Therapeutic effects of Curcumin, Saffron, and Moringa against Aluminum Toxicity in Rats

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ABSTRACT

Natural plants can help treat some diseases and are a great source of vitamins and minerals for the body. Objective: research the use of moringa, saffron, and curcumin to treat animals from aluminum poisoning. Thirty-five male albino rats weighing around 170 ± 10g were divided into 5 groups (7 rats/ each) as follows: The main first group was kept as a negative control and was fed on the basal diet only. The second main group (28 rats) after six weeks of feeding a normal diet supplemented with aluminum chloride ($AlCl_3$), was divided into four subgroups fed $AlCl_3$ and treated plants for a further four weeks. The first was a positive group that consumed a normal diet with $AlCl_3$. A basal diet mixed with $AlCl_3$ + Moringa (100 mg/kg diet) was provided to subgroup 2. The consumption of a basal diet combined with 15 mg/kg of saffron and $AlCl_3$ supplied subgroup 3. A basal diet mixed with $AlCl_3$ and curcumin (0.5 g/kg diet) was given to subgroup 4. The findings showed that the plant with the greatest potential to reduce aluminum toxicity was saffron, while moringa improved liver and kidney functions and curcumin helped ameliorate the lipid profile. In conclusion, employing these natural plants can reduce the severity of aluminum poisoning.

Keywords: *Aluminum poisoning, curcumin, saffron, moringa*.

INTRODUCTION

Nutrition is the study of nutrients in food; how the body uses them and the relationship between diet, health, and disease. (**Swaminathan**, **2014**).

Aluminum exposure is usually harmless, but exposure or inhalation of high levels can cause health problems and poisoning (**El-Daouk *et al.***, **2020**). The increased use of food preparation and storage in aluminum containers, cans, and foil may lead to an increase in aluminum content, especially in foods that are salty, acidic, or contain a large amount of alkaline (**Shati *et al.***, **2011**).

Spices and herbs have been used for centuries for culinary and medicinal purposes and they are not only enhancing the flavor, aroma, and color of foods and beverages but can also protect against acute and chronic diseases. There is now ample evidence that spices and herbs possess antioxidant, anti-inflammatory, antitumor, anti-carcinogenic, and glucose, cholesterol-lowering activities. In addition, the characteristics affect perception and mood (**Jiang**, **2019**). The other search found that polyphenols are in it.

Turmeric, especially curcumin, helps manage oxidative conditions, arthritis, and anxiety. A relatively low dose of the compound can influence health benefits for people who have not been diagnosed with health conditions and provides multiple health benefits (**Hewlings and Kalman**, **2017**).

Saffron is widely cultivated in Iran and other countries such as India and Greece. It contains more than 150 volatile compounds and produces mainly odor. In addition, it possesses several important medicinal activities such as hypotensive, anti-tussive, antispasmodic, anti-genotoxic, and cytotoxic. It also improves memory and learning skills (**Srivastava *et al.*, 2010).**

Moringa *oleifer**a* is a plant called the drumstick tree,

radish tree, or coffee tree oil, and it has been used for centuries because of its medicinal properties and health benefits. B3, niacin, B6, folic acid, phosphorous, iron, zinc, calcium, and potassium, and it is very low in fat and do not contain harmful cholesterol (**Gopalakrishnan and Kumar, 2016).**

MATERIALS AND METHODS

Materials:

Plants

Moringa seeds and Saffron, purchased from Al-Azhar Al-Sherif pharmacy, Giza Egypt, were ground to mix with the meal. Curcumin was obtained from Nano Gate Company, Mokattam, Cairo, Egypt.

Animals

Thirty-five adult male Sprague Dawley albino rats weighing 170 ± 10 g, were purchased from the Agricultural Research Center in Giza, Egypt.

Diet

The basal diet was prepared according to **(Reeves et al., 1993)**, and was obtained from El - Gomhoreya Company, Cairo, Egypt.

Chemicals:

Aluminum chloride ($ALCl_3$), was obtained from an International Company, in Cairo, Egypt

kits for biochemical analysis were obtained from Alkan for pharmaceuticals and chemicals in Dokki, Giza, Egypt.

Methods:

Induced rats by aluminum

Preparation of infection material for (Al poisoning): Rats were induced to develop aluminum (Al) poisoning with $Alcl_3$ (345 mg/kg body weight) mixed with a basal diet, for 6 weeks **(Khalaf, et al., 2007)**.

Biological study

Animals were housed in plastic cages measuring 16 x 20 x 10 inches (7 Rats per cage). They were housed in well-ventilated cages and under appropriate hygienic

conditions in a well-ventilated room with alternating light and dark cycles for 12 hours each and at room temperature 25 °C. With access to basal feed and water for two weeks to adapt. Authorization for the study (Protocol NO: A9-2023) was obtained from the National Hepatology and Tropical Medicine Research Institute (NHTMRI), and the Protocol for the Care and Usage of Lab Animals was followed.

Experimental design

Rats were divided into two groups as follows:

The main group 1 (7 rats): (negative control group), was fed on the basal diet for 10 weeks.

The second main group (28 rats) after six weeks of feeding a normal diet supplemented with aluminum chloride ($AlCl_3$), was divided into four subgroups (7 rats/ group) fed $AlCl_3$ and treated plants for a further four weeks.

The positive control subgroup was fed on basal diet + $Alcl_3$ (345mg/kg diet) **(Khalaf, et al., 2007).**

Subgroup 2: Rats were fed on a basal diet with $Alcl_3$ (345 mg/kg diet) and Moringa seed (100 mg/kg diet) **(Gouda, et al., 2018).**

Subgroup 3: Rats were fed on a basal diet + $Alcl_3$ (345 mg/kg diet) with the supplement of Saffron (15 mg /kg diet**) (Karimi-Nazari, et al., 2019).**

Subgroup 4: Rats were fed on a basal diet + $Alcl_3$ (345 mg/kg diet), with added Curcumin (0.5 g /kg diet**) (Ganjali, et al., 2017).**

Dosing was continued until the end of the experiment (10 weeks).

In the fifth week of the experiment, the blood sample was taken from each rat eye under light anesthesia. The concentration of aluminum was analyzed in the serum of rats according to **Selvi et al., (2017).**

Biochemical analysis

Blood samples were collected from each rat eye under light anesthesia and serum was separated and kept frozen for determination of the following:

The total cholesterol was assayed with Kit was made by Bioassay Systems CO. according to the colorimetric method described by **Lee *et al*., (2008).** The triglycerides estimated with Kit were made by Biomed CO. by enzymatic method according to (**Fossati and Principe, (1982).** The high-density lipoprotein cholesterol (HDL-c) determined with Kit was made by Biomed CO. according to the method described by **Natio *et al*.,** (**1984**).

The **A**lanine amino-transferase (ALT) estimated with Kit was made by BioMed CO. The aspartate aminotransferase (AST)assay Kit was made by Bio-Vision CO. and was carried out according to the method of **Young, (1990).** The Uric Acid assay with Kit was made by Bioassay Systems CO. according to the colorimetric method described by **van Dam *et al*., (2020).** The creatinine assayed with Kit was made by Bioassay Systems CO. according to the colorimetric method described by **Davalos-Misslitz *et al*., (2007).**

Histopathology Technique

At the end of the experimental period (10 weeks); the brain, liver, and kidneys were removed. Organs were weighed before preservation, washed with ice-cold saline, and kept in airtight containers containing 10% formalin for histological study.

Autopsy samples were taken from the brain, liver, and kidney of rats in different groups and fixed in 10% buffered formal saline for twenty-four hours. Washing was done in tap water then serial dilutions of alcohol (methyl, ethyl, and absolute ethyl) were used for dehydration. Specimens were cleared in xylene and embedded in paraffin at 56 degrees in a hot air oven for twenty-four hours. Paraffin beeswax tissue blocks were prepared for sectioning at 4 microns' thickness by sled microtome. The obtained tissue sections were collected on glass slides, deparaffinized,

and stained by hematoxylin & eosin stain for examination through the light electron microscope **(Bancroft et al., 1996).**

Statistical Analysis

Statistical analysis was carried out by SPSS program (Version 26). Data were expressed as mean and standard error (mean ± SE) and the statistical analysis was performed using a one-way analysis of variance followed by Duncan's test **(Chawla, 2010).**

RESULTS AND DISCUSSION

The data in **Table (1)** showed the protective effect of moringa, saffron, and curcumin on the level of blood lipids in the aluminum poisoning rat model. The results showed that the levels of triglycerides (TG), low-density lipoprotein-cholesterol (LDL-c), and very low-density lipoprotein-cholesterol (VLDL-c) of the positive control group were higher than those of the negative control groups ($P< 0.05$). This is consistent with the fact that the accumulation of aluminum in food is a major source of human exposure and thus a threat to human health. Some reports are available about the toxic effects of AL in cardiovascular diseases such as hypertension, aneurysm, thrombosis, heart attack, and stroke (**Ghorbel *et al.*, 2015).**

Moreover, these results agreed with **Alqayim, (2015),** who reported significant increases in levels of total cholesterol, triglycerides, LDL- cholesterol, and VLDL-cholesterol in the group that received AL ($P< 0.01$). Moreover, all treated groups had TG, TC, LDL-c, and VLDL-c levels lower than the positive control group but still higher than the negative control group. The best result was recorded for the group fed with moringa except for HDL-c. The Saffron has improved it. These results may agree with (**Uchendu *et al.*, 2016**), who reported that the results showed that the test group showed a non-significant decrease in TG, LDL-c, and VLDL-c and a non-significant increase in HDL-c concentrations but not as much as the group that showed a significant decrease in LDL-c ($p < 0.01$), TG ($p < 0.05$), VLDL-c and also significantly

increased HDL concentrations ($P< 0.05$) when compared to the negative control group.

As shown in **Table (2)** induction of AL-toxicity (positive control) caused significant increases in levels of serum uric acid, creatinine, and urea nitrogen as compared to the negative control group.

The protective effect of protective substances was manifested by significant decreases in serum creatinine, urea, and uric acid as compared to the positive control group *(P*<0.05). This result agreed with **Kawahara, (2011).** Moreover, the best protection was observed in the group fed moringa, followed by the groups fed on curcumin and saffron respectively.

Meanwhile, results in **Table (3)** demonstrate that co-administration of curcumin, moringa, and saffron caused significant decreases in serum levels of ALT and AST activity compared to the positive control group, these results agreed with **Hassan and Kadry** (**2021**), who reported that AL- toxicity, led to a significant increase in the serum levels of ALT and AST in the serum compared with control values that reflected severe AL-induced hepatotoxicity. All treated groups had lower ALT and AST levels than the positive control group ($P < 0.05$).

Data in **Table (4)** displayed that serum levels of AL in all treated groups were significantly lower than the positive control group observed (*P*<0.05). this is consistent with the study of **Akter, 2021).** Moringa aloe vera reduces nephropathy and reduces necrosis and dilatation of the tubules. It also agrees with **Pareek, 2023)**. It improves liver function, which is affected by aluminum, and causes a significant increase in liver function levels. There were also statistically significant differences between all groups except the group that was fed with saffron, a result that is not consistent with **Razavi, 2015),** which states that saffron improves kidney and liver functions caused by aluminum poisoning in rats.

Histopathological examination of the brain:

The brains of rats from the negative control group that were fed the basal diet showed normal tissue structure with normal neurons (photo 1,2).In contrast, the brain sections of

the rat from the positive control group induced with AL showed necrosis in neurons and also showed clear shrinkage and dysfunction in the neurons of the second group (photo 3.,4).In addition to cellular edema and cerebral vascular congestion (Photo 4) as well as Astrocytosis (Photo 5).Meanwhile, the cerebral cortex of rats from group 3 described necrosis, shrunken-ness, and pyknosis of some neurons (Photo 6, 7 & 8) and slight proliferation of glial cells (Photo7). Furthermore, sections from rats in group 4 exhibited necrosis of some neurons (Photo 8), cellular edema, and focal gliosis. Otherwise, the cerebral cortex of rats from group 5 revealed mild changes characterized by necrosis of some neurons (Photo 7&8). These findings are consistent with the fact that other brain changes include inflammation and degene-ration. The presence of toxic beta-amyloid activates immune system cells in the brain called microglia, as microglia attempt to remove toxic proteins as well as scattered debris from dead and dying cells. Chronic inflammation is thought to occur when microglia cannot keep up with all that needs to be removed by atrophy or shrinkage **Gordon et al., (2018).** Therefore, amyloid B is neurotoxic, leading to the development of neuronal damage and leading to neuronal degeneration by promoting neuro-inflammation and disrupting neurogenesis.

Histopathological examination of kidneys:

Microscopic examination of the kidneys of rat from the negative control group, which is Group (1), which were fed a basic diet revealed the normal histological structure of the renal parenchyma, glomeruli, and tubules in the cortex (photos 1, 2). On the contrary, the kidneys of rats from the positive control group showed Those treated with AL, namely group 2, had vacuolar degeneration of renal tubules with interstitial nuclei and congestion in blood vessels (Photo 3,4), and these results agreed with **Okail (2020),** who stated that histological examination of kidney sections of different animal groups was performed. Obtained a month after treatment, examination of kidney sections from Al-

treated rats revealed severe tissue damage compared to the control group. On the other hand, all groups treated with (moringa, saffron, and curcumin) showed the normal histological structure of the tubes and tubules in the renal cortex compared to the control groups and reflected the positive therapeutic effect of the basic food to which herbs (moringa, saffron, and curcumin) were added, against the damage caused by (AL) on the kidneys of male rats infected with aluminum poisoning. The rat of group 3 showed congestion in the renal blood vessels (photo 3), slight vacuolar degeneration in the epithelial lining of some renal tubules (photo 4), and slight congestion in the glomerular tuft (photo 5). This result agreed with **Al-Bashir et al. (2020),** who reported the occurrence of histopathological changes in kidney tissues. Furthermore, sections of renal tissues of rats from Group 4 did not describe histopathological changes except for slight vitreous degeneration in the epithelial lining of some renal tubules in some sections (photo 6,7), and Some of the examined sections from Group 5 revealed slight vacuolar degeneration in the epithelial lining of some renal tubules, and dilatation and congestion of the renal blood vessels (Photo 8), while other sections did not show any pathological histological changes (Photo 7,8). The curcumin group also significantly improved compared to the positive control group and this was agreed with **(Mehany, 2023).** Taking saffron orally also improved those ultrastructural changes that occurred in the kidneys.

Histopathological examination of the liver:

Microscopic inspection of liver sections from different animal groups. The rats from the negative control group, which is Group 1, which were fed a basal diet, revealed the normal histological structure of the central vein and the hepatocytes surrounding the hepatic lobule (photos 1,2). In contrast, the livers of the rats from the control group showed. Positive rats treated with AL showed activation of Kupffer cells, vacuolar degeneration of hepatocytes (Photo 3), and focal necrosis of hepatocytes associated with inflammatory cell infiltration (Photo 3, 4). In addition, the

liver of rats from group 3 showed a slight activation of Kupffer cells (Photo 5,7), and slight vacuolar degeneration of some liver cells (Photo 6,7). Otherwise, the liver of rats from group 4 showed only slight hydrolytic degeneration of some liver cells (Photo 9,8). This result also agrees with the role of curcumin in treating damage caused by AL in liver tissue cells (**Farzaei,2018).** On the other hand, the liver of rats from group 5 showed a slight activation of Kupffer cells and a small focal necrosis of hepatocytes associated with infiltration of inflammatory cells (Photo6). These results agreed with **Hamza, 2010),** who showed that moringa has an anti-inflammatory effect and its ability to reduce the activation of hepatic stellate cells. This means that prolonged exposure to Al often results in damage to hepatic tissue cells.

CONCLUSION

This study concludes that natural plants such as moringa, saffron, and curcumin can protect against some diseases such as aluminum poisoning, as they improve the level of uric acid and creatinine, and also improve the function of liver enzymes.

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Table (1): Therapeutic Effect of Some Plants (moringa, Saffron, and Table curcumin), on Lipid Profile in Aluminum poisoning Rats Model.

Biochemical Parameters / Groups of rats	Lipids profile				
	TC (mg /dl)	TG (mg /dl)	HDL-c (mg /dl)	LDL-c (mg /dl)	VLDL-c (mg /dl)
G1: Control (- Negative)	114.4 ± 13.5 ^{c}	68.9 ± 1.2 ^{c}	60.0 ± 3.4 ^{ab}	40.6 ± 2.2 ^{b}	13.8 ± 0.8 ^{a}
G2: Control (+ Positive)	134.0 ± 6.3 ^{a}	88.4 ± 3.5 ^{a}	63.0 ± 2.9 ^{a}	54.6 ± 3.1 ^{a}	17.7 ± 1.6 ^{b}
G3: Stander diet +(Moringa 100 mg/ kg diet)	109.5 ± 6.7 ^{ab}	74.8 ± 3.4 ^{bc}	65.0 ± 2.5 ^{b}	29.5 ± 1.9 ^{b}	14.9 ± 2.3 ^{a}
G4: Stander diet + (Saffron 15 mg/ kg diet)	111.7 ± 6.11 ^{ab}	84.1 ± 3.9 ^{ab}	66.4 ± 2.09 ^{b}	28.48 ± 2.8 ^{a}	16.82 ± 1.0 ^{ab}
G5: Stander diet + (0.5 g Curcumin / kg diet)	114.7 ± 7.1 ^{ab}	74.5 ± 4.2 ^{bc}	63.1 ± 2.4 ^{a}	36.7 ± 2.01 ^{ab}	14.9 ± 1.6 ^{b}

Values are means ±SE: where n =7

In the same row: Similar superscript means insignificance difference, while different letters mean a significant difference between groups at (p <0.05).

Table (2): Therapeutic Effect of Some Plants (moringa, saffron, and curcumin) on Kidney Functions in aluminum poisoning rat model.

Biochemical Parameters / Groups of rats	kidney Function		
	Uric acid (mg/dl)	Creatinine (mg/dl)	Urea (mg/dl)
G1: Control (- Negative)	0.98 ± 0.19^{b}	0.67 ± 0.019^{b}	42 ± 2.4^{b}
G2: Control (+ Positive)	2.7 ± 0.30^{a}	1.4 ± 0.14 ^{a}	54 ± 2.21 ^{ab}
G3: Stander diet + (Moringa 100 mg/ kg diet)	0.93 ± 0.04^{b}	0.82 ± 0.02^{bc}	48.4 ± 2.4^{b}
G4: Stander diet + (Saffron 15 mg/ kg diet)	1.01 ± 0.06^{a}	1.02 ± 0.06^{a}	50.1 ± 1.4 ^{ab}
G5: Stander diet + (0.5 mg Curcumin / kg diet)	1.3 ± 0.02^{a}	0.98 ± 0.03^{bcd}	51.9 ± 1.3 ^{ab}

Values are means ± SE: where n= 7

In the same row: Similar superscript means insignificant difference, while different letters mean a significant difference between groups at (p <0.05).

Table (3) Therapeutic effect of some Plants (moringa, saffron, and curcumin) on liver function in aluminum poisoning rat model.

Biochemical Parameters / Groups of rats	Liver Function	
	ALT (U/l)	AST (U/l)
G1: Control (- Negative)	49 ± 2.9 [b]	15.5 ± 1.5 [b]
G2: Control (+ Positive)	61.5 ± 2.1 [a]	19.5 ± 1.3 [a]
G3: Stander diet + (Moringa 100 mg/ kg diet)	55.8 ± 3.6 [ab]	16.2 ± 1.5 [ab]
G4: Stander diet + (Saffron 15 mg/ kg diet)	60.5 ± 2.1 [a]	18.5 ± 1.1 [ab]
G5: Stander diet + (0.5 mg Curcumin / kg diet)	58 ± 2.9 [a]	17.2 ± 1.4 [ab]

Values are means ±SE: where n=7

In the same row: Similar superscript means insignificant difference, while different letters mean a significant difference between groups at (p <0.05).

Table (4) Therapeutic effect of some Plants (moringa, saffron, and curcumin) on aluminum poisoning rat model.

Parameters / Groups	AL (mg/dl)
G1: Control (- Negative)	0.025 ± 0.018 [a]
G2: Control (+ Positive)	0.123 ± 0.033 [b]
G3: Stander diet + (Moringa 100 mg/ kg diet)	0.037 ± 0.023 [a]
G4: Stander diet + (Saffron 15 mg/ kg diet)	0.010 ± 0.030 [b]
G5: Stander diet + (0.5 mg Curcumin / kg diet)	0.031 ± 0.022 [a]

Values are means ±SE: where n =7

In the same row: Similar superscript means insignificance difference, while different letters mean a significant difference between groups at (p <0.05).

Histopathological examination of the brain:

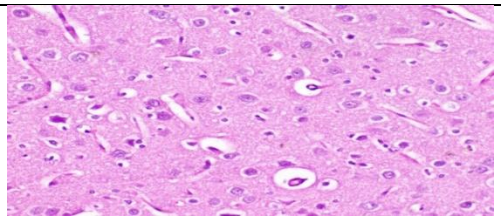

Photo. (1: Photomicrograph of the cerebral cortex of a rat from group 1 showing the normal histological architecture (H & E X 400).

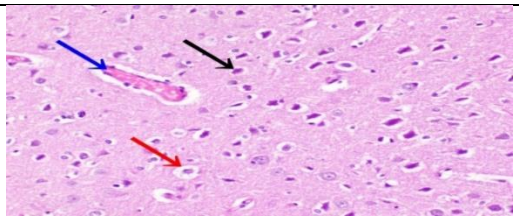

Photo. (2): Photomicrograph of the cerebral cortex of a rat from group 2 showing necrosis, shrunken and pyknosis of neurons (black arrow), cellular edema (red arrow), and congestion of cerebral blood vessel (blue arrow) (H & E X 400).

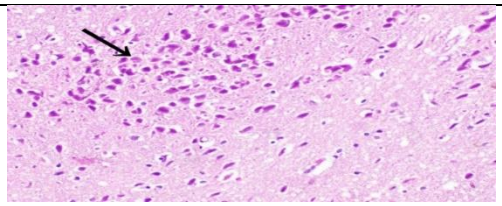

Photo. (3): Photomicrograph of the cerebral cortex of a rat from group 2 showing astro-cytosis (arrow) (H & E X 400).

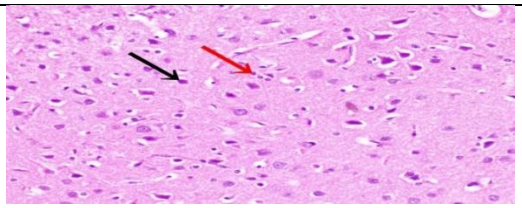

Photo. (4): Photomicrograph of the cerebral cortex of a rat from group 3 showing necrosis, shrunken, and pyknosis of some neurons (black arrow) and slight proliferation of glial cells (red arrow) (H & E X 400).

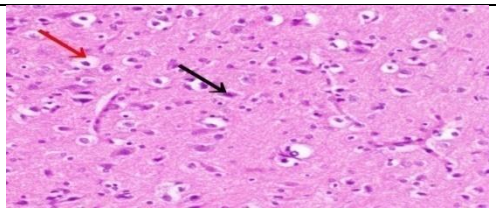

Photo. (5): Photomicrograph of the cerebral cortex of a rat from group 4 showing necrosis of some neurons (black arrow) and cellular edema (red arrow) (H & E X 400).

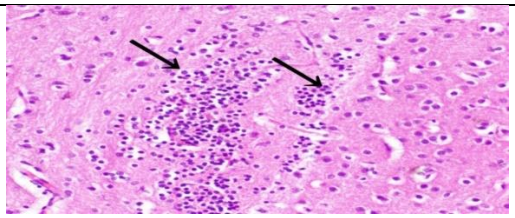

Photo. (6): Photomicrograph of the cerebral cortex of a rat from group 4 showing focal gliosis (arrow) (H & E X 400).

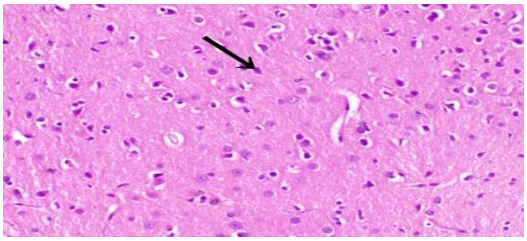

Photo. (7): Photomicrograph of the cerebral cortex of a rat from group 5 showing necrosis of some neurons (arrow) (H & E X 400).

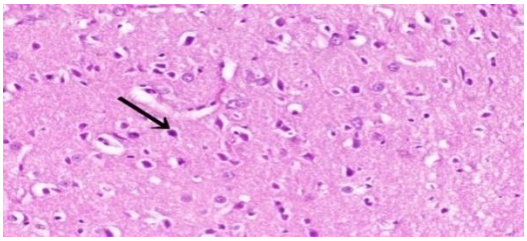

Photo. (8): Photomicrograph of the cerebral cortex of a rat from group 5 showing necrosis of some neurons (arrow) (H & E X 400).

Histopathological examination of the kidney:

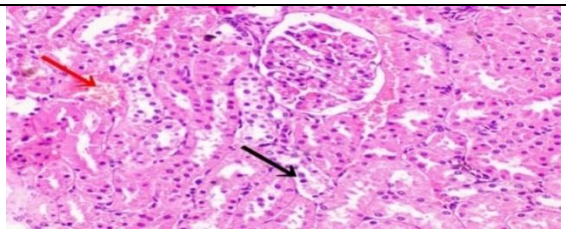

Photo. (1): Photomicrograph of the kidney of a rat from group 1 showing the normal histological structure of renal parenchyma (H & E X 400).

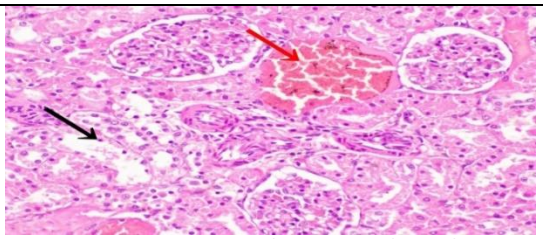

Photo. (2): Photomicrograph ofthe kidney of a rat from group 2 showing necrobiosis of epithelial lining renal tubules with pyknotic nuclei (black arrow) and congestion of renal blood vessel (red arrow) (H & E X 400).

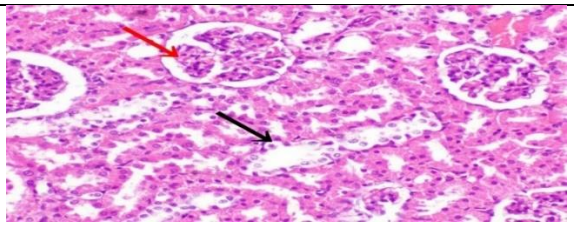

Photo. (3): Photomicrograph of the kidney of a rat from group 3 showing congestion of renal blood vessel (arrow) (H & E X 400).

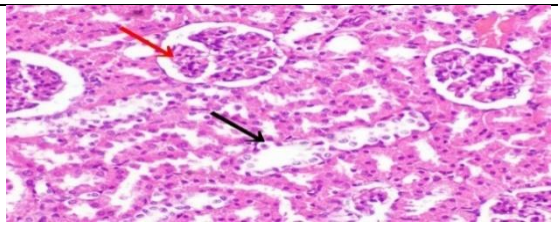

Photo. (4): Photomicrograph of the kidney of a rat from group 3 showing slight vacuolar degeneration of epithelial lining some renal tubules (black arrow) and slight congestion of glomerular tuft (red arrow) (H & E X 400).

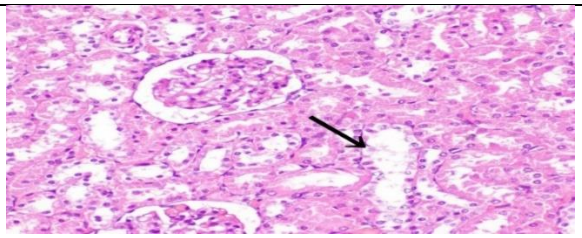

Photo. 5): Photomicrograph ofthe kidney of a rat from group 4 showing slight vacuolar degeneration of epithelial lining some renal tubules (arrow) (H & E X 400).

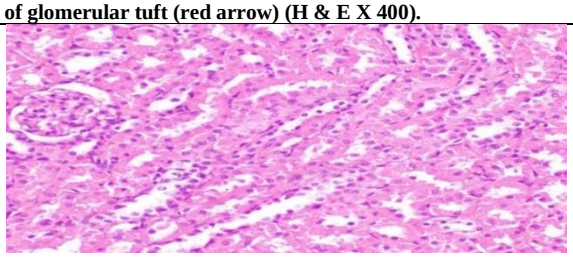

Photo. (6): Photomicrograph of the kidney ofa rat from group 4 showing no histopathological alterations (H & E X 400).

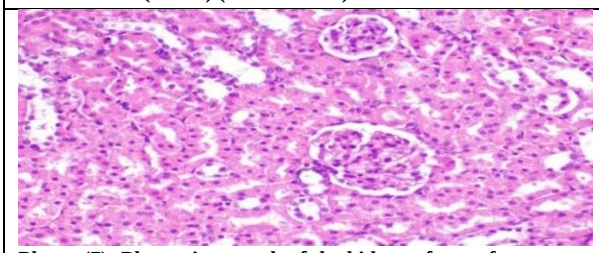

Photo. (7): Photomicrograph of the kidney of a rat from group 5 showing no histopathological alterations (H & E X 400).

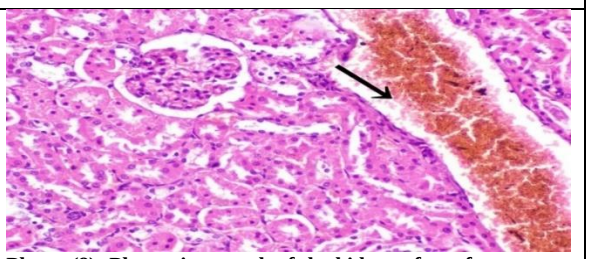

Photo. (8): Photomicrograph of the kidney ofarat from group 5 showing dilatation and congestion of renal blood vessel (arrow) (H & E X 400).

Histopathological examination of the liver:

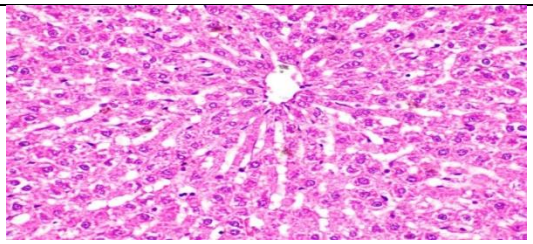

Photo. (1): Photomicrograph of the liver of a rat from group 1 showing the normal histological architecture of hepatic lobule (H & E X 400).

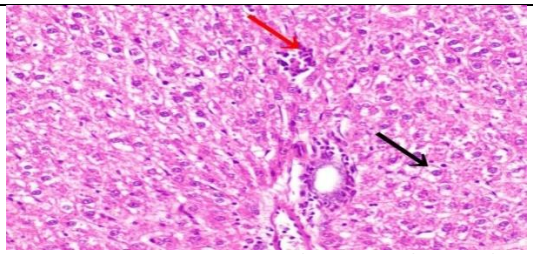

Photo. (2): Photomicrograph ofthe liver of a rat from group 2 showing vacuolar degeneration of hepatocytes (black arrow) and focal hepatocellular necrosis associated with inflammatory cell infiltration (red arrow) (H & E X 400).

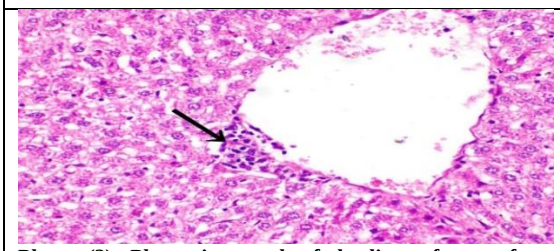

Photo. (3): Photomicrograph of the liver of a rat from group 2 showing focal hepatocellular necrosis associated with inflammatory cell infiltration (arrow) (H & E X 400).

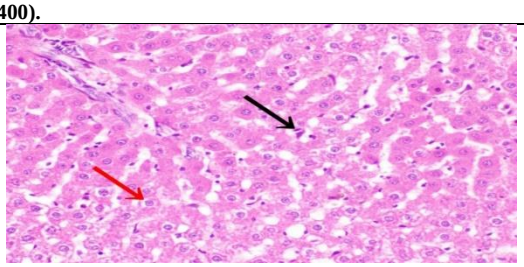

Photo. (4): Photomicrograph of the liver of a rat from group 3 showing slight Kupffer cell activation (black arrow) and slight vacuolar degeneration of some hepatocytes (red arrow) (H & E X 400).

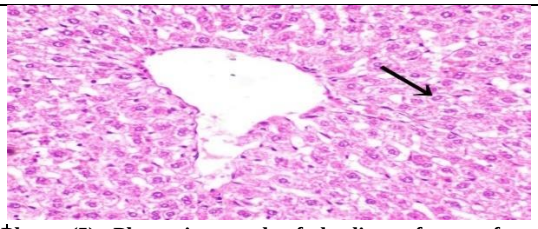

Photo. (5): Photomicrograph of the liver of a rat from group 4 showing slight hydropic degeneration of some hepatocytes (arrow) (H & E X 400).

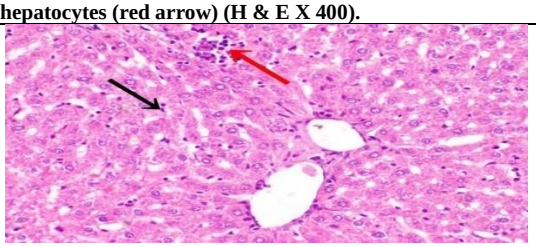

Photo. (6): Photomicrograph of the liver of a rat from group 5 showing slight Kupffer cells activation (black arrow) and small focal hepatocellular necrosis associated with inflammatory cells infiltration (H & E X 400).

التأثير العلاجي للكركمين والزعفران والمورينجا لتسمم الألومنيوم في الجرذان

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2- قسم كيمياء التغذية والتمثيل الغذائي – المعهد القومي للتغذية – القاهره – مصر

الملخص العربي

يمكن أن تساعد النباتات الطبيعية في علاج بعض الأمراض وتعتبر مصدرًا رائعًا للفيتامينات والمعادن للجسم. الهدف: استخدام البحث المورينجا والزعفران والكركمين لعلاج الحيوانات من التسمم بالألمنيوم. تم تقسيم خمسة وثلاثين فأراً ألبينو ذكراً بوزن حوالي 170 ± 10 جرام إلى مجموعاتان رئيسية على النحو التالي:: تم الاحتفاظ بالمجموعة الأولى الرئيسية (7 جرذان) كمجموعة ضابطة سلبية وتم تغذيتها على الوجبة الأساسية فقط. تم تقسيم المجموعة الرئيسية الثانية (28 جرذ) بعد ستة أسابيع من إطعامها نظامًا غذائيًا عاديًا بكلوريد الألومنيوم تم تقسيمهم إلى أربع مجموعات فرعية ، ثم تغذيتهم بكلوريد الالمنيوم والنباتات المعالجة لمدة أربعة أسابيع أخرى. الأولى كانت مجموعة ضابطة إيجابية تناولت نظاماً غذائياً عادياً يحتوي على كلوريد الالومنيوم. تم تقديم نظام غذائي أساسي ممزوج بـ كلوريد الالومنيوم + المورينغا (100 مجم/كجم غذائي) للمجموعة الفرعية 2. تم توفير نظام غذائي أساسي ممزوج بـ 15 مجم/كجم من الزعفران و كلوريد الالومنيوم للمجموعة الفرعية 3. تم اعطاء نظام غذائي أساسي ممزوج بـ كلوريد الالومنيوم والكركمين (0.5 جم / كجم من النظام الغذائي) للمجموعة الفرعية 4. وأظهرت النتائج أن النبات ذو القدرة الأكبر على تقليل سمية الألومنيوم هو الزعفران، في حين أن نبات المورينجا حسن وظائف الكبد والكلى وساعد الكركمين على تحسين صورة الدهون. وفي الختام فإن استخدام هذه النباتات الطبيعية يمكن أن يقلل من خطورة التسمم بالألمنيوم.

الكلمات المفتاحية :*التسمم بالألمنيوم، الكركمين، الزعفران، المورينجا .*