

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Effect of ethanolic extract of *Ricinus communis L.* on some Biochemical parameters and hormones in male mice

Israa Seger Salman, Hadeel Macheey Habeeb, Intisar Abdulla Hassan, Liqaa Ali Jasaa, Ghusoon Saaib Saleh, and Zhraa Hadi Helal\*

Department of Biology/ College of Science for women / Baghdad University, Iraq.

### ABSTRACT

The aim of this study is to explain the effect of ethanolic extract of *Ricinus communis L.* (1.25 and 1.5 mg/kg) for two weeks on some biochemical parameters and hormones in male mice. Fifteen adult male mice were used in this study that divided into three groups, the first group is control, the second group is treated group that injected with ethanolic extract of *Ricinus communis* at a dose 1.25 mg/kg and the third group that injected with ethanolic extract of *Ricinus communis* at a dose 1.50 mg/kg. Blood samples were collected from each group at the end of experiment for studying some liver enzymes like (Alkaline phosphatase (ALP), Glutamate pyruvate Transaminase (GPT), Glutamate oxaloacetate Transaminase (GOT)), kidney parameters (creatinine, urea) and some hormones ((Testosterone and luteinizing hormone). *R. communis* is a plant contain high levels of alkaloids, a qualitative and a quantitative detection has been made for their many chemical compounds. The quantitative detection of Ricinin the main alkaloid in castor plant with high performance liquid chromatography (HPLC) of ethanolic leaves extract showed that the presence of Ricinin at 65.8 mg/ml. The value of serum (creatinine, urea) were decreased  $p < 0.05$  in animals received *Ricinus communis* extract at both doses and non-significant  $p < 0.05$  in serum level of (GOT, GPT and ALP) as compared with control. While this study explain that there were significant increase ( $p < 0.05$ ) in serum hormones (testosterone and LH) as compared with control.

**Keywords:** *Ricinus*, Liver enzymes, Kidney parameters, Hormones

\*Corresponding author



## INTRODUCTION

*Ricinus communis*; family: Euphorbiaceae known as castor oil plant is cultivated in tropical regions. A perennial tree up to (6 m.) considered as ornamental plant for the beauty of its leaves and flowers, and to collect castor oil (1). *R. communis* is an important plant its products used in many industrial fields, like lubrication and polish waxes (2). A great medicinal properties of *R. communis* flavonoids, glycosides, saponins, steroids, alkaloids, phenolic compounds, essential oils and tannins in all parts of the plant body in different concentrations (3,4). It used as antifungal and antibacterial like *Staphylococcus* sp.(5,6). Narcotic plants and useful for the treatment of Jaundice also contain quercetin that effective as insecticidal (7). (WHO) recommended the use of *R. communis* as a therapy for diabetes and other diseases (8). The aim of this research is to study the effect of ethanolic extract of *R. communis* on some physiological standards of male mice.

## MATERIAL AND METHOD

Plant collection and Extraction preparation:

Preparation of *R. communis* ethanolic extract (9), leaves were collected from Baghdad University gardens, washed with tap water then shade dried and smashed to prepare it for hot ethanolic extract with Soxhlet extractor at ratio (1:10) (weight:volume), duration (6-8) hr., at (60-80)°C, after then filtered and dried.

### Qualitative detection of some active compounds of *R. communis*

The bioactive compounds were analyzed by the test for ethanolic extract (10):

**a-Alkaloids:** 1. Mayer's test, adding drops of the reagent to (0.5)ml. of the extract.

2. Wagner's test, adding drops of the reagent to (0.5)ml. of the extract.

**b- Tannins:** 1. Detection by adding drops of FeCl<sub>2</sub> to (0.5)ml. of the extract.

2. Detection by adding drops of lead acetate to (0.5)ml. of the extract.

**c- Saponins:** 1. Foam test.

2. Detection by adding drops of HgCl<sub>2</sub> to (0.5)ml. of the extract.

**d- Flavonoids:** 1. Detection by adding crystals of Mg then drops of concentrated HCl to (0.5)ml. of the extract.

2. Detection by adding drops of concentrated H<sub>2</sub>SO<sub>4</sub> to (0.5)ml. of the extract.

### Quantitative Detection of Ricinin using HPLC: (11)

Quantitative detection for ricinin by using fast liquid chromatography (FLC), using Column: phenomenex C-18 DB, 3µm particle size, (50×2.0 mmID) column. Flow rate: 1.2 ml/min., detection: UV.: 310.

### Experimental animals and blood sampling

The experiment was conducted at the animal of biology department at college of science for women / Baghdad university. Fifteen adult male mice were used in this study. The animals were kept under good condition and received a balanced diet, water and food throughout the experiment. Mice were divided into three groups (n=5) as control group without injection and treated group injected in peritoneal at a dose (1.25, 1.5) of 25mg/kg for two weeks. At the end of the experiment period overnight fasted animals and blood sample were collected by heart puncture in tubes without anticoagulant serum was separated from coagulant blood by centrifugation at 5000 rpm for 10 minute and then quickly stored at -20°C for biochemical parameters analysis that include: serum urea, creatinine, serum glutamic oxaloacetate transaminase (GOT), serum pyruvic transaminase (GPT) and serum alkaline phosphatase (ALP). Also this study explained the effect of *Ricinus communis* on Testosterone and Lutin (LH) hormones. The biochemical analysis was carried out on the blood serum. Serum urea and creatinine levels were determination by using Diamond Diagnostic kit (11,12) respectively. Determination of serum GOT, GPT by using enzymatic kit (14) and ALP activity was measured according to the method of (15). Testosterone and LH was measured according to the method of (16).

**Statistical analysis**

The data was analyzed using the statistical package for social program ( SPSS) for comparison between different experiment groups analysis of variance Anova (17).

**RESULTS AND DISCUSSION**

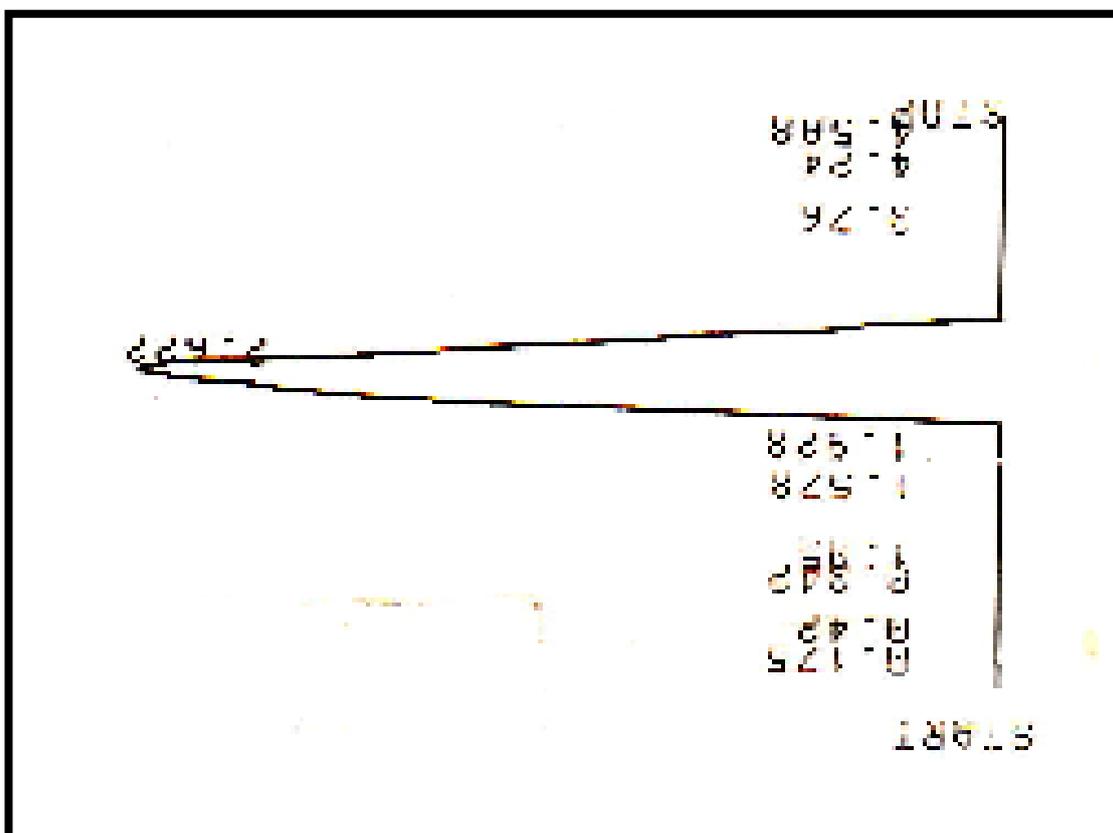
Qualitative detection of *R. communis* ethanolic extract showed that the presence of bioactive compounds alkaloids, flavonoids, saponins and tannins in leaves extract which detected by using two different reagents for each compound as showed in (table 1), these results agreed with (15).

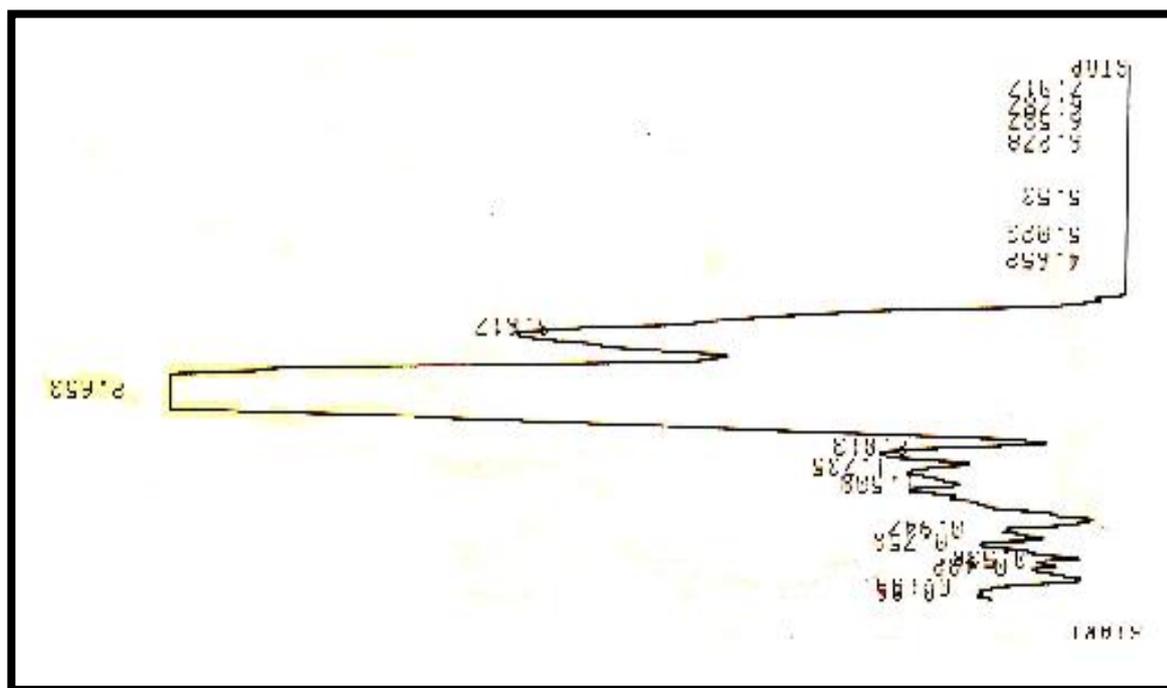
**Table 1: Qualitative detection of *R. communis* ethanolic extract**

Bioactive compound	Reagent 1	Reagent 2
alkaloids	+ / weigh precipitate	+ / radish brown precipitate
tannins	+ / blue color	+ / yellow precipitate
saponins	+ / foam appearance	+ / weigh precipitate
flavonoids	+ / red color	+ / red color

**(+) the presence of bioactive compounds**

The quantitative detection of Ricinin the main alkaloid in castor plant with ( HPLC ) of ethanolic leaves extract (picture 1) showed that the presence of Ricinin at 65.8 mg/ml. these results agreed with (16) that confirm the quantitative detection of ricinin in the stem, leaves and seeds with the same technique and the highest amount were found in the leaves.





Picture(1): HPLC of Ricinin of *Ricinus communis* .

Table(2) explained that injected mice of ethanolic extract of leaves *Ricinus communis* for two weeks on serum GOT, GPT and ALP showed non-significant  $p < 0.05$  in the level of serum GOT and ALP, but there is significant decrease  $p < 0.05$  in level of serum GPT treated groups as compared with control for two doses ( 1.25, 1.5mg/kg).

Table(2): Effect of ethanolic extract of leaves *Ricinus communis* on liver enzymes

Para. Group	GOT (IU/ML) Mean±SD	GPT (IU/ML) Mean±SD	ALP (IU/ML) Mean±SD
Control	A 200.58±2.29	A 65.817±1.59	A 70.250±0.94
Treated(1.25mg/kg)	A NS 200.86±1.99	B * 61.530±1.59	A 69.380±0.94
Treated(1.5mg/kg)	A NS 196.24±2.71	B 59.630±1.06	A 68.910±1.71

Differences letters A,B are significant at (  $p < 0.05$ ) to compression row.  
NS non-significant \* significant

Table(3) explained that there is significant decrease  $p < 0.05$  in the level serum urea and creatinine treated groups as compared with control while there is no significant between the doses.

Table (3): Effect of ethanolic extract of leaves *Ricinus communis* on Kidney function

Para. Group	Urea mg/dl Mean±SD	Creatinin mg/dl Mean±SD
Control	A 17.303±0.41	A 0.606±0.01
Treated(1.25mg/kg)	AB NS	B *

	<b>16.270 + 0.29</b>	<b>0.550±0.02</b>
Treated(1.5mg/kg)	<b>B *</b> <b>15.120±0.79</b>	<b>B</b> <b>0.533±0.02</b>
<b>Differences letters A,B are significant at ( p&lt;0.05) to compression row.</b> NS non-significant * significant		

Table 4 explained that there is significant increase  $p<0.05$  in the level serum Testosterone and LH in male mice treated groups as compared with control while the result showed that there is no significant between the doses.

**Table (4): Effect of ethanolic extract of leaves *Ricinus communis* on hormones**

Group	Para.	Testosterone ng/ml Mean±SD	LH (mIU/MI Mean±SD
Control		<b>A *</b> <b>1.133±0.09</b>	<b>A *</b> <b>0.7133±0.020</b>
Treated(1.25mg/kg)		<b>B NS</b> <b>1.863 ± 0.17</b>	<b>B NS</b> <b>0.763±0.020</b>
Treated(1.5mg/kg)		<b>B</b> <b>2.006±0.16</b>	<b>B</b> <b>0.533±0.020</b>
<b>Differences letters A,B are significant at ( p&lt;0.05) to compression row.</b> NS non-significant * significant			

Liver enzymes are important in the diagnosis of liver function and considered as markers of liver dysfunction (20), as high in these enzymes in case of disruption in the functions of the liver as a result of the use of drugs and necrosis of the liver cells and chronic hepatitis(21).

The use of natural products due to natural available is general trend now(22). The decrease in serum level of liver enzymes(GOT,GPT and ALP), urea and creatinine in animals treated with *Ricinus communis* may be due to the antioxidant activity of it(23) and these active compounds of this plant have hepatoprotective (24) , anti-inflammatory and the treatment of liver and kidney(25)(26). *Ricinus communis* has reduction of liver enzymes and kidney function, healing of liver cells and protecting them from necrosis(27), in addition to the protection of liver and kidney and be safe even after the use of high concentrations of these extract (28)(29).

While the effect of *Ricinus communis* on hormones, the result showed that the increase of these hormones in animals treated differs from other research where this plant is decreased in the serum level of male hormones and reduced of spermatids and antifertility(31).The extracts of *Ricinus communis* seeds have negative effect on reproductive system via destroying of somniferous tubules , decreasing of testosterone and reducing of testis weight (32). Besides, The effect of this plant on female hormones, where it prevents evolution and inhibits LH and FSH and follicles (33). This difference may be due to difference in use of the doses and the parts of this plant.

#### AKNOWLEDGMENT

The conclusion of this study explained that *Ricinus communis* extract have protective properties on Kidney and liver function and also it has a positive activity on fertility.

#### REFERENCES

- [1] Gubta,A.K. 2012. *Ricinus Communis* Linn:A Phytopharmalological Review . Int.J.Pharm.Sci,4:25-29.
- [2] Rana ,M.; Hitesh,DH.; prashar,B.and Sharma,S. R. 2012.Com. L- reiew. IJPR;4( 4) :1706-1711.
- [3] Kensa,V,M.and Yasmin,S. 2011. Phytochemical screening and antibacterial activity on *Ricinus communis* L. journal plant science feed,1(9):167-173.

- [4] Alugah,C,I. and Ibraheem,O.2014. Whole plant screenings for flavonoid and tannins contents in castor plant (*Ricinus communis L.*) and evaluation of their biological activities. IJHM;2(2):68-76.
- [5] Naz,R. and Bano,A.2012. Antimicrobial potential of *Ricinus communis* leaf extracts in different solvents against pathogenic bacterial and fungal strains.Asian Pac.J.Trop.Biomed,2(12):944-947.
- [6] Pandhure,N.2014. Phytochemical Analysis and Antibacterial activity in *Ricinus communis L.* Gulab Rathod. Periodic Research,3(1):2349-9435.
- [7] Shripad, M.;Upasani ,S,M.; kotkar ,H, M .; mendki,P,S. and Maheshwari,U,L . 2003. Partial characterization and insecticidal properties R.com. li foliage flavonoids. PestManag.Sci,59:1349-1354. Day , C. 1998. Traditional plant treatments for diabetes mellitus , pharmaceutical foods . Br. J. Nutr,80 : 203-208.
- [8] Hussein,A,O.; Hameed,I,H,.; Jasim,H. and Kareem,M,A.2015.Determination of alkaloid compounds of *Ricinus communis* by using gas chromatography-mas spectroscopy(GC-MS).JMPPR;9(1):349-359.
- [9] Harborn, J.B. 1984. Phytochemical methods, A guide to modern techniques of plants analysis. 2<sup>nd</sup> .Ed. London, New York, Chapman and Hall.
- [10] حبيب، هديل مكي و صالح، غصون صائب وجازع، لقاء علي وجاسم، بسمة علي وعبد الامير، سجي حسن. 2012. التحري عن زيادة بعض المركبات الفعالة والفيتامينات في كالس الصبار . مجلة بغداد للعلوم ،9(1):18-22.
- [11] Palton, C.J. and Crouch, S.R. 1997. Enzymatic determination of serum urea by modified Berthelot reaction . *Anal Chem.*; 49:464-469.
- [12] Henry, R.J. 1974. Principle and Techniques. Clinical chemistry, 2<sup>nd</sup> ed. Harper and Row :525.
- [13] Reitman, S. and Frankel, S. 1975. A colourimetric for the determination of serum glutamic pyruvic transaminases. *Am.J.Clin. Path.*,28:56.
- [14] Belfield,A. and Goldberg,D.M. 1971. Revised assay for serum phenyl phosphatase activity using 4-amino-antipyrine. *Enzyme.*; 12: 561-73.
- [15] Vining,R.F. and McGinley, R.A.1987. The measurement of hormones in saliva. Possibilities and pitfalls.JSB;27:81-94.
- [16] Daniel,W.W.1983. Biostatistics: A foundation for analysis in the Health. John Wiley and Sons, New York, USA.
- [17] Vandita P, Nirali Amin, Khyati P, \*Monisha K.2014. Effet of Phytochemical Constituents of *Ricinus Communis*, *Pterocarpus Santalinus*, *Terminalia Belerica* on Antibacterial, Antifungal and Cytotoxic Activity.IJTPR;5(2):47-54.
- [18] Jinjin,L. Huihui,W, Jinwei,W,. Tieying,P. and Minbo,L.2013. Ricinine content in different parts of *Ricinus communis* and its insecticidal activity. CJPS,2.Abstract.
- [19] Jasmine, R. and Daisy, P. 2007. Hypoglycemic and Hepatoprotective activity of *Eugenia jambolana* in streptozotocin- diabetic rats.IJBC,1(2):117-121.
- [20] Thaba , B. R. and walia , A. 2007 .Liver function tests and their interpretation . IJP; 74 : 663-671.
- [21] Qattan,K.A.; Thomson,M,. and Muslim,A. 2008. Garlic( *Allium sativum*) and ginger (*Zingiber officinale*) attenuate structural nephropathy progression in Streptozotocin- induced diabetic rats.e-SPEN, the European e-J.Clin Nutr Metabol.3:e62-e71.
- [22] Dai, J.; Mumper, R.J. 2010 .Plant Phenolics: Extraction, Analysis and Their Antioxidant and Anticancer Properties. *Molecules* 15 :7313-7352.
- [23] Franz,C,H, Bauer,R, Carle,R, Tedesco,D, Tubaro,A.and Zitterl-Eglseer,K.2005. Study on the assessments of plants/herbs,plant/herb extracts and their naturally or synthetically produced components as additives for use in animal production.01, :155-69.
- [24] Kensa , V. M.and Syhed yasmi , S. 2011.phytochemical screening and antibacterial activity on *Ricinus communis L.* plant sciences feed , 1 (9) : 167-173.
- [25] Havarasan , R.; Malikao,M.and Venkataraman , S. 2006. Anti- inflammatory and free radical scavenging activity of *Ricinus communis* root extract . J.Ethnopharm , 103: 478-480 .
- [26] Chondhary , M. I.; Begum, A .; Abbaskhan , A.; Musharraf , S. G.; Ejaz ,A.; Atta-ur-Rahman,T .2008.New: antioxidant phenylpropanoids from *lindelofia stylosa*. Chem. Biodiv , 5 :2676-2683.
- [27] Oyewole,O,I, Owoweni,A.A. and Faboro,E.O.2010. Studies on medicinal and toxicological properties of *Cajanus cajan*, *Ricinus communis* and *Thymus vulgaris* leaf extracts.JMPPR,4(19):2004-2008.
- [28] Kumar,O.; Sugendran,k.; Pant,S.C. and Vijayarahavan. 2004.Effect of Ricin on some Biochemical,Haematological and Histopathologicalvariable in mice. DSJ;54(4):493-502.
- [29] Padmapriya,B.; Lema,M.C.E.; Kumar,A.B.; Ilyas,M.H. and Rajeswari,T. 2012. Antihepatotoxicity of *Ricinus communis L.* against ketoconazole induced hepatic damage. JABR,6(1):3036.
- [30] Nithya, R.S.;Anuja, .M;Rajamaniclam,C.;indira,M. 2012. Rat sperm immobilization effects of a protein From *Ricinus communis (linn)*,;an *in vitro* comparative study with nonoxynol *Andrologia* ;44 ,381-387



- [31] Raji, Y.Oloyo, A,K. and Morakinyo, A,O. 2006. Effect of methanol extract of *Ricinus communis* seed on reproduction of male rats. Asian . Androl,8 (1):115-121.
- [32] Singh,R.and Geetanjali.2015.Phyochemical and pharmacological Investigation of *Ricinus Communis* Linn .JANP,3: 120-129.