

**How to Cite:**

Hamzah, S. A., & Jawad, R. A. A. (2022). Study of the protective role of panax ginseng aqueous extract on the antioxidants glutathione (GSH) and oxidants malondialdehyde (MDA) in male rabbits treated with lead acetate for 30 days. *International Journal of Health Sciences*, 6(S4), 9082–9090. <https://doi.org/10.53730/ijhs.v6nS4.11899>

## **Study of the protective role of panax ginseng aqueous extract on the antioxidants glutathione (GSH) and oxidants malondialdehyde (MDA) 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 the antioxidants glutathione GSH and oxidants malondialdehyde (MDA) in the blood serum of male rabbits for 30 days. The result of present study showed: increase ( $P<0.05$ ) in mean levels of glutathione (GSH) in the (G3) and (G4) group compare with Second group (positive control G2). decrease ( $P<0.05$ ) in mean levels of malondialdehyde (MDA) in group (G3) and (G4) compare with Second group (positive control G2).

**Keywords**---panax ginseng extract, glutathione (GSH), malondialdehyde (MDA), 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 concern(5)

*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). It 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 treat diseases. In past decades, ginseng has become one of most famous herbs in the world (8). It 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)

## 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 <sup>16</sup>. 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 <sup>17</sup> 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**

#### **Malondialdehyde (MDA) and glutathione (GSH) estimation**

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 : The level of MDA in the blood serum was measured using the method <sup>( 18)</sup> .and Measuring the level of glutathione (GSH) in the blood serum by Ellman's reagent, which is 5,5'-Dithio-bis-(2-nitrobenzoic acid) DTNB according to the method <sup>(19)</sup>.

#### **Statistical Analysis**

All totals using one-way ANOVA with a level of Significance were considered as significant Values (P<0.05 )<sup>(20)</sup>

## Result and Discussion

Effect of lead acetate on some parameters of the antioxidant glutathione (GSH) and some oxidative parameters of malondialdehyde (MDA) in the blood serum of male rabbits treated with lead acetate for 30 days. Results of the physiological study shown in Table (1) showed a significant increase ( $P < 0.05$ ) in the level of malondialdehyde (MDA) and a significant decrease ( $P < 0.05$ ) in the level of GSH glutathione in the group of rabbits treated with lead acetate compared with the negative control group (G1). The results of the current study agreed with the studies<sup>(21, 22)</sup>

The reason for the high level of malondialdehyde is attributed to the effect of lead acetate on testicular tissues, which leads to lipid peroxidation in the cell membranes of the testicles. Malondialdehyde used as an indicator of cell membrane injury, the increase in the level of malondialdehyde in the testicular tissues increases lipid peroxidation and leads to tissue damage and the failure of antioxidant mechanisms to prevent the formation of free radicals<sup>(23)</sup>.

The reason for the low level of glutathione in the body is a deficiency of Nicotinamide adenine dinucleotide phosphate (NADPH), which is one of the materials needed to build it during the oxidative stress caused by lead, lead binds to a sulfhydryl group, which directly interferes with glutathione and act to reduce its level<sup>(24)</sup> and reduces its antioxidant activity and increases oxidative stress. Oxidative stress occurs when there is an increase in the production of free radicals or reactive oxygen species (ROS) while the antioxidant enzymes in the body decrease<sup>(25)</sup>. Free radicals consume glutathione, which removes free radicals and their products<sup>(26)</sup>. Glutathione is one of the non-enzymatic antioxidants that works to protect the body from free radical damage caused by oxidative stress and its found in various living organisms and is a peptide. It consists of three amino acids: glutamate, glycine, and Cysteine<sup>(27)</sup>. The toxicity of lead acetate leads to an increase in the level of malondialdehyde (MDA) and a decrease in the activities of antioxidants<sup>(28)</sup> as well as a disturbance in the balance between oxidants and antioxidants in the blood, which indicates tissue damage.

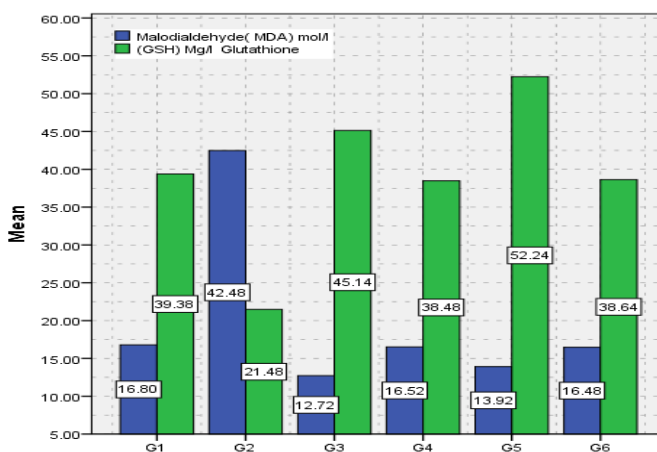
Effect of ginseng aqueous extract group at a concentration of (400) mg/kg and group of aqueous extract of ginseng at a concentration of (400) mg/kg that treatment with lead acetate on some parameters of the antioxidants glutathione (GSH) and oxidants MDA in the blood serum of male rabbits for 30 days. The results of the physiological study shown in Table (1) showed a significant increase ( $P < 0.05$ ) in the level of GSH glutathione in the group of rabbits that administration with aqueous extract of ginseng at a concentration of 400 mg/kg (G3) compared with the negative control group G1 and in the group of rabbits administration with aqueous extract of ginseng and the lead acetate (150) mg/kg (G4) compared with the positive control group G2 (lead acetate group) and there was a significant decrease ( $P < 0.05$ ) in the rate of malondialdehyde (MDA) in the group of rabbits administration with aqueous extract of ginseng at a concentration of (400) mg/kg. (G3) compared with the negative control group G1 and in the group of rabbits administration with aqueous extract of ginseng and the lead acetate (150) mg/kg (G4) compared with the positive control group G2 and the results of the current study agree with studies<sup>(29,30)</sup>.

The results of the study Ali *et al* <sup>(31)</sup> conducted on rats when administration with alcoholic ginseng extract at a concentration of 200 mg/kg for 5-10 weeks showed a significant decrease in the concentration of malondialdehyde. roots of ginseng contain active compounds such as tannins, saponins, alkaloids, flavonoids, glycosides, and phenols <sup>(32)</sup>, which have antioxidant, anti-inflammatory, and immune-stimulating activity, which maintains DNA , affects RNA synthesis, The integrity of the cell membrane and resistance to the entry of toxic substances, as well as increasing protein synthesis by stimulating the activity of RNA Polymerase I, administration ginseng leads to activating the action of antioxidants and reducing the level of malondialdehyde MDA <sup>(33)</sup>.

study of Rahim, <sup>(34)</sup> which was conducted on rats when injected with ginseng extract at a concentration of 200-400 mg/kg for a month, indicated a rise in the rate of glutathione level, ginseng plays an important role in maintaining the ability of antioxidants in the liver by strengthening hepatocytes and its antioxidant ability, the ginsenosides improve the cycle of GSH enzymes and protect cells from hydrogen peroxide H<sub>2</sub>O<sub>2</sub> that causes cell death <sup>(35)</sup>, as ginseng treatment inhibits oxidative damage such as lipid peroxide and maldialdehyde and increases the activity of antioxidants. Oxidative stress and reduces the level of ROS in the blood serum <sup>(36)</sup>, and the polysaccharides in ginseng are among the components that have a strong antioxidant property <sup>(37)</sup>. The reason for the high rate of glutathione is attributed to the ability of the antioxidant components in ginseng to break or cut the lipoperoxidation chain reaction and facilitate the removal of reactive oxygen species (ROS) <sup>(38)</sup>

Table (1) shows the effect of aqueous extract of *panax ginseng* at a concentration of (400) mg/kg and aqueous extract group treated with lead acetate on the average level of MDA and GSH in male rabbits treated with lead acetate for 30 days

groups	MDA(IU/L)	GSH (IU/L)
(G1) Negative control group treated with normal saline	16.80 ± 0.32	39.38 ± 0.67
( G2) positive control group treated with lead acetate (150) mg/kg	42.48 ± 2.15	21.48 ±1.03
G3 Aqueous extract group of ginseng at a dose (400) mg / kg	12.72 ± 0.96	45.14 ± 1.64
(G4) Group of aqueous extract of ginseng (400) mg/kg treated with lead acetate (150) mg/kg	16.52 ± 0.53	38.48 ± 0.61



## Conclusion

In conclusion, the current study confirmed that exposure to lead acetate leads to impairment of the antioxidant defense system in the body, and it has been shown that ginseng extract protects the antioxidant defense system in the body due to its antioxidant properties.

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