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Research Article

Effect of Turmeric & Ginger on Lipid Profile in Male Rats Exposed to Oxidative Stress

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ABSTRACT

The present study aimed to investigate the effect of turmeric & ginger on lipid profile of male rats exposed to oxidative stress induced by hydrogen peroxide H2O2 at a concentration of 1% given with consumed drinking water to male rats. Methods: 200 mg/kg from turmeric & ginger were used, and the animals were treatment for 30 days. Results: the results showed a significant increase in cholesterol, triglycerides, low density lipoprotein (LDL), very low density lipoprotein (VLDL), whereas it explained a significant decrease in high density lipoprotein (HDL) of male rats exposed to oxidative stress when compared with control group. the results showed a significant decrease in cholesterol, triglycerides, (LDL), (VLDL), whereas it explained a significant increase in (HDL) of rats treated with turmeric & ginger at dose 200 mg/kg when compared with male rats exposed to oxidative stress.

Keywords: Turmeric, Ginger, lipid profile, oxidative stress.

INTRODUCTION

Turmeric (*Curcuma longa*) is extensively used as a spice, food preservative and colouring material in India, China and South East Asia. It has been used in traditional medicine as a household remedy for various diseases, including biliary disorders, anorexia, cough, diabetic wounds, hepatic disorders, rheumatism and sinusitis. For the last few decades, extensive work has been done to establish the biological activities and pharmacological actions of turmeric and its extracts[1]. Ginger (*Zingiber officinale*) is a member of the family of plants that includes cardamom and turmeric. The strong aroma of ginger is the result of pungent ketones including gingerol, the extract that primarily has been used in research studies. It is categorized as a food additive by the us food and drug administration[2]. Ginger is example of botanicals which is gaining popularity amongst modern physicians and its underground rhizomes are the medicinally useful part[3]. Ginger rhizome has been used in traditional herbal medicine. Ginger has enormous health promoting potential effects in number of ailments including degenerative disorders (arthritis and rheumatism), digestive health (indigestion and constipation), cardiovascular disorders, diabetes mellitus and cancer. Also it has anti-inflammatory properties, which are beneficial in controlling the process of aging. Moreover, it has antimicrobial potential, which can help in treating infectious diseases and helminthiasis[4,5]. Many studies were carried out on ginger and its pungent conistituents, fresh and dried rhizome. Among the pharmacological effects demonstrated are anti-platlet, antioxidant, anti-tumour, anti- rhinoviral, anti-hepatotoxicity and anti arthritic effect[6]. The exposure to stress situations can stimulate numerous pathways, leading to increased production of oxygen free radicals generate a cascade producing lipid peroxidation. Lipid peroxidation is one of the main events induced by oxidative stress. Lipid peroxidation can produce a range of enzymatically damaging consequences Extensive lipid peroxidation is shown to cause membrane disorganization, by peroxidizing mainly the polyunsaturated fatty acids and phospholipids leading to alterations in the ratio of polyunsaturated fatty acids to other fatty acids. Thus, lipid peroxidation is considered as a serious consequence of free radical toxicity leading to profound changes in the membrane structure and function that may even cause cellular death[7]. The study aimed to investigate the capacity of turmeric and ginger in preventing oxidative stress induced by hydrogen peroxide H2O2 at a concentration of 1% given with drinking water to male rats.

MATERIALS AND METHODS

Experimental design

The study was carried out on twenty four mature male rats (*Rattus norvegicus*), aged as 10-12 weeks and weighing between 180 - 200 gm were procured from Department of Biology, College of Science, University of Thi Qar, Iraq. The animals were housed in a well ventilated 12 hrs light and 12 hrs dark cycles. The animals were divided into four equal groups, each group consist of[6] rats:

The first group (control group) was treated with free drinking water, for 30 days.

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Table 1: Effect of Turmeric & Ginger on lipid profile in male rats exposed to oxidative stress.

Animal groups	Cholesterol Mg/dl	T.G Mg/dl	HDL Mg/dl	LDL Mg/dl	VLDL Mg/dl
First group	87.83±0.94[d]	63.00±1.23[d]	52.16±1.37 [a]	27.16±0.94[d]	13.83±0.47[d]
Second group	238.66±4.55[a]	177.00 ±1.77[a]	36.33±1.56 [c]	48.66±0.33 [a]	21.66±0.40 [a]
Third group	221.16±2.50[b]	84.83±1.55[b]	44.16±1.74 [b]	42.16±0.54 [b]	18.83±0.54 [b]
Fourth group	99.50±2.24[c]	76.50.35±0.84 [c]	40.00±1.18[d]	37.66±0.42 [c]	16.16±0.54 [c]
LSD	12.0	8.0	3.0	4.0	2.0

Values are means ± S.E.
Different letters refer to significant differences at ($p<0.05$).
Same letters refer to no significant differences at ($p<0.05$).

The second group was treated daily with 1% hydrogen peroxide and 99 ml of drinking water for 30 days.
The third group was treated daily with (200mg) of turmeric dissolved in (200ml) of drinking water(1ml hydrogen peroxide and 99 ml of drinking water) for 30 days.
The fourth group was treated daily with (200mg) of ginger dissolved in (200ml) of drinking water(1ml hydrogen peroxide and 99 ml of drinking water) for 30 days.

Blood collection

After 30 days of treatment, the animals were sacrificed. Blood samples were collected by cardiac puncture, 5mL of blood were drawn from each animal of experimental groups, and put in tubes without EDTA, centrifuged at 3000 rpm for 15 minutes, and then serum was separated and kept in the refrigerator at -20ºC until the time of assay.

Measurement of serum lipid profile

The used reagents were supplied by Biolabo (France), and serum total cholesterol was measured according to Allan and Dawson[8] and Serum TG was measured according to Tietz *et al.*,[9]. While serum HDL was measured according to Lopes-Virella[10]. and measurement of LDL and VLDL according to Friedwald *et al.*,[11], LDL and VLDL concentration was measured as follows:

LDL = total cholesterol – (HDL + VLDL)
VLDL = serum TG /5

Statistical analysis

Statistical analyses were done utilizing the computer data processing (SPSS, version 14). A probability value ($P<0.05$) was considered to be statistically significant. and used to calculate least significant difference (LSD) values for the comparison of means following.

RESULTS

The results showed a significant increase ($p<0.05$) in the level of cholesterol and TG of the male rats exposed to oxidative stress when compared with control group (table 1), while the rats treated with turmeric & ginger at dose 200 mg/kg showed a significant decrease ($p<0.05$) in the level of cholesterol and TG of the male rats when compared with male rats exposed to oxidative stress (table 1). There was a significant decrease ($p<0.05$) in the serum level of HDL of the male rats exposed to oxidative stress when compared with control group(table1). While, male rats treated with turmeric & ginger at dose 200 mg/kg showed a significant increase ($p<0.05$) in the level of HDL of the Turmeric & Ginger when compared with male rats exposed to oxidative stress (table1). The results indicated a significant increase ($p<0.05$) in plasma LDL, VLDL of the male rats exposed to oxidative stress when compared with control group (table1), while, male rats treated with turmeric & ginger at dose 200 mg/kg showed a significant decrease ($p<0.05$) in plasma LDL, VLDL compared with male rats exposed to oxidative stress and control group (table1).

DISCUSSION

Stress is called pressure, is a common phenomenon that is often experienced by individuals in their daily lives. Among the conditions that can lead to stress conditions is a heavy workload, conflicts in relationships, serious financial problems and so on[12]. Stress is known to bring negative impact on the mind and body. Exposure to repeated or prolonged stress can lead to excessive exposure to stress hormone that increases the risk of various health problems[13]. The herbal drugs have been prescribed widely because of their effectiveness, fewer side effects and relatively low cost[14]. Several studies revealed the benefits of medical plants like Turmeric or Ginger which showed reduction hyperlipidemic effect. In the present study, the male rats exposed to oxidative stress showed very highly significantly increase the level of cholesterol, TG, LDL and VLDL levels accompanied by a very highly significantly decrease in serum HDL level when compared with control group. A similar result reported that male rats exposed to oxidative stress used hydrogen peroxide in a dose of 1% had a negative effect in lipid profile levels when compared with normal rats[15]. Treatment of rats with turmeric and ginger exhibited remarkably ameliorated effects in all lipid profile parameters, turmeric significantly lower cholesterol, TG, LDL-C, VLDL-C levels and improved HDL-C level as compared with diabetic untreated rats. Moreover, the improvement effect of turmeric & ginger in cholesterol and TG levels in rats when compared with untreated diabetic rats[16,17].

Turmeric is effective in inhibiting lipid synthesis, storage, and stimulating fatty acids degradation, these effects mediated by regulating the activities of several key enzymes and the expression of transcription factors that regulate lipid metabolism[18]. Turmeric in hypolipidemic activities could be mediated through cholesterol catabolism by the stimulation of hepatic cholesterol- 7α-hydroxylase activity, and this step converts cholesterol to

bile acid, which is important pathway in the degradation of cholesterol[19]. The reduction in hypolipidemic activities of ginger may be explained by Han *et al*.,[20] who found that increased the faecal excretion of cholesterol, suggesting that Ginger may block absorption of cholesterol in the gut. Moreover, Nammi *et al*.[21] mentioned that the hypocholesterolemic effect of ginger may be attributed to inhibition of cellular cholesterol synthesis, results in augmenting the LDL receptor activity, leading to the elimination of LDL from plasma thus modifying lipoprotein metabolism.

CONCLUSION

This study demonstrated the role of turmeric and ginger significantly reduction in hyperlipidemic effect in male rats exposed to oxidative stress. Therefore, it recommended that dietary turmeric and ginger could be excellent adjuvant support in the therapy of hyperlipidimc and prevent its complications.

REFERENCES

1. Ammon, H. and Wahl, M. (1991).Pharmacology of *Curcuma longa*. *Planta Med*., 57, 1–7.
2. White, B. (2007). Ginger: an overview. Am. Family Physici., vol. 75 (11): 1689-1691.
3. Mascolo, N.; Jain, R.; Tain,S. and Capasso,F. (1989). Ethnopharmacologic investigation of ginger *(Zingiber officinale*).J. Ethano Pharmacol., 27(1-2): 129-140.
4. Jiang, H.; Xie, Z.; Koo, H. ; McLaughlin, S. ; Timmermann, B. and Gan, D. (2006). Metabolic profiling and phylogenetic analysis of medicinal *zingiber*species: tools for authentication of ginger *(Zingiber officinale Ros*.). Phytochem., vol. 67: 232-244.
5. Ali, B.; Blunden, G.; Tanira, M. and Nemmar, A. (2008). Some phytochemical, pharmacological and toxicological properties of ginger *(Zingiber officinale Roscoe*). A review of recent research. Food Chem. Toxicol. 46: 409-420.
6. Kamtchoving, P.; Mbongue G.; Fndio, T. ;Dimo and Jatsa, H. (2002). Evaluation of androgenic activity of *Zingiber officinale* and *Pentadiplandra brazzeana* in male rats .Asian J. Androl., 4(4): 299- 301.
7. Nayanatara, A.; Nagaraja, H. and Anupama, B.(2005). The effect of repeated swimming stress on organ weights and lipid peroxidation in rats. Thai J. Physiol. Sci., 18: 3-9.
8. Allan, C. and Dawson, J. (1979). Enzymatic assay of total cholesterol involving chemical or enzymatic hydrolysis-a comparison of methods. Clin.Chem.; 25 (6) : 976-984.
9. Tietz, N.W.; Burtis, C.A., Ashwood, E.R. and Saunder, W.B. (1994). Text book of clinical chemistry , 2nd Ed. : 1030-1058 et 1073-1080.
10. Lopes-Virella, M. (1977). Cholesterol determination in high-density lipoproteins separated by three different methods. Clin. Chem. ; 23(25) : 882-884.
11. Friedwald, W. ;Levy, R. and Fredrickson, D. (1972). Estimation of concentration of LDL-C in plasma without the use of preparative ultracentrifuge .Clinical Chemistry .Chapter18 : 499-502.
12. Azlina, N.; Fahmi, M. and Muharani, T.(2011). Effects of tocotrienol and tocopherol supplementation on liver oxidative status and antioxidant enzyme activity in stress-induced rats. Sains Malaysiana, 40: 481-487.
13. Kelly, M.; Tyrka,A.; Anderson, M.; Price,L. and Carpenter,L. (2008). Sex differences in emotional and physiological responses to the trier social stress test. J. Behav. Therapy Exp. Psychiatry, 39: 87-98. DOI: 10.1016/j.jbtep.2007.02.003.
14. Venkatesh, V.; Sharma, J. D. and Raka Kamal. (2002). A Comparative Study of Effect of Alcoholic Extracts of Sapindus emarginatus, Terminalia belerica, Cuminum cyminum and Allium cepa on Reproductive Organs of Male Albino Rats J. Exp. Sci. 16 (2) : 51-63.
15. Forteza R.; Salathe M.; Miot F.; conner GE.(2005). Regulated H2O2 production by Duox in human airway epithelial cells Am.J Respir cell Mol Biol.32:462-9.
16. Rai, P.K., Jaiswal, D., Mehta, S., Rai, D. K., Sharma, B. and Watal, G. (2010). Effect of *Curcuma Longa* freeze dried rhizome powder with milk in STZ induced diabetic rats. Indian J. Clin. Bio., vol. 25: 175-181.
17. Khattab,H.A.; Al-Amoudi N.S.and Al-Faleh A.A(2013). Effect of Ginger, Curcumin and Their Mixture on Blood Glucose and Lipids in Diabetic Rats. Life Science Journal 2013;10(4).
18. Alappat, L. and Awad, A. B. (2010). Curcumin and obesity evidence and mechanisms. Nutr. Rev. 68:729-738.
19. Wongeakin, N., Sridulyakul, P., Jariyapongskul, A., Suksamrarn, A. and Patumraj, S. (2009). Effects of curcumin and tetrahydrocurcumin on diabetes induced endothelial dysfunction.Afr. J. Biochem. Res., vol. 3:259-265.
20. Han, L., Gong, X., Kawano, S., Saito, M., Kimura, Y. and Okuda, H. (2005). Antiobesity actions of *Zingiber officinale* roscoe.Yakugaku. Zasshi., vol. 125: 213-220.
21. Nammi, S., Sreemantula, S. and Roufogalis, B. D. (2009): Protective effects of ethanolic extract of *Zingiberofficinale* rhizome on the development of metabolic syndrome in high-fat diet-fed rat. Basic and Clin. Pharmacol. and Toxicol., vol. 104 :366–373.