

How to Cite:

Hamzah, S. A., & Jawad, R. A. A. (2022). Study of the protective role of ginseng aqueous extract on Lipid profile (TC), (Tg), (HDL) and (LDL) in male rabbits treated with lead acetate for 30 days. *International Journal of Health Sciences*, 6(S4), 9067–9074.
<https://doi.org/10.53730/ijhs.v6nS4.11897>

Study of the protective role of ginseng aqueous extract on Lipid profile (TC), (Tg), (HDL) and (LDL) in male rabbits treated with lead acetate for 30 days

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Abstract---The Study involved twenty healthy adult white male rabbits (*Lepus arcticus L.*). the average weight (1500- 1600) Kg and aged from eight months to one year. The rabbits were divided to four groups(G) each group contains five rabbits. G1 was treated with normal saline (1.5) ml orally as negative control group, G2 was treated with lead acetate (150) mg/kg as positive control group, G3 was treated with the aqueous extract of the *Panax ginseng* (400) mg/kg b.wt and G4 was treated with the aqueous extract of the *Panax ginseng* (400) mg/kg b.wt after 3 hours given them lead acetate (150 mg/kg b. wt/day) for period 30 days . study aimed to determine the protective role of *Panax ginseng* extract on Lipid profile like total cholesterol (TC) , triglycerides (Tg) , high-density lipoproteins (HDL) , low-density lipoproteins(LDL). The result of present study showed:- increase ($P<0.05$) in mean levels of high-density lipoproteins (HDL) in the (G3) and (G4) group compare with Second group (positive control G2). decrease ($P<0.05$) in mean levels total cholesterol (TC), triglycerides (Tg) low-density lipoproteins(LDL) in group (G3) and (G4) compare with Second group (positive control G2).

Keywords---panax ginseng extract, lead acetate toxic, lipid profile, rabbit.

Introduction

Lead is one of the heavy metals widely spread in the environment, as the content of lead in the air, food and drinking water increased due to the increase in its use in automobile fuel and the manufacture of dyes and paints and other industries ¹. It is one of the toxic industrial and environmental pollutants, as causes environmental pollution and health problems ². Lead enters the body through inhalation, skin and ingestion of contaminated food or water ³. Accumulates in all body tissues such as liver, lung, kidneys, genital organs, bones, and acts to destroying them causing psychological, neurological and immune damage ⁴. Its considered one of ten chemicals recorded in (WHO) Which are ecological pollutants of universal health concern⁵.

Panax Ginseng is a perennial, slow-growing, shade-loving deciduous plant belonging to the Araliaceae family ⁶ Its vastly used in East Asia as a medicinal herbaceous plant because of its medicinal properties. The word *Panax* indicates that ginseng possesses medicinal properties for all diseases of the body ⁷ Its grows mainly in the cool regions in eastern Siberia, Korea and northern China, It has been used as a traditional medicine for thousands of years in East Asian countries to treated diseases, In past decades, ginseng has become one of most famous herbs in the world ⁸, Its consists of 10% of inorganic materials and 80-90% of organic materials. Ginsenosides are the main active substances in ginseng ⁹. It contains polysaccharides, peptidoglycans carbohydrates, amino acids, some enzymes, fatty acids, Vitamins, minerals, phytosterols, phenolic compounds and alkaloids ¹⁰. root is the main part of ginseng and the most widely used in the medical field because it contains active compounds ¹¹.

Panax Ginseng is used in herbal medicine in numerous countries of the world to treat many diseases, as ginseng roots contain active ingredients (ginsenosides), which have proven effective in improving immune functions, reducing mental strain and stabilizing blood pressure. Ginseng is also used as a physical performance enhancer ¹². Several studies managed on the pharmacological characteristics of ginseng extract indicated that its act to reduce fat, anti-allergy, anti-inflammatory, anti-diabetic, anti-stress, anti-depressive, anti-aging, anti-fatigue and anti-adhesion, as well as improving the functioning of the cognitive system and memory, preventing the growth of cancer cells as well as acting as an anti-inflammatory, Antioxidant, relieves menopausal symptoms, protects heart from diseases, protects against neurological disorders, and act to reduce high pressure ^{13, 14, 15}. A study showed that ginseng act to diminish fatty tissue and prevents fatness in diet-induced beefy mice¹⁶ ginseng is used to treat liver degenerative diseases ¹⁷ ginseng root powder is beneficial for liver damage resulting from cholesterol-rich food, and these beneficial effects of ginseng as a result of containing The ginsenosides that reduce the level of liver enzymes ¹⁸.

Materials and Methods

Materials

Preparation of aqueous extract of root ginseng

roots of the ginseng plant were obtained from Baghdad Governorate / Iraq. The roots were cleaned and cut into tiny parts to obtain small pieces, then they were ground with an electric grinder to obtain a fine powder. 30 grams of dry ginseng root powder was taken by means of a sensitive scale, Sartorius type, and placed inside a 1000 ml glass flask containing 300 ml of distilled water, then leave the solution for 24 hours at room temperature after covering it, then filter the solution by whatman filter paper No.101 , then take the filtrate and leave the sediment, then put the filtrate in clean and sterilized metal dishes and enter the electric oven at a temperature of 40 for the purpose of obtaining On the dry extract ¹⁹. then put it in glass bottles and keep in the refrigerator until use.

Experimental animals

This study was conducted for the duration from the beginning of November 2021 until April 2022. In this study, 20 male red-eyed adult white laboratory rabbits, *Lepus arcticus*, aged between eight months to one year, and average weights (1500-1600) kg. The animals were reared under controlled conditions of water, suitable ventilation, and at a temperature (25 °C) and a duration of 12 hours of illumination, 12 hours of light and 12 hours of darkness throughout the period of the experiment. The animals were left for (2)weeks to acclimatize before starting the experiment.

Study was carried out on 20 rabbits, which were divided into four groups for each group (5) of male rabbits, they were treated as follows:

1. Group I the negative control group: were used as control, orally given (1.5) ml normal saline.
2. Group 2 the Positive control group: was orally administration with lead acetate at dose of (150mg/kg bwt) 1/10 LD50 ²⁰ daily for 30 days.
3. Group 3 : the rabbits was orally was administration with extract of *panax ginseng*, at dose 400 mg/kg , for 30 days.
4. Group 4 : was orally administration with (400 mg/kg B.W) of ginseng extract after 3 hours given them lead acetate (150mg/kg bwt) for 30 days.

Methods

Serum lipid profile analysis

Blood serum of all groups were centrifuged (3000) rpm for 15 min for the purpose of obtaining the serum that was kept in the refrigerator at a low temperature (20-C) to measuring the necessary physiological examinations total cholesterol ²¹ and triglycerides ²² and measuring the level of high-density protein fats according to method ²³ and measuring the level of low-density protein lipoprotein , which were

calculated mathematically using an equation Fried Ewald Equation It is as follows:

$$\text{LDL - CHOLESTEROL} = \text{Total CHOL} - (\text{HDL} + \text{Triglycerides} / 5)^{24} .$$

Statistical Analysis: All totals using one-way ANOVA with a level of Significance were considered as significant Values ($P < 0.05$)²⁵.

Result and Discussion

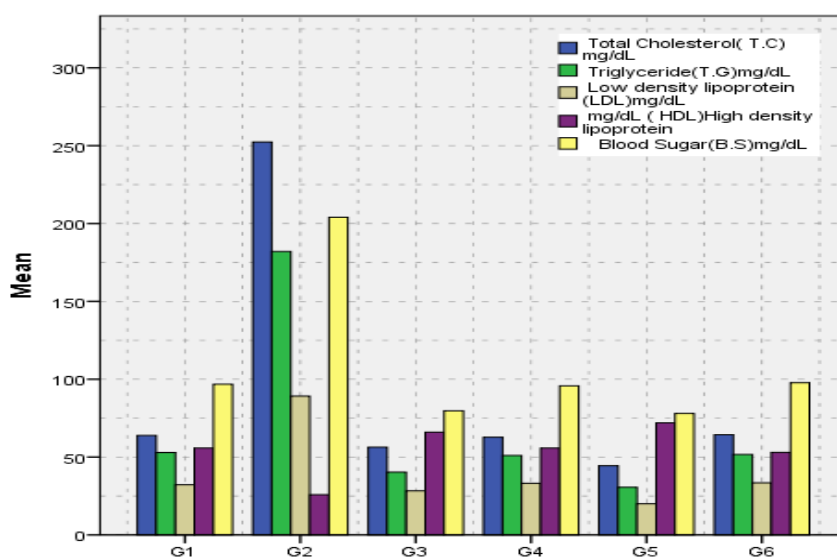
The results of our physiological study shown in Table (1) indicated an increase ($P < 0.05$) in the average level of (TC), (Tg) , (LDL) and decrease ($P < 0.05$) in the average level of (HDL) in the positive group (G2) compared to negative control group (G1). The results of our study agree with studies^{26,27} . A study El-belbasy *et al*, which was conducted on rats when fed with lead acetate 50 mg/kg for six weeks, indicated raise in the level of lipids in the blood serum²⁸ due to the role of lead in disrupting the lipoprotein receptors on the cell surface or restricting lipase enzyme action (Heparic lipoprotein), which leads to severe disturbances in the metabolism of fats and carbohydrates²⁹, and lead reduces the activity of cytochrome P-450, which is necessary for the biosynthesis pathway of bile acids (which is the main pathway in the body to remove cholesterol from the body³⁰ Lead acetate leads to raise in the level of lipids in the serum either by increasing the biosynthesis of cholesterol by inhibiting several enzymes in the cholesterol biosynthesis pathway in liver cells such as Hydroxy Diphosphate Synthase-3 or by reducing the breakdown of cholesterol by inhibiting the enzyme Cholesterol-7- α Hydroxylase, which leads to an increase in serum cholesterol³¹.

results of the present study in Table (1) showed an increase ($P < 0.05$) in the rate of (HDL) and decrease ($P < 0.05$) in the rate of (Tc) , (Tg) and of LDL in G3 and G4 group compared with the (G2). results of the current study agree with what studies have indicated^{32,33,34}. Studies have indicated that ginseng improves the high level of lipids in the blood serum by increasing acetyl-CoA carboxylase and the phosphorylation of AMP-Activated Protein Kinase, also stimulates the process of lipolysis by activating (AMPK), saponins in ginseng increases the Secretion of cholesterol through the formation of bile acids and thus reduces the level of cholesterol in the blood^{35, 36}. Administration aqueous and alcoholic ginseng extract leads to a reduction in the average of total cholesterol, triglycerides and low-density lipoproteins, as its act to regulate the genes responsible for the formation of lipogenesis, such as Acetyl transferase 2,3-hydroxyl-3-methyl-glutaryl-coA and sterol regulatory element-binding protein³⁷.

Ayaz and Alnahdi indicated in his study on male and female rats administration ginseng extract at a dose 150 mg/kg for two weeks, its led to an improvement in lipid profiles in the serum of rats treated with ethanol by decreasing the level of TC, TG, LDL and increasing HDL³⁸ .The saponins in ginseng increase the secretion of cholesterol into bile acids and regulate LDL receptors, thus reducing the concentration of fats in the blood³⁹.

Table (1) shows the effect of the aqueous extract of ginseng (400) mg/kg and the group of aqueous extract treated with lead acetate on the average level lipids in male rabbits treated with lead acetate for 30 days

| groups | Total Cholesterol mg/dl | Triglyceride (T.g) mg/dl | High density lipoprotein HDL mg/dl | Low density lipoprotein LDL mg/dl |
|--|-------------------------|--------------------------|------------------------------------|-----------------------------------|
| (G1) Negative control group treated with normal saline | 63.90 ± 1.83 | 52.94 ± 1.16 | 55.80 ± 1.76 | 32.22 ± 1.33 |
| (G2) positive control group treated with lead acetate (150) mg/kg | 252.40±1.295 | 182.10±3.73 | 25.86±1.61 | 89.14±3.30 |
| G3 Aqueous extract group of ginseng at a dose (400) mg / kg | 56.36±2.31 | 40..38±2.69 | 66.02±2.64 | 28.36±0.83 |
| (G4) Group of aqueous extract of ginseng (400) mg/kg treated with lead acetate (150) mg/kg | 62.72± 1.20 | 51.02±1.22 | 55.80 ± 1.50 | 33.16 ± 0.81 |



Conclusion

In conclusion the current study has confirm that exposure to lead acetate induces damage in the liver, and root ginseng extract prove to protected against the lead acetate induced hepatopathy. Ginseng extract has protective effects due to its antioxidant properties by inhibition of lipid peroxidation

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