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**Effect of Zingiber Officinal and Ambrosia Maritima on some Physiological Parameters and Kidney Structure in Rats**

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**ABSTRACT**

The present work was carried out to investigate the effect of ZOR Roscoe (ZOR), AML L (AML) and their mixture on some physiological parameters and kidney structure of male albino rats. This study was undertaken in the animal house belong to Animal Production Department, Faculty of Agriculture, Al-Azhar University. Twenty-four male albino rats with an average body weight 100-130 g. The animals were divided into 4 similar groups: (Control untreated group), group2, (rats fed with diet contain 5% ZOR Roscoe), group3 (rats fed on diet contain 5% AML L) and group4 (rats fed on diet containing 2.5% ZOR Roscoe +2.5% AML L.). During the whole experimental period blood samples were collected and serum was analyzed for concentration of glucose, cholesterol, triglyceride , urea and creatinin. At the end of the experiment, rats were scarified to obtain the kidneys. Results indicated that treatment of rats with zinger officinal and AML for 8 Weeks showed mild ischemic charges of some glomeruli and tubules in the cortex of the kidney. Meanwhile mix with zinger officinal and AML showed minimal ischemic changes of some glomeruli and tubules in the cortex of the kidney. All medicinal plants treatment had hypercholesterolemic and hypolepidimic effects being the highest for the comparing treatment. Treatment of rats with medicinal plants for 8 weeks significantly increased serum urea and creatinine concentration.

**Keywords:** Rat, Zingiber officinal, Ambrosia maritima kidney function.

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**INTRODUCTION**

The kidney is one of the major organs involved in whole – body homeostasis, with its major functions being to excretion of waste of metabolites, blood pressure regulation and metabolism of lipid, secretion and degradation of hormones and the production and utilization of systemi glucose ( Khalil, 2004) and Gai et al (2014). Recently the use of herbal medicines have become indispensable. and considered as essential part of the primary health care in human and veterinary medicine. Medicinal plants have essential constituents such as essential oils, terpenes, sesquiterpenes, quinines and alkaloids for maintain the health and treatment of various animals disorders (Oliver – Bever, 1986, Bakhiet and Adam 1995 and Barakat et al 2012). Many plant products exert antioxidant effects and some of these are widely used in food in different parts of the world UZ et al (2009).

Many natural products are used to protect tissues from oxidative stress, various drugs or chemicals – induced toxicities. Among of the natural products ZOR and Ambrosia maritima. Zingiber officinal, ginger commonly known (Ahmed et al., 2008). Ginger is a rhizome that is widely used as culinary herb and herbal remedy fore some common ailments Lakshmi and Sudhakar (2010) Ginger is belong to the family of Zingiberaceae and considered a usual ingredient of diet worldwide (Sertie et al., 2005). Ginger roots and its extract contain 6- gingerol and its derivatives, which are active phenolic compounds with high antioxidant activities both in vivo and in vitro that could protect against free radical damage as effectively as ascorbic acid (kim et al , 2007). It had been reported that ginger exhibit anti-inflammatory, antipyretic, antimicrobial, hypoglycemic, ant migraine, antioxidant, hepatoprotective, diuretic and hypocholesterolemic effects (Uz et al. 2009, Masada et al 2004 and Langner et al. 1998), Ambrosia maritima L. (Compositae) an annual herbaceous plant widely distributed throughout the Mediterranean region and Africa. It is well known in Egypt under the name of Damsissa (Mohamed and Saber 2011). It contains important sesquiterpene lactones and flavonoids which showed molluscicidal effect (Evans 1996). It is used in some renal tea due to it is proved effect in renal colic and expel renal stones Sakar et al (2000), Mohamed and Saber (2011) demonstrate the protective role of damsissa against oxidative stress and biochemical changes of potassium dichromate. This study aims planned to evaluate the effect of ZOR, Ambrosia maritima and its mix on Kidney structure, functions and some serum liped profile.

**MATERIALS AND METHODS**

This study was carried out in Animal House Laboratory, Department of Animal Production, Faculty of Agriculture, Al-Azhar University, Cairo, Egypt.

**Experimental animals**

The male albino rats used in this study were originally bought from El Osman farm, Cairo, Egypt. Animals were housed in stalsteel cages. The laboratory standard for chow and tap water were provided ad libitum. All animals were healthy and clinically free from diseases.

**Plant materials**

Rizomes of Zingiber officinals Roscoe (ginger) and whole plant of AML L ( Damssisa) were used in this study . Medicinal plant were purchased from the local market in Cairo Egypt.

**Experimental design**

A total of 24 male albino rats were used in this study. Rats with live body weight ranged from 100-130 gm. All rats were housed in stalsteel cages from 2 week prior to the
experiment for acclimatization and to ensure normal growth and behavior. After 2 weeks from acclimatization rats were divided randomly into four groups each group contain 6 rats G1 control group, G2, G3 and G4 fed diets contain 5% Zingiber officinal, AML L. and 2.5% ZOR + 2.5% Ambrosia Maritima respectively.

Rats were fed the experimental diets for 8 weeks, Blood samples were collected from all rats (after 4 and 8 weeks from the the experiment) by withdrawing blood from the orbital venous plexuses using a capillary tube. Blood samples were centrifuged at 3000 rpm from 15 min to obtain serum which transferred to Ependorf tubes and stored at – 20°C until subsequent analyses.

At the end of the experiment rats were sacrificed to obtain their kidneys. Immediately after extraction, the kidneys were immermed in formalin 10% for two days, washed in water, dehydrated in ascending grade of ethyl alcohol and finally cleared by xylene and embedded in melted parafin wax. The kidney blocks were sectioned at six- micron thickness and stained by eosin and hematoxylin according to Pearse (1968).

**Serum parameters**

Concentration of serum urea measured according to the colorimetric method described by (Tabacco et al., 1979). Serum creatinine was determined by using enzymatic colorimetric method according to (Junge et al., 2004). Serum glucose measured according to the oxidas method (Trinder, 1969). Serum cholesterol wos measured by enzymatic colorimetric method according to of (Roeschlau et al, 1974) Serum triglyceride determined using enzymatic colorimetric method according to Bucolo and David (1973)

**Statistical Analysis:**

Statistical analysis was conducted by analysis of variance using SPSS Package (2016). The means and standard errors of all parameters were calculate and Duncan Multiple Range test (Duncan 1955) was used to test the significant differences

**RESULTS AND DISCUSSION**

Histopathological examination of the kidney

Examination of eosin and hematoxylin stained sections of kidney tissue of the control group showed preserved architecture the cortex revealed normal glomeruli, tubules and cortical blood vessels. The medulla revealed normal tubules and normal blood vessels of interstitial tissue (fig 1). Easins and hematoxylin stained sections of kidney of the 5% ZOR or 5% Ambrosia maritima treated rats also showed preserved architecture. The cortex revealed mild ischemic changes of some glomeruli and tubules with normal cortical blood vessels. The cortex revealed normal tubules and normal blood vessels of interstitial tissue (figs 2 & 3) Examination of eosin and hematoxylin stained sections of kidney tissue of the 2.5% ZOR + 2.5% Ambrosia maritima treated group (fig. 4) showed preserved architecture. The cortex revealed minimal ischemic changes of some glomeruli and tubules with normal cortical blood vessels.

The above results revealed that treatment of rats with 5% ZOR or 5% AML for 8 weeks caused mild ischemic changes of some glomeruli and tubules. Meanwhile treatment of rats with 2.5% ZOR + 2.5% Ambrosia maritima for 8 weeks caused minimal ischemic changes of some glomeruli and tubules in the renal cortex.

These results are in accordance with those found by Ilham et al. (2016) who reported that renal damage was severe should by focal necrosis of cortical convoluted tubules and extended to medullary tubules were detected in goats treated with AML 2000 mg/Kg/ day. They also stated that Ambrosia maritima was toxic to both female and male goats at 2000 mg/kg/day but the female goats are more sensitive to the plant toxicity than the males and the plant was found to have revel and hepatic chronic toxicity, Vassiliades and Diaw (1980) stated that Ambrosia maritima up to 1000 ppm had no toxic effects in mice and Alard et al (1991) concluded that Ambrosia maritima has a very low toxicity to aquatic non-target organisms and it is not toxic when used at the molluscidal concentration of 35 to 70 mg/litre, Lakshmi and sudhokar (2010) control rats showed normal glomeruli with intact bowma's capsule and proximal convoluted capsule. Rats treated with gentamicin, showed bubuler epithelial loss with intense granular degeneration involving >50% renal cortex, In addition to the tubular epithelial loss, some of the tubular epithelium contains tubular casts and blood vessel congestion and result in the presence of inflammatory cells in kidney sections. The histomorphology of rats treated with ethyl acetate extract from Zingiber officinal plus gentamicin showed moderate tubular epithelial degeneration with desquamation in patehy areas of the renal cortex, Concurrent treatment of rats with the dried fresh juice extract from Zingiber officinal also was found to reduce such changes moderately in kidney histology induced by gentamicin.

El- kott el al (2015) showed that kidney section of both control and ginger – treated group exhibited normal renal archite eure.

![Fig. 1. Kidney structure in the control rats showing preserved architecture. The cortex revealed normal glomeruli, tubules and cortical blood vessels.](image-url)
Serum parameters:
Table (1) shows that treatment of rats with 5% zingiber officinal, Ambrosia maritima or its mix for 4 weeks did not show any significant effect on serum urea and creatinine concentration. Meanwhile after 8 weeks all medicinal plant treatment groups significantly increased serum urea and creatinine levels as compared with the control group.

The insignificant effect of treatment with Ambrosia maritima for 4 weeks on serum urea and creatinine are in accordance with those found by (Barakat et al., 2012) and (Badr et al., 2012) they showed that oral administration of medicinal plants (cymbopogon proximus, Ammi visnaga and Ambrosia maritima) had on significant effect on plasma creatinine and urea concentrations. (Lakshmi and Sudhakar, 2010) reported that ZOR treatment did not produce detectable changes in serum creatinine and urea levels in normal rats.

Fig. 2. Kidney structure in the 5% ZOR group showing preserved architecture. The cortex revealed mild ischemic changes of some glomeruli and tubules with normal cortical blood vessels. (H&E., stain, x100). Mild ischemic changes of glomeruli.

The above results also showed that treatment of rats with 5% zingiber officinal , 5% Ambrosia maritima for 8 weeks significantly increased serum urea and creatinin. These results indicated that treatment of rats with Zingiber officinal and Ambrosia maritima for long time (8weeks) had aside effect on the kidney functions These results are in accordance with those found by (Ilham et al., 2016) stated that Ambrosia maritina was toxic to both female and male goats at 2000 mg/kg/day. They also reported that Ambrosia maritima found to have renal and hepatic chronic toxicity. On the other hand Halal et al., 2014) reported that treatment of the diabetic rats with Ambrosia mortitima extract produced significant decreased in the serum urea and creatinine level in comparison with diabetic group. (El- Kott et al., 2015) indicated that extract of ginger alone rendered significant protection against glycerol – induced nephrotoxicity which was evident from the lowered serum urea and creatinine levels.

Fig. 3. Kidney structure in the 5% Ambrosia maritima group showing preserved architecture. The cortex revealed mild ischemic changes of some glomeruli and tubules with normal cortical blood vessels. (H&E., stain, x100).

Fig. 4. Kidney structure in the 2.5% Zingiber officinal +2.5% Ambrosia maritima group showing preserved architecture. The cortex revealed minimal ischemic changes of some glomeruli and tubules with normal cortical blood vessels. (H&E., stain, x100).
This contradiction may be due to the different doses used, duration of treatment between the present work and the others.

Table (1) also showed that treatment of rats with 5% Zingiber officinal, 5% Ambrosia maritima and 2.5% zingiber officinal + 2.5% Ambrosia maritima for 4 or 8 weeks significantly decreased serum cholesterol, triglycerides and glucose as compared with the control group.

The results in the current study showed that medicinal plants significantly decreased serum cholesterol and triglycerides. These results may by due to the presence of saponins in Ambrosia maritima which has a direct saponin antioxidant activity and Ambrosia maritima contain flavonoids that can reduced the levels of cholesterol and triglycerides through its anti oxidant activity (Helal et al 2014 and Jadeja et al. 2010). Barakat et al. 2012 reported that treatment of rats with Ambrosia maritima (2% or 10%) significantly decreased cholesterol and triglycerides.

The hypoglycemic effect of medicinal plant may be due to that flavonoids in Ambrosia maritima that have hypoglycemic effect Helal et al (2014), Barakat et al. (2012) reported that glucose were significantly deceased in arats fed 2% and 10% Ambrosia maritima with diet. Kazem et al. (2013) reported that oral administration of free polyphenol extracts of Zingiber officinal significantly decreased fasting glucose reaction 12.22 mmol/L from the initial 20.44 m mol/L. It may be due to insulinomimetic activity of the polyethers giving rise to divergent peripheral glucose uptake (Lolitkair and Rao, 1996).

### Table 1. The effect of the medicinal plants on different serum parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>5% Zingiber officinal</th>
<th>5% AML</th>
<th>2.5% Zingiber officinal</th>
<th>2.5% AML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea mg/dl</td>
<td></td>
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<tr>
<td>4 weeks</td>
<td>75.71 ± 3.18 A</td>
<td>76.24 ± 2.67 A</td>
<td>77.35 ± 2.31 A</td>
<td>76.58 ± 2.19 A</td>
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<tr>
<td>8 weeks</td>
<td>76.76 ± 2.11 B</td>
<td>85.18 ± 4.24 A</td>
<td>87.74 ± 3.51 A</td>
<td>87.08 ± 3.56 A</td>
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<tr>
<td>Creatinine mg/dl</td>
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<tr>
<td>4 weeks</td>
<td>3.57 ± 0.71 A</td>
<td>3.21 ± 0.62 A</td>
<td>3.67 ± 0.53 A</td>
<td>3.71 ± 0.66 A</td>
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<tr>
<td>8 weeks</td>
<td>3.89 ± 0.68 B</td>
<td>4.91 ± 0.91 A</td>
<td>4.87 ± 0.88 A</td>
<td>5.11 ± 0.93 A</td>
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<tr>
<td>Cholesterol mg/dl</td>
<td></td>
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<tr>
<td>4 weeks</td>
<td>111.75 ± 2.1 A</td>
<td>100.07 ± 1.26 B</td>
<td>99.17 ± 2.78 B</td>
<td>92.24 ± 3.11 C</td>
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<tr>
<td>8 weeks</td>
<td>116.12 ± 2.1 A</td>
<td>107.41 ± 1.71 B</td>
<td>104.76 ± 2.85 B</td>
<td>93.24 ± 2.81 C</td>
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<tr>
<td>Triglycerides</td>
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<tr>
<td>4 weeks</td>
<td>145.46 ± 4.66 A</td>
<td>121.55 ± 3.54 B</td>
<td>125.73 ± 4.22 B</td>
<td>109.21 ± 6.54 C</td>
<td></td>
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<tr>
<td>8 weeks</td>
<td>148.77 ± 4.36 A</td>
<td>127.23 ± 3.66 B</td>
<td>125.82 ± 4.11 B</td>
<td>111.44 ± 4.81 C</td>
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<tr>
<td>Glucose</td>
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<tr>
<td>4 weeks</td>
<td>110.75 ± 3.36 A</td>
<td>100.91 ± 2.11 B</td>
<td>101.90 ± 2.11 B</td>
<td>93.52 ± 1.92 C</td>
<td></td>
</tr>
<tr>
<td>8 weeks</td>
<td>112.66 ± 2.53 A</td>
<td>101.41 ± 2.31 B</td>
<td>103.81 ± 1.54 B</td>
<td>95.33 ± 2.34 C</td>
<td></td>
</tr>
</tbody>
</table>

Means within each row with similar latters are not significantly different at P < 0.05 Duncan’s Multiple Range test between groups.

### CONCLUSION

Zingiber officinal, Ambrosia maritima and their mix is safe to be used for 4 weeks as an effective remedy for hypoglycemic and hypolipidemic effect without any adverse side effects on kidney structure and function. Treatment of rats with zingiber officinal, Ambrosia maritima or its mix for 8 weeks had a side effect on kidney structure and function.

### REFERENCES


تأثر الزنجبيل والدمسیس على بعض القياسات الفسيولوجية وتركيب الكلي في الفئران

عبد المجید عبد الرحمن عبد الحليم

قسم الافراط الحيوانيات - كلية الزراعة بالقاهرة جامعة الأزهر

حاصل على الدكتوراه في كلية الطب جامعة مصر بالقاهرة.

هذا البحث لدراسة تأثير الزنجبيل (ZOR) ، والدمسیس (Z.O.R)، والكمیناء (AML) على بعض القياسات الفسيولوجية وتركيب الكلي في الفئران 

الذكور. أجريت هذه الدراسة في البيت الحيوان التابع لقسم الإنتاج الحيواني ، كلية الزراعة بالقاهرة ، جامعة الأزهر. ارتبع وسئبت من ذكور الفئران البيضاء (AML) وزن الجسم حوالي 100-130 مجم حرام. تم تقسيم الحيوانات إلى 4 مجموعات متساوية (الحیوانات الالكلية)، المجموعة الکلية (الفئران التي تتغذى على الزنجبیل والدمسیس 5%)، المجموعة الثلاثية (الفئران التي تتغذى على الزنجبیل 2.5% و المجموعة الکلية) (الفئران التي تتغذى على الزنجبیل والحمض الکهربودي 2.5%). تم جمع عينات الدم وجرشات لقياس مستويات الجلوکوز والكوليسترول والدهون الثلاثية. ونظام الثخين على الكلي. تم تجريف الفئران للحصول على كلية كمobservation. كان هذا الهدف من هذه الدراسة هو

الجرعات، الدهون الثلاثية، والكوليسترول، والكوليسترول في الكلي. وعندما يتم شحذ قطرة كريستال عميقة، يتم تمشيط الدورة دورة. ويتم احتفال باقل من أكلة. كما تأثرت الفئران في نهاية التجربة. هذه الدراسة تحقق华侨. وتعتبر نتائجها مثيرة للاهتمام وتفتح الباب لإجراء المزيد من الأبحاث في هذا المجال.

ولنتمين على بعض القياسات الفسيولوجية وتركيب الكلي في الفئران

الكلي.

المراجعات

الخلاصة

 هذا البحث لدراسة تأثير الزنجبیل والحمض الکهربودي والكلینیکاً على نسيج الكلي في الفئران. أجريت هذه الدراسة في البيت الحيوان التابع لقسم الإنتاج الحيواني، كلية الزراعة بالقاهرة، جامعة الأزهر. ارتبع وسئبت من ذكور الفئران البيضاء (AML) وزن الجسم حوالي 100-130 مجم حرام. تم تقسيم الحيوانات إلى 4 مجموعات متساوية (الحيوانات الالكلية)، المجموعة الكلية (الفئران التي تتغذى على الزنجبيل والحمض الکهربودي 5%)، المجموعة الثلاثية (الفئران التي تتغذى على الزنجبیل 2.5% و المجموعة الکلية) (الفئران التي تتغذى على الزنجبیل والحمض الکهربودي 2.5%). تم جمع عينات الدم وجرشات لقياس مستويات الجلوکوز والكوليسترول والدهون الثلاثية، وكليتية الفئران. ونظام الثخين على الكلي. تم تجريف الفئران للحصول على كلية كمobservation. كان هذا الهدف من هذه الدراسة هو

الجرعات، الدهون الثلاثية، والكوليسترول، والكوليسترول في الكلي. وعندما يتم شحذ قطرة كريستال عميقة، يتم تمشيط الدورة دورة. ويتم احتفال باقل من أكلة. كما تأثرت الفئران في نهاية التجربة. هذه الدراسة تحقق华侨. وتعتبر نتائجها مثيرة للاهتمام وتفتح الباب لإجراء المزيد من الأبحاث في هذا المجال.