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Anti hyperlipidemic and Antioxidant Activity of Extract *Cinnamomum zeylanicum* in male Rats Fed a High Fat Diet

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Abstract : The study was divided into four groups (7 rats in each group) for 8 weeks in 3 days in each week. Include gives high cholesterol diet (Libitum). Group 1: control animals give 0.5 ml/kg of normal saline only. Group 2: administrated with 100g/kg of volume dose from libitum only. Group 3: was administrated with 0.5 ml/kg of volume dose from ECE at concentration 250 mg/kg plus 100g/kg of libitum. Group 4: administrated with 0.5 ml/kg of volume dose from ECE at concentration 500 mg/kg plus 100 g/kg of libitum.At the end of treatment period (8 weeks), rats were scarified, serum sample obtained for assessment of antioxidant parameters and lipid profile, the result indicated that ECE 250 and 500 mg/kg show a significant decline ($p<0.05$) in activities of MDA and a significant raise ($p<0.05$) in GSH levels. This results showed the concentration 500 mg/kg of ECE have high effect of antioxidant. In line of high cholesterol diet, the result shown, that libitum have significantly increased ($p<0.05$) in total cholesterol, TG, LDL, HDL and VLDL and body weight but when gives libitum with extract, the results shown that the parameters near to normal.
Key words: Hyperlipidemia, ECE, Lipid profile.

Introduction

Hyperlipidemia refers to hypercholesterolemia, hypertriglyceridemia and hyperlipoproteinemia, are an important risk factor for develop cardiovascular diseases. Hyperlipidemia is increase level of total cholesterol, triglycerides and low-density lipoprotein cholesterol among decrease in high-density lipoprotein cholesterol. The predictor of coronary artery disease, fatty liver disease and carcinogenesis which is associated with the formation of reactive oxygen species[1,2].

Antioxidant means "against oxidation", antioxidants work to guard lipids, proteins and nucleic acids by radicals from peroxidation. They hinder or interval the oxidation of other particles by stopping the beginning or spread of oxidizing chain reactions. "Antioxidants are effective because they are ready to give up their possess electrons to free radicals. After a free radical gains the electron from an antioxidant it no lengthier needs to attack the cell and the chain reaction of oxidation is destroyed[3,4].

'Cinnamon', *Cinnamomum zeylanicum*(Lauracea), locally known as Qerfah or Darsin is an older and essential spice with wide-ranging requests in flavoring, perfumery, drinks and drugs[5]. In some previous studies, an essential oil of cinnamon is identified to have antibacterial[6]. Previously, some studies also suggested that cinnamon owns strong free radical scavenging capability[5], antioxidant and antimutagenic[3] activities and properties of LDL[6].

Materials and Methods

Preparation of Plant Ethanol Extract

To formation ethanolic cinnamon extract (ECE), 20 g of cinnamon powder were kept in thimble was extracted with 200 ml 90% ethanol in a soxhlet extractor for 24 hour. The extract was concentrated in a vacuum at 60 C° using rotary evaporator, to evaporate the remaining solvent. The extract was kept in a freeze dryer for 24 hour yielding semisolid residues of extract[7].

Preparation of doses (Libitum)

High cholesterol diet (HCD) mixture was made by addition cholesterol (100g), cholic acid (50g) in 1000 ml of coconut oil added with egg. The coconut oil contain many of fatty acid such as; Louric acid 45-50%, Myristic acid 13-20% , Palmicacud 7-10% , and Caprylic acid 5-10%[8].

Biochemical analysis

Determination of Serum Glutathione Activity

The test is intended for quantitative of glutathione concentration in serum through the enzyme linked immunosorbant assay (ELISA) using bio Elisa reader EL x800 (biokit, U.S.A.).The assay Max Glutathione ELISA kit was achieved according to the manufacturing company (CUSABIO, U.S.A.)[19].

Determination of Lipid Peroxidation Activity (MDA)

Cell Bio labs TM MDA Adduct ELISA Kit (USA) is an enzyme immunoassay[10].

Determination of lipid profile activity

Total cholesterol kit for quantitative determination of total cholesterol in human serum was supplied by Biolabo SA, France,

Serum HDL-Cholesterol level was measured by HDL-Cholesterol phosphotungstic acid (PTA) precipitant kit (Biolabo SA, France) Triglycerides Kit was supplied by Biolabo SA, France. for measureable of triglycerides in human serum. Very Low Density Lipoprotein (VLDL) were measured by the next principle: VLDL= TG (mmol/l) / 5 and Low Density Lipoprotein (VLDL) were measured by the next formula: LDL= TC(mmol/l)- VLDL(mmol/l)- HDL(mmol/l)[11]. .

Biostatistical Analysis

The results were expressed as (mean ± standard deviation). Pooled t- test was used for the comparison between control and other groups in the measured parameters. One way analysis of variance (ANOVA) followed by least significant difference (L.S.D.) analyses at 0.05% probability of levels. All statistical analysis were performed using Excel program (2010) from Microsoft Company. USA. and MegaStat. The difference will be significant when $P < 0.05$ value.

Results

No significant difference was show in initial weight in animals gives a libitum when compared all groups with control. Significant increase in finalweight in animals dives a libitum when compared groups of libitum plus ECE 250 mg/kg with control, also show significant raise in liver weight and spleen weight in rats fed a libitum when compared all groups with control.

Table1: Activity of *Cinnamomum zeylanicum* on weights of Animals and their organs in rats fed high cholesterol diet (libitum)

Groups	Initial weight	Final weight	Liver weight	Kidney weight	Spleen weight
Control	178.00 ± 8.367	200.00 ± 7.071	5.82 ±1.089	2.28 ±0.259	1.88± 0.217
Libitum	182.00 ± 8.367	205.80± 9.121	*8.44 ± 0.251	*3.08 ± 0.239	*3.80 ± 0.274
Libitum + ECE 250	180.68 ± 8.245	*182.44±10.003	*6.32 ± 0.164	2.42 ± 0.084	*2.82 ± 0.130
Libitum + ECE 500	180.00±10.000	181.00± 10.05*	*6.04 ± 0.089	2.32 ± 0.192	2.74 ± 0.305*
L.S.D. 0.05	7.934	8.698	0.15	0.153	0.211

The effect of ECE on lipid profile, show nearby raised in total cholesterol in group of rat fed a libitum as compared with control.Cinnamon extract significantly decline in total cholesterol in group treated with libitum plus ECE 250 mg/kg and ingroup gives a libitum plus ECE 500 mg/kg body weight in contrast with rat group fed on libitum only.

Table2: Activity of *Cinnamomumzeylanicum* on lipid profile in rats fed high cholesterol diet (libitum)

Groups	TC	TG	HDL	LDL	VLDL
Control	90.8±1.10	74.6±0.55	40.4±1.14	42.8±2.59	14.8±1.48
Libitum	*223.0 ±10.95	*199.8± 7.09	*32.6±1.14	*77.4 ±5.59	*48.8 ±6.69
Libitum + ECE 250	*151.2 ±1.30	*157.0 ±2.74	*34.6 ±0.55	*55.8 ±7.79	*34.8 ±2.05
Libitum + ECE 500	120.8±0.84*	76.0 ±5.48	42.6±1.95*	46.8 ±1.92	15.6±1.14
L.S.D. 0.05	3.904	4.561	1.08	4.564	2.944

A result show effect of ECE on malondialdehyde (MDA) andGSH, there were significant increase in MDA and GSH among rats fed on libitum as compared to control. Cinnamon extract significantly decrease in MDA and GSH in group treated with libitum plus concentrations cinnamon extract 250 mg/kg and in groups that gives a libitum plus concentrations cinnamon extract 500 mg/kg in contrast with groups of rats fed on libitum only.

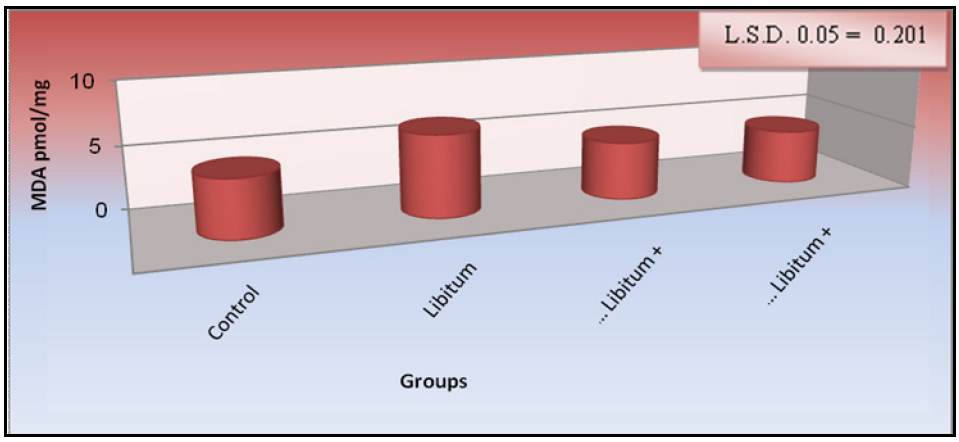

Figure1: Effect of *Cinnamomum zeylanicum* extract on levels of MDA in animals fed a libitum

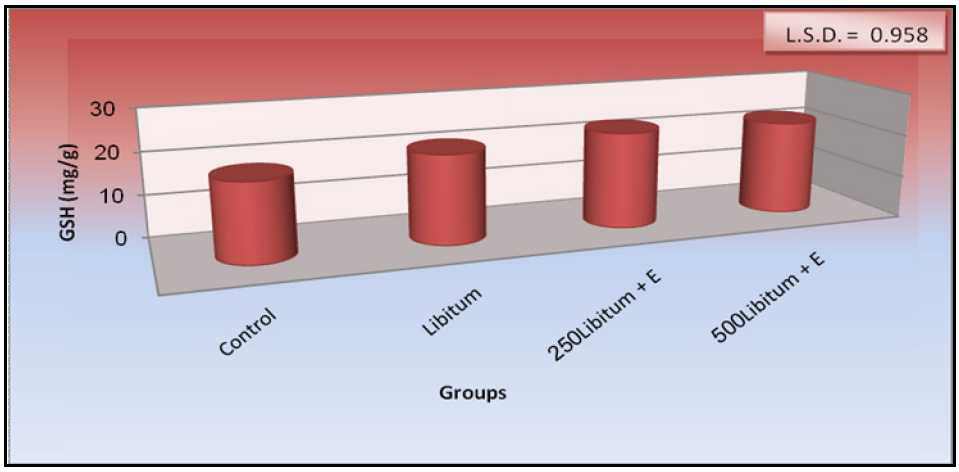

Figure2: Activity of *Cinnamomum zeylanicum* extract on level of GSH in animals fed a libitum

Discussion

Ethanolic cinnamon extract significantly increase ($p< 0.05$) in GSH. "This observation is consistent with administration of high cholesterol in experimental rats, this results are in agreement with those of others, who studied the effect of high fat diet[12,13], that study "Effects of *Lyciumbarbarum* aqueous and ethanol extracts on high fat-diet induced oxidative stress in rat liver tissue".

"It has been reported that lower GPx activity is generally accompanied with an increase of MDA concentration[14,15]. "The ability of the extract to protect the heart and aorta against hypercholesterolemia-induced MDA lipid peroxidation and oxidative stress may explain its folklore use in the management of cardiovascular diseases[16,17].

The effect of ethanolic cinnamon extract on lipid profile, from obtained result it was observed that significant rise in total cholesterol in group of rat fed a libitum in contrast to control rats. This results similar with[8] "The mechanism of action of cholic acid is two folds: an increase in cholesterol absorption and a concomitant suppression of cholesterol 7a-hydroxlyase activity that results in decreased cholesterol excretion"[18-20]. Cholic acid increases absorption of cholesterol by its emulsifying.

Cinnamomum zeylanicum extracts have capability to dawn normalize free radicals raise, enhance liver, kidney and cholestatic biomarkers, perfect hepatic marker enzymes, decrease fibrosis severity **Cinnamomum zeylanicum** extracts have ability to dawn regulate lipid profile elevation[21-23].

Free radicals produced from CCl4 made peroxidation of fat cell membrane which can be whole harm because it leads to modification, in the biological functions of membrane, such as amount of flexibility, and can lead to inactivation of membrane linked receptors or enzymes, which impaired normal cellular function. Lipid peroxidation product, the MDA commonly used as biomarker of oxidative stress[24-29]. The results in this study showed raised in lipid peroxidation in group treated with CCl4 for 8-weeks compared to control.

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