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Study The Effect Of Some Herps And Seeds As A Protection From The Undesirable Effect Of Monosodiume Glutamate

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Abstract: This study aimed to investigate the protective role of some herbs and seeds against health hazard induced due to consumption of monosodium glutamate(MSG).Fourty eight mature albino rats weighting 150-160g B.Wt each were used, and divided into 8 equal groups, one was kept as a control-ve group, while group 2 was control+ve given monosodiume glutamate (MSG)7% from the basel diet (70 g /kg.B.wt) daily for a month. Other groups were treated with MSG 7% plus tested herbs Rosmary*(Rosmarinus),*Sage *(Salavia),*Curcuma*(Curcumalong),*Thym*(Thymus vulgaris),*Coriander *(Corian drum sativium) and (Linumusita - tissmum) flax* seeds were given as a percent of 5% from the basel diet. Serum liver function (GOT, GPT and ALP) MDA, kidney functions (urea, creatinine and uric acid), and histopathological changes of Liver were examined. The obtained results concluded that feeding with all tested herbs and seeds improved liver functions .According to the results, all tested plant parts could be used for impaired liver functions.

Key words : monosodium glutamate , liver functions, MDA ,histopathological changes.

Introduction

Monosodium Glutamate (MSG) is one of the most widely used food-additives in commercial foods. Its application has increased over time and it is found in many different ingredients and processed foods obtainable in every market or grocery store. MSG

gives a special aroma to processed foods which is known as umami in Japanese. This taste sensation is also called "savoury" **(Xiong*et al.*, 2009).** In many countries MSG goes by the name "China salt". Beside its flavour enhancing effects, MSG has been associated with various forms of toxicity. MSG has been linked with obesity, metabolic disorders, Chinese Restaurant Syndrome, neurotoxic effects and detrimental effects on the reproductive organs. MSG acts on the glutamate receptors and releases neurotransmitters which play a vital role in normal physiological as well as pathological processes **(Abdallah*et al.*, 2014).** Glutamate receptors have three groups of metabotropic receptors (mGluR) and four classes of ionotropic receptors (NMDA, AMPA, delta and kainite receptors). All of these receptor types are present across the central nervous system. They are especially numerous in the hypothalamus, hippocampus and amygdala, where they control autonomic and metabolic activities **(Zhu and Gouaux, 2017).** Results from both animal and human studies have demonstrated that administration of even the lowest dose of MSG has toxic effects. The average intake of MSG per day is estimated to be 0.3-1.0 g **(Solomon *et al.*, 2015).** These doses potentially disrupt neurons and might have adverse effects on behaviour. Animal studies have demonstrated that neonatal MSG consumption sets a precedent for the development of obesity later on. Insulin resistanceand reduced glucose tolerance in rodents due to MSG consumption raise concerns about the development of obesity in MSG consuming humans. The same study revealed that MSG intake causes a disrupted energy balance by increasing the palatability of food and disturbing the leptin-mediated hypothalamus signalling cascade, potentially leading to obesity **(He *et al.*, 2011 and Araujo*et al.*, 2017).** In a study into the inflammatory profile of MSG induced obesity, it has been shown that MSG triggers micro-RNA (mRNA) expression of interleukin-6 (IL-6), tumour necrosis factor-alpha (TNF-α), resistin and leptin in visceral adipose tissue. This in turn leads to enhance insulin, resistin and leptin concentrations in the circulation and ultimately an impaired glucose tolerance **(Roman-Ramos *et al.*, 2011).** In the same study, the authors were able to demonstrate that MSG induces a significant decrease in liver transaminases indicating hepatic damage. This

damage was likely the result of non-alcoholic steatohepatitis which is associated with long lasting inflammation. MSG was not reported to have any effect on hunger. There are reports though of gastric distention caused by MSG two hours after ingestion. Also changes in important parameters, particularly concentrations of amino acids, have been noted. Leurine, isoleucine, valine, lysine, cysteine, alanine, tyrosin and tryptophan were significantly higher in pig blood samples after MSG consumption as compared to controls. No changes have been observed in the postprandial glucose and insulin levels after intake of food supplemented with MSG **(Kong *et al.*, 2015). Geha*et al.*,(2000)** conducted a multicenter, double-blind, placebo-controlled, multiple-challenge evaluation of the reported reactions to MSG. They concluded that large doses of MSG given without food could cause more symptoms than a placebo in individuals who believe that they react adversely to MSG. However, neither persistent nor serious effects from MSG ingestion were observed, and the responses were not consistent on retesting. Despite these reports and conclusions, the effects of MSG on human health have been controversial.The term phytochemical is used to refer chemical compounds that occur naturally in plants (phyto means plant in Greek), chemicals that may have biological significance but are not established as essential nutrients. Scientists estimate that there may be as many as 10,000 different phytochemicals with the potential to affect diseases such as cancer, stroke, or metabolic syndrome. Plants need amino acids, sugars, organic acids, etc., for primary metabolism or their development. In addition, all higher plants produce one or several representatives called as secondary metabolites, which are not essential for a plant for its metabolism **(Wink, 2003).** Phyto constituents are the natural bioactive compounds found in plants. These phyto constituents work with nutrients and fibers to form an integrated part of defense system against various diseases and stress conditions **(Koche*et al.*, 2010).** These phytochemicals, often secondary metabolites present in smaller quantities in higher plants, include the alkaloids, steroids, flavonoids, terpenoids, tannins, and many others **(Nonita*et al.*, 2010).** An antioxidant, which can quench reactive free radicals, can prevent the oxidation of other molecules and may therefore have

health-promoting effects in the prevention of degenerative diseases **(Shahidi, 1997).** It has been mentioned that antioxidant activity of plants might be due to their phenolic compounds. Consumers now prefer food products that are natural, non-thermally processed and have an acceptable shelf life with assured quality and safety. This has necessitated using natural substances from various sources as natural preservatives which have capacity to inhibit microbial growth, ability to inactivate microorganisms in food and promote the growth of desirable microorganism without adversely affecting most of their nutritional and organoleptic properties **(Cook and Samman, 1996).** Therefore, The present study aimed to investigated the protective role of some herbs and seeds against health hazard induced due to consumption of monosodium glutamate.

Materials and methods

Plantmaterials Rosmary*(Rosmarinus)* ,Sage *(Salavia)* ,Curcuma *(Curcumalong)* ,Thym *(Thymus vulgaris),*Coriander *(Corian drum sativium) and (Linumusitatissmum) flax* seeds, were obtained from local market in Kafr EL-Zayatcity anddehydrated at 60°Cfor 6 hrs then grinded to soft powder and kept in dusky stoppard glass bottles.

Rats and diets: Male albino rats weighing 150-160g per each were purchased from Medical Insects Research Institute, Cairo, Egypt.Mono sodium glutamate was obtained from local market in Cairo.Basal diet constituents were obtained from local market in Cairo.

Chemicals: The basal diet was prepared according to the following : protein (10%), corn oil (10%), vitamin mixture (1%), mineral mixture (4%), choline chloride(0.2%), methionine (0.3%), cellulose (5%), and the remained is corn starch (69.5%) according to **Campbell, (1963)**. The vitamin mixture component was recommended by **Hegested *et al.*, (1941)**, while the salt mixture was formulated according to**Drury and Wallington, (1980).**Mono sodium glutamate containing diet was prepared by adding 7% Mono sodium glutamate to the basal diet.

Experimental Design:

Fourty eight male albino rats were housed in healthy condition (21-23ºC) and fed on basal diet for one week before starting the experiment for acclimatization , after this, rats were divided into two main groups, the first group (6 rats) fed on basal diet as a negative control (ve-) and the other main group (42 rats) classified into 7sub groups as follow:

Group 2: Positive control group (6 rats):

In this group, rats were fed on mono sodium glutamate at rate of 7% from basel diet.

Group (3): 6 rats: were fed on 7% (MSG) and 5% Rosmary.

Group (4): 6 rats: were fed on 7% (MSG) and 5% Sage.

Group (5): 6 rats: were fed on 7% (MSG) and 5% Curcum.

Group (6): 6 rats: were fed on 7% (MSG) and 5% Thym.

Group (7): 6 rats: were fed on 7% (MSG) and 5% Coriander .

Group (8): 6 rats**:** were fed on 7% (MSG) and 5% Lin.

At the end of the experimental (4 weeks), rats were fasted for 12-h then scarified. Blood samples were collected from the portal vein into dry clean centrifuge tubes for serum separation, blood samples centrifuged for 10 minutes at 3000 rpm to separate the serum according to **Drury and Wallington, (1980).**Liver of sacrificed rats were kept in 10% formalin solution till processed for histopathological examination.

Estimation of Lipid peroxide (Malondialdehyde):

lipid peroxide was determined according to the method of**Drapper and Hadley,(1990).**

Liver functions

Glotamic oxalic transaminase (GOT), Glotamicpyrofic transaminase (GPT) and alkaline phosphatase (ALP) were determined according to the methods described by **Kachmar and Moss, (1976) ,Varley*et al.*, (1980) and Bergmeyer and Harder, (1986)**respectively.

Kidney functions

Urea, creatinine anduric acid were determined according to the methods of**Patton and Crouch (1977), Henry (1974),** and **Schultz, (1984**)respectively.

Histopathological Examination:

Liver of the scarified rats washed in slain solution, dried by filter paper, weighed, and stored frozen in formalin solution 10% for histopathological testing according to method mentioned by,**Drury and Wallington, (1980).**

Statistical Analysis:

Data were expressed as mean ± standard deviation. In order to compare the groups. Analysis of Variance (ANOVA) test was used. Values at P≤0.05 were considered to be statistically significant according to **SAS, (2006).**

Results and Discussion

Effect of some herbs and seeds on Malondialdehyde (MDA)

Data of Table (1) revealed that the mean value of serum MDA (mg\dl) of rats fed on different diets. It could be noticed that the mean value of MDA of control (+) group was higher than control (-) group, being 2.4 ± 0.02 & 1.26 ± 0.011 respectively, Rats treated with rosmary , sage,curcuma ,thym ,coriander and flax seed showed a lower values in serum level of GOT , GPT and ALP as compared to the positive control group.the best treatment was recorded for group (*Linumusitatissmum 5% + MSG 7%*) considering serum MDA.This result in the sam line with **Anilakumar*et al.*,(2001)** they founded thatThe prefeeding of rats with coriander seed powder (CSP) at 10% level was found to reduce the experimentally-induced (HCH-induced) rise in conjugated dienes, hydroperoxide and malondialdehyde (MDA) contents in the liver.

Table (1).Effect oF some herbs and seeds on Malondialdehyde (MDA)

Variable	(1) Negative control	(2) Positive control	(3) Rosmary5 % +msg 7%	(4) Salavia 5% +msg 7%	(5) Curcum 5% +msg 7%	(6) Thyme 5% +msg 7%	(7) Coriander 5% +msg 7%	(8) Flax seed 5% +msg 7%	L.S.D (P≤0,5)
	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	
(Malondial dehyde) M D A	1.26^{g} ± 0.011	2.4^{a} ± 0.02	1.39^{e} ± 0.020	1.47^{c} ± 0.025	1.36^{f} ± 0.019	1.52^{b} ± 0.011	1.45^{d} ± 0.015	1.33^{f} ± 0.015	0.029
Change of positive control%	-47.5	-	-42.08	-38.75	-43.33	-36.67	-39.58	-44.58	-

Means in the same line with different superscript letters are significantly different ($p \leq 0.05$).

Effect of some herbs and seeds on serum GOT, GPT, and ALP (u\l)

Data in table (3,4,2) showed that control negative group was significantly lower in serum level of GOT,GPT and ALPwhich were53^{e}±2 ,40^{f} 1 and 82^{h} ±1u/l ,respectivelywhen compared with control positive group 191^{a}±1, 125^{a}±2 ,197.3^{a} ±1.53u/l,respectively. Rats treated with (rosmary ,sage,curcuma ,thym ,coriander and flax seed) showed a lower values in serum level of GOT , GPT and ALP as compared to the positive control group. The best serum GOT, GPT, and ALP were recorded for group 8(*Linumusitatissmum 5% + MSG 7%).*These results are in agreement with**Kong *et al.*,(2015)**they reported that that MSG induces a significant decrease in liver transaminases indicating hepatic damage. This damage was likely the result of non-alcoholic steatohepatitis which is associated with long lasting inflammation.Furthermore**, Khalil and Khedr, (2016).**who found thatMSG-induced oxidative stress led to decreaselipid peroxidation, catalase and superoxide dismutase in the liver. It also improved levels of glutathione. Quercetin has been proven to reduce glucose, leptine and creatinine levels, which in turn enhanced superoxide dismutase and glutathione peroxidase, while diltiazem protects against morphological functional disorders. Furthermore, new research explores the function of curcumin in the amelioration of cognitive damage via stabilisation of acetyl cholinesterase (AchE) levels and reduction of TNF-α. Furthermore, curcumin acts as a protective agent against neural damage due to its effect of decreasing the expression of mGLUR5 and N-Methyl-D-aspartate receptors 2B (NMDA2B) in the hippocampus. Because of its properties that help balance glutamate levels scientistswich have suggested the introduction of combinations of curcumin and MSG in the market.**(Okediran*et al., 2015*)** showed that there was increase in aminotransferases alanine and aspartate aminotransferases. **(Wangensteen*et al* .,2004).**

Founded that addition of coriander to food would increase the antioxidant content and may have potential as a natural antioxidant and thus inhibit unwanted oxidation processes. **(Schwars and Ternes,1992)** showed that sage preparation contain antioxidant activity improving the liver antioxidant potential.

Table (2): Fasting serum ALP u\l for negative control (1), positive control (2), and all treated groups as affected by someherps and seeds

variable	(1) Negative control	(2) Positive control	(3) Rosmary 5%+msg 7%	(4) Salavia 5%+msg 7%	(5) Curcum5 %+msg 7%	(6) Thyme 5%+msg 7%	(7) Coriander 5%+msg 7%	(8) Flax seed 5% +msg 7%	L.S.D (P≤0,5)
	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	
ALP(u\l)	82^{h} ± 1	197.33^{a} ± 1.53	96.17^{e} ± 0.76	104.87^{c} ± 1.21	91^{f} ± 1	108.08^{b} ± 0.89	99.23^{d} ± 0.68	85^{g} ± 1	1.88
Change of positive control%	-58.45	-	-51.27	-46.86	-53.89	-45.23	-49.71	-56.93	-

Means in the same row with different litters are significantly ($p \leq 0.05$) different.

Table (3): Fasting serum GOT u\l for negative control (1), positive control (2), and all treated groups as affected by some herps and seeds

variable	(1) Negative control	(2) Positive control	(3) Rosmary5%+ msg 7%	(4) Salavia 5% msg 7%+	(5) Curcum5% +msg 7%	(6) Thyme5% + msg7%	(7) Coriander 5% +msg 7%	(8) Flax seed 5% +msg 7%	L.S.D (P≤0,5)
	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	
GOT (U/L)	53^{e} ± 2	191^{a} ± 1	69.02^{c} ± 1.54	76^{b} ± 1	68^{c} ± 1	78.32^{b} ± 1.06	76^{b} ± 2	59^{e} ± 1	2.54
Change of positive control%	-72.25	-	-63.86	-60.21	-64.40	-59	-60.21	-69	-

Means in the same row with different litters are significantly ($p \leq 0.05$) different.

Table (4): Fasting serum GPT (u\l) for negative control (1), positive control (2), and all treated groups as affected by some herps and seeds

variable	(1) Negative control	(2) Positive control	(3) Rosmary5 %+msg 7%	(4) Salavia5 % +msg 7%	(5) Curcum 5%+msg 7%	(6) Thyme5%+ msg 7%	(7) Coriander 5% +msg 7%	(8) Flax seed 5% +msg 7%	L.S.D (P≤0,5)
	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	
GPT (U\L)	40^{f} ± 1	125^{a} ± 2	55^{cd} ± 1	57^{bc} ± 1	54^{d} ± 1	58^{b} ± 1	57.03^{bc} ± 0.45	48.38^{e} ± 0.98	1.98
Change of positive control%	-68	-	-56	-54.4	-56.8	-53.6	-54.38	-61.30	-

Means in the same row with different litters are significantly ($p \leq 0.05$) different.

Effect oF some herbs and seeds on on serum urea, creatinin, and uric acid (mg\dl)

Data in table (5,6,7) indicated that control negative group was significantly lower in serum levels of urea, creatinin, and uric acid which were **32.75^{e} 0.73**, **0.66^{d}± 0.01**, and **1.39^{d}±0.015** mg/dl, respectively when compared with control positive group which were **53.5^{a} ± 0.5**, **1.96^{a}± 0.02**, and **4.15^{a}±0.02**mg/dl, respectively. Rats treated with (*rosmary* ,sage,*curcuma ,thym ,coriander and flax* seed)showed significantly lower values in serum levels of urea, creatinin, and uric acid compared to the positive control group. The best serum urea,creatinin, and uric acid were recorded for group 8(*Linumusitatissmum 5% + MSG 7%*).**Khalil and Khedr, (2016)**reported that MSGimproved levels ofcreatinine.**(Sampson *et al*.,2011**) reported that urolithiasis and oxidative stress due to MSG can cause fibrosis in the kidney, as ROS can induce the transformation of fibroblasts to myofibroblast. **(Barnes and Gorin ,2011)** founded that Tubular interstitial fibrosis is highly associated with the progress of renal diseases**.**

Table (5): Fasting serum urea (mg\dl) for negative control (1), positive control (2), and all treated groups as affected by someherps and seeds

variable	(1) Negative control	(2) Positive control	(3) Rosmary5% +msg 7%	(4) Salavia5 %+msg 7%	(5) Curcum5%+ msg 7%	(6) Thyme5% +msg 7%	(7) Coriander 5%+msg 7%	(8) Flax seed 5% +msg 7%	L.S.D (P≤0,5)
	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	
urea (mg\dl)	32.75^{e} ± 0.73	53.5^{a} ± 0.5	36.17^{d} ± 0.91	40.21^{c} ± 0.21	33.5^{e} ± 0.5	41.36^{b} ± 0.67	39.7^{c} ± 0.2	30.10^{f} ± 0.21	0.953
Change of positive control%	-38.79	-	-32.39	-24.84	-37.38	-22.69	-25.80	-43.74	-

Means in the same row with different litters are significantly($p \leq 0.05$) different.

Table (6): Fasting serum creatinin (mg\dl) for negative control (1), positive control (2), and all treated groups as affected by some herps and seeds

variable	(1) Negative control	(2) Positive control	(3) Rosmary5 %+msg7 %	(4) Salavia5 %+msg 7%	(5) Curcum 5%+msg 7%	(6) Thyme5 %+msg7 %	(7) Coriander 5% +msg 7% Mean±	(8) Flax seed 5% +msg 7%	L.S.D (P≤0,5)
	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	Mean ±S.D	
creatinin (mg\dl)	0.66^{d} ± 0.01	1.96^{a} ± 0.02	0.72^{cd} ± 0.01	0.8^{bc} ± 0.1	0.69^{d} ± 0.02	0.84^{b} ± 0.01	0.76^{bcd} ± 0.01	0.67^{d} ± 0.02	0.071
Change of positive control%	-66.33	-	-63.27	-59.18	-64.62	-57.14	-61.23	-65.82	-

Means in the same row with different litters are significantly ($p \leq 0.05$) different.

Table (7):Fasting serum uric acid (mg\dl) for negative control (1), positive control (2), and all treated groups as affected by some herps and seeds

variable	(1) Negative control	(2) Positive control	(3) Rosmary msg +5% 7%	(4) Salavia5 % msg 7%	(5) Curcum msg +5% 7%	(6) Thyme msg +5% 7%	(7) Coriander5% +msg 7%	(8) Flax seed msg +5% 7%	L.S.D (P≤0,5)
	Mean ±S.D	**Mean ±S.D**	**Mean ±S.D**	**Mean ±S.D**	**Mean ±S.D**	**Mean ±S.D**	**Mean ±S.D**	**Mean ±S.D**	
uric acid (mg\dl)	1.39^{d} ± 0.015	4.15^{a} ± 0.02	1.64^{c} ± 0.01	1.89^{b} ± 0.02	1.56^{c} ± 0.02	1.91^{b} ± 0.11	1.81^{b} ± 0.11	1.41^{d} ± 0.02	0.101
Change of positive control%	-66.51	-	-60.48	-54.46	-62.41	-53.98	-56.39	-66.03	-

Means in the same row with different litters are significantly ($p \leq 0.05$) different.

Histopathological examination of liver

Liver tissues of control rats revealed normal histological structure **(photo. 1).** On the other hand the examination of various sections of liver of rats with induced nephropathy revealed amarked tissue alterations. The liver of those rats showed severe congestion of the central vein and hepatic sinusoid with granular and vacuolar degeneration, necrosis of the hepatic parenchymal cells **(photo. 2 and 3)** .nuclear pyknosis of the hepatic cells with activated Kupffer cells. The liver of rats with induced nephropathy and treated with rosmary 5% + MSG 7% showed retraction of congestion with still hepatocellular vacuolar degeneration and scattered necrotic cells **(photo. 4).**The liver tissue of rats with induced nephropathy and treated with salvia 5% + MSG 7% showed good restoration of the hepatic parenchyma with moderate degree of hepatocellular vacuolar degeneration and scattered necrotic cells **(photo. 5).**The liver of rats treated with curcum 5% MSG 7% showed good protection of the parenchymal cells with mild congestion and mild hepatocellular degenerative and necrotic changes **(photo. 6).** The liver of those rats which treated with thym 5% + MSG 7% showed wide spread swelling with moderate degree of vacuolar degeneration and necrosis of the hepatic cells **(photo. 7).** The hepatic tissue of rats treated with corian 5% + MSG 7% showed marked protection of the hepatic parenchymal cells with mild vacuolar degeneration and scattered necrotic cells **(photo. 8).**The liver tissue of those rats rats treated with flax seed 5% + MSG7% showed marked restoration of the hepatic parenchyma with very few degenerated cells **(photo. 9).**

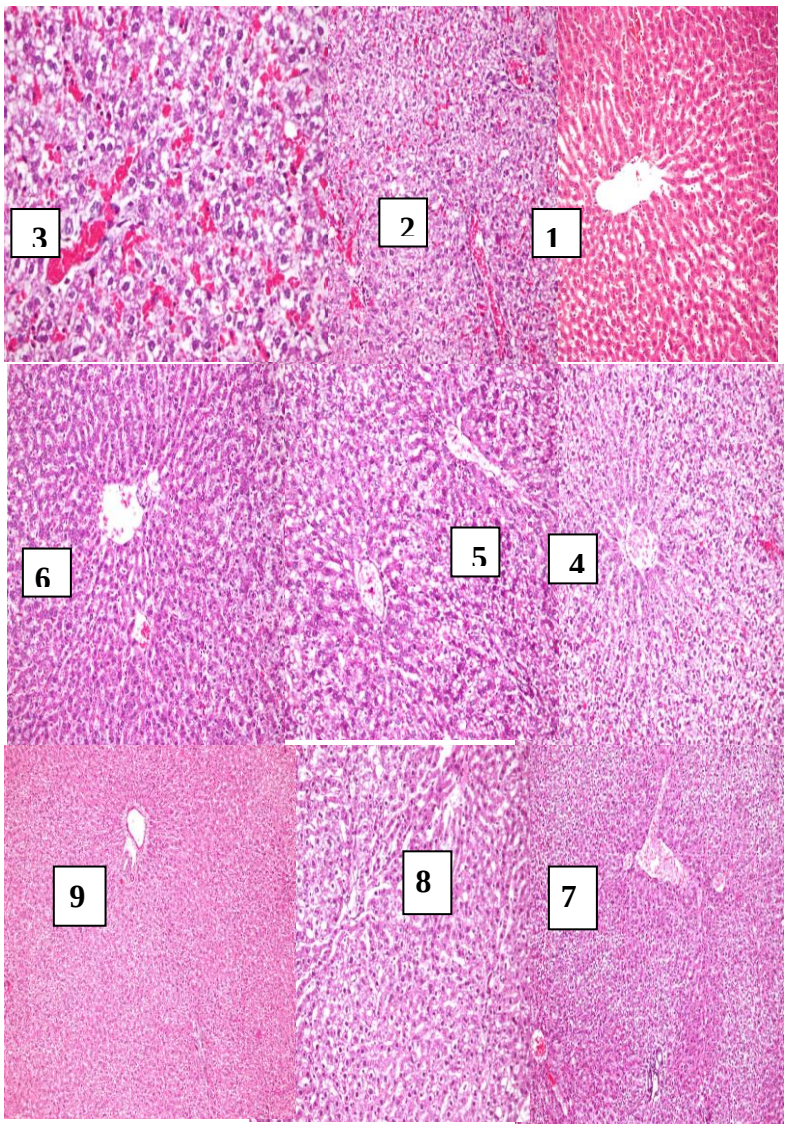

Figure (1):Effect of tested herbs on histopathological changes of liver as aprotection from the Undesirable Effect of Monosodiume Glutamate rats. (From 1 to 9) 1 normal (control diet); 2fed the control diet and induced by Monosodiume Glutamate 3,4,5,6,7,8 and 9 fed on diet containing (*Rosmary* ,Sage,*Curcuma* ,*Thym* ,*Coriander and Li*n seeds) 5 % plus MSG 7 % for a month.. (H&E, X 400).

Conclusion

The selected plant in the present study were effective in protecting rats against undesirable effect of monosodiumeglutamate.

These results supported our that tested plant wichcontain several important compounds such as fibers, minerals, polyphenols, flavonoids and carotenoids which are able to protect the health (liver and kidney) from the Undesirable effect of monosodiumglutamate. Therefore, data recommended the selected plant leaves by a moderate amount to be included in our daily diets.

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دراسة تأثير بعض الأعشاب والبذور للوقاية من التاثيرات الغير مرغوبه لاحادي جلوتامات الصوديوم.

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المستخلص: اجريت هذه الدراسه علي مجموعه من فئران التجارب للتعرف علي مدي التاثير الضار لمادة احادي جلوتامات الصوديوم. تم استخدام ٤٨ فأر أبيض بالغ يتراوح وزن كل منهما من ١٥٠-١٦٠ جم وتم تقسيمهم الى ٨ مجموعة متساوية احداهما كمجموعة ضابطة سالبة وواحدة كمجموعة ضابطه موجبه تم تغذيتها علي احادي جلوتامات الصوديوم بمعدل ٧٠ جم /كجم من الوجبه الاساسيه يوميا ولمدة شهر أما المجموعات الأخرى فتم تغذيتها علي احادي جلوتامات الصوديوم بمعدل٧ % من الوجبه الاساسيه وأضيفت النباتات المستخدمة بنسبة ٥% لكل منهما من الوجبة الأساسية على هيئة مطحون منالروزماري-المرمريه-الكركم-الزعتر-الكزبرة-بذور الكتان. وتم قياس انزيمات الكبد وانزيم الاكسده(MDA) ووظائف الكلى (اليوريا ,الكرياتينين,حمض اليوريك) . وكذللك اجراء الفحص الهستوباسولوجى للكبد . وقد أظهرت نتائج هذه الدراسة أن تناول تلك الأجزاء النباتية نتج عنه تحسن فى وظائف الكبد

الكلمات المفتاحية: احاديجلوتامات الصوديوم-وظائف الكبد- إنزيمالاكسده(MDA)-التغيرات الهستوباثولوجية.