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*Original Article*

# Hepatoprotective Effect of Ginger Induced Experimentally by Dimethoate And Liver Injury in Adult Male Rabbits

**Fayrouz Khaled [1]*, Ali Shoaib [1], Mansour Attia [2]**

[1] *Department of Chemistry, Faculty of Science, University of Omar El-Mokhtar, El –Beyda, Libya.*
[2] *Department of Zoology, Faculty of Science, University of Omar El-Mokhtar, El –Beyda, Libya.*

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* ***Fayrouz Khaled:*** *Department of Chemistry, faculty of Science, University of Omar El-Mokhtar, El –Beyda, Libya. Mobile phone: (+218) 911645723. fayrouzalzobair@yahoo.com*

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**ABSTRACT**

**Background**: Dimethoate (DM) is a widely used organophosphate insecticide and acaridae. Ginger extracts have shown a wide array of beneficial role in the regulation of regular liver functions and the treatment of liver hepatotoxicity. This study was carried out to investigate the possible anti-oxidant activity of ginger extract on the DM-induced effect on liver injury of adult mail rabbits. **Methods**: Twenty male New Zealand White rabbits were randomly divided into four groups: (1): control group; (2): rabbits were treated with ginger alone (3): rabbits were treated with DM and (4): rabbits were given DM and ginger. Blood, and liver mushed were using for estimation of liver functions in serum and liver. **Results**: There were statistically significant elevations in the levels of serum alkaline phosphatase (ALP), alanine transaminase (ALT) and aspartate aminotransferase (AST) activities in plasma and liver as affected by treatment with ginger, DM and/or their combination. Treatment with DM resulted in significant increase in the activities of plasma AST, ALT and ALP and caused significant decrease in the activities of these enzymes in liver. Ginger alone caused significant decrease in the activities of AST, ALT and ALP in plasma and insignificant increase in liver. **Conclusion**: The presence of ginger with DM caused significant decrease in the induction of AST, ALT, and ALP activities in plasma, and insignificant improvement in liver enzymes.

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## INTRODUCTION

Wide spread utilizes and transfer of organophosphorus compounds for bother control have come about within the discharge of their buildup into common water, hence actuating a natural issue and have been broadly recognized as a wellbeing danger [1]. Other than fatalities, caused by tall dosage, introduction of creatures to moo dose organophosphorus bug sprays has been found to cause broad impact on body including organ particular injuries in central anxious framework, liver, kidneys and generalized effects like immunosuppression, teratogenesis, carcinogenesis and metabolic disorders [2-4]. Organophosphorus bug spray, DM, may be a systemic bug spray broadly utilized in agriculture and household bug control [5]. It acts by interferometer with the exercises of cholinesterase exercises and is poisonous to insects, rodents, angle and people [6]. Its unremitting presentation has been related with the critical increase in hepatopathy, nephropathy as well as

diabetic mellitus in people and has been recognized as a conceivable human carcinogen [7,8]. Several studies addressed the toxic effect of DM on the functions of several mammalian organs including liver and kidney. DM was detailed to change the level of the marker parameters related to the liver and kidneys in rats and mice [3]. Noteworthy increment within the levels of alanine aminotransferase (ALT), aspartate aminotransferase (AST), soluble phosphatase (High mountain) and gamma glutamyl transferase (ɣ-GT) as well as the diminish within the levels of cholinesterase, bilirubin, add up to protein and egg whites within the serum were the major demonstrative indications of liver illnesses in creatures and human [9]. Cancer prevention agents are broadly required to avoid deterioration of other oxidizable merchandise, such as makeup, pharmaceuticals and plastics.

Polyphenols are the major plant compounds with antioxidant movement, in spite of the fact that they are not the as it were ones. In expansion, other organic properties such as anti-carcinogenicity, anti-mutagenicity, anti-allergenicity and anti-aging movement have been detailed for natural and manufactured cancer prevention agents [10]. Ginger is one of the foremost commonly utilized spices around the world, particularly within the South-Eastern Asian countries. Ginger is additionally a restorative plant that has been broadly utilized in Chinese, Ayurvedic and Unani-Tibb solutions, since relic, for a wide cluster of afflictions that incorporate arthritis, rheumatism, sprains, strong throats, spasms, clogging, heartburn, vomiting, hypertension, dementia, fever, irresistible maladies and helminthiasis [11]. Ginger has been consumed since antiquity and is known to play diverse biological roles including anti oxidation, anti-inflammation, hypo-lipidemia, anti-carcinogenesis, anti-nausea, anti-thrombosis, and anti-bacterial process [12].

It has been reported that nephron-protective and hepato-protective movement of watery ethanol extricate of Zingiber. Its roots and the gotten extricates contain polyphenolic compounds (6-gingerol and its derivatives), which have a tall antioxidant movement [13]. The admissions of ginger significantly decreased the concentration of thiobarbituric acid-reactive substances (TBARS), lipid peroxidation and the arrangement of malonaldehyde in rats [14]. The present study was designed to induce hepatotoxicity by DM and to demonstrate the defensive impact of ginger in male rabbits treated with ginger extract.

## METHODS

### *Materials*

This study was approved by the research committee of faculty of Science, University of Omar El-Mokhtar, El –Beyda. In this study DM and ginger were used. DM (purity 400g/L) was purchased from B&W agrochemicals (China) and ginger was obtained from Superior Nutrition and Formulation by Jarrow Formulas, Los Angeles, USA. All other chemicals utilized in the experiment were of analytical grade. Each capsule contains 3 g powder and the content of each capsule was broken down in corn oil just before use. Mature male used Zealand White rabbits (age of 6 months and initial weight of (1.641±27.2 Kg) were used.

Creatures were separately housed in cages and weighed weekly throughout 3-months experimental period. Twenty develop male rabbits were arbitrarily isolated into four equal groups (each five rabbits): Group I: Rabbits were used as control daily for 12 progressive weeks. Group II: Rabbits were treated with ginger. Ginger was given ginger every day by gavage at a dosage of 100 mg/kg B.W, [15,16] which broken down in corn oil for 12 progressive weeks. Group III: Rabbits were treated day by day with DM (DM) by gavage at a dosage of 43.2 mg/kg B.W/day (1/50 of DM) deadly measurements [17]. Group IV: Rabbits were given with DM day by day at a dosage of 43.2 mg/kg B.W./day by gavage like gather III and given the ginger concurrently day by day at a dosage of 100 mg/kg B.W./day by gavage like gather II for 12 progressive weeks.

### *Biochemical Parameters*

After the exploratory period, creatures in different groups were sacrificed. Blood was collected in tubes without anticoagulant to separate serum for various biochemical estimations. The serum was isolated by centrifugation at 3000 rpm for 10 minutes. The liver was dissected out, washed in ice-cold saline, blotted dry, and weighed. Then homogenate was prepared in phosphate buffer 0.1M, pH 7.4 and used for the biochemical analysis. The activities of plasma aspartate transaminase (AST) and alanine transaminase (ALT) were assayed by the method [18]. Alkaline phosphatase (ALP) activity was determined in plasma according to the method [19]. Enzyme activity values are expressed as IU/L.

### *Statistical Analysis*

Where applicable, statistical analysis was carried out in Minitab software version 17; statistical significance was assessed using one-way ANOVA analysis. After detection normal distribution to the data and appropriate $P < 0.05$ consider significant.

## RESULTS

Tables 1 and 2 showed the overall means of the activities of (AST), (ALT) and (ALP) in plasma and liver as affected by treatment with ginger, DM and/or their combination. Treatment with DM come about in critical (P<0.05) increment in the activities of plasma AST and ALT, and High mountain were essentially (P<0.05) decreased compared with control bunch, whereas caused critical (P<0.05) diminish within the activities of these chemicals in liver. Ginger alone caused critical (P<0.05) decrease in the activities of AST and ALT, whereas High mountain caused immaterial (P<0.05) increment in plasma and caused inconsequential (P<0.05) increment in these proteins in liver as compared with control. The nearness of ginger with DM caused noteworthy (P<0.05) diminish in the induction of AST and ALT, and significant (P<0.05) increment within the lessening ALP activities in plasma, whereas caused inconsequential (P<0.05) enhancement in AST, ALT and ALP exercises in liver. These comes about too shown that treatment had noteworthy (P<0.01) effect on AST, ALT and High mountain in liver. The interactions between treatment and time was showed significant (P<0.01) effect on AST, and had no significant effect on ALT and ALP.

***Table 1: Average of liver (AST), (ALT) and (ALP) in male rabbits treated with ginger, DM and/or their combination***

| Parameters | Animal Groups | | | |
|---|---|---|---|---|
| | Control | Ginger | DM | Ginger + DM |
| **Aspartate transaminase AST (IU/L)** | 112.53 ±3.95ab | 129.07 ±6.45a | 100.40 ±1.21b | 111.20 ±3.26b |
| **Alanine transaminase ALT (IU/L)** | 141.07 ±2.56a | 151.50 ±39.37a | 121.20 ±4.46a | 146.90 ±18.39a |
| **Alkaline phosphatase AlP (IU/L)** | 334.00 ±8.79a | 350.50 ±13.57a | 302.00 ±109.71a | 346.40 ±20.31a |

*abc Within row overall mean Inside push in general cruel with diverse superscript letter differ significantly (P<0.05).*

***Table 2: Average of serum (AST), (ALT) and (ALP) in male rabbits treated with ginger, DM and/or their combination***

| Parameters | Animal Groups | | | |
|---|---|---|---|---|
| | Control | Ginger | DM | Ginger + DM |
| **Aspartate transaminase AST (IU/L)** | 43.083 ± 0.460$^{b}$ | 40.421 ± 0.696$^{b}$ | 46.890 ± 0.700$^{a}$ | 43.20 ± 1.104$^{b}$ |
| **Alanine transaminase ALT (IU/L)** | 46.191 ± 0.67$^{a}$ | 41.908 ± 0.84$^{b}$ | 48.62 ± 1.14$^{a}$ | 45.300 ± 0.71$^{a}$ |
| **Alkaline phosphatase AlP (IU/L)** | 142.55 ± 0.79$^{b}$ | 154.32 ± 1.06$^{a}$ | 135.81 ± 1.05$^{b}$ | 143.85 ± 0.75$^{b}$ |

$^{abc}$ *Within row overall mean Inside push generally cruel with different superscript letter vary essentially (P<0.05).*

## DISSCUSION

The current results exhibited that DM caused changes in the exercises of marker enzymes like ALT, AST and ALP in plasma, Liver (Tables 1 and 2). Data

presented in this order appeared that the cruel levels of serum ALT, AST and ALP in the DM treated rabbits were significantly higher than those in the control. Such elevation of liver enzymes as a result of DM administration was documented by other authors [7, 20-25].

Liver is the center of biotransformation and detoxification of outside compounds and is the most helpless to the chemical attacks such as DM harming [24,26,27]. Serum ALT an AST are considered to be among the foremost touchy markers utilized in the diagnosis of hepatotoxicity [23,28]. Pesticide presentation causes liver harm and leakage of cytosolic proteins from hepatocytes and other body organs into blood [29,30]. Elevation of liver enzymes may too be due to increased gene expression due to long term requirement of detoxification of pesticides [31]. In contrast to elevation of transaminases, ɣ-GT and ALP was markedly decreased in DM treated rabbits compared to control. Such inhibition in ChE in response to organophosphorus DM administrated was obtained by [21,27,32-36].

Elevation in aminotransferases and phosphatases were observed in liver of female albino rats treated with organophosphates methyl parathion, monocrotophos and DM [37]. The liver functional transaminases (AST and ALT) and (ALP) enzymes activity in serum are most frequently measured for diagnosis of liver diseases particularly infective hepatitis, alcoholic cirrhosis, biliary obstruction, toxic hepatitis and liver cancer [38,39]. The former liver functional enzymes are not secreted into the blood; any elevation of their activities in blood is resulted from leakage of liver damage cells and from the disturbance and dysfunctions in lever functional enzymes [22,38,40]. Similarly, Triazophos and quinlophos also caused increase in liver enzymes [41,42].

The present study appeared that ginger caused changes within the action of marker proteins in plasma and liver. The common increment within the action of liver AST and ALT taking after the consumption of ginger slim down may well be due to de novo union of the chemical atoms or an adaptation by the liver to the nearness of the ginger driving to movement higher than the control [43]. The diminish in plasma AST, ALT, High mountain and exercises within the display ponder is in assertion with the results of Ajith et al., who reported that aqueous extricate of Zingiber officinale (ginger) significantly protected the hepatotoxicity as apparent from the exercises of serum transaminase and alkaline phosphatase [13]. Also, study reported that treatment of ginger in isoproterenol-treated rats decreased the levels of serum marker enzymes aspartate transaminase and alanine transaminase [44].

Vitalis et al.,[45] reported that the AST and ALT activities are significantly lower ($P<0.05$) in the rats treated with ginger. The hepatic cells participate in a variety of metabolic activities and contain a host of enzymes in tissues, AST and ALT are found in higher concentrations in cytoplasm and AST in particular also exists in mitochondria [46]. In liver injury, the transport function of the hepatic cells takes an interest in an assortment of metabolic exercises and contain a set of enzymes in tissues, AST and ALT are found in higher concentrations in cytoplasm and AST in specific too exists in mitochondria [46]. In liver harm, the transport work of the hepatocytes is exasperating, coming about within the spillage of plasma layer, thereby causing an expanded protein level in serum, and solvent chemicals like AST will moreover be similarly discharged. The raised activities of AST and ALT in serum are demonstrative of cellular spillage and misfortune of useful astuteness of cell films in liver [46].

## CONCLUSION

In conclusion, ginger and its vital components have appeared a wide cluster of pharmacological exercises counting advantageous part within the control of liver capacities and the treatment of liver disarranges of acute/chronic hepatotoxicity.

### *Conflict of Interest*

There are no financial, personal, or professional conflicts of interest to declare.

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