

## The effect of ginger (*Zingibar officinale*) aqueous extract on some biochemical parameters and kidney function in male mice

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### تأثير المستخلص المائي للزنجبيل على بعض المعايير الكيموحيوية ووظائف الكلية في ذكور الفئران المختبرية (*Mus Musculus L.*)

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الخلاصة:-

يعتبر الزنجبيل من النباتات الطبية الواسعة الاستخدام في العالم لما لها من تأثير على صحة الانسان. تم دراسة تأثير مستخلص الزنجبيل على بعض المعايير الكيموحيوية في الفئران المختبرية، حيث قسمت الفئران الى ثلاثة مجاميع ، مجموعة سيطرة ومجموعتين معاملة بالمستخلص وحقتت المجاميع بالخلب (ip) باعتبار مجموعة السيطرة حقتت بالماء المقطر ، بينما حقتت المجموعتين المعاملة بالزنجبيل ب(٢, ١ ملغم/فأر) على التوالي. شملت الدراسة قياس نسبة سكر الدم، الكوليستيرول، LDL، HDL، بالإضافة الى تأثير المستخلص على بعض وظائف الكلية (اليوريا، uric acid، الكرياتينين). اظهرت النتائج انخفاضا معنويا في المعايير الكيموحيوية ونسبة سكر الدم، والكوليستيرول، LDL، وبعض من وظائف الكلية وارتفاعا معنويا في HDL بالمقارنة مع حيوانات السيطرة وعند مستوى احتمال ( $p < 0.01$ ).

#### Abstract

Ginger has become a subject of interest because of its beneficial effect on human health. The purpose of the present study was to investigate the effect of daily intraperitoneal injection of ginger extract for four weeks on some biochemical parameters (serum cholesterol, RBS, HDL, LDL) and kidney functions (urea, uric acid, creatinine). 24 Mice were divided into three groups, normal control group and two treated groups, each group contain eight mice. They were injection intraperitoneally with 0.1ml distill water to control group while two treated groups received the same dose of ginger extract (1mg,2mg/mice) respectively for four weeks.

Biochemical's parameters (blood glucose, serum cholesterol, LDL) showed significant decrease ( $p < 0.01$ ), while (HDL) appeared significant increase when compared with control group.

On the other hand study of kidney function showed significant decrease in (urea, uric acid, and creatinine) when compared its with control group.

**Key word :** ginger, biochemical parameter, kidney function, HDL, LDL

#### Introduction:-

Ginger is an under ground rhizome of plant *Zingibar officinale* belonging to the family zingibaceae, and now it is considered a common constituent of diet world wide<sup>(1)</sup>. The deride extract of ginger contains monotrpens and susquiterpens, besides the main active antioxidant in ginger are the gingerols and shogaols as well as some phenolic ketone derivatives<sup>(2)</sup>. ginger also have a large variety of pharmacological activities effect as well as attenuation of lipid peroxidation and oxidative stress<sup>(3)</sup>. although ginger have a

pharmacological useful and active compounds, it may also contain toxic substances which may accumulate in body or excrete through the kidneys<sup>(4)</sup>.

The effect of ethanolic extract of ginger significantly reduced total serum cholesterol, triglyceride and increased the HDL-cholesterol level and also can protect tissue from lipid peroxidation and exhibit a significant lipid lowering activity in rat<sup>(5)</sup>. The predominant compound of ginger inhibited ascorbate complex induced lipid peroxidation in rat liver<sup>(6)</sup>. Furthermore, gingerol isolated from *Zingibar* shown to interfere with inflammation processes and feeding of ginger elevated significantly the activity of hepatic cholesterol by stimulating enzymes conversion to bile acids<sup>(7,8)</sup>.

The treatment with ginger extract caused decreased in total serum cholesterol and serum triglyceride in diabetics rats<sup>(9)</sup>.

Its concluded that the ginger extract produced a significant effect in some biochemical parameters and kidney function in mice.

### **Materials and methods:-**

#### **Preparation of plant extract:-**

The dried rhizome of *Zingibar officinale* were purchased at basrah market Iraq. (20) gm of ginger powder was put in a pot containing (200) ml of distill water. This was allowed to boil for (15) minuet, after which it was allowed to cool. then it will be filtered to making an effecting dose. The concentration of dose was used in this experiment (2 gm/1 ml), and according to the primary test on the experimented animals, the dose which has been used (1 mg and 2 mg per body weight of mice).

#### **Animals:-**

Twenty four adult male mice of (*Mus Musculus* L.) weighting (22-25 gm) were used in this study obtained from animal house of biology department, Education college. These animals are divided into three groups one control group and two treated group (each group contain eight mice). They were kept in standard diet and water for 28 days at room temperature (23±3°C) with a 12 h dark and 12 h light cycle.

#### **Experimental design:-**

All groups injection intraperitoneally (IP) 0.1 ml on each dose, two treated groups received (1 mg and 2 mg/mice)of ginger extract respectively, while a control group received the same dose of distill water. After the last dose, animal were scarified and blood samples collected from the heart to stored in a special tube until assayed.

#### **Biochemical analysis:-**

At the end of four weeks blood samples was separated by centrifugation of the samples for (15 min at 3500 rpm). The (bicon Germany kits) using to determine the total serum cholesterol, blood glucose, LDL, HDL and kidney function (urea, uric acid, and creatinine) by different waves of spectrophotometer<sup>(10)</sup>.

#### **Statistical analysis:-**

Results are expressed as mean standard deviation (SD) by using SPSS version 10. The mean different between groups was determined by revised least significant different (RLSD), and ( $p < 0.01$ ) was used to criterion of the statistically significant.

**Results:-**

This study showed the effect of ginger extract on some biochemical parameters (table 1) appeared a significant decrease in ( serum cholesterol, blood glucose, LDL) and significant increase in HDL when compared with control group in(p<0.01).

The results also showed in (table 2) that urea, uric acid and creatinine changes by decrease the levels of its in treatment group (high dose) compared with control group(p<0.01).

**Table (1):- the effect of ginger on some biochemical parameters in male mice. (N=8)**

| Treatment             | T.S. cholesterol mg/dl | Bl. Glucose mg/dl | LDL mg/dl     | HDL mg/dl      |
|-----------------------|------------------------|-------------------|---------------|----------------|
| Control Distill water | 165.4 ± 1.8            | 195.65 ± 0.19     | 60.46 ± 1.44  | 90.5 ± 1.1     |
| 1mg/mouse             | 151.92 ± 1.64          | 172.18 ± 1.34     | 53.14 ± 0.99  | 99.32 ± 32     |
| 2mg/mouse             | 132.44 ± 2.22*         | 135.22 ± 2.11*    | 45.81 ± 2.79* | 112.2 ± 1.16** |

**Table (2):- the effect of ginger on some kidney function in male mice. (N=8)**

| Treatment             | urea mg/dl   | Uric acid mg/dl | Creatinine mg/dl |
|-----------------------|--------------|-----------------|------------------|
| Control Distill water | 40.72 ± 0.38 | 31.6 ± 0.1      | 84.98 ± 0.13     |
| 1mg/mouse             | 32.4 ± 2.5   | 27.9 ± 0.89     | 77.42 ± 2.14     |
| 2mg/mouse             | *25.2 ± 1.11 | 21.2 ± 2.31*    | *63.8 ± 2.81     |

\*Significant decrease in (p<0.01).

\*\*Significant increase in (p<0.01).

**Discussion:-**

In this work we have studied the effect of aqueous extract of ginger on some biochemical parameters and kidney function during four weeks. The *Zingibar officinale* were commonly used as spices and medicinal plant in the world by acting as free radical scavengers in an animal model. The evaluate effect of these plant in clinical trials that regarded the assumption of gingerols was responsible for antioxidant activity of *Zingibar officinale* were studies<sup>(11,12)</sup>. A study of the inorganic part of a medical plant contains mainly mineral elements which are responsible for hypoglycemic activity and a number of essential minerals associated with the mechanism of insulin release and its activity in different animals<sup>(13)</sup>. These result agreement with the study of treatment male rats with ginger extract significantly decrease the blood glucose level<sup>(14)</sup>.

On the other hand, injection ginger extract decreased cholesterol level due to elevated the activity the hepatic cholesterol 7-alpha-hydroxylase which is arate-limiting enzyme in the biosynthesis of the bile acids and stimulate the conversion of cholesterol to bile acids leading to the excretion cholesterol from the body<sup>(15)</sup>. In this study ginger extract caused reduction in the levels of plasma cholesterol, LDL, but HDL statistically increased, this finding are in agreement with previous studies suggest that ginger extract produced significantly decrease in serum cholesterol and increased HDL-cholesterol levels<sup>(16)</sup>. Furthermore the extract of ginger reduced plasma cholesterol and inhibited LDL oxidation in mice<sup>(17)</sup>. This may explained that ginger contain monoterpens and shogaols compounds interfered with cholesterol biosynthesis in liver homogenates of hypercholesterollaemic mice causing its reduction<sup>(18)</sup>. The reduction of cellular cholesterol biosynthesis is associated with increased activity of the LDL receptor, which leads to enhanced removal of LDL from plasma, resulting in reduced plasma cholesterol concentration<sup>(19)</sup>.

The effect of ginger on kidney functions was assayed by the determination the levels of plasma creatinine, urea, and uric acid. The ginger extract rendered significant protection against induced nephrotoxicity, which was evident from the lowered serum urea and creatinine levels in the mice<sup>(20)</sup>. A number of studies indicated that ginger exhibit antioxidant activity and anti free radicals abilities that stimulate the liver performance and urea synthesis<sup>(21)</sup>. The reduction of blood urea, uric acid, and creatinine in animals receiving ginger extract suggested that ginger may contains some effective compounds that influence removing certain waste products from plasma that interfered with a mechanism of reabsorption inhibition of urea in the nephrons<sup>(22)</sup>. The ginger extract could prevent the depletion of antioxidant concentration and antioxidant enzymes activity in the kidneys by instructive the effect of urine flow rate on the renal eliminating of a substance such as creatinine and uric acid to the effects of flow on urea<sup>(23)</sup>.

The presence of polyphenols and flavinods in ginger extract might be responsible for the antioxidant nephroprotective activities and the reduction of serum urea, creatinine, and uric acid levels<sup>(24)</sup>.

From the data obtained, its concluded that ginger extract have a significant effect on cholesterol and blood sugar, also could be used to depressing some of kidney enzymes in mice.

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