ISSN 1110-5089

Zagazig J. Pharm. Sci., December 2002
Vol.11, No. 2, pp. 1-6

THE PROTECTIVE EFFECT OF EVENING PRIMROSE OIL AGAINST OXIDATIVE STRESS INDUCED BY ENDOTOXIN IN RATS

Atef S. El-Gharbawy

Department of Pharmacology and Toxicology, Faculty of Pharmacy, Zagazig University, Zagazig, Egypt

ABSTRACT

Gram-negative bacteria have a wall surfaced with endotoxin, a lipopolysaccharide (LPS), which is released during bacterial lysis. Endotoxin is extremely active biologically, can lead to the release of free radicals, which cause tissue damage e.g. multiple organ failure. The aim of the present study was to investigate the effects of evening primrose oil on LPS-induced multiple organ failure and related mechanisms.

A group of male rats received lipopolysaccharide (LPS) (20 mg/kg, intraperitoneally). A second group was treated with evening primrose oil (EPO) (8 ml/kg, p.o.,daily) for four weeks followed by administration of LPS (20 mg/kg, intraperitoneally). A third group received EPO (8ml/kg, orally) for four weeks followed by intraperitoneal injection of saline. A fourth group received saline intraperitoneally and served as control.

Serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), total bilirubin (T.bil), blood urea nitrogen (BUN) and creatinine were determined. Plasma lipid peroxidation (LPO) was analyzed using commercial kit. Nitric oxide (NO) production was estimated by Griess reaction. Liver and kidney glutathione contents (GSH) were determined.

Lipopolysaccharide administration induced a significant increase in serum ALT, AST, BUN, T.bil., and creatinine levels. In addition, it induced a significant increase in plasma lipid peroxidation and nitric oxide. While, glutathione contents of liver and kidney were significantly reduced as a result of LPS administration. Pretreatment of rats with evening primrose oil attenuated LPS- induced hepatic and renal damage . Moreover, evening primrose oil significantly decreased LPS-induced plasma lipid peroxidation and significantly increased kidney and liver GSH contents compared to LPS alone –treated rats. On the other hand, evening primrose oil had no significant effect on LPS-induced nitric oxide production. Treatment of rats with EPO for four weeks had no significant effect on any of measured parameters.

In conclusion, data indicated that evening primrose oil attenuated LPS-induced multiple organ failure at least in part through its antioxidant effect.

INTRODUCTION

During The management of septicemia and septic shock, resulting from severe bacterial infections, the systemic inflammatory response syndrome and ensuing multiple organ failure are major clinical complications[1]. Lipopolysaccharide (LPS) is a component of Gram-negative bacterial cell wall that triggers severe pathological alterations, such as systemic inflammation, hypotension, cardiac dys-function, multiple organ failure and death[2,3]. Lipopolysaccharide trigger oxidative stress through the increased synthesis of reactive oxygen species, such as superoxide radical, in the lung[4,5], liver[6], and kidney[7,8]. Lipopolysaccharide causes a release of several cytokines (such as tumor necrosis factor-alpha (TNF-α), interleukin and interferon-gamm (INFγ))[9,10,11].

Gamma-Linolenic acid (GLA) has a prophylactic role in treating various chronic disease states. This strategy is based on the ability of GLA to modify cellular lipid composition and eicosanoid (cyclooxygenase and lipoxygenase) biosynthesis[12]. Gamma-linolenic acid is found in relatively high abundance in plant seed oil of evening primrose[13]. Gamma linolenic acid in the form of evening primrose oil (EPO) induced a significant decrease in plasma triglycerides, total and LDLc . and a rise in HDLc in hyperlipidemic men[14].Moreover, evening primrose oil was reported to have a useful antioxidant defense in hyperlipidemic rabbits[15]. Gamma-linolenic acid modulates the level of serum interferon-gamma (INFγ), and tumor necrosis factor-alpha (TNF-α), which may be a worthwhile line of treatment in certain diseases[16].

Multiple organ failure , defined as a syndrome consisting of the sequential failure of two or more organ system, is common in patients suffering from lipopolysacchride-caused sepsis[17]. It is thought that oxidative stress resulting from lipopolysaccharide is the cause in multiple organ failure in septic patients[18] and rat[19]. The aims of the present study were to investigate the effects of evening primrose oil on lipopolysaccharide-induced multiple organ failure and the possible mechanisms involved.

MATERIAL AND METHODS

Material

Lipopolysaccharide (serotype 055:B5) was obtained from Sigma Chemical, USA. Evening primrose oil was obtained from San Mark (China). Glutathione reductase, 5,5dithiobis-(-nitrobenzoic acid) (DTNB), GSH, and NADPH were obtained from Sigma Chemicals (USA).

Animals

Male Wister rats, weighing 150-200 gm, were used. Rats were housed in room with air conditioning (23±2° C). They were allowed free access to water and pelleted rodent diet. Rats were deprived of food but allowed free access to water for 24 hours before the experiments. Rats were injected intraperitoneally with 20 mg/kg LPS dissolved in saline. Serum liver enzyme activity, kidney function tests ,serum nitric oxide (NO), liver and kidney glutathione (GSH) and plasma lipid peroxidation (LPO) concentrations were analyzed 6 hours after lipopolysaccharide or saline injection.

To evaluate the protective effect agaist lipopoly-sacchride–induced organ damage, a second group of

Scanned with CamScanner

rats were treated with evening primrose oil (8 ml /kg orally) daily for four weeks before lipopolysaccharide administration. A third group received evening primrose oil (8 ml/kg, orally) for four weeks followed by intraperitoneal injection of saline. The last group of rats received saline intraperitoneally and served as control.

Blood Collection

Rat blood samples were collected from orbit sinus of the eye using capillary tubes. Blood was drawn into serum separation tubes and was allowed to clot for 30 min at 37°C followed by centrifugation (3000 rpm for 15 min). Another volume of blood was collected in tubes containing EDTA followed by centrifugation.

Blood biochemistry

Hepatic dysfunction and failure were assessed by measuring the increase in serum levels of alanine aminotransferase, aspartate aminotransferase and total bilirubin[20].

Renal dysfunction and failure were assessed by measuring the increase in serum levels of blood urea nitrogen (BUN) and creatinine[21].

All the previously mentioned indicators were measured by using Synchron® systems, blood biochemical analyzer (Beckman Coulter, UK).

Measurement of plasma lipid peroxidation (LPO)

Blood samples were collected in tubes containing EDTA as anticoagulant. Centrifuge blood at 2500 × g at 4°C for 5 minutes. 200 μL of plasma supernatant was used for LPO measurement by using LPO assay kit (Oxford Biomedical Research, USA).

Determination of plasma nitrite

Serum nitrite was determined by using Griess reagent, according to the method of Moshage et al.,[22]

Determination of total GSH

Tissues were homogenized and deproteinized in buffer containing sodium dihydrogen phosphate (125 mM), EDTA (6.3 mM), and sulfosalicylic acid (5%) in a 1 : 5 ratio (wet weight to volume). Total GSH was determined according to Zhang et al.,[23].

Data analysis

Data are reported as mean ± standard error of mean (SEM) . All data were analyzed by the Student's t- test [24]. Differences were regarded significant at P< 0.05 level of significance.

RESULTS

1- Effect of evening primrose oil (EPO) on lipopolysaccharide (LPS)- induced nephritic toxicity

A- Blood urea nitrogen (BUN)

As shown in figure (1), six hours following LPS administration, BUN concentration significantly increased from 3.45±0.2 mmol/L in control group to 9.48 ± 0.53 mmol/L in LPS- treated group (P<0.05) . The value for EPO+ LPS-treated group , was 5.68 ±0.39 mmol/L (P<0.05 compared with control group). The value for EPO- treated group (3.23 ± 0.23 mmol/L) was none significantly different from control group.

B- Serum creatinine

Lipopolysaccharide treatment resulted in a significant increase in serum creatinine level from 30.5 ±2.8 μmol/L in control group to 72 ± 5.46 μmol/L in LPS- treated group (P<0.05). Pretreatment with EPO, induced a significant decrease in serum creatinine level from 72 ± 5.46 μmol/L in LPS- treated group to 49.6 ± 4.18 μmol/L in EPO+ LPS- treated group (P<0.05). The results are illustrated in Fig. (1).

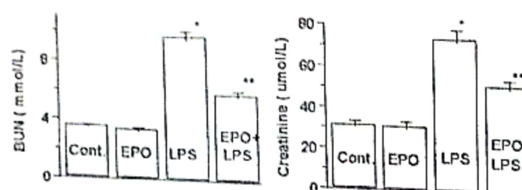

Fig. 1. The Effect of evening primrose oil (EPO) on serum blood urea nitrogen (BUN) and creatinine of normal and lipopolysaccharide (LPS)-treated rats. Rats received EPO (8 ml/kg orally) for four weeks before LPS (20 mg/kg intraperitoneally) administration. Data are presented as mean ± SEM (n=5-6).
* P< 0.05 compared with control group.
** P< 0.05 compared with other groups.

2- Effect of EPO on LPS-induced hepatic toxicity in rats.

The results obtained on the hepatoprotective effect of EPO on LPS-induced hepatic damage in rats are shown in Fig.(2) . Six hours following LPS treatment, ALT was significantly increased from 32.3±2.5 U/L in control group to 101.3 ± 7.13 U/L in LPS- treated group (P<0.05). The value of EPO+ LPS treated group was 56.7 ± 6.6 U/L and was significantly less than LPS- treated group (P<0.05). Moreover, LPS induced a significant increase in AST from 20.0 ± 2.033 U/L in control group to 88.0 ± 7.57 U/L in LPS- treated group. Pretreatment of rats with EPO, caused a significant decrease of AST from 88.0 ± 7.57 U/L in LPS- treated group to 47.5 ± 4.68 U/L in EPO+LPS- treated group (P<0.05).

Concerning the effect of LPS on total bilirubin, LPS induced a significant increase of total bilirubin from 5.8± 1.4 μmol/L in control group to 24.2 ± 2.9 μmol/L in LPS- treated group (P<0.05). While, pretreatment of rats with EPO, caused a significant decrease of total bilirubin from 24.2 ± 2.9 μmol/L in LPS- treated group to 14.5 ± 0.5 μmol/L in EPO+ LPS treated group (P<0.05). On the other hand , treatment of rats with EPO for four weeks had no significant effect on ALT, AST and total bilirubin as shown in Fig.(2)

Scanned with CamScanner

Zagazig J. Pharm. Sci., December 2002
Vol.11, No. 2, pp. 1-6

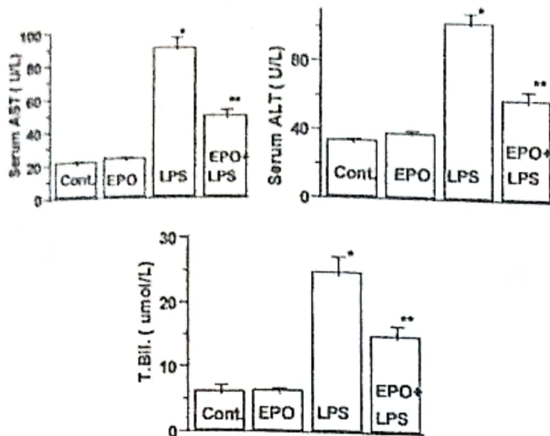

Fig. 2. The Effect of evening primrose oil (EPO) on serum alanine aminotransferase (ALT), aspatate aminotransferase (AST) and total bilirubin (T.Bil.)of normal and lipopolysaccharide (LPS)-treated rats. Rats received EPO (8 ml/kg orally) for four weeks before LPS (20 mg/kg intraperitoneally) administration. Data are presented as mean ± SEM (n=5-6).
* P< 0.05 compared with control group.
** P< 0.05 compared with all other groups.

3- Effect of EPO and/or LPS on plasma lipid peroxidation.

As shown in Fig. (3), the basal level of lipid peroxidation product in serum was 4.408 ± 0.39 µmol. In LPS- treated group, the level was significantly increased from the basal level to 13.68 ± 0.47µmol (P<0.05). EPO+LPS-treatment significantly reduced this level to 9.07 ± 0.4 µmol (P<0.05 compared with LPS treated group). On the other hand, administration of EPO alone for 4 weeks had no significant effect on serum lipid peroxidation in saline treated group.

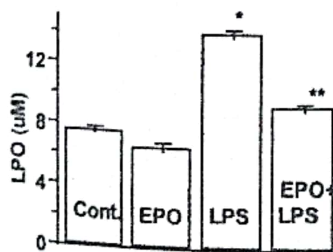

Fig. 3. The Effect of evening primrose oil (EPO) on serum lipid peroxidation products of normal and lipopolysaccharide (LPS)-treated rats. Rats received EPO (8 ml/kg orally) for four weeks before LPS (20 mg/kg intraperitoneally) administration. Data are presented as mean ± SEM (n=4).
* P< 0.05 compared with control group.
** P< 0.05 compared with LPS group.

4- Effect of EPO and/or LPS on kidney total glutathione (GSH) content.

As illustrated in Fig. (4a), LPS treatment induced a significant decrease of kidney glutathione content from 2.7 ±0.25 nmol/mg wet weight in control group to 1.4 ± 0.13 nmol/mg wet weight in LPS- treated group (P<0.05) . In EPO+ LPS- treated group the level was significantly increased to 2.1 ± 0.3 nmol/gm wet weight (P<0.05 compared with LPS treated group).

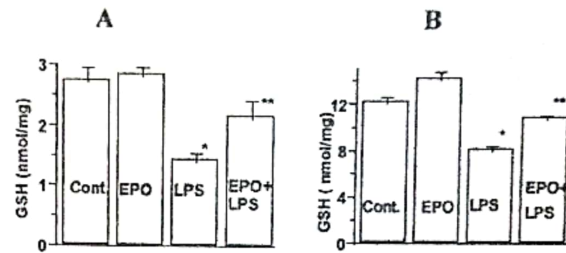

Fig. 4. Effect of evening primrose oil (EPO) on GSH concentration in the kidney (A) and Liver (B) of normal and lipopolysaccharide (LPS)-treated rats. Rats received EPO (8 ml/kg orally) for 4 weeks before LPS (20 mg/kg intraperitoneally) administration . Data are presented as mean ± SEM (n= 5-6).
* P < 0.05 compared with control group.
** P< 0.05 compared with LPS group.

5- Effect of EPO and/or LPS on liver total glutathione (GSH) content

As shown in Fig 4 (b), the basal level of total glutathione in liver was 12.0 ± 0.54 nmol/mg wet weight. In LPS-treated group, the level was significantly deceased to 7.9 ± 0.39 nmol/mg wet weight (P<0.05). EPO+LPS treatment significantly increased this value to 10.6 ± 0.29 nmol/ mg wet weight (P<0.05 compared to LPS -treated group).

6- Effect of EPO and/LPS on serum nitric oxide (NO)

As demonstrated in Fig. 5, LPS induced a significant increase of serum nitric oxide from 9.9 ± 0.74 µmol in control rats to 137 ± 12.5 µ mol in LPS-treated rats. This value was not significantly affected by EPO treatment. Moreover, administration of EPO had no significant effect on serum nitric oxide level.

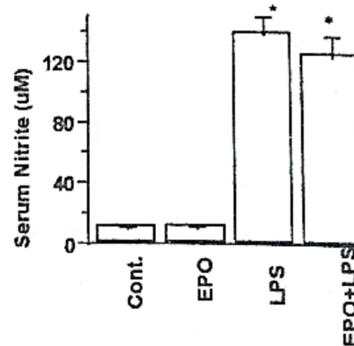

Fig. 5. The Effect of evening primrose oil (EPO) on serum nitric oxide (NO) concentration in normal and lipopolysaccharide (LPS)-treated rats. Rats received EPO (8 ml/kg orally) for four weeks before LPS (20 mg/kg intraperitoneally) administration. Data are presented as mean ± SEM (n=5-6).
* P< 0.05 compared with control group.

Scanned with CamScanner

DISCUSSION

Circulatory accumulation of lipopolysaccharides (LPS) in septicemia and septic shock causes multiple organ failure and death[3]. These conditions are associated with high mortality because therapy is mostly supportive[25]. Although various antioxidants have been applied as therapeutics for sepsis, the results of their efficacy are conflicting[26].

In the present study administration of LPS induced a significant increase in serum ALT, AST and total bilirubin . These results are in accordance with others who reported that LPS induced a significant increase in ALT, AST and bilirubin[27,28]. Moreover, LPS induced renal dysfunction and failure which is reflected by a significant increase in serum creatinine and blood urea nitrogen levels. The present study confirms the previous observations of Zhang et al.[23] and Hsu and Liu.[28] who mentioned that LPS induced a significant increase in blood urea nitrogen and serum creatinine levels in rats. From the forementioned results, it is noted that LPS induced multiple organ failure (MOF) as manifested by hepatic and renal dysfunction and failure. MOF, defined as a syndrome consisting of sequential failure of two or more organ systems, is common in patients suffering from LPS-caused sepsis[17].

The observed multiple organ failure in the present study can be attributed mainly to oxidative stress induced by LPS. This hypothesis is supported by the data of present study that show LPS induced significant increase in plasma lipid peroxidation and fall in liver and kidney GSH i.e. markers of oxidative injury. Therefore, the present results are in agreement with others who reported LPS induced a significant increase in plasma lipid peroxidation[28] and fall of liver and kidney GSH[23,27]. Moreover, LPS-induced oxidative stress has been implicated as a contributor to lung, liver and kidney injury[4,6,7,27].

GSH contributes a major defense against oxidative stress. The observed fall in kidney and liver GSH content in the present study after LPS treatment could be interpreted in a number of ways. LPS could cause efflux of intracellular GSH, as suggested by others[29,30]. 4-Hydroxynonal, a major product of membrane peroxidation can also react with GSH to yield inactive thioether derivatives[31].

The oxidative stress observed in the present study may be related to the increase in serum nitric oxide (NO) level. This increase in serum NO level is in accordance with findings of Zhang et al.,[23,27] and Hsu and Liu[28] who found that LPS causes a significant increase in serum NO levels in rats. Nitric oxide participate in the development of oxidative stress in a number of ways. The loss of single electron generates highly reactive nitrosyl cation (NO^+)[32]. In addition , the reaction of NO with superoxide generates $ONOO^-$. Both NO^+ and $ONOO^-$ are potent oxidants react with lipid, protein, DNA and are scavenged by GSH[32]. Generation of these reactive nitrogen species could also explain the loss of GSH and appearance of the markers of oxidative stress.

On the other hand , administration of evening primrose oil (EPO) prior to LPS administration suppressed significantly the increase in liver and kidney function tests compared to rats treated with LPS alone. Also, it is a induced a significant increase in liver and kidney GSH content and decrease plasma lipid peroxidation. This may be attributed to the ability of EPO to reduce oxidative stress by reinforcing the glutathione-dependent oxidant defense system and inhibition of lipid peroxidation[15].

Evening primrose oil is rich in linolenic acid (LA) and gamma linolenic acid (GLA)[33]. Gamma linolenic acid is rapidly elongated in vivo to dihomo-γ- linolenic acid (DGLA). DGLA can be further desaturated and converted to prostaglandin E1 (PGE1)[12]. In addition, other studies have reported that GLA supplementation in human[34,35] and rodents[36,37] selectively elevated the synthesis of prostaglandin E_1. Moreover, it has been reported that PGE_1 reduces LPS- induced liver injury[19] and E.Coli-induced liver injury[38]. In addition, Paller and Manivel[39] found that, prostaglandin E1 analogue, misoprostol, induced significant protection against ischemia-induced renal dysfunction in rats. They added that, this protective effect is not due to an antioxidant activity.

Moreover, systemic administration of bacterial endotoxin (LPS) causes the release of several cytokines (such as tumor necrosis factor (TNF)-α, Inter leukin-1 (IL-1) and interferon-α (INF-γ)[40,9,11]. These inflammatory molecules may contribute to organ injury and dysfunction[10]. Dirk and his coworkers[16] reported that EPO modulate the level of serum INF-γ and TNF-α. This may play at least role in EPO-associated organ protection in LPS-treated rats.

The present data showed that EPO significantly attenuated serum lipid peroxidation production , but nitric oxide production was unaffected. It is suggested that nitric oxide may not be involved in EPO-associated end-organ protection in LPS-treated rats. This finding is supported by Hsu and Lin[28] who observed that sesame oil, antioxidant, ameliorated multiple organ failure and mortality without effect on nitric oxide production

In summary, administration of LPS to rats induced oxidant stress and multiple organ failure . EPO helped to preserve liver and kidney GSH content and reduced plasma lipid peroxidation products. At the same time, EPO suppressed the deterioration of liver and kidney functions induced by LPS treatment. The study suggests that EPO ameliorated LPS-induced MOF, at least in part, through its antioxidant properties.

REFERENCES

1- Bone, R.C.; Balk, R.A.; Cerra, F.B.; Dellinger, R.B.; Fein,A.M.; Knaus, W.A.; Schein, R.M.H.; and Sibbald, W.J.; **Chest** 101:1644 (1992)

2- Bone, R.C.; **JAMA**:155(1995)

Scanned with CamScanner

3- Murray, M.J.: **Yale J. Biol. Med.** 71: 485 (1998)

4- Demling, R.H.; Lalonde, J.; Ryan, P.and Fox R.; **J.Appl. Physiol.** 60: 2094-2100 (1986)

5- Milligan, S.A.; Hoeffel, J.M.; Goldstein, I.M. and Flick, M.R.; **Am. Rev. Respir.Dis.** 137: 420 (1988)

6- Bautista, A.P. and Spitzer, J.J.; **Am. J. Physiol.** 259:G907-G912 (1990)

7- Zurovsky, Y. and Gispaan, I.; **Am.J. Kidney dis.** 25: 51-57 (1995)

8- Faas, M.M.; Schuiling, G.A.; Valkhof, N.; Baller, J.and Bakker, W.; **Kidney Blood Press Res.** 21: 432(1998)

9- Andersson, J.; Nagy, S.; Bjork, J.; Abrams, J.; Holm, S. and Andersson, U.; **Immunol. Rev.** 127: 69-96 (1992)

10- Nathan, C.; **J. Clin. Invest.** 100: 2417-2423 (1997)

11- Ruetten, H.; Thiemermann, C. and Vane, J.R.; **Br. J. Pharmacol.** 118: 198-204.(1996)

12- Fan, Y.-Y.; Chapkin, R.S.; **J. Nutr.** 128 : 1411-1414 (1998)

13- Lawson, L.D.; Hughes, B.G.; **Lipids** 23:313 (1988)

14- Guiveneau, M.; Meza, N.; Barrja, P.; and Roman, O.; **Prostaglandins Leukot. Essent. Fatty Acid.** 51: 311 (1994)

15- De La Cruz, J.P.; Quintero, L.; Galvez, J.; Villalobos, M. and Sanchez de la Cuesta.; **Science.** 65(5): 543-555 (1999)

16- Dirk, J.; van Aswegen, C.H. and du Plessis, D.J.; **Prostaglandins Leukot Essnt. Fatty Acids.** 59(4): 273-277 (1998)

17- Beau A.E.; **Arch. Surg.** 110:778-781 (1975)

18- Galley, H.F.; Davis, M.J.and Webster, N.R.; **Crit. Care Med.** 24: 1649-1653 (1996)

19- Ohira, H.; Suzuki, T.; Shishido, S.; Tojo, J.; Miyata, M.; Obara, K. and Kasukawa, R.; **Hepatol. Res.** 19(1): 74-84 (2001)

20- Hewett, J.A. and Roth, R.A.; **J. Pharmacol. Exp. Ther.** 272:53 (1995)

21- Thiemermann, C.; Rutten, H. Wu, C.C. and Vane, J.R.; **Br. J. Pharmacol.** 116:2845 (1995)

22- Moshage, H.; Hok, B.; Huizenga, J.R. and Jansen, P.L.M, **Clin. Chem.** 41: 892 (1995)

23- Zhang C.; Walker L.M. and Mayeux R.; **Biochem. Pharmacol.** 59:203-9 (2000a)

24- Snedecor, G.W. and Cochran, W. G.; Statistical Methods. The Lowa state University press. Ames, Lowa, USA. Pp.593 (1967)

25- Wenzel, R.P.; Pinsky, M.R.; Ulevitch, R.J.and Young, L.; **Clinical Infect. Dis.** 22: 407-413 (1996)

26- Minamiyama Y.; Takemura S. and Toyokuni S.; **J.Nutr. Sci. Viyaminol.** 44: 547-59 (1998)

27- Zhang C.; Walker L.M.; Hinson J. and Mayeux R.; **J. Pharmacol. Exp. Ther.** 293(3): 968-72 (2000b)

28- Hsu, D.Z.and Liu, M.Y.; **Crit. Care Med.**, 30(8): 1859 (2002)

29- Jaeschke, H. and Farhood, A.; **Am. J. Physiol.** 260: G355-G362 (1991)

30- Jaeschke, H.; **J. Physiol.** 263: G60-G68 (1992)

31- Esterbauer, H.; Schraur, R.J. and Zollner, H.; **Free Radic. Biol. Med.** 11: 81-128 (1991)

32- Stamler, J.S.; Singel, D.J. and Loscalzo, J.; **Science** (Wash. DC) . 258: 1898-1902 (1992)

33- Hudson, B.J.; **J. Am. Oil Chem. Soc.** 61(3): 540-543 (1984)

34- Zurier, R.B.; Rossetti, R.G.; Jacobson, E.W.; DeMarco, D.M.; Liu, N.Y.; Temming, J.E.; White, B.M. and Laposta, M.; **Arthritis Rheum.** 39: 1808-1817 (1996)

35- Johnson, M.M.; Swan, D.D.; Surette, M. E.; Stegner, J.; Chilton, T.; Fontech, A. and Chilton, F.H.; **J. Nutr.** 127: 1435-1444 (1997)

36- Fan, Y.-Y.; Chapkin, R.S.; **J. Nutr.** 122 : 1600-1606 (1992)

37- Fan, Y.-Y.; Ramos , K.S. and Chapkin, R.S.; **Arterioscler. Thromb. Vasc. Biol.** 15 : 1397-1403 (1995)

38- Mokuno, Y.; Takano, M.; Matsgushi, T.; Nishimura, H.; Washizu, J.; Naiki, Y.; Nimura, Y. and Yoshikat, Y.; **Hepatology.** 30 (6) : 1464-1472 (1999)

39- Paller, M.S. and Manivel, J.C.; **Kidney Int.** 42(6): 1345-1354 (1992)

40- Nathan, C.; **J. Clin. Invest.** 79 : 319-326 (1987)

Received: July 26, 2002
Accepted: Sept. 1, 2002

Scanned with CamScanner

التأثير الوقائي لزيت زهرة الربيع المسائية ضد الضغط التأكسدي الناتج عن التيمان الداخلي في الجرذان

عاطف سعد الغرباوي

كلية الصيدلة – جامعة الزقازيق

يحتوى الجدار الخلوي للبكتريا سالبة الجرام علي سموم داخلية المنشأ وهى السكريات المتعددة الدهنيه (LPS) ، التى تخرج أثناء تحلل البكتريا. السموم داخلية المنشأ تكون نشطة بيولوجيا ويمكن أن تؤدي إلي انطلاق الشوارد الحرة التي تسبب ضـرر للأنسـجة مـثل الفشل العضوي المتعدد. الهدف من الدراسة الحالية هو استقصاء تأثير زيت زهرة الربيع المسائية علي الفشل العضوي المتعدد الناتج عن إعطاء السكريات المتعددة الدهنيه وميكانيكية عملها.

أعطيت المجموعة الأولي السكريات المتعددة الدهنيه (LPS) (٢٠ مج/كج بالحقن في الغشاء البريتوني). تم معالجة المجموعـة الثانية بزيت زهرة الربيع المسائية (٨ مل/كج عن طريق الفم يوميا لمدة أربعة أسابيع) قبل إعطائها السكريات المتعددة الدهنيه (LPS) (٢٠ مج/كج بالحقن في الغشاء البريتوني). أما المجموعة الثالثة فقد عولجت بزيت زهرة الربيع المسـائية (٨ مل/كج عن طريق الفم يوميا لمدة أربعة أسابيع) قبل حقنها بمحلول الملح في الغشاء البريتوني فيما تم حقن المجموعة الأخيرة بمحلول الملح في الغشاء البريتوني واستخدمت كمجموعة ضابطه .

بعـد ٦ سـاعات من الحقن ، تم تقدير مستوي انزيمات ناقلات الألانين(ALT) ، إنزيمات ناقلات الأسبرتات(AST) ، البيلوروبيـن الكلـي(T Bil) ، الكرياتيـن و النتروجين الأزوتي في مصل الدم (BUN). أما نواتج دهون الدم المؤكسدة (LPO) فقـد تم تقديرها باستخدام مجموعة الدلائل الخاصة بها. وكذلك تم تقدير مستوي اوكسيد النتريك (NO) في مصل الدم باستخدام تفاعل Griess . وأيضا تم قياس كمية الجلوتاثيون (GSH) في كل من الكبد والكلية.

وقد أظهرت النتائج أن حقن السكريات المتعددة الدهنيه منفردة أدت إلي زيادة معنوية في مستوي إنزيمات ناقلات الألانيـن(ALT) ، انـزيمات نـاقلات الأسـبرتات(AST) ، البيلوروبين الكلي(T Bil) ، الكرياتين والنتروجين الأزوتي (BUN) في مصل الدم. وفي نفس الوقت أدي تناول السكريات المتعددة الدهنيه الي زيادة معنوية في كمية نواتج دهون الـدم المؤكسدة (LPO) ومستوي اوكسيد النتريك(NO) في مصل الدم .بالاضافة إلي ذلك، أدي تناول السكريات المتعددة الدهنيه الي نقص ملحوظ في كمية الجلوتاثيون (GSH) في كل من الكبد والكلية. هذا وقد لوحظ أن معالجة الجرذان مسبقا بزيـت زهـرة الربـيع المسائية قبل إعطاء السكريات المتعددة الدهنيه، أدي الي تقليل جوهري للضرر الناتج عن إعطاء السكريات المتعددة الدهنيه علي كل من الكبد والكلية وكذالك أدي إلي نقص ملحوظ في نواتج دهون الدم المؤكسدة بالإضافة الـي زيادة ملحوظة في كمية الجلوتاثيون في كل من الكبد والكلية وذلك بالمقارنة بالجرذان المعالجة بالسكريات المتعددة الدهنيه فقط . ومن الناحية الأخري تبين أن معالجة الجرذان مسبقا بزيت زهرة الربيع المسائية ، ليس له تأثير معنوي علي مستوى اوكسيد النتريك في مصل الدم بعد إعطاء السكريات المتعددة الدهنيه .

هـذه النـتائج تظهر أن تناول زيت زهرة الربيع المسائية يؤدي الي الحد من التأثير الضار للسكريات المتعددة الدهنيه علي الأعضاء . هذا يتم علي الأقل من خلال مفعول زيت زهرة الربيع المسائية المضاد للأكسدة .

Scanned with CamScanner