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GINKGO BILOBA: A SEARCH INTO THE LIPID LOWERING POTENTIAL OF AN ANCIANT HERB

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Abstract:

Cardiovascular system (CVS) is affected by numerous pathologies, dyslipidemia being the common most cause behind IHD a major health concern of the public around the globe with mortality. Many drugs are available in market including Omega-3 fatty acids (poly-unsaturated fatty acids) (PUFAs) essential for human body. Currently, the Omega-3 fatty acids and Ginkgo biloba, have received much attention for medical research for the clinical medicine, in lipid lowering effects, in prevention of cardiovascular diseases. We conducted this study to evaluate the effect of Omega-3 fatty acids, Ginkgo biloba (GkB) and the effect of combined therapy of Omega-3 fatty acids (Ω 3- FAs) and Ginkgo biloba (GkB) on blood lipid profile, in Atherogenic diet fed experimental rats. There were 50 healthy Male Albino Wistar rats were obtained from market and were divided into 5 groups, 10 rats in each group. Groups A, B, C, D, and E. Group A: was control. Group B: High cholesterol diet400mg/kg. Group C: Omega -3- FAs 571mg/kg orally + High cholesterol diet 400mg/kg. Group D: G. Biloba 50mg/kg +High cholesterol diet. Group E:combined mixed therapy of Omega-3-FAs (571mg/kg orally) +G.B (50mg/kg orally) + High cholesterol diet(400mg/kg). Blood samples for TC, TGs, LDL-C, HDL-C were collected from all 5 groups after 4 wks of intervention. There is decrease in TC, TGs, LDL-C levels in experimental group (C, D and E) in comparison to rise in TC, TGs, LDL-Clevels in group B (only High cholesterol fed group); whereas significant increase in HDL-C level is found in experimental group as compared to control group. Combination therapy of omega-3 Fatty acid and Ginkgo biloba (group E) show further significant effects in improving lipid profile when compared to individual treatment groups.

Conclusion: *Ginkgo biloba decreases total blood lipids, TC, TGs, LDL-C and increases HDL-C but its Combination with omega-3 Fatty acid is more effective.*

Keywords: *Gingko Biloba, Omega-3 Fatty acids, Blood lipid profile.*

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INTRODUCTION:

Cardiovascular system (CVS) is one of the vital systems of human body, may be affected by various pathologies like, dyslipidemia Dyslipidemia or Hyperlipidemia is the most common cause of cardiovascular disease, a major public health problem which is a leading cause of death. Cardiovascular system is very important system of the human body a beating heart is the sign of life and a failing heart is an alarm for death. Vessels are the pathways for the blood to transport nutrients and other essential contents to all parts of the body and to drain out unnecessary products from the body. Vascular endothelium is continuously exposed to this dangerous intravascular climate. Any injury to the endothelium initiates sequence of events leading to disturbed physiology of the vessels wall. Consuming saturated fats (e. g Dairy products, meat, coconut and palm oils) increases the serum total cholesterol and LDL-C which are associated with great risk of cardiac diseases [1]. Increased plasma lipid levels prone the body to ischemic events due to deposition of cholesterol in the intimal layer of the vessel wall leading to narrowing of the lumen. It is recommended to check total cholesterol, LDL-C, HDL-C and triglycerides in patients which are at risk of atherosclerosis [2]. A number of medicines are available to control or reduce the serum cholesterol like HMG Co-A reductase inhibitors also known as statins, fibrates, Niacin, bile acid sequestrants, cholesterol absorption inhibitors and omeg-3 fatty acids .Daily consumption of 4gm of these fatty acids reduces the serum triglycerides by 25% - 30% slightly increasing the LDL-C and HDL-C at the same time [3]. The Omega-3 fatty acids are poly-unsaturated fatty acids (PUFAs) essential for human body. Currently, the Omega-3 fatty acids and Ginkgo biloba, have received much attention for medical research for the clinical medicine, in lipid lowering effects, in prevention of cardiovascular diseases. Leave extract of the G. biloba is named as EGb 761 which contains 24% ginkgo-flavone glycosides (e.g Kaempferol, quereetin and isorhamntin) and 6% terpenoid (gink-golide A, B, C, J and bilobaide) used as diet supplement and herbal remedy [4]. Ginkgo biloba extract is nontoxic, safe with no major side effects but in some rare cases gastric upset, headache and skin rashes are also reported [5]. Current study is aimed to explore the extent to which the combined and individual regimen of omega-3 fatty acids and ginkgo biloba extract work to reverse the hyperlipidemia.

METHODOLOGY:

It was Qausi experimental animal study, conducted at Department of Animal Husbandry and Veterinary Sciences, Agricultural University Tando Jam, for six months from 25thjuly 2017 to 29th August 2017 after getting approval from the ethical review committee. We purchased 50 healthy Male Albino Wistar rats from local market and divided them into 5 groups in a way that each group have 10 rats equally kept according to NIH protocols for animals[6]. Group A: was control group maintained on normal Saline and normal chow diet. Group B: High cholesterol diet400mg/kg for 4 weeks was given. Group C: Omega -3- FAs 571mg/kg orally + High cholesterol diet 400mg/kg orally for 4 wks was given. Group D: G. Biloba 50mg/kg +High cholesterol diet orally for 4 wks was given. Group E: combined mixed therapy of Omega-3-FAs (571mg/kg orally) +G.B (50mg/kg orally) + High cholesterol diet (400mg/kg) orally for 4 wks was given. Blood samples for TC, TGs, LDL-c, HDL-c, were collected from all 5 groups after 4 wks of study, data was analyzed on SPSS version 21 using ANOVA.

RESULTS:

Result of present study show significant decrease in TC, TGs, LDL-c (bad cholesterol) levels in experimental group (C, D and E) in comparison to rise in TC, TGs, LDL-c (bad cholesterol) levels in group B (only High cholesterol fed group); whereas significant increase in HDL-c (good cholesterol) level is found in experimental group as compared to control group. Combination therapy of omega-3 Fatty acid and Ginkgo biloba (group E) show further significant effects in improving lipid profile when compared to individual treatment groups. Detailed results are shown in table1.

Table1. Comparison of lipid profile between various study groups on ANOVA

Parameters	Normal Control Group A (n=10)	Induced Hyperlipidemia Group B (n=10)	Omega-3-FA Group C (n=10)	Gingko Biloba Group D (n=10)	Omega-3 -FA+Gingko Group E (n=10)	P-Value
Total Cholesterol (mg/dl)	62.11±8.6	87.41±11.2	63.69±9.3	64.14±2.7	62.83±2.15	0.0001
LDL-Cholesterol (mg/dl)	9.68±1.2	13.65±1.6	12.66±2.14	11.41±1.3	11.53±1.5	0.00036
HDL-Cholesterol (mg/dl)	9.54±2.33	25.6±16.56	25.47±4.78	32.98±5.20	48.55±7.22	0.0001
Triglycerides (mg/dl)	91.1±8.32	109.45±23.52	86.81±18.06	100.98±15.18	80.27±25.69	0.01

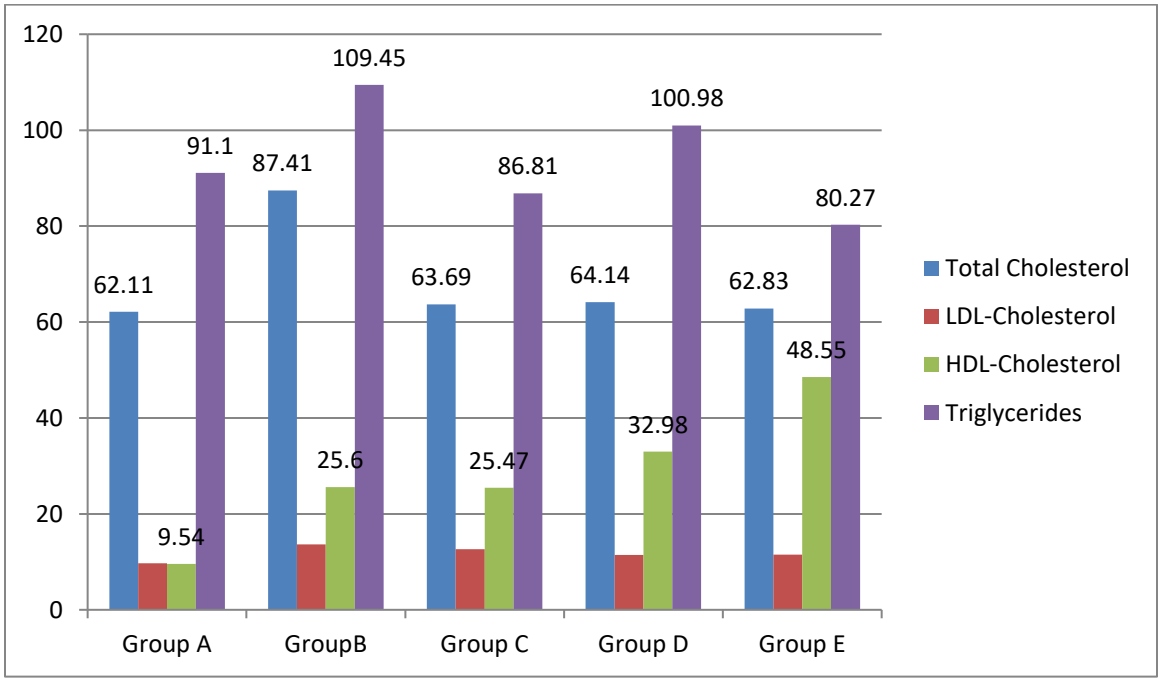

Figure.1 Distribution of mean of TC, LDL, HDL and Triglycerides in different study groups

DISCUSSION:

Vandana S et al (2014) reported the cardio protective effects of this extract through inhibition of the lipid peroxidation of the phospholipids of the myocardial membrane [7]. Ginkgo biloba has lipid lowing properties [8]. Lipid lowering effects of the G.biliba extract are mediated through the CPT1A (carnitine palmitoyl transferase) up-regulation [9].Cholesterol Regulation is dependent on HMG Co-A reductase activity and its Synthesis is controlled by Transcription factor, SREBP-2 (sterol regulatory element binding protein-2) through gene expression. Any reduction in sterol level in cells stimulates gene expression (HMG Co-A reductase) moving SREBP-SCAP complex from ER to Golgi enhancing the synthesis of cholesterol and wise versa if level gets raised [21]. HMG Co-A reductase plays a sensor role in membrane of ER responding to raised intracellular sterol causing proteolytic degradation by binding to insig protein [10].Sterol Independent Regulation is carried out by 1. AMP activated kinase 2. by phosphoprotein phosphatase both of these regulate the HMG Co-A activity by activating and deactivating on phosphorylation and dephosphorization respectively[11]. Some hormones like Insulin, Thyroxine, Glucagon and Glucocorticoids enhanced gene expression to synthesize HMG Co-A reductase [21].Low density lipoproteins are responsible for transporting the cholesterol to the peripheral tissues taking away from the liver as 50% of its contents. Cells

have surface receptors for LDL. LDL- receptors complex gets entered into cells through endocytosis mediated by Apo-B100 (Apo lipoprotein). LDL is utilized by intracellular lysosomes enzymes as well as chemically alteration of LDL is also observed by macrophage by oxidizing the Apo lipoprotein converting macrophages into foam cells a factor in atherosclerosis. Serum normal value is <130mg/dl but Lost or deficient LDL receptors r elevates the LDL-Cholesterol (type II hyperlipidemia or familial hypercholesterolemia) [11]. We found GkB to possess lipid lowing potential and these findings are in agreement with what was reported by Kang H et al(2017) using GkB seeds on high fat (300 mg/kg/day) fed rat model based study with significant reduction in Total lipids, Total Cholesterol, LDL-cholesterol, TGs, and increase in HDL-C [12]. Munira et al (2015) evaluated the therapeutic efficacy of hilsha fish (Tenualosailisha) oil on blood lipids in high cholesterol diet fed Albino mice. They reported a decrease in serum lipid profile of TC, TGs, LDL-c, VLDL-c ($p<0.001$) and increase in HDL-c ($p<0.001$) compared to the positive control group [13]. Cheng D et al (2013) evaluated GkB extract on streptozotocin induced hyperglycemic rat model concluding it to be good glucose, lipid lowering agent along the anti-oxidant properties [14].

CONCLUSION:

Ginkgo Biloba possess good lipid lowering potential that is further increased when combined with Omega -3- fatty acids.

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