Effect of the Consumption of Some Vegetables on Oxidative Stress Biomarkers and Renal Functions in Rats with Blood Acidosis

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Abstract:

The present study was conducted to evaluate the beneficial effect of eggplant, sweet green pepper and parsley powder on the biomarkers of oxidative stress and renal functions in rats with blood acidosis. Thirty healthy male albino rats were divided into five equal groups. The first group rats were fed on basal diet as a negative control. The second group rats were fed on basal diet mixed with white bread powder (15% of diet) to induced acidity as positive control. The third group rats were fed on basal diet mixed with white bread (15% of diet) and 5 % eggplant powder (EP). The fourth group rats were fed on basal diet mixed with white bread (15% of diet) and 5% green pepper powder (GP). The fifth group rats were fed on basal diet mixed with white bread (15% of diet) and 5% parsley powder (P). The rats' weight was recorded weekly for each rat during the experimental period, and gains in body weight of rat groups were calculated. Blood samples were collected for assessment of some biochemical markers of kidney functions (Urea, creatinine and uric acid), malonaldehyde (MDA) and total antioxidant capacity (TCA). pH value of the blood and stomach were determined. Results showed that all experimental groups showed varied degrees of weight lose which considered as an indicator for impaired growth compared to the negative control group. MDA levels were decreased in experimental groups when compared with the positive control group and these decrements were only significant in EP 5%. On the other hand, TAC was increased in groups of rats fed on EP 5%, GP 5% and P 5% in comparison with positive control value. Serum creatinine values were increased in trial groups, whereas serum urea was decreased in all groups when compared with positive control. Serum uric acid levels were increased in EP 5% and GP5%, on the contrary, the P 5% group showed lower uric acid level when compared with positive control. Calcium levels of trial groups showed

increments in EG 5%, P 5% and GP 5%. Blood pH levels were slightly increased only in GP 5% and P 5% groups in comparison with the positive control group. Stomach pH levels were increased only in EP 5% and decreased in GP 5% and P 5% groups in comparison with the positive control group. In conclusion, eggplant, sweet green pepper and parsley powder can be administrated in diet of rats with blood acidosis up to 5% and may improve kidney functions and used as anti-acidity agent.

Keywords: eggplant, sweet green pepper, parsley, stomach, kidney function, acidity.

Introduction

The possible toxicity of synthetic antioxidants has been a major concern for consumers and the potential of plant parts to serve as antioxidants to protect against various diseases induced by free radicals has been explored (**Hou *et al.*, 2003**). In fact, supplementary antioxidants from natural sources such as plant parts are efficient in protection against oxidative stress. They may prompt more food manufacturers to replace synthetic antioxidants with ingredients containing natural antioxidative compounds. Therefore, natural additives have gained more attention as they are perceived as posing no health risk to the consumers (**Shahidi and Wanasundara, 1995 and Shahidi and Ambigaipalan, 2015**). The antioxidant protection mechanism acting against the reactions of the free radicals is made up of enzymatic and non-enzymatic elements, part of which is synthesized only in plants and the body can get them only from foods (**Butnariu and Grozea, 2012**).

Plants belonging to *Solanaceae* family, which have high amount of phenolic content, include eggplant (*Solanum melongena*) and pepper (*Capsicum annum*) which were considered as rich sources of phenolics with antioxidant activity (**Martínez-Ispizua *et al.*, 2021**). Parsley (*Petroselinum crispum*) belongs to the *Umbelliferae* family of plants. Parsley is rich in flavonoids and essential oil compounds which act as powerful antioxidants. Parsley is a diuretic that purifies the blood and accelerates the excretion of toxins (**Chevallier, 1996: El Gindy *et al.*, 2017)**.

The protective action of vegetables has been attributed to the presence of antioxidants, and the majority of the antioxidant activity may be from compounds such as flavonoids, isoflavone, flavones, anthocyanin, catechin and isocatechin rather than from Vitamin C, E and b-carotene (**Kahkonen *et al*., 1999**). Also, **Kaur and Kapoor (2002)** indicated that antioxidant activity correlated significantly and positively with the total phenolics in vegetables. Natural phenolic compounds have been suggested as ideal substitutes for preservatives in food formulations due to their antioxidant and antimicrobial properties (**Acosta-Estrada *et al*., 2014**). In addition to scavenging free radicals, the multiple activities of antioxidants include inactivating metal catalysts by chelation, reducing hydroperoxides into stable hydroxyl derivatives (**Frankel and Finley, 2008; and Shahidi & Ambigaipalan, 2015).** Antioxidants (e.g., flavonoids, phenolic acids, tannins, vitamin C, and vitamin E), interacting synergistically with other reducing compounds and have diverse biological properties such as anti-inflammatory, anti-carcinogenic and anti-atherosclerotic effects (**Cosem *et al*, 2020**).

Metabolic acidosis is characterized as an abnormal state of reduced alkalinity in the blood and body tissues and can occur in a variety of medical conditions. Even a modest degree of metabolic acidosis can be harmful and can initiate a series of maladaptive responses that are not easily reversed (**Bailey, 2005**). The kidneys are vital organs essential for excretion of metabolic wastes as well as maintaining chemical homeostasis among other functions and studies have linked oxidative stress as a potential cause of different forms of renal damage and nephrotoxicity (**Samue *et al*., 2018**). It has been shown that increase in oxidative stress due to free radical generation is a likely result of inflammatory responses (**Himmelfarb *et al*., 2004 and Tomsa *et al*, 2019)**. Therefore, the aims of the study were to examine the effect of vegetables i.e. eggplant, sweet green pepper and parsley consumption on the oxidative stress biomarkers and renal functions in rats with blood acidosis.

Materials and methods

Fresh eggplant (*Solanum melongena*), sweet green pepper (*Capsicum annum*) and parsley (*Petroselinum crispum*) were obtained from Cairo local market, washed with water then dried at 40°C in an oven;, grounded and stored in air tight container under refrigeration.

Standard basal diet was prepared according to **Reeves et al., (1993).** Experimental diets were prepared by mixing of eggplant, sweet green pepper and parsley powder at 5 g/100 g diet, as replacements of corn starch.

Experimental design

Thirty male adult albino rats of Sprague Dawely strain weighing 150- 185 g were obtained, and housed in wire cages at 25° C. Rats were then divided into 5 groups (Sex rats in each group) as follow:

- Group 1: Rats were fed on basal diet as a negative control.
- Group 2: Rats were fed on basal diet mixed with white bread powder (15% of diet) to induced acidity according to (**Robertson *et al.*, 2007**) as positive control.
- Group 3: Rats fed on basal diet mixed with white bread (15% of diet) and 5 % eggplant powder (EP).
- Group 4: Rats fed on basal diet mixed with white bread (15% of diet) and 5% green pepper powder (GP).
- Group 5: Rats fed on basal diet mixed with white bread (15% of diet) and 5% parsley powder (P).

The rats' weight was recorded weekly for each rat during the experimental period, and gains in body weight of rat groups were calculated. At the end of the experimental period (28 days), animals were lightly anesthetized with diethyl ether, and blood was collected from the hepatic portal vein. The blood samples were collected and centrifuged at 3000 rpm for 15 min to separate serum, which stored at -40° C until biochemical analysis.

Biochemical analysis

The method of **Caraway (1955)** was used to determine serum uric acid, serum creatinine level was measured by the method **of Bohmer (1971)** and serum urea was determined according to **Marsch *et al*., (1965).** Total antioxidant capacity (TAC) and malondialdehyde (MDA) were determined in serum according to **Koracevic *et al*. (2001)** and **Satoh (1979),** respectively. Calcium content: Absorption method (serum were measured at. Calcium determination using the atomic absorption pye Unicom mod AW according to **Pearson (1970).** pH value of the blood and stomach were determined by direct immersion of pH electrode in blood and gastric fluid at the room temperature (25 °C) using the digital pH meter model 3020 Dunmou (Jenway, Essex, UK).

Histopathological examination

Specimens from lung and stomach were collected directly after scarification of animals at the end of experimental period, fixed in 10% formalin, dehydrated in ethyl alcohol, cleared in xylene and embedded in paraffin wax 4-6 thick sections were prepared and stained with hemetoxlin and eosin (**Carleton 1976**).

Statistical analysis

One way analysis of variance (ANOVA) was used to test the statistical significance of mean differences between groups. Least Significant Difference (LSD) test at $P< 0.05$ was used to test the differences between means. SPSS software package (Version 16; SPSS Inc Chicago., USA) was used for all Data analysis.

- *Results and discussion*

Final weight and body weight gain

Figure (1) illustrated that all experimental groups showed varied degrees of weight lose which considered as an indicator for impaired growth compared to the negative control group. These results were in agreements with the studies on rats which indicated that when metabolic acidosis is induced in rats they lose weight and muscle protein degradation is accelerated **(Mitch *et al*., 1994).** Chronic metabolic acidosis increases the net protein dialysis in muscle, which might be

caused by stimulation of proteolysis (**May *et al*., 1986**). Moreover, **Bailey, (2005**) showed that metabolic acidosis has deleterious effects, skeletal growth is impaired, muscle protein is subject to increased catabolism and amino acids undergo increased oxidation, negative nitrogen balance results, and muscle wasting occurs. However the use of selected vegetables was not efficient to enhance gain in body weight as it contains high amount of dietary fiber which considered as a tool for reducing body weight. These results are in the line with those reported by **Alzergy *et al*, (2018)**, **Scorsatto *et al* ,(2019), and Nwankpa *et al* ,(2018)**.

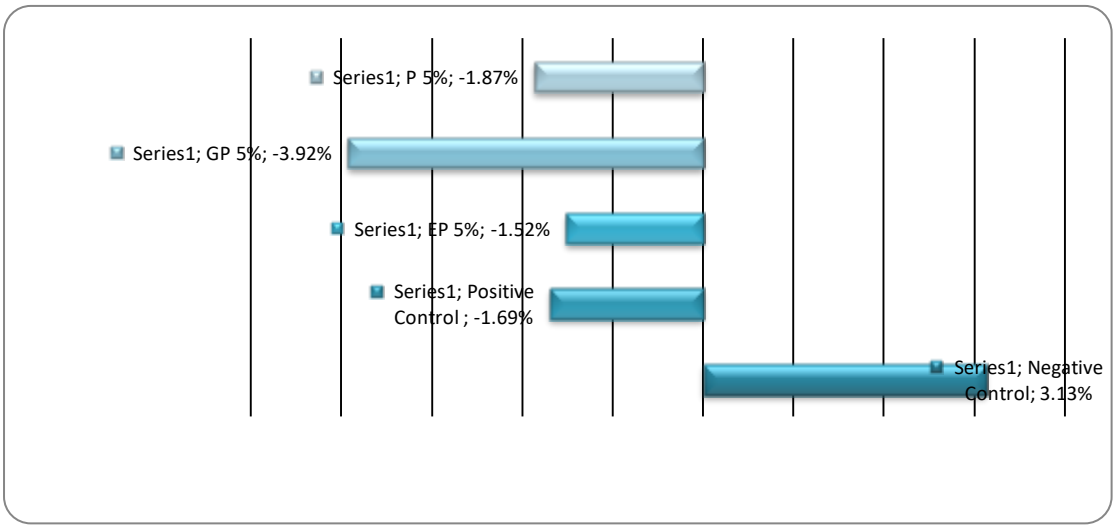

Figure (1): Percentage of body weight gain in rats groups fed basal diet or acidic diet with examined vegetables.

Serum MDA, TAC, creatinine, urea, uric acid and calcium levels in negative and positive control groups

From Table (1) it could be noticed that rats group fed on acidic diet showed significant ($P<0.01$) increments in serum levels of urea and calcium, with significant decrements ($P\leq0.01$) in serum TAC and blood pH when compared with values of negative control group. Serum creatinine and uric acid levels showed insignificant increments when compared with that of negative control group. These results concerning elevation of MDA and reduction of TAC in positive control group fed on acidic diet were in agreement with the findings of **Epler *et al*., (2003)** and **LaMonte *et al*., (2013)** who illustrated that metabolic acidosis increases

ROS levels within the cells and this could be due to the fact that metabolic acidosis increases glutamine and glutamate metabolism in renal cells. In addition, acidosis redirects cellular glutamine to the TCA cycle for cellular bioenergetics (ATP generation) which leads to depletion of other glutamine dependent metabolites such as glutathione (GSH).

All parameters of renal function were affected by the feeding of acidic diet, and that was clear from the elevation in serum creatinine, urea ($P \leq 0.01$) and uric acid as compared to levels of negative control. These results were in line with that of **Garibotto *et al*., (2004)** who stated that both *in vitro* and *in vivo* studies in animals have shown that metabolic acidosis causes several biochemical and morphologic changes in tubule cells which are ultimately associated with kidney hypertrophy, and the rates of whole body protein turnover tended to be higher in subjects with metabolic acidosis as compared with controls. Chronic acidosis causes several metabolic alterations in the renal proximal tubule, including increased H^+ secretion, ammonia synthesis, and citrate reabsorption. Rats group fed on acidic diet showed significant ($P \leq 0.01$) increments in serum calcium levels, with significant decrements ($P \leq 0.01$) in blood pH as compared to the values of negative control group, and this could be attributed to the finding of **Sebastian *et al* (1994)** who reported that intake of a high protein diet resulted in a negative calcium balance with a significant increase in urinary calcium losses, suggesting that excess acid generated by the diet was buffered by endogenous alkali from bone.

Table (1): Mean serum MDA, TAC, creatinine, urea, uric acid and calcium levels in negative and positive control groups (Mean± SE).

	Negative Control	Positive Control
MDA (nmol/ml)	25.00± 0.58	26.00± 0.58
TAC (mm/l)	0.88± 0.04	0.50± 0.03 **
Creatinine (mg/dl)	0.49± 0.06	0.53± 0.05
Urea (mg/dl)	17.00± 0.58	24.00± 1.00 **
Uric Acid (mg/dl)	2.77± 0.15	3.13± 0.18
Calcium (mg/dl)	4.32± 0.19	5.16± 0.09 **
Blood pH	7.20± 0.01	7.02± 0.02 **
Stomach pH	4.35± 0.31	3.96± 0.35

* Significant difference from negative control group at P≤0.05.,** Significant difference from negative control group at P≤0.01.

Serum MDA, TAC, creatinine, urea, uric acid and calcium levels in rats fed on diets with EP 5%, GP 5% and P 5%

Table (2) illustrated that MDA levels were decreased in experimental groups when compared with the positive control group, although, these decrements were only significant (P≤0.05) in EP 5%. On the other hand, TAC were significantly increased (P≤0.01) in groups of rats fed on EP 5%, GP 5% and P 5% in comparison with positive control value. Serum creatinine values were insignificantly increased in trial groups whereas serum urea were decreased significantly (P≤0.05) in all groups when compared with positive control. Serum uric acid levels were significantly (P≤0.01) increased in EP 5% and GP5%. On the contrary, the P5% group showed significantly (P≤0.05) lower uric acid level when compared with positive control. Calcium levels of trial groups showed significantly increments in EG 5% (P≤0.05) and P 5% (P≤0.01) and insignificantly in GP 5%. Blood pH levels were slightly and insignificantly increased only in GP 5% and P 5% groups in comparison with positive control group. Stomach pH levels were insignificantly

increased only in EP 5% and insignificantly decreased in GP 5% and P 5% groups in comparison with positive control group. These results could be explained in according to the findings of **Ou *et al*., (2002)** who reported that green pepper considered as one of the leading sources of antioxidants with activities against lipid peroxyl radicals. Also, **Di Sotto (2018)** reported that sweet pepper has been highlighted to be an important source of vitamins C and A, carotenoids, diterpene glycosides and polyphenols (**Materska, 2014 and Asnin and Park, 2015**), particularly polyphenols are the most abundant bioactive food compounds (reaching about a 1 g daily intake) (**Mokhtar *et al*., 2015 and Sricharoen *et al*., 2017**). Also, eggplants are a rich source of vitamins and dietary fiber, as well as phytonutrients, including phenolic compounds such as caffeic and chlorogenic acids, and flavonoids , anthocyanin phytonutrient called nasunin (**Singh *et al*., 2009 and Naeem and Ugur, 2019).** Nasunins are potent antioxidants by its ability to remove excess iron; it does not directly scavenge free radicals, rather it interferes with hydroxyl radical generation by chelating iron (**Ichiyanagi *et al*., 2005; Matsubara *et al*., 2005 and Solanke and Tawar, 2019**). Although, they are primarily present in their purple skin, they are equally present in freeze-dried eggplants containing both flesh and skin (**Martínez-Ispizua *et al*., 2021**). On the other hand, parsley extracts having a wide range of phenolic compounds, flavonoids, essential oils, cumarines and vitamin C, and its protective effect may be attributed to its higher content of these flavonoids which scavenge free radicals and/or increase the production of the detoxifying enzyme glutathione S- transferase (GST) (**Tahoon , 2016 and Danciu *et al*., 2018**). Oral administration of parsley expressed nephroprotective and diuretic effects, as it reversed the biochemical and antioxidant activity as evident by decreasing lipid peroxidation, increasing content of reduced glutathione and restoring activities of antioxidant enzymes (superoxide dismutase, SOD, glutathione peroxidase, GPx and catalase, CAT) in renal tissue (**Shalaby *et al*., 2014**). The nephroprotective effect of parsley was attributed to the antioxidant activity due to its high content of flavonoids. Parsley leaves are rich in Apigenin and its glucosidal flavonoids that were found to possess anti-inflammatory especially for renal inflammation; antioxidant and anticancer activities (**Dorman *et al*., 2011 and Papay *et al*., 2012).** Oral pretreatments with ethanolic extracts of parsley leaves and turmeric

roots in nephrotoxic rats produce nephroprotective, diuretic and antioxidant activities. These effects were confirmed via improvements of serum, urine and renal biochemical parameters as well as mitigation of acute renal tubular necrosis (**Elkhamisy, 2015**). Phenolic compounds including anthocyanins, flavols, flavones, flavanol, flavonones and isoflavones are widespread in vegetables and fruits. Indeed, chronic consumption of diets rich in plants polyphenols helps reduce the development of several cardiometabolic disorders including hyperuricemia and gout (**Panche *et al*, 2016**). Empirical evidence indicates these compounds exert their anti-hyperuricemic effect via their antioxidant/radical-scavenging activities and interactions with enzymes involved in uric acid synthesis particularly the xanthine oxidase system. Xanthine oxidase catalyzes the hydroxylation of hypoxanthine to xanthine and UA in the purine metabolic pathway (**Abdulhafiz *et al*, 2020**). Phenolic compounds are classical antioxidant agents which increase the bioavailability of endothelial nitric oxide leading to dilatation of the renal afferent arterioles and increasing glomerular filtration rate (**Gasparotto *et al*., 2012**). The endogenous antioxidant defense system (antioxidant enzymes, uric acid, bilirubin, metal-binding proteins like ferritin, transferrin, lactoferrin and ceruloplasmin) is complemented by the intervention of exogenous antioxidants present in diet or in nutritional supplements (ascorbic acid, tocopherols, carotenoids, phenolics, flavonoids and nonflavonoids). Nevertheless, it has been suggested that the organisms can keep constant their level of oxidative stress, irrespective of the intake of antioxidant supplements. It has been stated that antioxidant supplementation proves its effectiveness if the initial oxidative stress is above normal or above the individual's stabilized level (**Pisoschi and Pop 2015**). These results in our study were the line with those reported by **Alzergy *et al*, (2018)** demonstrated that *P.crispum* improved the kidney Function Indices of mice injected with gentamicin, **Ali *et al*, (2016),** concluded that the addition of parsley leaves by 1000 and 1500 mg / kg feed to the ration can lead to improve in some blood serum biochemical traits of broiler Ross 308. **Scorsatto *et al*, (2019)** showed that eggplant flour improved the anti-oxidant status in overweight women-a randomised clinical trial. Also, **Nwankpa *et al*, (2018)** demonstrated that green pepper improved kidney function indices in rats.

Table (2): Mean serum MDA, TAC, creatinine, urea, uric acid and calcium levels in rats fed on diets with EP 5%, GP 5% and P 5% (Mean± SE)

	Positive Control	EP 5%	GP 5%	P 5%
MDA (nmol/ml)	26.00± 0.58	21.67± 1.86 *	24.33± 1.85	22.33± 1.20
TAC (mm/l)	0.50± 0.03	0.78± 0.02 **	1.39± 0.12 **	0.89± 0.01 **
Creatinine (mg/dl)	0.53± 0.05	0.56± 0.02	0.61± 0.02	0.58± 0.01
Urea (mg/dl)	24.00± 1.00	20.00± 1.16 *	19.00± 2.08 *	19.78± 0.40 *
Uric Acid (mg/dl)	3.13± 0.18	3.77± 0.09 **	4.53± 0.09 **	2.70± 0.06 *
Calcium (mg/dl)	5.16± 0.09	5.70± 0.14 *	5.24± 0.14	8.46± 0.13 **
Blood pH	7.02± 0.02	7.02± 0.01	7.04± 0.01	7.03± 0.02
Stomach pH	3.96± 0.35	4.73± 0.35	3.60± 0.19	3.40± 0.04

* Significant difference from positive control group at P≤0.05. ** Significant difference from positive control group at P≤0.01.

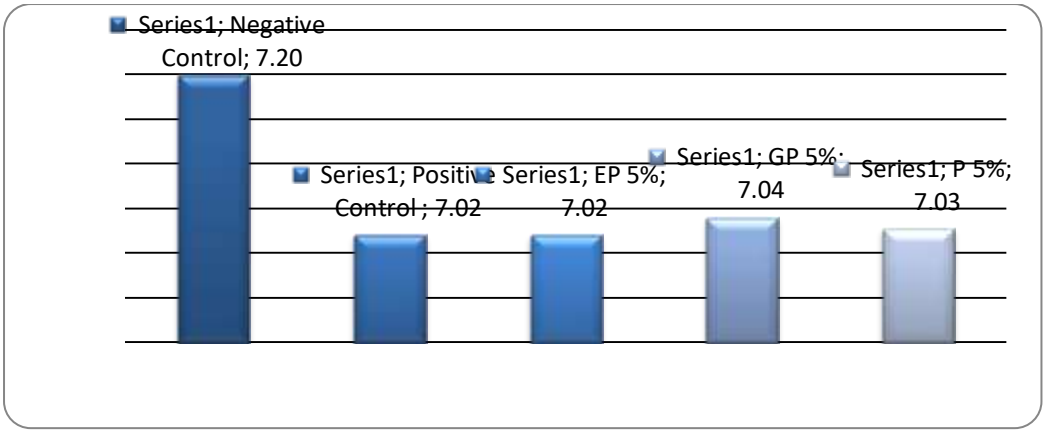

Figure (2): Blood pH for the experimental rats

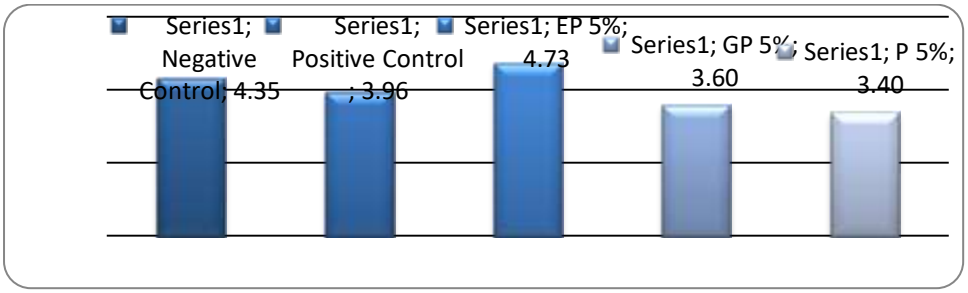

Figure (3): Stomach pH for the experimental rats

Histopathological examination of lung

Figure (4) illustrated the histopathological examination of lung in of control and treated rats (fed on diets with EP 5%, GP 5% and P 5%). Lung of rats from group 1 revealed no histopathological changes (Photos. 1 & 2). In contrary, lung of rats from group 2 revealed focal interstitial pneumonia (focal mononuclear inflammatory cells infiltration) (Photo 3), marked perivasculitis (Photos. 4 & 5), hyperplasia and vacuolation of bronchial epithelium (Photo 6). Some examined sections from groups 3 & 4 revealed interstitial pneumonia (Figs. 7 & 9), whereas, other sections from those groups showed no histopathological changes (Figs. 8 & 10). However, most examined sections from group 5 revealed perivasculitis (Photo 11) and slight interstitial pneumonia (Photo 12), whereas, few sections revealed no histopathological changes (Photo 13).

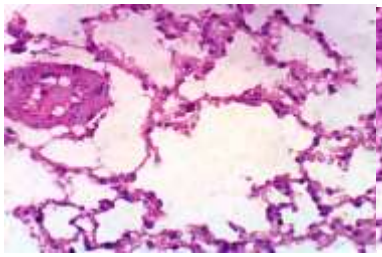

Photo (1): Lung of rat from group 1 showing no histopathological changes (H & E X 400).

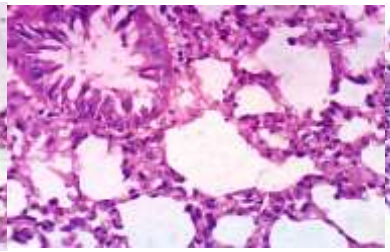

Photo (2): Lung of rat from group 1 showing no histopathological changes (H & E X 400).

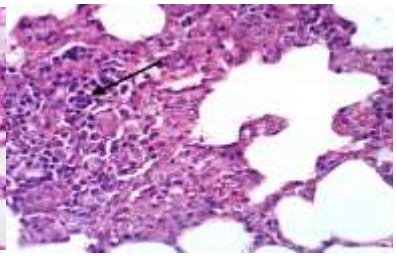

Photo (3): Lung of rat from group 2 showing focal interstitial pneumonia. Note focal mononuclear inflammatory cells infiltration (H & E X 400).

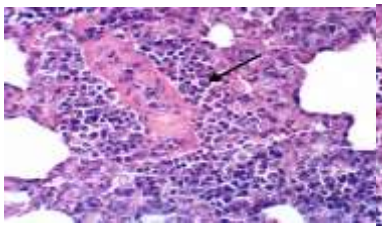

Photo (4): Lung of rat from group 2 showing marked perivasculitis (H & E X 400).

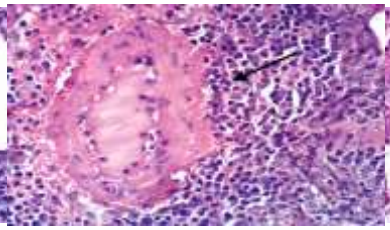

Photo (5): Lung of rat from group 2 showing marked perivasculitis (H & E X 400).

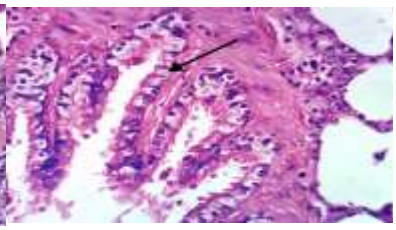

Photo (6): Lung of rat from group 2 showing hyperplasia and vacuolation of bronchial epithelium (H & E X 400).

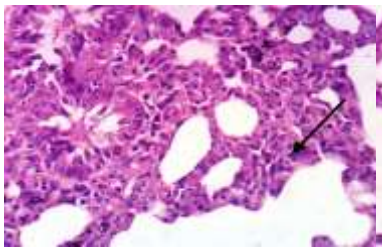

Photo (7): Lung of rat from group 3 showing interstitial pneumonia (H & E X 400).

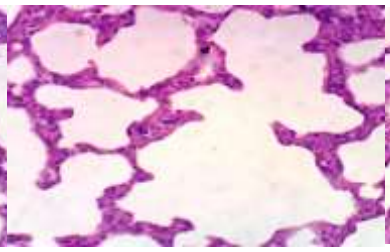

Photo (8): Lung of rat from group 3 showing no histopathological changes (H & E X 400).

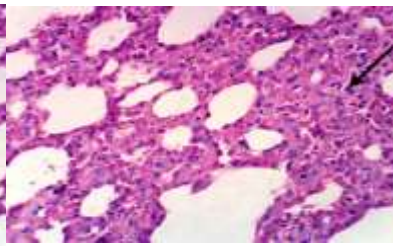

Photo (9): Lung of rat from group 4 showing interstitial pneumonia (H & E X 400).

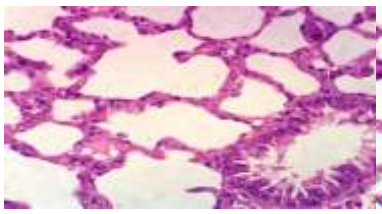

Photo (10): Lung of rat from group 4 showing no histopathological changes (H & E X 400).

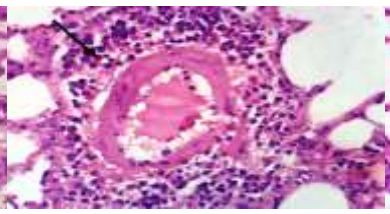

Photo (11): Lung of rat from group 5 showing perivasculitis (H & E X 400).

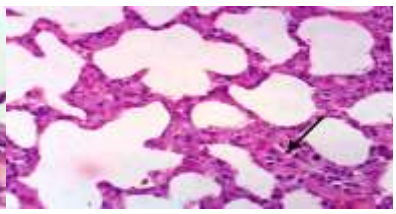

Photo (12): Lung of rat from group 5 showing interstitial pneumonia (H & E X 400).

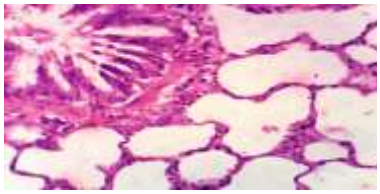

Photo (13): Lung of rat from group 5 showing no histopathological changes (H & E X 400).

Figure (4): Histopathological examination of lung in of control and treated rats (fed on diets with EP 5%, GP 5% and P 5%)

Histopathological examination of the stomach

Figure (5) illustrated the histopathological examination of stomach in of control and treated rats (fed on diets with EP 5%, GP 5% and P 5%). Stomach of rats from group 1 revealed the normal histological structure of gastric layers (mucosa, submucosa and musculosa) (Photos. 1 & 2). In contrary, stomach of rats from group 2 revealed submucosal inflammatory cells infiltration (Photo 3) and marked submucosal oedema (Photo 4). Slight submucosal oedema (Photo 5) was the only histopathological change observed in stomach of rats from group 3 (Photo 6). Moreover, stomach of rats from groups 4 & 5 revealed no histopathological changes (Photos 7, 8, 9 & 10).

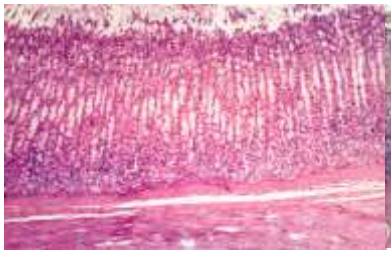

Photo (1): Stomach of rat from group 1 showing the normal histological structure of gastric layers (mucosa, submucosa and muscolosa) (H & E X 100).

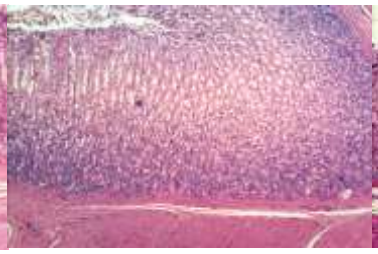

Photo (2): Stomach of rat from group 1 showing the normal histological structure of gastric layers (mucosa, submucosa and muscolosa) (H & E X 100)

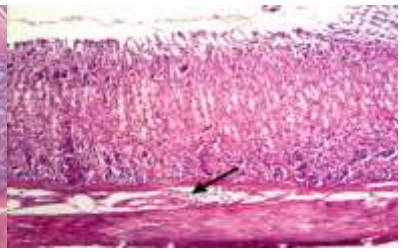

Photo (3): Stomach of rat from group 2 showing submucosal inflammatory cells infiltration (H & E X 100).

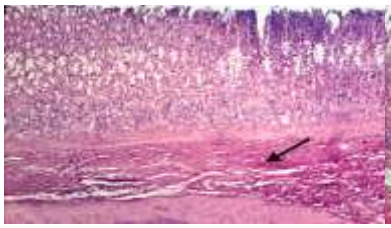

Photo (4): Stomach of rat from group 2 showing marked submucosal oedema (H & E X 100).

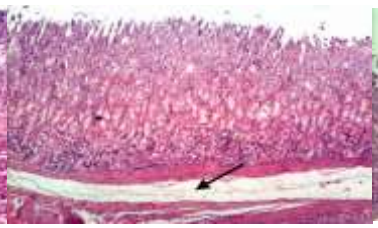

Photo (5): Stomach of rat from group 3 showing slight submucosal oedema (H & E X 100).

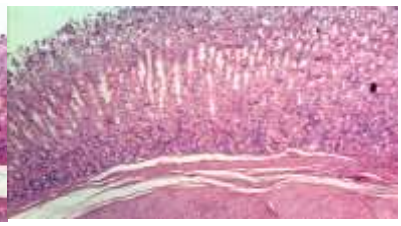

Photo (6): Stomach of rat from group 3 showing no histopathological changes (H & E X 100).

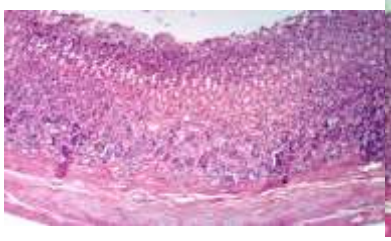

Photo (7): Stomach of rat from group 4 showing no histopathological changes (H & E X

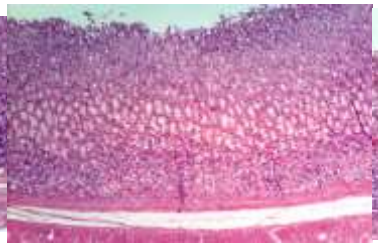

Photo (8): Stomach of rat from group 4 showing no histopathological changes (H & E X

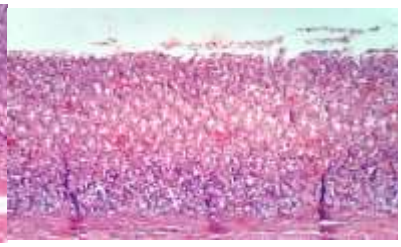

Photo (9): Stomach of rat from group 5 showing no histopathological changes (H & E X

100). 100). 100).

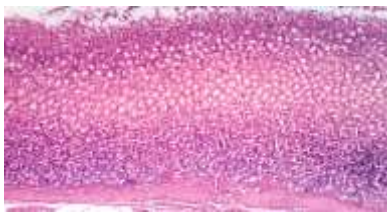

Photo (10): Stomach of rat from group 5 showing no histopathological changes (H & E X 100).

Figure (5): Histopathological examination of stomach in of control and treated rats (fed on diets with EP 5%, GP 5% and P 5%)

Conclusion

From obtained results it could be concluded that the use of eggplant, sweet green pepper and parsley powder as a dietary supplement is useful in maintaining stomach and blood pH and preserving a good oxidative status which positively reflects on general health. Thus, we recommended that eggplant, sweet green pepper and parsley powder could be introduced in our daily diet by the ratio up to 5%.

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تأثير تناول بعض الخضروات على المؤشرات الحيوية للإجهاد التأكسدي والوظائف الكلوية في الجرذان المصابة بحموضة الدم

الملخص العربى

أجريت الدراسة الحالية لتقييم التأثير المفيد للباذنجان والفلفل الأخضر الحلو ومسحوق البقدونس على المؤشرات الحيوية للإجهاد التأكسدي ووظائف الكلى في الفئران المصابة بحموضة الدم. تم تقسيم ٣٠ من ذكور الفئران البيضاء السليمة إلى ٥ مجموعات متساوية. تم تغذية فئران المجموعة الأولى على النظام الغذائي الأساسي كمجموعة ضابطة سالبة، بينما تم تغذية فئران المجموعة الثانية على النظام الغذائي الأساسي المخلوط بمسحوق الخبز الأبيض (١٥٪ من العلف) لتحفيز الحموضة كمجموعة ضابطة موجبة، أما المجموعة الثالثة فقد تم تغذيتها على النظام الغذائي الأساسي المخلوط مع الخبز الأبيض (١٥٪ من العلف) و ٥٪ مسحوق الباذنجان (EP) ، تم تغذية فئران المجموعة الرابعة على النظام الغذائي الأساسي المخلوط بالخبز الأبيض (١٥٪ من العلف) و ٥٪ مسحوق الفلفل الأخضر (GP)والمجموعة الخامسة تتغذى على حمية قاعدية مخلطة بخبز أبيض (١٥٪ دايت) و ٥٪ مسحوق بقدونس (ف). تم تسجيل وزن الفئران أسبوعيا لكل فأر خلال فترة التجربة ، وتم حساب الزيادة في وزن الجسم لمجموعات الفئران. تم جمع عينات الدم لتقييم بعض المؤشرات البيوكيميائية لوظائف الكلى (اليوريا ، الكرياتينين ، حمض البوليك، المالونادهيد (MDA) و السعة الكلية للنشاط المضاد للأكسدة (TAC). تم تحديد قيمة الرقم الهيدروجيني للدم والمعدة. أظهرت النتائج أن جميع المجموعات التجريبية أظهرت درجات متفاوتة من فقدان الوزن والتي تعتبر مؤشرا لضعف النمو مقارنة بالمجموعة الضابطة السالبة ، وانخفضت مستويات MDA في المجموعات التجريبية عند مقارنتها بالمجموعة الضابطة الإيجابية وكانت هذه الانخفاضات معنوية فقط في المجموعة EP (٥٪).من ناحية أخرى ، تمت زيادة TAC في مجموعات الفئران التي تم تغذيتها على5 EP ٪ و5 GP ٪ و5 P ٪ مقارنة مع المجموعة الضابطة الموجبة. زادت قيم الكرياتينين في الدم في المجموعات التجريبية ، بينما انخفض اليوريا في الدم في جميع المجموعات عند المقارنة مع السيطرة الإيجابية. تم زيادة مستويات حمض اليوريك في الدم في5 EP ٪ و5 GP ٪ ، على العكس من ذلك ، أظهرت مجموعة5 P ٪ انخفاض مستوى حمض اليوريك بالمقارنة مع المجموعة الضابطة الموجبة. أظهرت مستويات الكالسيوم في المجموعات التجريبية زيادات في5 EG ٪ و5 P ٪ و5 GP ٪ .وزادت مستويات pH الدم بشكل طفيف فقط في مجموعات5 GP ٪ و5 P ٪ مقارنة مع المجموعة الضابطة الموجبة. زادت مستويات الأس الهيدروجيني في المعدة فقط في5 EP ٪ وانخفضت في مجموعات5 GP ٪ و5 P ٪ مقارنة بالمجموعة الضابطة الموجبة. خلصت هذه الدراسة إلى أنه يمكن تناول الباذنجان والفلفل الأخضرالحلو ومسحوق البقدونس في النظام الغذائي للفئران المصابة بحموضة الدم بنسبة تصل إلى ٥٪ وقد يحسن وظائف الكلى والعوامل المضادة للحموضة .

الكلمات المفتاحية: الباذنجان، الفلفل الأخضر الحلو، البقدونس، المعدة، وظائف الكلى،الحموضة.