Protective effect of curcumin against injury induced stress i albino rats.

A.F.El-Kirdasy[a], Saad Shousha[b] , Osama A. Hassan[c]

[a] Department of Biochemistry, Faculty of Veterinary Medicine, Menoufia University (Sadat
Department of Physiology, Faculty of Veterinary Medicine, Benha University, 13736 Mo
Department of Forensic Medicine & Clinical Toxicology, Faculty of Medicine, EL-Minia (
Egypt.

Abstract

Curcumin is a phytopolylphenol pigment isolated from the pl Curcuma longa, commonly known as turmeric, with a variety pharmacologic properties. Curcumin blocks the formation of reacti oxygen species, possesses anti-inflammatory properties as a result inhibition of cyclooxygenases (COX) and other enzymes involved inflammation. These effects may play a role on the agent's hav antineoplastic properties, which include inhibition of tumor cell proliferat and suppression of chemically induced carcinogenesis and tumor growth animal models of cancer. This study was designed to clarify the effec curcumin on induced stressing male albino rats. For this purpose about male albino rats weghting110-130gm were divided into four groups; the group considered as a healthy matched group (control) and the 2nd gro exposed to intraperitoneal puncture (sham stress). While the 3rd gro administered orally with curcumin powder in a dose of (80 mg/kg bo weight). The 4th group exposed to Sham stress and administered v curcumin in the same previous dose.

Three different samples were taken; liver and kidney tissue were tak for measuring of malondialdehyde (MDA), Superoxide dismutase (SO reduced glutathione (GSH). Blood samples were taken, where the plas was used for estimation of Total protein, Albumin, Urea and Creatini The whole blood was taken for erythrocytic count (RBCs), total leukoc count (WBCs), packed cell volume (PCV) and hemoglobin. Res revealed that sham stress (2nd group) show significant increase in mean values of MDA, SOD and a significant decrease in the mean val of GSH, WBCs count, PCV and hemoglobin concentration.

The obtained results revealed non significant changes in total prot albumin, creatinine and urea. However, the results revealed that adc curcumin significantly alleviated or these changes caused due to str and returned these changes near to the normal values. Sham stress w taken as a model of sever stress which the body can be exposed to These results suggest that curcumin may play an important role alleviating the changes caused by exposure to stress.

***Key words**: Curcumin; Antioxidants; Stress.*

Introduction

In the US, turmeric is generally recognized as safe (GRAS) as a food a the FDA. Serious adverse effects have not been reported in humans taking l of curcumin. Curcumin supplementation up to 8 g/day for 3 months was rep well-tolerated in patients with precancerous conditions or noninvasive canc *et al., 2001)*. Each injury is accompanied with the oxidation stress with an i the level of free oxygen radicals and decrease in the body's antioxidant *(Motycka et al., 2006)*. Reactive oxygen species (ROS) may be generated after physical exercise in working muscles, and in the tissues that undergo reperfusion *(Sjödin et al., 1990; Ji, 1995)*. It is estimated that 2-5% of the to flux leaks to form primary short-lived ROS such as superoxide radical a hydrogen peroxide (H_2O_2), and hydroxyl radical ($OH^{\cdot}$) *(Boveris and* Chan Sources of ROS during exercise include enhanced purine oxidation, dama containing proteins, disruption of Ca^{2+} homeostasis *(Jackson, 2000)*, and flo endothelium ROS production *(Shi et al., 2001)*. Neutrophils infiltrating the m injury by exercise may also produce ROS *(Jones et al., 1986)*, which r oxidative tissue damage *(Sen, 1995)*, e.g., DNA injury *(Inoue et al., 1* peroxidation *(Meydani et al., 1993)* and protein oxidation (*Saxton et al., 19* processes are associated with the appearance of an increase in the severi diseases *(Ames et al., 1993; Gutteridge, 1993)*. If the production of free excessive as observed during strenuous aerobic exercise (*Ji, 1995)* antioxidant defense mechanisms are impaired, the balance between pro-ox antioxidants will be lost. Increased MDA levels and decreased GSH le stressed group were reversed to control values after antioxidant treatment *al., 2007)*. In the same aspect, *Ohta et al., (2007)* reported that increases in peroxidation), NOx (nitrite/nitrate) concentrations and myeloperoxidase a decreases in ascorbic acid, reduced glutathione concentrations and dismutase activity.

Findings of *Yu et al., (2006*) revealed that chronic oral treatmer galactosides and glucosides in a polysaccharide extract elevates enzymat of SOD and GPx (glutathione peroxidase) accompanied by a correspondin in malondialdehyde level. The ant- oxidative activities of these compour exercise-induced oxidative stress are correlated with various activitie reducing the production of superoxide and hydroxyl radicals, inhi peroxidation, enhancing antioxidative defenses, and increasing the producti glutathione peroxidase activity and expression in different tissues. *Sahin an (2007)* found that the level of SOD, GSH and MDA in both kidney and live affected by stress. There is an apparent paradox between the benefits (moderate) and strenuous aerobic exercise or exposure to bad atmospheri such as torture. For these reasons the intrapretonial injures (Sham considered as sever physiological stressors to which animals exposed. The study was to investigate if curcumin which is a phytopolylphenol pigment is the plant *Curcuma longa,* can ameliorate or alleviate the changes due to stre

Materials and methods

1- Animals and design:

This study was carried out on 80 male albino Wistar strain rats. Their body ranged from 110-130 g and their ages ranged from 60-70 days. All animals wer their plastic cages for two weeks for acclimatization in suitable well ventilatec They were maintained under controlled temperature (23°C ± 2 °C) and light cor (lights on, 0700–1900 h) with adlibitum access to water and standard laborator that was purchased from the B.M. Company for International Commerc Development in Egypt. These animals were divided into 4 groups each one c 20 male albino rats. The 1st one considered as control group (G1) was not re anything except the used ration for 3 successive weeks and from the 4th week e received corn oil (250µl/ kg body weight) which is the vehicle of the drug use other day by using stomach tube till the 11th weeks of experimental period. group called sham stressed group (G2) subjected to false intraperitoneal injecti the third week till the 10th week and at the 11th week false intraperitoneal injecti stopped for the recovery. The 3rd group called curcumin group (G3) in wh animals received curcumin only in an oral dose of 80 mg/kg body weight *(kalpa Menon, 2004)* dissolved in (250ml/ kg body weight) corn oil which is the ve curcumin from the third week until the end of the experiment. The animals of group (G4) were subjected to false intraperitoneal injection and the curcum administered in the same previously mentioned dose from the 3rd week till the the experiment. These experiments were performed in duplicate. All procedure performed in accordance with the Menoufia University Guide for the Care and Experimental Animals. All rats included in this study were certified as healt exhibited normal grooming and feeding behavior on the day of studies.

2. Ration ingredients:

The ration was purchased from the BM. Company for International Comme Development in Egypt.

3. Sampling:

From the fifth week of starting experiment, 5 rats were killed by decapitati each group every two weeks. The liver and the kidneys were taken and dis homogenized with buffer (phosphate buffer pH 7.4) and stored at -20 °C until u the determination of antioxidant enzymes and malondialdehyde (MDA).

From the fifth week of starting experiment, 10 rats were taken every two weel blood samples were taken from the orbital sinus puncture; one in heparenized hematological examinations and the 2nd left to clot and serum was aspirat collected at -20 °C until used for biochemical studies.

4. Biochemical and hematological analysis:

The biochemical parameters as malondialdehyde (MDA) was measured ac to the method described by Yashkochi and Masters (1979), while Sup dismutase (SOD) was measured according to the method of Giannopolitis a (1977) and reduced glutathione (GSH) as showed by Patton and Chanarin (

liver and kidney tissues. The tissue homogenate was prepared according method described by Combs et al., (1987).
Total protein, albumin and creatinine were estimated calorimetrically as desc Young (2001) using kits obtained from Elctroscient Company. Serum Ur measured according to the method described by the Patton and Chanarin (198 kits from Diamond diagnostic company. The RBC_s and total leukocytes were as the method described by the Feldman et al., (2000). Packed cell volume (P hemoglobin were measured as described by Feldman et al., (2000).

5. Statistical analysis:

Data were expressed as means + SEM (Standard error mean) and resu considered statistically significant at $P \leq 0.05$. All data were subjected to an variance (ANOVA) test according to Snedecor and Cochran (1980).

Results

1. Effect of curcumin on malondialdehyde (MDA) level.

Our results revealed a significant ($P \leq 0.05$) increase in Malondialdehyde (both liver and kidney tissue in the 2nd group (sham stress group) compared t control group as shown in both figure 1A and figure 2A, respectively. Ad curcumin to the stressed group (4th group) significantly ($P \leq 0.05$) amelior increase of MDA and returned its values to normal in both liver and kidney. T of curcumin on this change due to induced stress was very clear and promine all the time of experiment (at the 5th, 7th, 9th and the 11th week) in case of kic liver.

2. Effect of curcumin on superoxide dismutase (SOD) activity.

A significant ($P \leq 0.05$) increase in superoxide dismutase (SOD) in both kidney tissue in the 2nd group (sham stress group) compared to the 1st contro figure 1B and figure 2B, respectively). Adding the curcumin to the stressed g group) significantly ameliorated the increase of SOD and returned its value normal in both liver and kidney. The effect of curcumin on the induced stress clear and prominent during all the time of experiment (at the 5th, 7th, 9th and week) in both liver and kidney (figures 1B and 2B).

3. Effect of curcumin on reduced Glutathione (GSH) level.

MDA level and SOD activity increased significantly ($P \leq 0.05$) in both kidney due to the induced stress in the 2nd group, while the values of GSH d significantly ($P \leq 0.05$) in both liver and kidney at 5th, 7th, 9th and 11th week (fi and 2C, respectively). The effect of curcumin on this change due to induced s very clear and prominent during all the time of experiment (at the 5th, 7th, 9 11th week) in both kidney and liver (figure 1C and 2C).

4. Effect of curcumin on total protein, albumin, creatinine and urea levels

A non significant changes due to sham stress (2nd group) or due to curc group) on total protein, albumin, creatinine and urea was observed (3A, 3E 3D, respectively).

5. Effect of curcumin on some hematological parameters

Sham stress (2nd group) significantly ($P \leq 0.05$) decreased the value leukocytic count , packed cell volume (PCV) and hemoglobin content thro experiment as shown in figures 4B, 4C and 4D, respectively. Oral adminis curcumin to the stressed group (4th group) significantly ($P < 0.05$) allev changes caused due to stress and returned these changes to normal values B, C and D).

Discussion

In our experiment, we used group of rats administered orally with without induction stress (3rd group) to confirm that all the significant changes in the 2nd group were due to stress induced by intraperitoneal puncture and t any other cause.

Malondialdehyde (MDA) is the most abundant product of lipid pe (Chaudhary et al., 1994). The statistical analysis in the present study sh there was a significant increase in the level of (MDA) in liver and kidney tiss 2nd group as shown in figure 1A and figure 2A due to exposure of the animal stress. This increase in the level of malondialdehyde is due to ability of sham generate (ROS) which leads to oxidative damage in several tissues by incre peroxidation. This result is in agreement with (Halliwell and Gutteridag Curcumin is a potent anti-oxidant was shown to protect experimental animal lipid peroxidation (Sreejayan and Rao, 1997; Dinkova-Kostova and Talalay, the present study, the curcumin significantly ($P \leq 0.05$) decreased the mean the MDA in the liver and kidney tissues in sham stressed rats (the 4th grou results come in accordance with the results of Reddy and Lokesh (1994) ; p (2000) and Reyes-Gordillo et al., (2007). This decrease of MDA attrib explained by enhancing the activities of antioxidant enzymes (Reddy an 1994; Mohanty et al., 2004), and inhibiting the generation of ROS (Somasu al., 2002).

In the same manner, Soudamini et al., (1992); Unnikrishnan and Rao (Sreejayan and Rao (1994) attributed the antioxidant mechanism of curcur neutralizing effect of free radicals and decreasing the O_2 and made it less av oxidation and also may attributed the potent inhibitant effect of curcumin to c lipo-oxygenase and cyclo-oxygenase in arachidonic acid during the metaboli acids (Huang et al., 1997) on opposite side Reyes-Gordillo et al., (2007) att antioxidant effect of curcumin to inhibiting NF- (tumor necrosis factor-alpha activation and thus production of proinflammatory cytokines.

Superoxide dismutase (SOD) acts on Superoxide radical and con hydrogen peroxide radical. SOD activity produces H_2O_2 which is a toxic p performing reactive hydroxyl radical with iron and hydrochlorus acid (HOC (Lunec, 1990). Statistically, there was a significant ($P \leq 0.05$) increase in S in both liver and kidney tissues in sham stress group (2nd group) when co control group (1st group) (Figures 1B and 2B, respectively). This increase

returned to its normal activity after oral administration of curcumin to stresse (4th group). These results may be due to an increase in lipid peroxidati consequently increase free radicals production. These results were in accorda that showed by Goel et al., (2005). They attributed this increase to the oxidativ which leads to an increase in SOD activity to compensate this stress.

Reduced glutathione (GSH) is a pool for three important metabolic path enters as cofactor for glutathione-S-transferase (GST) during the proc detoxification. and it is considered as a substrate for the γ-glutamyl transferase. as it plays an important role as free radical scavenger like antioxidant e (Meister, 1994; Anderson, 1997). In the present study, the statistical analysis r that sham stress significantly ($P \leq 0.05$) decreased the level of reduced glu (GSH) in both liver and kidney tissues in comparison to the control group (fig and 2C, respectively). After oral administration of curcumin to the sham stresse 4^{th} group, we found that curcumin overcomed the effect of stress cau intraperitoneal puncture. These results may be due to lowering peroxida maintaining the activities of antioxidant enzymes at higher levels. Our data accordance with that exhibited by Reddy and Lokesh, (1994) or by increasing of glutathione to prevent the decrease that takes place during the process of a (Jaruga et al., 1998; Yu et al., 2006).

In this study, there was a significant ($P \leq 0.05$) decrease in total leukocy and hemoglobin concentration in sham stress group (2^{nd} group) when compa control group (1^{st} group) (figures 4B, 4C and 4D, respectively. After oral admir of curcumin to the sham stressed rats in 4^{th} group, the results revealed that c overcomed the effect of stress caused by intraperitoneal puncture. These resu agreement with Littarru et al., (1994); Tesoriere et al., (2001); Jaja et al., (2005 results maybe attributed to the oxidative stress caused by intraperitoneal punctu We can concluded that, curcumin, appears to play important roles a antioxidant, anti-inflammatory agent and has non toxic or harmful effects whe to the food in a recommended dose and therefore we recommend adding of c to the diet of animals or peoples those exposed to different conditions of stress ameliorates and alleviates the changes caused due to stress. Further researc required to elucidate the exact actions of curcumin and any further role tha have.

References

Ames, B.N., Shigenaga, M.K., Hagen, T.M. (1993). Oxidants, antioxidants, degenerative diseases of aging. Proc. Natl. Acad. Sci. U S A. 90 (1 7922.

Anderson, M.E. (1997). Glutathione and glutathione delivery compour Pharmacol. 38: 65-78.

Boveris, A., Chance, B. (1973). The mitochondrial generation of hydrogen General properties and effect of hyperbaric oxygen. Biochem. J. 134 716.

Chaudhary, A.K., Nokubo, M., Marnett, L.J., Blair, I.A. (1994). Analysis malondialdehyde-2'-deoxyguanosine adduct in rat liver DNA b chromatography/electron capture negative chemical ionization spectrometry. Biol. Mass. Spectrom. 23 (8): 457-464.

Cheng, A.L., Hsu, C.H., Lin, J.K., Hsu, M.M., Ho, Y.F., Shen, T.S., Ko, J.Y., L Lin, B.R., Ming-Shiang, W., Yu, H.S., Jee, S.H., Chen, G.S., Chen, T.M C.A., Lai, M.K., Pu, Y.S., Pan, M.H., Wang, Y.J., Tsai, C.C., Hsieh, C.Y. Phase I clinical trial of curcumin, a chemopreventive agent, in patients w risk or pre-malignant lesions. Anticancer Res. 21 (4B): 2895-2900.

Combs, G.F., Levander, O.A., Spallholz, J.E., Oldfield, J.E. (1987). Text Biology and Medicine. Part B,Van hostrand Company, New York: 572.

Dinkova-Kostova, A.T., Talalay, P. (1999). Relation of structure of curcumin an their potencies as inducers of Phase 2 detoxification enzymes. Carcino 20 (5): 911-914.

Feldman, B.F., Zink, J.G., Jain, N.C. (2000). Schalm's Veterinary Hematolo Edition.

Giannopolitis, C.N., Ries, S.K. (1977). Superoxide Dismutases: I. Occurrence in Plants. Plant Physiol. 59 (2): 309-314.

Goel, A., Dani, V., Dhawan, D.K. (2005). Protective effects of zinc on lipid perox antioxidant enzymes and hepatic histoarchitecture in chlorpyrifos-toxicity. Chem. Biol. Interact. 156 (2-3): 131-140.

Gutteridge, J.M. (1993). Free radicals in disease processes: a compilation o and consequence. Free Radic. Res. Commun. 19 (3): 141-158.

Halliwell, B., Gutteridage, J. M. (1989). Free radical biology and medicine, Japan Scientific Society Press, Tokyo, Japan, 67-80.

Huang, M.T., Ma, W., Yen, P., Xie, J.G., Han, J., Frenkel, K., Grunberger, D., (A.H. (1997). Inhibitory effects of topical application of low doses of curcu 12-O-tetradecanoylphorbol-13-acetate-induced tumor promotion and DNA bases in mouse epidermis. Carcinogenesis 18 (1): 83-88.

Inoue, T., Mu, Z., Sumikawa, K., Adachi, K., Okochi, T. (1993). Effect of exercise on the content of 8-hydroxydeoxyguanosine in nuclear DNA p from human lymphocytes. Jpn. J. Cancer Res. 84 (7): 720-725.

Jackson, M. (2000). in Handbook of Oxidants and Antioxidants in Exercise, ed C. K., Packer, L. & Hännier, O. (Elsevier, Amsterdam), pp. 57-68.

Jaja, S.I., Aigbe, P.E., Gbenebitse, S., Temiye, E.O. (2005). Changes in eryth following supplementation with alpha-tocopherol in children suffering fro cell anaemia. Niger Postgrad. Med. J. 12 (2): 110-114.

Jaruga, E., Salvioli, S., Dobrucki, J., Chrul, S., Bandorowicz-Pikula, J., Sik Franceschi, C., Cossarizza, A., Bartosz, G. (1998). Apoptosis-like, re changes in plasma membrane asymmetry and permeability, and t modifications in mitochondrial membrane potential induced by curcumi thymocytes. FEBS Lett. 433 (3): 287-293.

Ji, L.L. (1995). Oxidative stress during exercise: implication of antioxidant n Free Radic. Biol. Med. 18 (6): 1079-1086.

Jones, D.A., Newham, D.J., Round, J.M., Tolfree, S.E. (1986). Experimental muscle damage: morphological changes in relation to other indices of c J. Physiol. 375: 435-448.

Kalpana, C., Menon, V.P. (2004). Curcumin ameliorates oxidative stres nicotine-induced lung toxicity in Wistar rats. Ital. J. Biochem. 53 (2): 82-8
Littarru, G.P., Battino, M., Tomasetti, M., Mordente, A., Santini, S., Oradei, A A., Ghirlanda, G. (1994). Metabolic implications of coenzyme Q10 in cells and plasma lipoproteins. Mol. Aspects Med. 15 Suppl: 67-72.
Lunec, J. (1990). Free radicals: their involvement in disease processes. Biochem. 27: 173-182.
Meister, A. (1994). Glutathione, ascorbate, and cellular protection. Cancer (Suppl 7): 1969-1975.
Meydani, M., Evans, W.J., Handelman, G., Biddle, L., Fielding, R.A., Meyc Burrill, J., Fiatarone, M.A., Blumberg, J.B., Cannon, J.G. (1993). Protec of vitamin E on exercise-induced oxidative damage in young and olc Am. J. Physiol. 264: 992-998.
Motycka, V., Grofová, Z., Havlíek, K., Siller, J., Fortová, M., Linda, B. (20 thoracic injury and the oxidative stress. Rozhl Chir 85 (8): 404-407.
Mohanty, I., Singh Arya, D., Dinda, A., Joshi, S., Talwar, K.K., Gupta, S. Protective effects of Curcuma longa on ischemia-reperfusion induced r injuries and their mechanisms. Life Sci. 75 (14): 1701-1711.
Ohta, Y., Chiba, S., Tada, M., Imai, Y., Kitagawa, A. (2007). Development o stress and cell damage in the liver of rats with water-immersion restra Redox Rep. 12 (3): 139-147.
Park, E.J., Jeon, C.H., Ko, G., Kim, J., Sohn, D.H. (2000). Protective effect o in rat liver injury induced by carbon tetrachloride. J. Pharm. Pharmac 437-440.
Patton, ., Chanari, I. (1989). Text book of laboratory haematology: An A laboratory Techniques Churchill living stone, New York, 107-109.
Reddy, A.C., Lokesh, B.R. (1994). Studies on the inhibitory effects of cur eugenol on the formation of reactive oxygen species and the oxidation iron. Mol. Cell Biochem. 137 (1): 1-8.
Reyes-Gordillo, K., Segovia, J., Shibayama, M., Vergara, P., Moreno, M.G. (2007). Curcumin protects against acute liver damage in the rat by inh kappaB, proinflammatory cytokines production and oxidative stress Biophys. Acta. 1770 (6): 989-996.
Sahin, E., Gümüşlü, S. (2007). Immobilization stress in rat tissues: alt protein oxidation, lipid peroxidation and antioxidant defense syste Biochem. Physiol. C Toxicol. Pharmacol. 144 (4): 342-347.
Saxton, J.M., Donnely, A.E., Roper, H.P. (1994). Indices of free-radica damage following maximum voluntary eccentric and concentric mus Eur. J. Appl. Physiol. Occup. Physiol. 68 (3): 189-193.
Sen, C.K. (1995). Oxidants and antioxidants in exercise. J. Appl. Physiol. 686.
Shi, Y., Niculescu, R., Wang, D., Patel, S., Davenpeck, K.L., Zalewski, Increased NAD (P) H oxidase and reactive oxygen species in coron after balloon injury. Arterioscler. Thromb. Vasc. Biol. 21 (5): 739-745.
Sjödin, B., Hellsten Westing, Y., Apple, F.S. (1990). Biochemical mech oxygen free radical formation during exercise. Sports Med. 10 (4): 236
Snedecor, G.W., Cochran, W.G. (1980). Statistical methods. 7th ed., Ames university prerss.

Somasundaram, S., Edmund, N.A., Moore, D.T., Small, G.W., Shi, Y.Y., Orlows (2002). Dietary curcumin inhibits chemotherapy-induced apoptosis in m human breast cancer. Cancer Res. 62 (13): 3868-3875.

Soudamini, K.K., Unnikrishnan, M.C., Soni, K.B., Kuttan, R. (1992). Inhibition peroxidation and cholesterol levels in mice by curcumin. Indian J. Pharmacol. 36 (4): 239-243.

Sreejayan, R., Rao, M.N. (1994). Curcuminoids as potent inhibitors peroxidation. J. Pharm. Pharmacol. 46 (12): 1013-1016.

Sreejayan, R., Rao, M.N. (1997). Nitric oxide scavenging by curcuminoides. J. Pharmacol. 49 (1): 105-107.

Tesoriere, L., D'Arpa, D., Butera, D., Allegra, M., Renda, D., Maggio, A., Bo A., Livrea, M.A. (2001). Oral supplements of vitamin E improve meas oxidative stress in plasma and reduce oxidative damage to LDL and eryth in beta-thalassemia intermedia patients. Free Radic Res. 34 (5): 529-540.

Unnikrishnan, M.K., Rao, M.N. (1992). Curcumin inhibits nitrite-methemoglobin formation. FEBS Lett. 301 (2): 195-196.

Yashkochi, Y., Masters, B.S. (1979). Some properties of detergent solubilized N cytochromic (cytochrome P450) reductase purified by biospecific chromatography. J. Biol. Chem. 251 (17): 5337-5344.

Young , D.S. (2001). Effects of drugs on clinical lab. Tests. 4th ed. AACC.

Yu, F., Lu, S., Yu, F., Feng, S., McGuire, P.M., Li, R., Wang, R. (2006). Pr effects of polysaccharide from Euphorbia kansui (Euphorbiaceae) swimming exercise-induced oxidative stress in mice. Can. J. Physiol. Pha 84 (10): 1071-1079.

Zeybek, A., Ercan, F., Cetinel, S., Cikler, E., Saglam, B., Sener, G. (2007). Pr effects of aqueous garlic extract in reducing water avoidance stress-degeneration of the stomach, ileum, and liver: morphological and bioc study. Dig. Dis. Sci. 52 (11): 2984-2992.

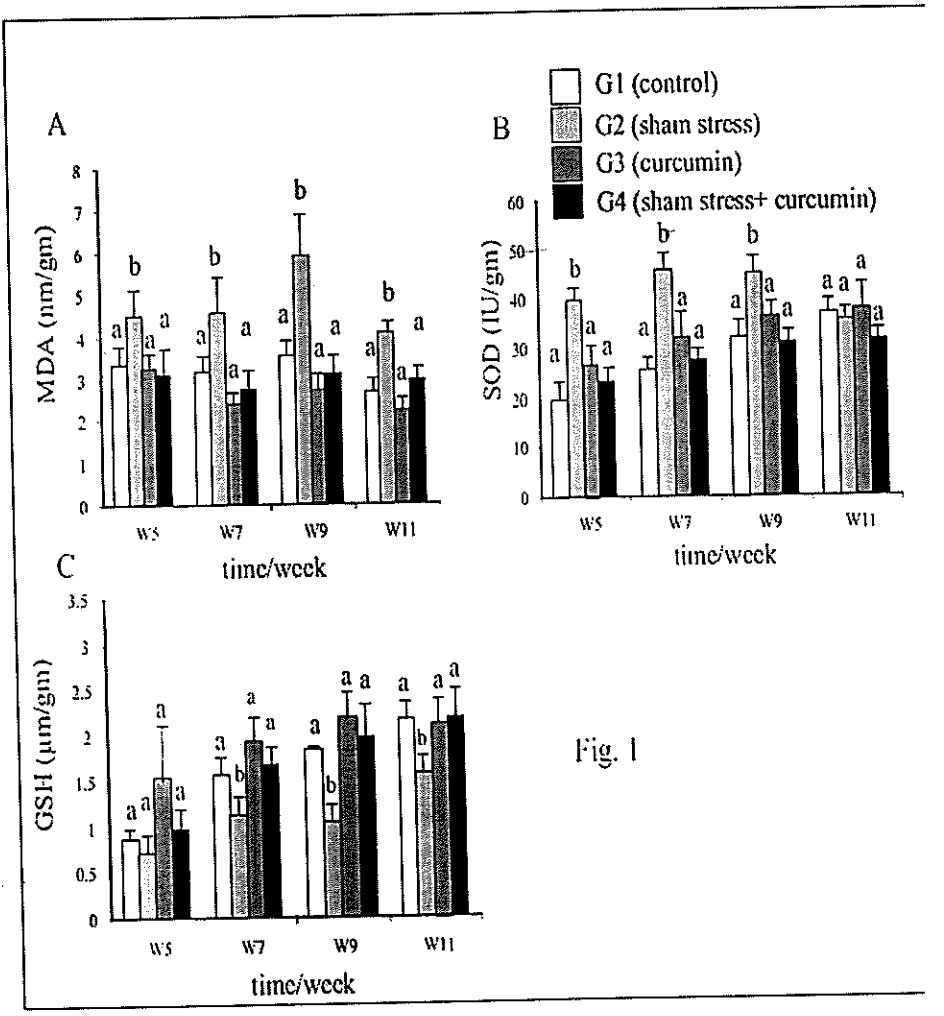

Fig. 1

Figure 1. Effect of curcumin on the level of MDA, SOD and GSH in rat liv G1 (1st group or control group), G2 (2nd group or sham stress group) group that received oral administration of curcumin in a dose of 80 mg weight from the 3rd week till the end of the experiment), G4 (4th group the rats subjected to false intraperitoneal puncture and the curcu administered orally with the same dose mentioned in the 3rd group). and vertical line represents the mean ± SEM (n = 5). Bars with differ from control group (G1) are significantly different; $P \leq 0.05$.

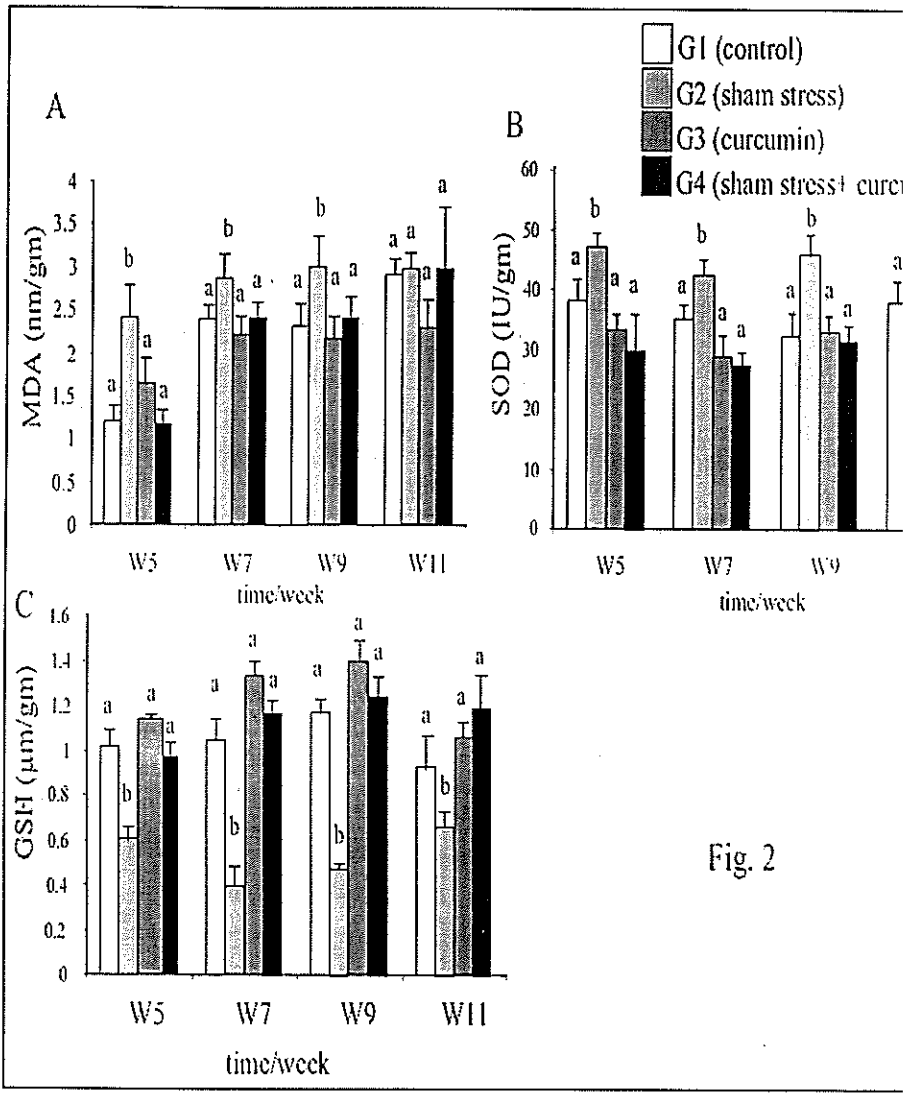

Fig. 2

Figure 2. Effect of curcumin on the level of MDA, SOD and GSH in ra tissue. G1 (1st group or control group), G2 (2nd group or sham stress gr (3rd group that received oral administration of curcumin in a dose of 8 body weight from the 3rd week till the end of the experiment), G4 (4th which the rats subjected to false intraperitoneal puncture and the curcu administered orally with the same dose mentioned in the 3rd group). and vertical line represents the mean ± SEM (*n* = 5). Bars with differ from control group (G1) are significantly different; *P* ≤ *0.05*.

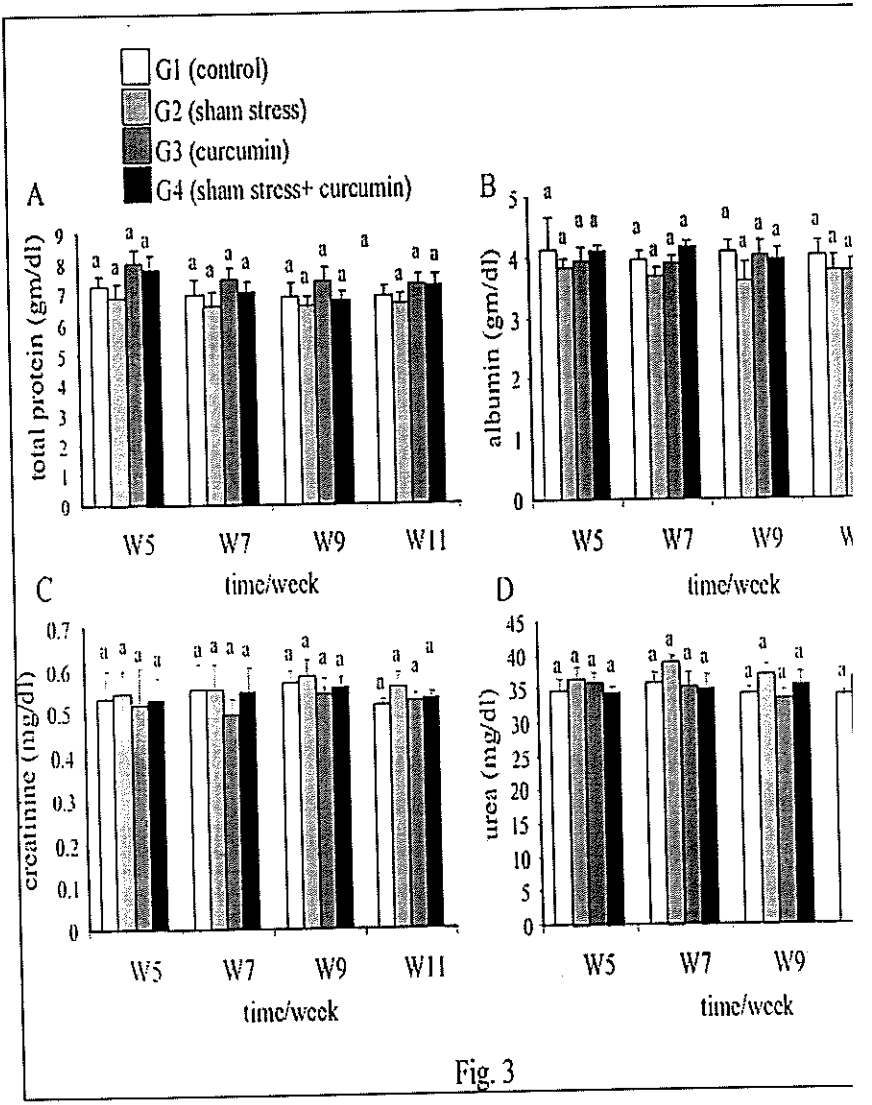

Fig. 3

Figure 3. Effect of curcumin on the level of total protein, albumin, crea urea in rat sera. G1 (1st group or control group), G2 (2nd group or sh group), G3 (3rd group that received oral administration of curcumin in 80 mg/kg body weight from the 3rd week till the end of the experime group in which the rats subjected to false intraperitoneal punctu curcumin was administered orally with the same dose mentioned group). Each bar and vertical line represents the mean ± SEM (n = 5) different letter from control group (G1) are significantly different; $P \leq 0$

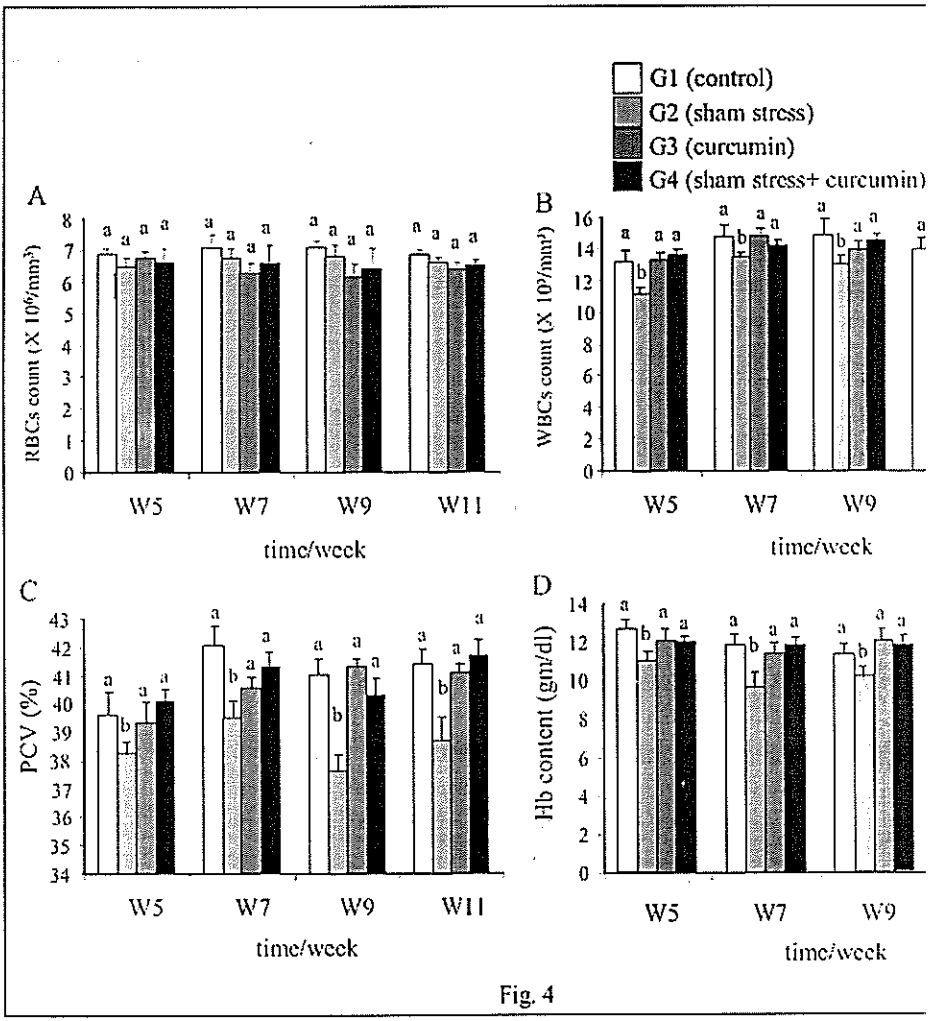

Fig. 4

Figure 4. Effect of curcumin on RBCs count, total leukocytic count count), packed cell volume (PCV) and hemoglobin concentration in rat. group or control group), G2 (2nd group or sham stress group), G3 (3rd gro received oral administration of curcumin in a dose of 80 mg/kg body weig the 3rd week till the end of the experiment), G4 (4th group in which t subjected to false intraperitoneal puncture and the curcumin was admin orally with the same dose mentioned in the 3rd group). Each bar and verti represents the mean ± SEM (n = 5). Bars with different letter from contro (G1) are significantly different; $P \leq 0.05$.

ى العربى

الوقائية للكوركومين ضد الاجهاد المستحث فى فئران الالبينو.

الكرداسى*.سعد محمد شوشه**.اسامه عبدالعزيز***.

اء الحيوية وكيمياء التغذية-كليه الطب البيطرى- جامعة المنوفيه بالسادات ** قسم الفسيولوجيا- كليه الطب
عة بنها. ***قسم الطب الشرعى والسموم-كليه الطب-جامعة المنيا.

ستبرنبات الكركومين من النباتات التى تمتلك خصائص دوائيه كثيرة .حيث يمنع تا ثير انزيم
سجينيز ولذلك فله خاصيه كمضاد للالتهاب. كما اثبتت الابحاث العلمية المختلفه ان
تاثيرات مضادة لنمو الخلايا السرطانية.وقد اجريت هذه الدراسه لدراسة بعض التاثيرات
وركومين فى الفئران المعرضة للاجهاد المستحدث صناعيا . ولمعرفة هذه التاثيرات تم
أر من النوع الالبينو يتراوح وزنها من ١١٠-الى١٣٠ جرام .قسمت الى اربع مجموعات
ة اشتملت على ٢٠ فأر .الاولى G1) وهى المجموعة الضابطة والمجموعة الثانية ((G2)
ت هذه المجموعة للوخذ البريتونى(Sham stress).وتم تجريع المجموعة الثالثة (G3)
ن عن طريق الفم (٨٠ ملجرام/كجم) من وزن الحيوان.والمجموعة الرابعة(G4) تم
لاجهاد وكذلك تم تجريعها الكوركومين بالجرعة السابقة. بعد ذلك تم تجميع عينات بعد
اسبوع بالترتيب من الكبد والكلى لقياس مستوى المالوندالديهيد والجلوتاثيون المختزل
ط انزيم السوبراوكسيد ديسميوتيز. كما تم تجميع عينات الدم وتم فصل البلازما لقياس
ى والالبيومين واليوريا والكرياتينين.ايضا تم عد كل من كرات الدم الحمراء والبيضاء
ات المضغوطة والهيموجلوبين. وقد اوضحت النتائج ان هناك زيادة معنوية فى كل من
وندالديهيد ونشاط السوبراوكسيد ديسميوتيز ونقص معنوى فى مستوى كل من الجلوتاثيون
كرات الدم الحمراء وحجم الكريات المضغوطة والهيموجلوبين. كما اوضحت ايضا عدم
فى مستوى البروتين الكلى والألبيومين والكرياتينين. ومن هذه النتائج يتضح لنا ان اضافة
ادى الى علاج الاثار السلبيه الناشئة من الاجهاد عن طريق الوخذ البريتونى.