The Protective role of Pomegranate seed oil (Pometon) on kidney (functional and structural) damage induced by Methionine overload in adult female Rabbits

Ahmed Dawood Salman
Department of Physiology and Pharmacology, College of Veterinary Medicine, Baghdad University, Iraq.
E-mail: ads_phy@yahoo.com
Accepted on: 20/4/2014

Summary

This study was designed to investigate the protective effect of Pomegranate seed oil (PSO) on kidney damage induced by methionine overload in adult female rabbits. Twenty four adult female local rabbits were randomly divided into four equal groups, and they were treated daily for 42 days,as fallows: the first group (C)**:** rabbits were received ordinary corn oil orally, serving as control**;** aniamls in the second group T_1 were intubated with methionine (100 mg/kg BW) orally; and animals in third group (T_2) were intubated with methionine (100mg/kg BW) plus pometon (30mg/kg BW) diluted in corn oil . Rabbits in fourth group (T_3) were intubated with pometone (30 mg/kg BW) diluted in corn oil.Fasting blood samples were collected from all experimental groups at 0, 21, and 42 days of experiment to study the parameters: Serum creatinine (SC) concentration and Blood urea nitrogen (BUN) concentration. Sections of kidney were assessed for histopathological studies. The result revealed that exposure of animals to methionine in group (T_1) for 42 days caused a significant increase ($P<0.05$) in SC and BUN concentrations as compared to pomegranate treated groups and control. While oral intubation of PSO caused significant decrease ($P<0.05$) in the previous and correct the values near that of the control. Exposure to methionine overload showed severe acute cellular degeneration with mononuclear cells infiltration between renal tubules while there was no clear pathlogical lesions in kidney section after PSO intubation. In conclusion, it seems that Pomegranate seed oil intubation possessed renoprotactive (functional and structural) effect against deleterious damage induced by Methionine overload in rabbits.

Keywords: Methionine overload, Kidney, Pomegranate seed oil.

Introduction

Methionine is an essential sulfur containing amino acid obtained from various proteins or prepared synthetically and used as a dietary supplement and pharmaceuticals (1). The limiting amino acid methionine is found in richest sources in proteins of animal origin including cheeses, eggs, fish, meat and poultry. It is also found in fruits. Besides, small amounts of methionine are occurring in vegetables, juice and tormented foods (2). It is required for much physiological process. In principle excess could lead to generation of toxic sulfur metabolites (1).

The recommended daily methionine intake is 13 mg / kg or about one gram daily for adults human being however actual intake is many higher (3). Homocysteine (Hcg) is a sulfur containing amino acid extensively formed as an intermediate product in metabolism of methionine. It exists at a critical biochemical junction between methionine metabolism and biosynthesis of amino acid cysteine and taurine. Homocysteine is normally metabolized via two biochemical pathways: Remethylation, which converts Homocysteine back to methionine and trans-sulfuration which converts Homocysteine to cysteine and taurine (4). Under normal metabolic circumstances, there is a strict balance between Hcy formation and elimination .Usually about 50 % of Hcy formed is remethylated to methionine. When protein or methionine intake is in excess, the transsulfuration pathway catabolizes a larger proportion (5). If there is an increased formation of Hcy relative to its consumption, Hcy is excreted from the cells .This can be detected as an increased level of Hcy in plasma /serum or in the urine (6), affect methionine synthase dependent Homocysteine remethylation leading to hyperhocysteinemia (7). The mechanisms proposed for the deleterious effects of homocysteine is its

ability to generate reactive species thereby producing oxidative stress. Thiol group of Hcy can autooxidize in the presence of transition metals catalysts and molecular oxygen, leading to the formation of ROS.Oxidation of two Hcy molecules yields the oxidized disulfide (homocystine), two protons (H^+), and two electrons (e^-), promoting the formation of reactive oxygen species (ROS) (8).

Pomegranate (*Punicagranatum* Linn.) is a fruit belonging to the Punicaceae family(9). Pomegranate seed oil is a potent source of punicic acid(95-percent); other constituents, including:ellagicacid; other fatty acids; sterols(10). Clinical assays *in vivo* and *in vitro* have shown that juice, flower and fruit extracts have antioxidant and anti-inflammatory activities and create positive effects on glycemia, insulin, dyslipidemia, blood pressure and foam cell formation; additionally, some mechanisms of these effects have been reported (11 and 12). Besides the antioxidant properties of a pomegranate by-product (PBP) extract made from whole fruit minus the juice, showing a 19% reduction in oxidative stress in mouse peritoneal macrophages (MPM), a 42% decrease in cellular lipid peroxide content, and a 53% increase in reduced glutathione levels (13). Pomegranate extracts also inhibit the rate of cancerous invasion and spread by metastasis, processes which are ultimately responsible for death in a majority of cancer patients (14).

Materials and Methods

Twenty four adult female local rabbit (6-8 months) were randomly divided into four equal groups, they were treated daily for 42 days Group C: Rabbits were administrated ordinary corn oil orally, serving as control (C) while the other three treated group include: Second group (GroupT_1):rabbits in this group were treated with methionine (100 mg/kg BW) orally (15). Third group of animals were treated with methionine (100mg/kg BW) plus pometon (30mg/kg BW) dilution in corn oil (T_2). Finally Rabbit in fourth group (T3 group) were treated with pometone (30 mg/kg BW) dilution in corn oil. Blood samples were collected by cardiac puncture technique (16) from fasting animal (8 hrs) at 0, 21,42, days of the experiment. and kept in tube not more than 4 hours followed by centrifugation for 15 minutes at 4000rpm. Serum was isolated and frozen at -20°C until analysis. Serum Creatinine concentration was determined, based on a modification of the original picrate reaction (17). Creatinine under alkaline condition reacts with picrate ions forming reddish complex, the formation rate of the complex measured though the increase of absorbance in a prefixed interval of time is proportional to the concentration of creatinine in the sample .Blood urea Nitrogen based on the specific action of urease which hydrolyses urea in ammonium ions carbon dioxide complex, this coloration, proportional to the urea concentration in the specimen (18). At the end of expirment rabbits were anesthetized and sacrificed by withdrawal of blood from heart for histopathological study, Immediately, after sacrification, the kidney were excised blotted, opened and preserved in 10% neutral formalin buffer solution till the preparation of histopathological sections. Several tissue sections were prepared according to (19).

Statistical analysis of data was performed on the basis of Two-Way Analysis of Variance (ANOVA) using a significant level of ($P<0.05$). Specific group differences were determined using least significant differences (LSD) as described by Snedecor and Cochran (20).

Results and Discussion

There were no significant differences ($P>0.05$) in serum creatinine concentration among expermintal groups in pretreatment period (Table, 1). After 21 days a significant increase ($P<0.05$) in serum creatinine concentration was observed in methionine overload (T_1) treated group with mean value (1.28±0.07) as compared to pomegaranate treated groups and control, where significant decrease in this parameter was observed in T_2 (0.82±0.05) and T_3 treated groups (0.83±0.03). Further significant decrease was observed at the end of experiment due to PSO administration in groupsT_2 (1.32±0.03) and T_3 (0.88±0.04) compering to Methionine treated group (T_1) which showed further

significant increase (2.4±0.04) indicating the deleterious effect of Methionine on kidney function and protective effect of PSO in normal and Methionine overload rabbits.

Table, 1: Effect of pomegranate seed oil (PSO), on Serum Creatinine concentration (mg/dl) in methionine treated adult female rabbits.

Group / Time	C	T1	T2	T3
Zero	0.97±0.02 a	0.9±0.02 c	0.87±0.08 b	0.83±0.03 A
21 days	0.87±0.08 B a	1.28±0.07 A b	0.82±0.05 B b	0.83±0.03 B a
42 days	0.95±0.04 C a	2.4±0.04 A a	1.32±0.03 B a	0.88±0.04 C b

L.S.D.= 0.2 Value express as mean ± SE,- n=6
c:- control group , T1: Animals received methionine 100 mg / kg B.W , T2 : Animal received methionine 100mg/ kg BW plus 30 mg /kg BW (PSO), T3:Animals received 30mg/kg BW (PSO)
Small letters denote within group difference p<0.05.
Capital letters denote between groups difference p<0.05

The result of the present study agreed with (21 and 22) who showed a positive correlation between plasma homocysteine level and serum creatinine level. Homocysteine (Hcy) is a sulfur containing amino acid extensively formed as an intermediate product in the metabolism of methionine (4). If there is an increase formation of Hcy relative to its consumption, Hcy is excreted from the cells.This can be detected as an increased level of Hcy in plasma /serum or in the urine. Hyperhomocysteinemia is a condition in which the regulation of intracellular Hcy level is disrupted and Hcy export to the plasma compartment is accelerated and/or normal plasma clearance is decreased (6). Oxidation of two Hcy molecules yields the oxidized disulfide (homocystine), two protons (H^+), and two electrons (e^-), promoting the formation of reactive oxygen species (ROS) (8). Some investigators pointed that protein overload mainly (methionine overload) enhance the oxygen consumption in surviving nephrons in subtotal ablation renal model (23), decrease antioxidant status (24), and increase the ROS production. Another mechanism that contributes to progressive renal damage is toxicity of the tubular site of filtered proteins (25). It can hypothesized that a elevation in serum Createnine concentration due to hyperhomocysteinemia which has been claimed to be an important causes of glomerular injury (26).

Serum creatinine is a marker for glomerular filtration rate which represents actual renal function (27). Juice, flower and fruit extracts of Pomegranate, have antioxidant and anti-inflammatory activities (11 and 12). On other hands (28) have shown that pomegranate extracts scavenge free radicals, and decrease macrophage oxidative stress and lipid peroxidation in animals. Intubation of the animals with pomegranate seed oil 30 mg/kg B.W. ameliorate the oxidative damage induced by methionine owing to its antioxidant properties (29).

Table, 2: Effect of pomegranate seed oil (PSO), on blood urea nitrogen (BUN) concentration (mg/dl) in methionine treated adult female rabbits.

Groups / Time	C	T1	T2	T3
Zero	26.33±1.01	26.5±0.66 c	25.17±0.35 c	25.33±0.18
21 days	25.83±0.35 B	31.67±0.73 Ab	30.5±2.75 Ab	25.5±0.19 B
42 days	25.67±0.4 C	48.5±3.4 Aa	35.17±1.22 Ba	25.5±0.37 C

L.S.D.=2.8 Value express as mean ± SE,- n=6 Small letters denote within group difference p<0.05. Capital letters denote between groups difference p<0.05

Table (2) illustrates the mean value of blood urea nitrogen (BUN) in the control and three treated groups. Depending on statistical analysis there were no significant differences ($P>0.05$) among three treated groups (T_1, T_2 and T_3) at zero time as compared with the control group. The table showed a general trend for the BUN value to significantly ($P<0.05$) increase in (T_1) group after 21, 42 days of methionine treatment comparing to contorl, T2 and T3 groups (at 42 day). While oral intubation of PSO (T2) for 42 days caused a significant decrease ($P<0.05$) in previous parameter with mean value of (35.17±1.22) as compared to Methionine treated groupm (T1) with mean value of (48.5±3.4). Besides, oral intubation of PSO to normal animal (group T3) caused significant decrease ($P<0.05$) in BUN (25.5±0.37) and the values normalized that of the control along the expermintal period with mean values of (25.33±0.18, 25.5±0.19 and 25.5±0.37) at 0,21 and 42 days respaectivly. The present study detected a significant increase of blood urea nitrogen concentrations in methionine treated groups.This may be due to hyperhomocysteinemia (hHCY) which is induced after methionine overload (30). Hyperhomocysteinemia may lead to overproduction and release of ROS from glomerulus, renal damage, impairment of glomerular filtration rate (GFR), and significant increase ($P<0.05$) in creatinine clearance, serum blood urea nitrogen and creatinine concentrations (31). The elevation of blood urea nitrogen is a positive indicator for kidney disorders, especially as it relates to glomerular function (32). On the other hand, ((Oxidative stress is supported by increased HCY level)) (33).

Oxidative stress is defined as an imbalance between higher cellular levels of reactive oxygen species (ROS), such as superoxide radical, hydrogen peroxide and nitric oxide (NO) (34) when oxidative stress reaches a certain limit, defense mechanisms against ROS become insufficient and led to a decrease in the intracellular concentration of GSH and antioxidant enzymes (35). Histological section of kidney in animal received methionine 100 mg / kg B.W (T1) for 42 days showed renal injury as indicated by severe acute cellular degeneration with mononuclear cells infiltration between renal tubules and proliferation of fibrous connective tissue between necrosis renal tubules beside ,severe vacuolar degeneration of epithelial lining cells of renal tubules with atrophy of glomerular tufts (Figure 1 - 4) as compared to normal section of kidney. While e histological section of rabbits kidney in T2 (received methionine 100mg/ kg BW plus PSO 30 mg /kg BW), showed vacuolar degeneration of epithelial lining cells of renal tubules no clear and mononuclear cells infiltration between renal tubules (Figure 5-8). On the other hand, intubated rabbits 30 mg /kg BW PSO (T3) for the same period of expermint, there were no clear lesions except congested blood vessels (Fig. 9) comparing to normal section of kidney. This study was an agreement with Al-Hashmy and Khudiar (36), where methionine overload lead to, degeneration in the epithelial cell lining renal tubules. We can hypothesize that homocysteine manifests direct toxic effects on endothelial cells and indirect ones on normal methylation in endothelial cells (37).

Moreover methionine has been associated with oxidative stress conditions (38), ROS induced by HHcy, importing oxidative insult by damaging structural and functional components of a cellular system and then cell death (39). Antioxidant properties of a pomegranate by-product (PBP) extract made from whole fruit minus the juice show a 19% reduction in oxidative stress in mouse peritoneal macrophages (MPM), a 42% decrease in cellular lipid peroxide content, and a 53% increase in reduced glutathione levels(40). Beside conjugated linoleic acid (CLA) in pomegranate seed oil is an especially potent anti-inflammatory and anti-carcinogenic agent (41). In conclusion, it seems that Pomegranate seed oil intubation possessed renoprotactive (functional and structural) effect against deleterious damage induced by Methionine overload in adult female Rabbits.

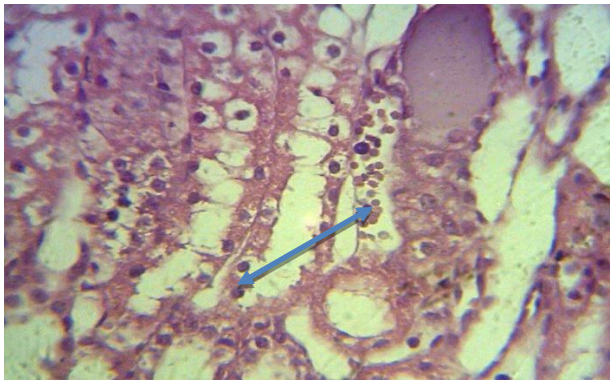

Fig. 1: Kidney of animal in T1 group 42 day post treated shows vacuolar degeneration of epithelial lining cells of renal tubules with congested blood vessels and inflammatory cells in their lumen (H and E stain 40x).

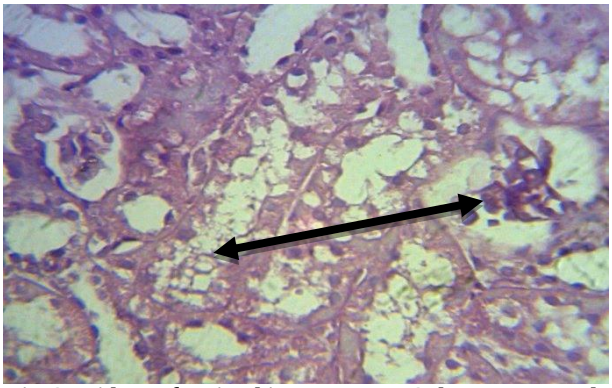

Fig. 2: Kidney of animal in T1 group 42 day post treated shows severe vacuolar degeneration of epithelial lining cells of renal tubules with atrophy of glomerular tufts (H and E stain 40x).

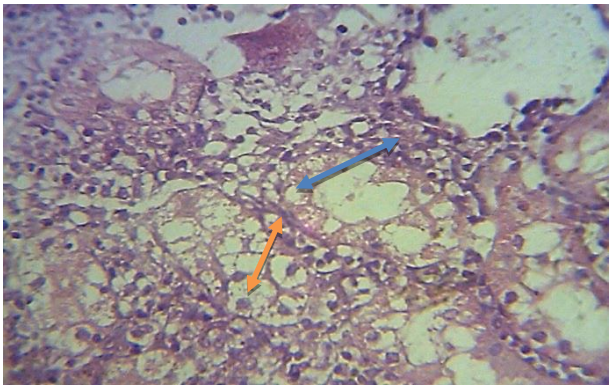

Fig. 3: Kidney of T1 group at 42-day post treated shows severe acute cellular degeneration with mononuclear cells infiltration between renal tubules ↔ and proliferation of fibrous connecive tissue between necrosis renal tubules ↔ (H and E stain 40x).

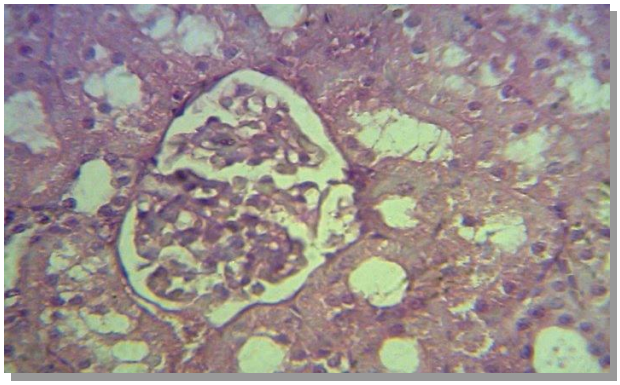

Fig.4: Histopathological section in the kidney of control group at 42 day post treated shows no clear lesions (H and E stain 40X) .

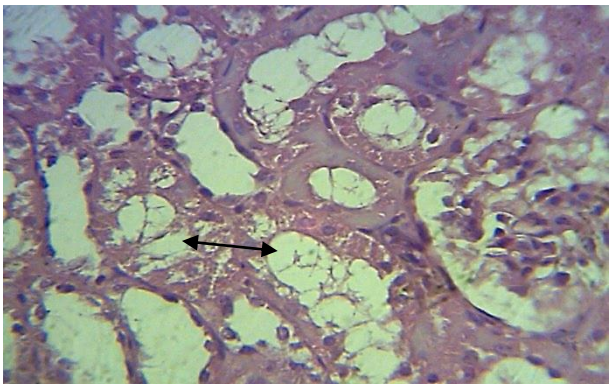

Fig. 5: Kidney of animal in T2 group 42 day post treated shows vacuolar degeneration of epithelial lining cells of renal tubules no clear ↔ (H and E stain 40x).

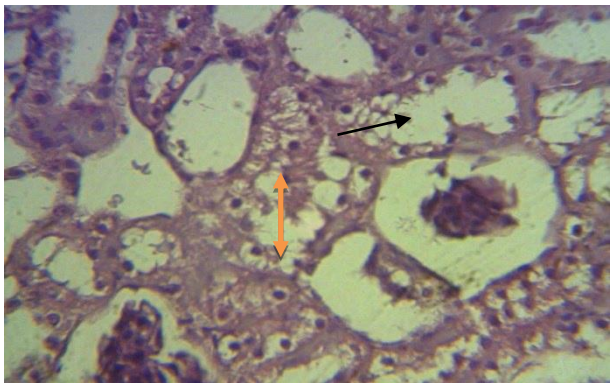

Fig. 6: Kidney of animal in T2 group 42 day day post treated with showed atrophy of glomerular tuft with dilatation of boman capsule → and vacuolar degeneration of epithelial lining cells of renal tubules ↔ (H and E stain 40x).

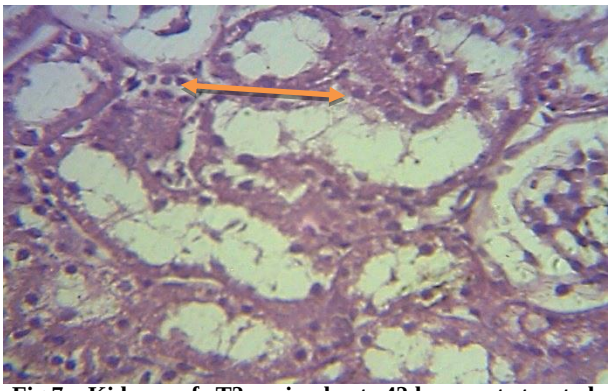

Fig.7: Kidney of T2 animal at 42day post treated shows vacuolar degeneration of epithelial lining cells of renal tubules and mononuclear cells infiltration between renal tubules ⟷ (H and E stain 40x).

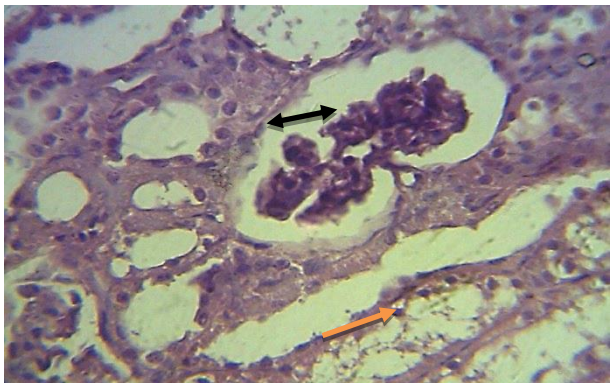

Fig. 8: Kidney of animal in T2 group 42 day post treated shows atrophy of glomerular tuft with thickness of boman capsule ⟷ and desquamation of epithelial cells degeneration of epithelial lining cells of renal tubules → (H and E stain 40x).

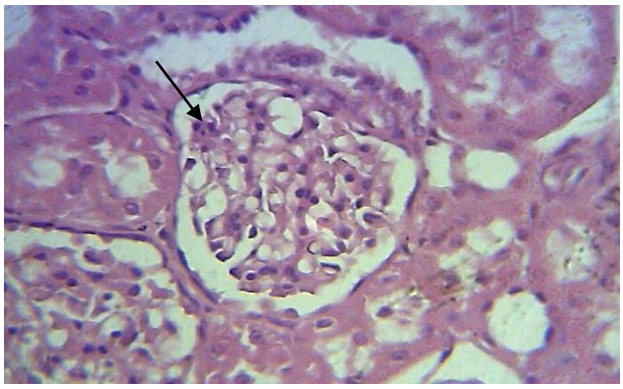

Fig. 9: Kidney of animal in T3 group 42 day post treated shows no clear lesions except congested blood vessels → (H and E stain 40x).

References

1. Shoob, H.; Reoger, D. and Sargen, J. (2001). Dietary methionine is involved inthe etiology of neural tube defect–related pregnaneles in Gumans. J. Nutr., 131: 2653.
2. Hoeler, D; Rademacher, M. and Mosenthin, R. (2005). Methionine requirement and commercial methionine sources in growing pigs. Advaces in Pork Production, 16:109-117.
3. Sahi, A.; Pan, X.; Paul, R.; Malladi, P.; Kahli, R. and Whitington, F. (2006). Roles of phosphotidylinsitol 3-kinase and osteopontin in steatosis and aminotransferase roles release by hepatocytes treated with methionine – choline deficient medium. Am. J .physiol. Gastro. Intest. physiol. liver physiol., 291(1):55-62.
4. Wijekoon, E. P.; Hall, B.; Ratnam, S.; Brosnan, M. E.; Zeisel, S. H. and Brosnan, J.T. (2007). Homocysteine metabolism in ZDF (Type 2) diabetic rats. Diabetes., 54: 3245-3251.
5. Herrmann, W.; Schorr, H.; Obeid, R.; Makowski, J.; Fowler, B. and Kuhlmann, M. K. (2005). Disturbed Homocysteine and methionine cycle intermediates S-adenosylhomocysteine and S-adenosylhomocysteine are related to degree of renal insufficiency in type 2 diabetes. Clin. Chem., 51:891-897.
6. Schwab, U.; Torronen, A.; Meririnne, E.; Saarinen, M.; Alfthan, G. A and Usitupa, M. (2006). orally administrated Betains has an acute and dose dependent effect on serum betaine and plasma Homocysteine concentration in healthy humans. J. Nutr., 136:34-38.
7. Smith, A. and Hagen, T. (2003). Vascular endothelial dysfunction in aging loss of AKI- dependent endothelial nitic oxide synthase phospd part restoration by (R), alphalipoc acid. Bio. Chem. Soc. Trans. 31(51): 1447-1450.
8. Hortin, G.; Seam, N. and Hoehn, T. (2006). Bound homocysteine. Cysteine and Cysteinglycine distribution between albumin and globulin. Clin. Chem., 52(12):2258-2264.

9. Saxena, A. and Vikram, N. K. (2004). Role of selected Indian plants in management of type 2 diabetes: A review, Journal of Alternative and Complementary Medicine, 10: 369–378.

10. De pascual-Teresa, S.; Santos-Buelga, C. and Rivas-Gonzalo, J. C. (2000). Quantitative analysis of flavan-3-ols in Spanish foodstuffs and beverages. J. Agric. Food Chem., 48:5331-5337.

11. Lansky, E. P. and Newman, R. A. (2007). Punica granatum (pomegranate) andits potential for prevention and treatment of inflammation and cancer J. Ethnopharm., 109:177–206.

12. Jurenka, J. (2008). "Therapeutic applications of pomegranate (Punica granatum L.): A review," Alternative Med. Rev., 13(2):128–144.

13. Rosenblat, M.; Volkova, N.; Attias, J.; Mahamid, R. and Aviram, M. (2010). Consumption of polyphenolic-rich beverages (mostly pomegranate and black currant juices) by healthy subjects for a short term increased serum antioxidant status, and the serum's ability to attenuate macrophage cholesterol accumulation. Food Funct. Oct; 1(1):99-109.

14. Wang, L.; Alcon, A.; Yuan, H.; Ho, J.; Li, Q. J. and Martins-Green, M. (2011). Cellular and molecular mechanisms of pomegranate juice-induced anti-metastatic effect on prostate cancer cells. Integr Biol., (Camb) 3(7):742–754.

15. Seshadri, N. and Robinson. (2000). Homocysteine B vitamin and coronary artery disease. Med. Clin. North. Am., 84(1):215-237. Apple FS, cardiac troponin I in: Wu AHB pathology and laboratory medicine cardiac markers, human press inced, Totowa, NJ (07/1998).

16. Lucas, R. L; Lentz, K. D. and Hale, A. S. (2004). Collection and preparation of blood products. Clinical Techniques in Small Animal Practice. 19(2): 55-62.

17. Jaffe, M. Z. (1886). Biochmical technique for messurment of serum creatinine. Midicinal. J., 3:134.

18. Searcy, R. L.; reardonn, J. E. and Foreman, J. A. (1967). A new photometric method for serum urea nitrogen determination. Med. Technol. Amer. J., 33:15-20.

19. Luna, L.G. (1968). Manual of Histological Staining Methods of the Armed Forces institutes of Pathology. 3rded. Mc Grow-Hill Book Company. New York.

20. Snedecor, G. W. and Cochran, W. G. (1973). Statistical Methods. 6th the Iowa state University press., Pp: 238-248.

21. Chen, S. F.; Cui, C. L.; Wu, P. and Xie, N. Z. (2013). Relationship of serum homocysteine level with nutritional status and HbA1c level in elderly inpatients, Int. J. Clin. Exp. Med., 6(9):779-784.

22. Huang, C. W.; Chen, T. H.; Lin, H. S.; Tseng,Y. L.; Lai, S. L.; Chen, W. H.; Chen, S. S.; and Liu, J. S. (2007). The Relation Between Plasma Homocysteine Level and Cardiovascular Risk Factors in Cerebral Ischemia., Acta Neurol Taiwan. 16:81-85.

23. Van-Guldener, C.; Stam, F. and Stehouwer, D. (2005). Homocysteine metabolism in renal failure. Kidney Int., 78:234-237.

24. Al-Hashmy, R. A. (2008). Protective role of Alcoholic Extract of Black Currant (Vitis Vinifera L.) On Renal Function of Male adult Rats Exposed to Methionine Overload and Hydrogen Peroxide. MSc. Thesis, College of veterinary medicine, University of Baghdad.

25. Chen, L.; Muh, K. and Li, P. (2006). Homocysteine–steinemia associated with decreased renal transulferation activity in Dahl rats .Hypertension., 4(6):1049-1100.

26. Yi, F.; Dos Santos, E. A.; Xia, M.; Chen, Q. Z.; Li, P. L. and Li, N. (2007). Podocyte injury and glomerulosclerosis in hyperhomo -cysteinemia rats. Am. J. Nephrol., 27:262-268.

27. Manjunath, G.; Sarnak, M. J. and Levey, A. S. (2001). Estimating theglomerular filtration rate. Dos and don'ts for assessing kidney function. Postgrad Med., 110:55-62.

28. Rosenblat, M.; Volkova, N.; Coleman, R. and Aviram, M. (2006). Pomegranate by Product Administration to Apoiipoprotein e-deficient Mice Attenuates Atherosclerosis Development as a Result on Decreased Macrophage Oxidative Stress and Reduced Cellular Uptake of Oxidized low-density Lipoprotein. J. Agricul. and Food Chemistry, 54(4):1928-1935.

29. Abdalah, L. N. and Baraa Najim Al-Okaily (2013). The protective role of Pometone (pomegranate seed oil) on cardiovascular function in methionine overload in treated female rabbits. MSc thesis , department of physiology, College of Veterinary Medicine, Baghdad University.

30. Atkinson, W.; Elmslie, J.; Lever, M.; Chambers, S. and George, P. (2008). Dietary and supplementary betaine:acute effects on

plasma betaine and homocysteine concentrations under standard and post methionine load conditions in healthy male subjects. Am. J. Clin. Nutr., 87(3):577-585.

31. Mallat, S. G. and Anoun, M. (2002). Hyperhomocysteinemia and its role in chronic renal failure. Sudia J. Kidney Dis. Transplantation., 13: 336-343.

32. Bishop, L. M.; Fody, P. E. and Schoe, H. L. (2005). Clinical chemistary principles procedures correlations.5th ed.Lippincoh Williams and wilkins, Philadelphia, Hong Kong. Pp: 220-253.

33. Dwivedi, j. And sarkar, P. D. (2010). Lipoprotein (a), homocysteine, lipid profile with oxidative stress in nephrotic syndrome and cardiovascular nephropathy. Int. J. Pharma. Bio. Sci., 1:340-350.

34. Carmeli, E.; Beiker R. and Morad, M. (2009). Nitric oxide and interlukin-6 levels in intellectual disability adults with epilepsy. Res. Dev. Disabil., 30:567–71.

35. Manna, P.; Bhattacharyya, S.; Das, J.; Ghosh, J. and Sil, P. (2011). Phytomedicinal role of Pithecellobium dolce against CCl4-mediated hepatic oxidative impairments and necrotic cell death. Evid. Based Compl. Alternat. Med., Pp:17.

36. Al-Hashmy, R. A. and Khudiar, K. K. (2009). Protective role of alcoholic extract of black currant (Vitis Vinifera L.) on renal function of adult male rats exposed to methionine overload and hydrogen peroxide. Iraqi J. Vet. Sci., 23:7-19.

37. Weir, D. and Molloy, A. (2000). Microvascular disease and dementia inthe elderly: Are they related to hyperhomocysteinemia? Am. J. Clin. Nutr., 71: 859–860.

38. Jones, D. P. (2006). Refinding oxidative stress Antioxide Redox Signal. 8:1865-1879.

39. Kerkeni, M.; Addad, f.; Farhat, M.; Miled, A.; Trivin, F. and Maaroufi, K. (2008). Hyperhomocysteinemia and parameters of antioxidantive defence in Tunisian patients with coronary heart disease .Ann. Clin. Bio., 45:193-198.

40. Rosenblat, M.; Volkova, N.; Attias, J.; Mahamid, R. and Aviram, M. (2010). Consumption of polyphenolic-rich beverages (mostly pomegranate and black currant juices) by healthy subjects for a short term increased serum antioxidant status, and the serum's ability to attenuate macrophage cholesterol accumulation. Food Funct., 1(1):99-109.

41. Stephen, F. (1990). Cornucopia: a Source Book of Edible Plants. Kampong Publications, Pp:166-167.

التاثير الوقائي لزيت بذور الرمان في الاذى الكلوي (الوضيفي والنسجي) المستحدث بواسطة فرط الميثيونين في اناث الارانب البالغة

احمد داود سلمان

فرع الفسلجة والادوية، كلية الطب البيطري، جامعة بغداد، العراق.

E-mail: ads_phy@yahoo.com

الخلاصة

صممت هذه الدراسة لمعرفة الدورالوقائي لزيت بذور الرمان على ألأذى الكلوي المستحدث بواسطة فرط الميثيونين (كعامل مؤكسد) في اناث الارانب البالغة. تم استعمال (24) من اناث الأرانب قُسّمت عشوائيا إلى أربعة مجاميع متساوية وعوملت لمدة 42 يوم كالتالي:اعطيت المجموعة الأولى زيت الذرة وعدت كمجموعة سيطرة، جرعت حيوانات المجموعة الثانية (Group T_1) الميثيونين 100 ملغم\كغم من وزن الجسم ، أما حيوانات المجموعة الثالثة (Group T_2) فقد جرعت فمويا فرط الميثيونين 100 ملغم\كغم فضلا عن زيت بذور الرمان بجرعة 30 ملغم \كغم من وزن الجسم، وأما حيوانات المجموعة الرابعة (Group T_3) جرعت زيت بذر الرمان بجرعة 30 ملغم \كغم من وزن الجسم. جمعت عينات الدم في الفترات 0 و21 و 42 يوم من التجربة لغرض: قياس تركيز الكرياتنين و تركيز نيتروجين يوريا الدم. اخذت مقاطع نسجيه للكلى لدراسة التغيرات النسجية المرضية. اظهرت النتائج ان تعرض الحيوانات لفرط الميثيونين (T_1) لمدة 42 يوما ادى الى حدوث زيادة معنوية ($p<0.05$) في تركيز SC و BUN مقارنة مع المجاميع المجرعة بزيت بذور الرمان ومجموعة السيطرة, أما التجريع الفموي بزيت بذورالرمان تسبب في انخفاض معنوي ($P <0.05$) في المعياريين السابقين وأدى الى تصحيح الأقيام لتصبح مقاربة من اقيام مجموعة السيطرة .أظهر التعرض لفرط الميثيونين ضمور خلوي حاد مع ارتشاح الخلايا وحيدات النوى بين الأنابيب الكلوية ولم توجد افات نسجية واضحة في الكلى بعد التجريع زيت بذور الرمان. تستنتج الدراسة ، أن زيت بذور الرمان لها تأثير وقائي للكلى (وضيفيا ونسجيا) ضد الضرر الناجم عن فرط الميثيونين في الأرانب .

الكلمات المفتاحية:فرط المثيونين, الكلى,زيت بذور الرمان.