 20 in the US population **(Khashayar,2019).** And calcium Stones (Calcium Oxalate and Calcium Phosphate) are predominant renal stones comprising about 80% of all urinary calculi. Struvite stones occur to the extent of 10–15% and have also been referred to as infection stones and triple phosphate stones, Uric Acid Stones or Urate is accounts approximately for 3–10% of all stone types ,Cystine Stones these stones comprise less than 2% of all stone types, and Drug-Induced Stones is accounts for about 1% of all stone types **(Tilahun and Beyene , 2018).** And it was symptoms of kidney stones are Pain in the side and back and below the ribs. This discomfort usually happen only on the side of the renal calculi and does not cross over to the other side ,Fluctuations in discomfort intensity, with periods of discomfort lasting 20-60 min ,Discomfort waves radiating from the side and back to the lower abdomen and groin ,Bloody, cloudy or foul-smelling urine ,Discomfort, pain and inflammation on urination, Nausea and vomiting ,Persistent urge to urinate, Fever and chills if an infection is present Nephrolithiasis **(Atul and Papiya ,2017).** Corn silk (Stigma maydis) means that the stigmas come from the female flowers of corn, and fresh corn silk looks like soft silk threads about 10 – 20 cm long that are either light green or yellow-brown in color **(Sanusi *et al* ., 2020).**

It is also, composed of lipids, proteins, vitamins, minerals, carbohydrates, and volatile oils **(Chutima *et al* .,2020).** It also contains various chemical components such as polysaccharides, proteins, flavonoids, alkaloids, tannins, steroids **(Dika *et al* .,2018).** And it has bioactive constituents for example terpenoids ,flavonoids **(Vijitha and Saranya,2017).** It has been widely reported to have various pharmacological activities such as anti-inflammatory, anti-depressant, antihyperlipidemic, anti-diabetic, anti-fatigue, antioxidant activities as well as neuroprotective, kaluretic effects and antitumor activities **(Jia *et al* .,2020 and Chutima *et al*.,2020).** In addition corn silk could decrease kidney stones, and it was a diuretic. The compound which plays the role of diuretic agent was flavonoid and the amount of potassium. The amount of potassium increased in the blood which caused potassium concentration in tubules also increased. This would bring about an increase in osmosis pressure in distal tubules and collectivist tubules. Osmosis law states that water will move from low concentration to high concentration so that high osmosis pressure in tubules would bring about water accumulation, and water would be excreted as urine and caused the incidence of the increase in urine production **(Tuty and muchlisyam , 2018).** Corn silk is also playing an important role as a diuretic agent which is usually made in the form of dekok. The high content of potassium can destroy calcium salt in kidney stones because potassium will get rid of calcium to join with the carbonate, oxalate, and phosphate, or uric forming potassium oxalate, potassium carbonate, potassium phosphate, or potassium urate compounds that soluble in water **(Tuty and muchlisyam ,2018).** Therefore, we recommended the use of Corn silk powder as food additives for their nutritional and healthy benefits.

Aim of study: This study aimed to knowing the therapeutic effect of corn silk on rats with kidney stones.

Material and Methods:

Materials:

Corn silk was obtained from Harraz market for spices at 6th October , Cairo, Egypt. Wheat flour, dry yeast, salt, sugar, Starch, skim milk powder, and corn oil were obtained from the local market of Damietta governorate, Egypt. Casein, all vitamins, minerals, cellulose, choline chloride Ethylene glycol, Twenty-five male albino rats (Sprague Dawley strain) weighing 140 ± 10 g, Kits used to determine serum glucose, alanine aminotransferase (ALT) , aspartate aminotransferase (AST), alanine aminotransferase (ALT), uric acid, urea nitrogen, and creatinine were obtained from Nile Center Experimental Research (NCER) ,Mansoura, Egypt.

Methods :

Corn silk was dried at 55°C in an air oven overnight until golden yellowish colors of corn silk were achieved. Dried corn silk was ground and formed into powder used domestic blender.

Preparation of bread:

The bread was prepared as follows.

1-Control: Control bread was made from 100% soft wheat flour

2-Different formulas

Treatment (a): were made from adding Corn Silk Powder on wheat flour at a ratio of 5%

Treatment (b): were made from adding Corn Silk powder on wheat flour at a ratio of 10%

Treatment (c): were made from adding Corn Silk powder on wheat flour at a ratio of 15%

bread prepared by straight dough method as described in A.A.C.C. (2002) as follows :

The ingredients consisted of wheat flour (200g), water (110g) dry yeast (5g), salt (2g), sugar (10g), skim milk powder (4g), and corn oil (10g). The ingredients were mixed for 4 minutes at slow speed (30 r. p. m) and for additional 6 minutes at a fast speed (60rpm) The resulted dough was let to rest for 20 min at 28- 30 ˚C (first fermentation)then divided, rolled and molded automatically in a molding machine . Each piece was put in baking molds and left to ferment for 60 min at 36 ˚C (final fermentation) then the baking

process was carried out in an electrical oven at 210-220 ˚C for 15-20 min. after baking, bread allowed to cool at room temperature.

Chemical analysis:

Moisture content, total protein, crude fat, fiber and ash were determined in both bread samples according to the methods outlined in **A.O.A.C. (1990)** While Total nitrogen extract due to fiber is carbohydrate were calculated by : The differences Carbohydrates(%) = 100 – (moisture + fat + protein + crude fiber + ash). Antioxidant capacity was determined by the method of **(Gaoa *et al*., 1998).**

Sensory evaluation:

Sensory evaluation was performed by invited ten panelists of staff members from the Home Economics Department, Faculty of Specific Education, Damietta University. Each panelist was asked to evaluate unfortified and fortified bread samples with Corn Silk, according to color, Odour, taste, texture and general appearance **Abd El-Latif,(1990).** All necessary procedures for sensory evaluation were applied .

Experimental Design:

Twenty-five (25)normal male albino rats (Sprague Dawley Strain) weighing (140±10) were housed individually in metabolic cages cages under hygienic condition at room temperature of 25 °C ,humidity of 50%and they housed 12 h light/12 h dark cycles. The rates were fed on basal diet one week and water was provided for adaptation. The experiment on rats was carried out according to the national regulation on animal welfare and animal committee.

The basal diet was prepared according to the recommended dietary allowances for rats (American Institute of Nutrition ,AIN)adjusted by **(Reeves *et al*.,1993).**Basal diet consisted of 14% protein , 10%sucrose , 5% corn oil . 0.25% choline chloride , 1%vitamin mixture **(Campbell.,1963)**,3.5%saltsalt mixture **(Hegsted *et al*.,1941)** and 5%fibers (cellules). The Remainder was corn starch up to 100%. Experimental diets were formulated as follow:

1.basal diet fortified with 5% corn silk powder .
2.basal diet fortified with 10% corn silk powder .
3.basal diet fortified with 15% corn silk powder .

After the period of adaptation on basal diet the rats were divided in to two main groups as follow:
The first main group (5 rats) fed on a basal diet and used as a negative control group. We gave the second main group (20 rats) s0.75% (v/v) Ethylene glycol in drinking water for 28 days to stimulate kidney, Infected rats with kidney stones divided into four subgroups (n= 5) as a following:
Subgroup (2): Fed on a basal diet as a positive control group.
Subgroup (3): Fed on a basal diet containing 5% corn silk powder.
Subgroup (4): Fed on a basal diet containing 10 % corn silk powder.
Subgroup (5): Fed on a basal diet containing 15% corn silk powder.

Biological Analysis:

Serum glucose was measured in the serum according to **Trinder, (1969).** Determination of alanine amino transferees (ALT) was carried out according to the method of **Tietz, (1976).** Determination of aspartate amino (AST) was carried out according to the method of **Henry, (1974)** and **Yound, (1975).** Determination of alkaline phosphatase (ALP) was carried out according to the method of **Kind and King(1954).**

Serum creatinine was determined according to **Larsen, (1972).** Uric acid was determined according to **Carawy, (1955).**Urea nitrogen was determined according to **Patton and Crouch,(1977).**

Histopathological Examination:

Specimens from kidney tissues were taken immediately after sacrificing an animal, and fixed a 10% buffered neutral formalin solution. The fixed specimens were hen trimmed, washed and dehydrated embedded in paraffin, cut in sections of 46 microns thickness and stained with haematoxylin and eosin stain, according to **Sheehan and Hrapechak, (1980).**

Statistical Analysis:

The data obtained were statistically analyzed by using he computer. The results were expressed as mean ± standard deviation "SD" and tested for significance using one-way analysis of variance "ANOVA" test, according to **Armitage and Berry, (1987).**

Results and Discussion:

Chemical composition of corn silk.

In the present study corn silk powders was analyzed for their content and illustrated in the table (1). The total carbohydrates represented the major component in corn silk , it contains a high proportion of total carbohydrates reach to 57.3 %, followed by fibers 17.75%, protein10.42 %, Moisture 9.65%, Ash3.91%,and contain a low proportion of lipid content 0.97%. On the other hand, the amounts of total antioxidant capacity were 83.57mg/100g , total phenols were 8236.72 mg/100g, total flavonoids were 256.12 mg/100g and 279.61 kca /100g total Energy.

Our results in the line with those found by **(Mersha and Gebrail, 2018)** who reported that, the contains of moisture (4.1%) ,crud lipid (%0.66), crud protein (14.62%) , ash(3.8%) ,carbohydrate (53.03%) and total dietary fiber (23.79%). In corn silk

With regard to total antioxidant capacity, the content of our samples was also in accordance with findings of which was reported by **(Haslina *et al*., 2017)** as 73mg/100g , total phenols 8262.93 mg/100g, total flavonoids 236.03 mg/100g, Beta-sitosterol 1343.93 mg/100g.

Table(1): Chemical composition of corn silk. (On dry weight basis):

Nutrient	Amount (%) Mean
Moisture content	9.65
Fat content	.97
Protein content	10.42
Ash content	3.91
Dietary Fiber content	17.75
Carbohydrate content	57.3
Total antioxidant capacity	83.57mg/100g
Total phenols	8236.72 mg/100g
Total flavonoids	256.12 mg/100g
Total Energy	279.61kca/100g

Sensory evaluation:

Sensory evaluation of bread fortified with different levels of corn silk powder.

The average scores obtained by bread products in the sensory evaluation are presented in Table (2). Data showed that, the mean value ± SD of the color, odour, taste, texture, general acceptable and total scores in all fortified bread with different levels of corn silk powder decreased significantly ($p \leq 0.05$), except for bread fortified with 5% corn silk , as compared with the control (unfortified pan bread), The data in this Table showed non-significant changes ($p \leq 0.05$) among bread fortified with 5%corn silk and control. The lowest score was recorded for bread fortified with the highest levels from corn silk powder (15% corn silk). Also, the increase of the dark color was due to the increasing corn silk powder.

Table (2): Sensory evaluation score (Mean± SD) of bread fortified with different levels of corn silk powder:

Groups	Color		Odour		Taste		Texture		General acceptance		Total	
	Mean	± SD	Mean	± SD	Mean	± SD	Mean	± SD	Mean	± SD	Mean	±
Bread control	19.50 ^{a}	± 1.58	18.80	± 2.10	19.50^{a}	± 1.08	19.80^{a}	± 0.42	20.00^{a}	± 0.00	**97.60^{a}**	±
Beard +5% corn silk	17.51^{ab}	± 2.17	17.79	± 1.52	17.25^{ab}	± 1.69	17.72^{ab}	± 1.44	17.60^{b}	± 1.90	**87.87a^{b}**	±
Beard +10% corn silk	16.32^{b}	± 3.15	16.84	± 3.00	16.55^{b}	± 3.06	16.70^{b}	± 2.67	16.15^{bc}	± 2.73	**82.56^{b}**	±
Beard +15% corn silk	13.84^{c}	± 4.74	15.63	± 3.86	15.00^{b}	± 3.65	14.56^{c}	± 3.46	14.14^{c}	± 3.74	**73.17^{c}**	±
F	5.653		2.391		5.239		8.893		9.733		**6.967**	
P-value	**0.003**		0.085		**0.004**		**0.001**		0.001		**0.001**	

Values in each column, which have different litters, are significant different ($p \leq 0.05$)

Biological Evaluation:

Initial weight, Final weight and Body weight gain% (BWG%):

Data in Table (3): showed a significantly decreased in body weight gain in the positive control group compared with the negative control group all treated groups showed significant increase in BWG%, as compared to the control groups, Among all treated groups, the highest increase in BWG% was noticed in the treated group with (15%) corn silk compared with the positive control group.

Kidney Weight %

Table (3): showed the mean values ± SD of weight kidney of the tested groups. The mean value ± SD of kidney weight % of Kidney stone disease rats increased significantly ($p \leq 0.05$), as compared to healthy rats fed on basal diet. all treated groups with corn silk recorded significant decrease in kidney weight% as compared to the positive control group. The highest decrease in this organ was found in the group which treated with 15% corn silk.

These results agree with that **Yogesh *et al*.,(2013)** who reported that, the diets using corn silk at different levels increased the body weight gain of rats with kidney stones disease compared with a positive control group. In addition to the increase of the weight of the kidney in the positive control group compared with the negative control group. It also decreased the weight of the kidney when we use corn silk in rats with kidney stones disease compared with the positive control group.

Suresh *et al*., (2020) indicated that Urolithiasis was induced using ethylene glycol in drinking water for 28 days.0.75%. It decreased the body weights and Increased the weight of the kidney in urolithic rats.

Table (3) : The effect of corn silk on weight kidney , B.W.G of rats with kidney stones and the relation between them:

Groups	Parameters											
	Initial weight		Final weight		Weight Kidney		B.W.G (%)		K.B.W			
	Mean	± SD	Mean	± SD	Mean	± SD	Mean	± SD	Mean	±		
CN (-)	141.68[a]	± 2.66	144.60[a]	± 2.48	0.70[a]	± 0.05	2.06[a]	± 0.95	0.48a	±		
CN (+)	113.80[b]	± 1.30	115.20[b]	± 2.18	1.18[b]	± 0.14	1.23[a]	± 1.16	1.02b	±		
5% Corn Silk	114.90[b]	± 2.46	119.30[c]	± 2.97	0.88[c]	± 0.13	3.82[b]	± 0.54	0.74c	±		
10% Corn Silk	115.60[b]	± 1.56	127.60[d]	± 1.29	0.83[ac]	± 0.07	10.39[c]	± 0.79	0.65cd	±		
15% Corn Silk	114.70[b]	± 2.46	134.30[e]	± 2.69	0.75[ac]	± 0.14	17.09[d]	± 1.09	0.56ad	±		
F	156.37		121.08		14.03		260.24		25.96			
P-value	0.001		0.001		0.001		0.001		0.001			

Means under same column have the different letters are significant different at p≤ 0.05.

Biochemical analysis:

Serum Glucose:

The mean value of serum glucose in the negative control group (healthy rats), the positive control group(rats with kidney stones disease),treated groups with different levels of corn silk (5%,10%, and 15%),are summarized in Table (4).

The mean value of serum glucose of positive control groups (rats with kidney stones disease)increased significantly ($p \leq 0.05$),as compared to negative control group (healthy rats)194.43±5.05 mg/dl vs.110.35±8.36 mg/dl),respectively . Serum glucose increased by about 76.2% in the positive control group, than that of the negative control group.

Also the data from the same Table revealed that, significant decreases ($p \leq 0.05$) were recorded in glucose levels between rats with kidney stones disease fed on Diet containing corn silk (5%,10%and 15%).On the other hand ,the highest decrease in serum glucose recorded for the group fed on diet containing 15% corn silk .The mean value of serum glucose of the treated group fed on (15%CS)showed non-significant change , as compared to the negative control group. These results are in agreement with those found by **Dika *et al*., (2020)** who mentioned that giving corn silk led to significant decrease in blood glucose concentrations in diabetic rats, because corn silk has many ingredients, including alkaloids, flavonoids, phenols, saponins , tannins, and fitosterol. The flavonoids in corn silk repair pancreatic β cells, which can stimulate insulin secretion.**(Carla *et al* .,2019)** said that corn silk is widely used as an anti-diabetic remedy all over the world. Results in this work confirmed that phenolics from maize silks can inhibit the activity of carbo- hydrate-hydrolyzing enzymes such as the intestinal α-glucosi- dases. Therefore, the hypoglycemic effect reported by intake of maize silk extracts could be partially related to the inhibition of intestinal α-glucosidases, just as happens with other anti-diabetic plants. According to the molecular docking simulation, maysin, methoxymaysin, and apymaysin are the maize silk compounds that could be the main responsible for α-

glycosidase inhibition. While **Umar, (2016)** found that Corn silk has cardiac glycoside, steroids, terpenoids, alkaloids, flavonoids, carbohydrates and anthraquinones. The aqueous extract of corn silk has already been investigated and found to reduce hyperglycemia ,The experimental results have found that the methanol extract of the cooked corn silk exhibited dose dependent action in a similar mechanism as glibenclamide where surviving beta cells are stimulated to release more insulin.

Table (4): Effect of Some Levels of Corn silk on Serum Glucose of rats with kidney stones disease:

Groups	Glucose (mg/dl)		F	P-value
	Mean	± SD		
CN (-)	110.35[a]	± 8.36	66.42	0.001
CN (+)	194.43[b]	± 5.05		
5% Corn Silk	169.00[c]	± 5.57		
10% Corn Silk	147.00[d]	± 8.19		
15% Corn Silk	126.67[e]	± 7.64		

Means under same column have the different letters are significant different at p≤0.05.

Liver Enzymes:

From the data presented in Table (5), it could be observed that, the mean value ±SD of serum (AST, ALT and ALP) in the positive control group increased significantly (p≤0.05), as compared to the negative control group. Rats with given Ethylene glycol led to increasing in (ALT,AST and ALP) enzymes by about 352.99%, 179.78% and 263.59% in the positive control group As compared to the negative control group. Treating rats on diet containing different levels of corn silk led to a significant decrease in serum AST, ALT and ALP enzymes, as compared to the non-treated group.

The highest level of corn silk (15%) recorded the best results in ALT, AST and ALP enzyme, where, this group showed non-significant differences, as compared with the negative control group.

These results agreement with **Arba *et al*., (2020)** who reported that corn silk contains phytochemicals which have beneficial effects, such as flavonoids compounds which act as antioxidant agents and has a hepatoprotective effect.

Nader *et al*.,(2018) have added that corn silk has a great effect on the improvement of liver function. **Fanoush *et al*.,(2018)** have also found that corn silk contains several flavonoids ,which have antioxidant capacity which in turn scavenging liver tissues from damage.

Table(5): Effect of Some Levels of corn silk on Liver Enzymes of rats with kidney stones disease:

Groups	Parameters					
	ALT (µ/l)		AST(µ/l)		ALP (µ/l)	
	Mean	± SD	Mean	± SD	Mean	± SD
CN (-)	22.02^{a}	± 6.13	32.25^{a}	± 8.92	85.50^{a}	± 16.76
CN (+)	99.75^{b}	± 11.48	90.23^{b}	± 20.92	310.87^{b}	± 95.56
5% Corn Silk	78.82^{bc}	± 26.21	70.83^{bc}	± 10.20	258.13^{bc}	± 46.38
10% Corn Silk	53.58^{c}	± 8.91	60.80^{cd}	± 6.89	187.23^{cd}	± 38.27
15% Corn Silk	25.58^{ad}	± 7.19	37.57^{ad}	± 20.48	98.13^{ad}	± 27.25
F	**17.17**		**7.90**		**10.51**	
P-value	**0.001**		**0.004**		**0.001**	

Means under same column have the different letters are significant different at p≤0.05.

Kidney Functions:

Statistical analysis in Table (6) indicated that, the mean value of serum uric acid, urea nitrogen and creatinine increased significantly p≤0.05 in the positive control group, as compared to the negative control group. On the other hand, all treated groups revealed a significant decrease in this parameters, as compared to the positive control group (untreated group).The highest

improvement of serum uric acid, urea and creatinine recorded for the group treated with 15% CS. **(Aewha *et al.*, 2018)** which reported that ,corn silk extract is effective in treating kidney related diseases as a diuretic agent. It has been hypothesized that corn silk extract contains many phytochemicals that can provoke diuresis. **Marijana *et al.*,(2016)** said that corn silk led to urea and creatinine reduction in mice kidneys.

Table (6): Effect of Levels of corn silk on Kidney Functions of rats with kidney stones disease:

Groups	Parameters					
	Urea (mg/dl)		U.A (mg/dl)		Creatinine (mg/dl)	
	Mean	± SD	Mean	± SD	Mean	± SD
CN (-)	39.18^{a}	± 2.94	3.83^{a}	± 0.83	0.55^{a}	± 0.06
CN (+)	104.06^{b}	± 37.94	16.40^{b}	± 3.80	0.90^{b}	± 0.04
5% Corn Silk	100.00^{b}	± 22.09	9.33^{c}	± 2.79	0.70^{c}	± 0.07
10% Corn Silk	95.36^{b}	± 16.22	9.07^{c}	± 1.47	0.65^{c}	± 0.04
15% Corn Silk	52.88^{a}	± 7.23	5.07^{a}	± 1.33	0.59^{a}	± 0.01
F	**6.00**		**13.49**		**24.22**	
P-value	**0.01**		**0.001**		**0.001**	

Means under same column have the different letters are significant different at $p \leq 0.05$.

Histopathological examination of kidneys:

Kidney of control animal showing normal renal glomeruli and tubules photo 1(A1). Kidney of positive control animal showing severe impaction of the renal tubules with oxalates crystals associated with marked interstitial fibrosis Photo 2(B1).Kidney of diseased animal treated with 5% of corn silk showing decrease

oxalates crystals deposition within the renal tubules and also decrease the interstitial reaction Photo3 (C1).Kidney of diseased animal treated with 10% of corn silk showing marked decrease both crystals within the renal tubules and interstitial reaction Photo 4(D1). Kidney of diseased animal treated with 15% of corn silk showing marked decrease crystals within the renal tubules and with normal interstitial Photo 5(E1).

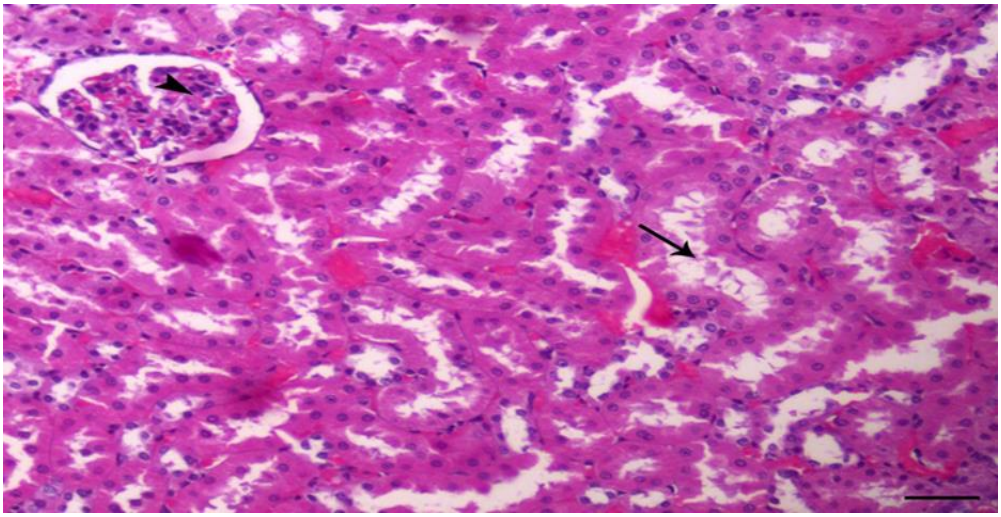

Photo (A1): Kidney of control animal showing normal renal glomeruli and tubules (arrowhead and arrow respectively), H&E, X200 bar= 50 µm.

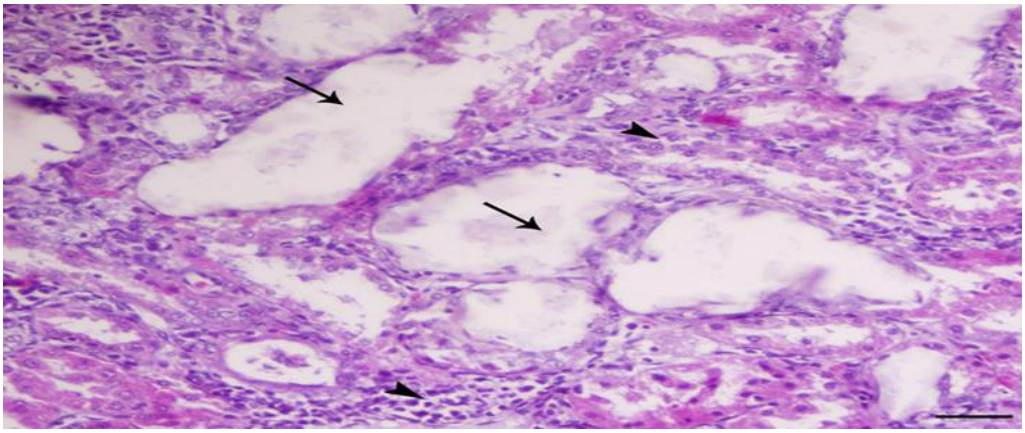

Photo (B1): Kidney of positive control animal showing severe interstitial nephritis associated with impaction of the renal tubules with oxalates crystals (arrows) and associated with marked interstitial fibrosis (arrowheads), H&E, X200 bar= 50 µm.

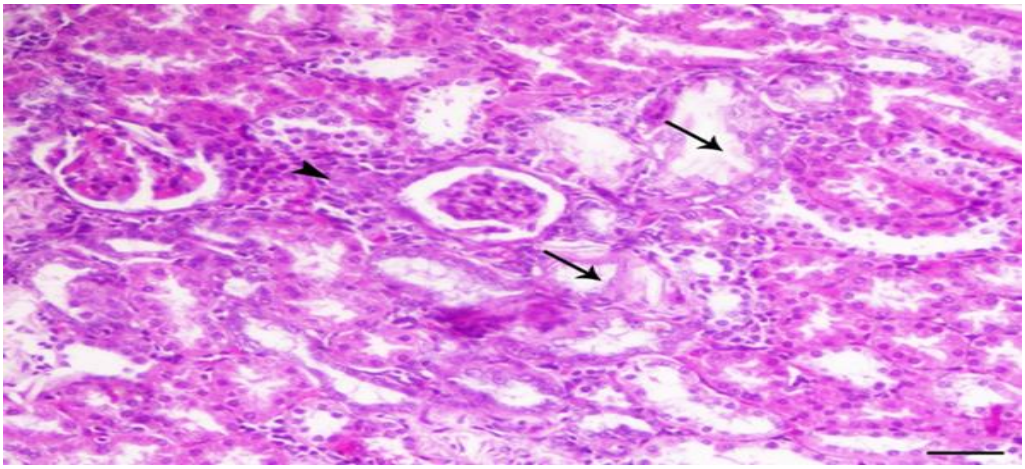

Photo (C1): Kidney of diseased animal treated with 5% of corn silk showing decrease oxalates crystals deposition within the renal tubules (arrows) and also decrease the interstitial reaction (arrowhead), H&E, X200 bar= 50 µm.

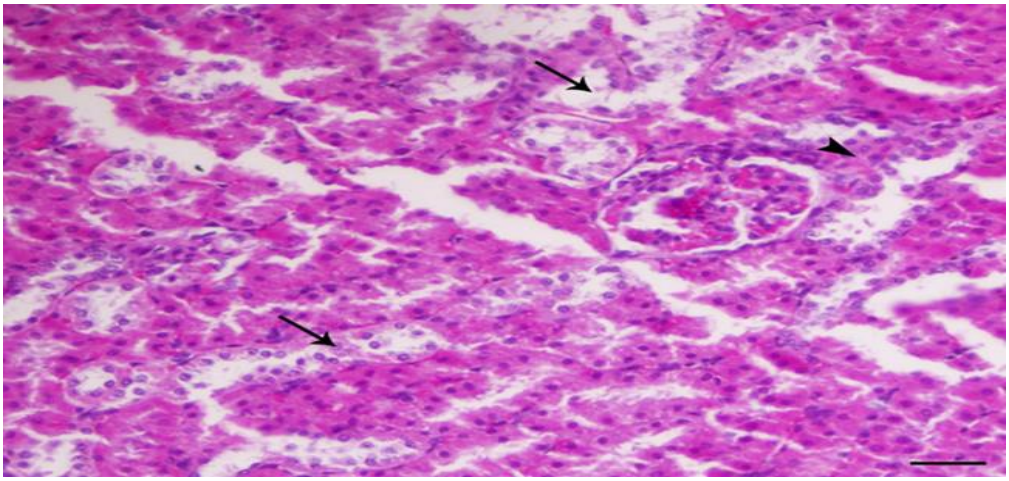

Photo (D1): Kidney of diseased animal treated with 10% of corn silk showing marked decrease both crystals within the renal tubules (arrows) and interstitial reaction (arrowhead), H&E, X200 bar= 50 µm.

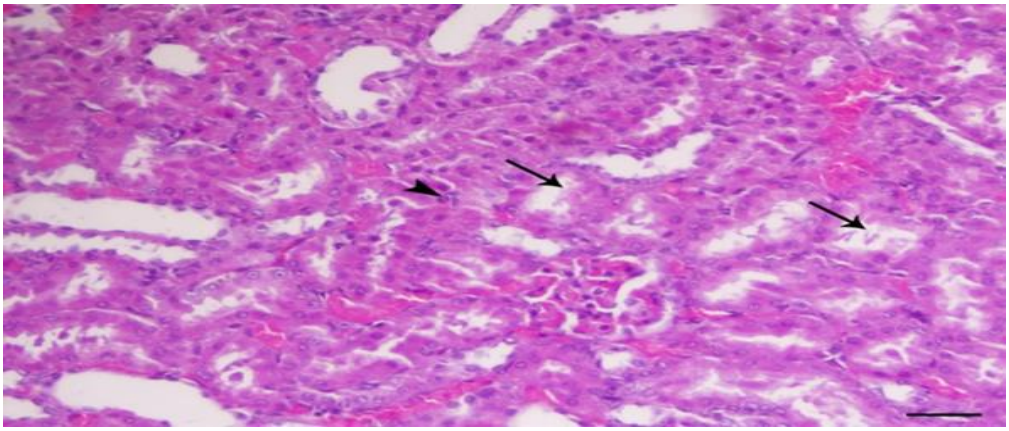

Photo (E1): Kidney of diseased animal treated with 15% of corn silk showing marked decrease crystals within the renal tubules (arrows) and with normal interstitial (arrowhead), H&E, X200 bar= 50 µm.

conclusion :

From the previous results , this study can conclude that the corn silk improved serum glucose levels , liver functions , and kidney functions in rats with kidney stones disease. Such improvements were increased with the increase of the corn silk concentration . This confirms that corn silk is a great agent in getting rid of kidney stones.

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