The Effect of Aqueous Extract of *Capparis spinosa* Flowers on the Level of Serum Lipids in Rabbits.

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Abstract

Background: The aqueous and alcoholic extract of *Capparis spinosa* Possessed many different pharmacological activity such as anti-hyperlipidemic Properties.
The aim: The present study aims at investigating the influence of the aqueous extract of *Capparis spinosa* flowers on the levels of serum lipids profile for normal and hyperlipidemic rabbits.
Material and method: Twenty male white rabbits of (2-2.5)Kg. in weight and of age six months hyperlipoproteinaemia was induced experimentally by feeding the first ten with a were used, The high cholesterol diet (2gm/kg/day animal fat with adding 2 gm / Kg / day cholesterol powder.) For six weeks then they divided into two subgroups: (A) as a positive control and (B) . The other ten rabbits were given ordinary diet and served as controls ,then divided into two subgroups (C) as negative control and (D). Subgroups (B) and (D) were treated daily for 30 days with an aqueous extract of *Capparis spinosa* flowers with concentration of 100 mg / ml and an oral dose of 5 ml/ Kg / day, that was given orally by intragastric tubation.
After 12- 14 hours of fasting, 5 ml of venous blood was drawn, then centrifuged for 10 min. at 3000 rpm for serum separation. Serum lipids were determined by the enzymatic method and Statistical analysis was performed.
Results :The results showed that the treatment of rabbits with an aqueous extract of C*apparis spinosa* flowers in concentration of 100 mg / ml and therapeutic dose of 5 ml/ kg / day via oral administration and for thirty days , reduced significantly ($P < 0.05$) the total serum cholesterol (TC) level , triglycerides (TG) , low- density lipoprotein cholesterol (LDL-C) and very low-density lipoprotein cholesterol (VLDL-C) in hyperlipidemic rabbits (group B) and had no effect on the level of high-density lipoprotein cholesterol (HDL-C) . Also the aqueous extract reduced significantly ($P < 0.05$) the level of (TG) and (VLDL-C) in normal rabbits (group D) ,while no significant reduction was seen in the level of TC., LDL-C and HDL-C .
Conclusion: The experimental results showed a therapeutic importance of C*apparis spinosa* flowers in lowering the levels of serum lipids and decreasing the infection risk of acute coronary syndrome.
Key words: Hyperlipidaemia , *Capparis spinosa* , Rabbits .

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Introduction

Capparis spinosa is a plant belonging to Capparidaceae family[1]. Previous chemical studies on *Capparis spinosa* showed that raw flower buds contain lipids , alkaloids, gluco capperin , as a major glucosinolate and a number of antioxidant phytochemicals such as flavonoids and other polyphenols [2] .

Capparis spinosa is alleged to possess a hypoglycaemic effect [3], molluscicidal activity, chonroprotective effect[4] , and in vitro anti-tumour effect [5] . The aqueous extract from total aerial

parts of the plant has been used for its anti-fungal , anti- inflammatory , anti- diabetic and anti- hyperlipidemic activities [2].

Cappers have been used in reducing flatulence, in the treatment of rheumatism, anemia and gout. Further medical uses include ingesting for improving liver functions, as diuretics, kidney disinfectants [6].

Hyperlipoproteinaemia is a condition in which the concentration of cholesterol and triglyceride carrying lipoproteins exceeds an arbitrary normal limit. This condtion is associated with clinical problems because it can accelerate the development of atherosclerosis. To reduce the risk of atherosclerosis that accompanies hyperlipoproteinaemias , reduction in the concentration of lipoproteins has been recommended. Dietary control of hyperlipidaemic symptoms is an alternative to drugs .

Medicinal plants have been previously used as hyperlipoproteinaemic agents [7] .

Materials and Methods

1- Plant material: *Capparis spinosa* flowers were collected from Al-Gezeera region, North of Ramadi City, They were collected during May and June, 2009, and a sample of plant was identified by Assistant prof. Dr. Mohammed Othman Mossa – College of Education for Pure Sciences – University of AL-Anbar.

2- Plant extraction: After cleaning , drying, garbling and powdering of plant material, 100 gm. of *Capparis spinosa* flowers powder was added to one liter of distilled water and mixed with blender then left at room temperture for 24 hours , then filtered . This process repeated several times.

The filterate was evaporated with a rotary evaporator to get the residue which was later used in preparing solution of concentration 100mg/ml. [8]

3- Laboratory Animals: Twenty male white rabbits, of (2-2.5) Kg. in weight and of six months

age were used.In the first ten rabbits hyperlipoproteinaemia was induced experimentally by feeding them with a high cholesterol diet [9,10,11] (2gm/kg/day animal fat with adding 2 gm / Kg / day cholesterol powder) for six weeks then thy divided into two subgroups: (A) as a positive control and (B) . The other ten rabbits were given ordinary diet and served as controls ,then divided into two subgroups (C) as negative control and D. Subgroups (B) and (D) were treated daily for 30 days with the aqueous extract of *Capparis spinosa* flowers with concentration of 100 mg / ml and an oral dose of 5 ml/ Kg / day, that was given orally by intragastric intubation.

4- Lipid profile test:

After 12- 14 hours of fasting, 5 ml of venous blood was drawn, then centrifuged for 10 min. at 3000 rpm for serum separation. Total cholesterol (TC) [12] and triglyceride (TG) [13] were determined by the enzymatic method (Kit supplied by BioMerieux Company, France) serum level of HDL-C [14] was also measured by the enzymatic method , while VLDL-C was calculated by using the following formula [15] :

$$\text{VLDL-C} = \text{TG} / 5 .$$

LDL-C was estimated by using the following formula [16] :

$$\text{LDL-C.} = \text{TC.} - (\text{VLDL-C.} + \text{HDL-C.})$$

Zero adjusment was made with a reagent and blank using [MSE- Spectro plus-

Germany spectrophotometer] then absorbance was measured for standard and unknown at wave length of 510 nm.

5- Statistical analysis: Data were inserted and analysed by the student t-test, arithmetic mean and standard deviation were used. P- Value which is less than 0.05 is considered significant.

Results:

Table (1) : Shows the normal values of serum lipids profile (TC. , TG. , HDL-C ,VLDL-C and LDL-C) for the four groups of normal rabbits (A , B , C and D) with everage of 127.22, 74.87, 37.45, 16.15,75.71 mg/100ml respectively.

Table(2): illustrates the levels of serum lipids profile(TC. , TG. , HDL-C ,VLDL-Cand LDL-C) in induced hyperlipidemic rabbits (group A and B)) with everage of 530.83, 365.55, 26.82, 73.10, 430.89 mg/100ml respectively.

Table (3) : indicates the effect of aqueous extract of *Capparis spinosa* with a concentration of 100 mg/ml and therapeutic dose of 5 ml /kg/day for thirty days on the levels of serum lipids profile for induced hyperlipidemic rabbits (group B) and the result demonstrated that the aqueous extract had lowered statistically (P<0.05)the level of TC , TG , LDL-C and VLDL-C by about (26.6 %) , (22.03 %) , (28.8 %) and (21.8 %) respectively and had no effect on the levels of HDL-C after thirty days of treatment .

Table (4) : figures the effect of aqueous extract of *Capparis spinosa* on serum lipids profile in normal rabbits (group D) for thirty days and the results showed that the aqueous extract had lowered statistically(P < 0.05) the levels of TG and VLDL-C by about (24.1 %) and (24.09), respectively and had no effect on the levels of TC , HDL-C and LDL-C after thirty days of administration .

Table (1) : serum lipids profile for normal (untreated) rabbits.

Group Symbol	TC mg / 100ml Mean ±S.D	TG mg / 100ml Mean ±S.D	HDL-C mg / 100ml Mean ±S.D	VLDL-C mg / 100ml Mean ±S.D	LDL-C mg / 100ml Mean ±S.D
A	128.35±8.45	75.29±9.2	36.53±4.23	20.20±11.82	80.37±10.72
B	130.89±3.92	76.07±4.09	37.88±4.77	15.21±0.81	77.75±5.13
C	126.73±10.05	75.03±4.22	38.05±0.86	14.60±6.31	73.66±13.03
D	122.93±6.31	73.13±4.27	37.35±2.51	14.61±0.85	71.06±5.48

Table (2): Serum lipids profile for induced hyperlipidemic rabbits for six weeks

Group symbol	TC Mg/100ml mean±S.D	T G Mg/100ml mean±S.D	HDL Mg/100ml mean±S.D	VLDL Mg/100ml mean±S.D	LDL Mg/100ml mean±S.D
A	523.54±16.44	359.69±24.83	27.28±1.36	71.93.±4.93	424.31±12.20
B	538.13± 8.25	371.42±19.38	26.37±1.55	74.28± 3.87	437.47± 5.93

Each value represents the mean from five rabbits ± S.D

Table (3): The effect of *aqueous extract of *Capparis spinosa* on serum lipids profile in induced hyperlipidemic rabbits for thirty days (group B).

Serum lipids mg/ 100ml	Before treating	Time(day) after treatment with the aqueous extract of *Capparis spinosa*			
		After (10)days	After (20)days	After (30)days	P-value
TC mean ± S.D	538.13± 8.26	499.90±7.51	4 45.13 ± 10.01	394.56±7.82	S
TG mean ± S.D	371. 3±19.38	344.70±25.1	316.66 ±20.83	289. 58±16.96	S
HDL-C mean ± S.D	26.37±1.55	25.51±2. 48	24.98 ± 2.10	25.02±1.53	NS.
VLDL-C mean ± S. D	76.66± 0. 25	72.8±0.76	66.54±0.35	59.89± 0.15	S
LDL-C mean ± S.D	437.47± 5.93	405.45± 5.40	362.26±19.84	311.33±6.33	S

Each value represents the mean from five rabbits ± S.D
/ml. Therapeutic dose = 5 ml/ kg / day, concentration = 100 mg *
S: significant(P‹0.05) as compared with the value before treating in the same group.
NS: not significant as compared with value before treatment in the same group.

Table (4): The effect of * aqueous extract of *Capparis spinosa* on serum lipids profile in normal (treated) rabbits for thirty days (group D).

Serum lipids mg/ 100ml	Before treating	Time(day) after treatment with the aqueous extract of *Capparis spinosa*			
		After (10)days	After(20) days	After (30) days	P-value
TC mean ± S.D	122.93 ± 6.31	123.63± 5.11	124.33 ± 4.23	123.61 ± 5.61	NS.
TG mean ± S.D	73.13 ± 4.28	63.06 ± 5.63	54.48 ± 4.40	55.47 ± 4.84	S
HDL-C Mean ±S.D	37.35 ± 2.52	38.17 ± 2.54	37.19 ± 1.83	37.15 ± 3.08	NS.
VLDL-C mean ±S.D	14.16 ± 0.85	12.59. ± 1.12	10.89 ± 0.89	11.09 ± 0.96	S
LDL-CMean ± S.D	70.97 ± 5.61	72.88 ± 6.42	77.18 ± 4.58	78.96 ± 6.84	NS.

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Each value represents the mean from five rabbits ± S.D
/ml. Therapeutic dose = 5 ml/ kg / day, concentration = 100 mg *
S: significant (P‹0.05) as compared with value before treating in the same group.
NS: not significant as compared with value before treatment in the same group.

Discussion:

Nowadays , one of the most common and fatal diseases in the world is cardiovascular disease. Hyperlipidaemia is one of its reversible major risk factor.The current study was designed to examine the effect of an aqueous extract of Capparis flowers on the levels of serum lipids profile for normal and hyperlipidemic rabbits .

The average normal values of serum lipids profile TC , TG , HDL-C ,VLDL-C and LDL-C for the four groups of normal rabbits A , B , C and D were about 127.22, 74.87, 37.45, 5,75.71 mg/100ml as everage respectively which are in agreement with previous studies [17]as shown in table (1) and the levels of serum lipids profile TC , TG , HDL-C ,VLDL-C and LDL-C in induced hyperlipidemic rabbits (group A and B) were aboout 530.83, 365.55, 26.82, 73.10, 430.89 mg/100ml (as average) respectively(table 2) which are in agreement with that reported [10].

The effect of aqueous extract of *Capparis spinosa* with a concentration of 100 mg/ml and therapeutic dose of 5 ml /kg/day for thirty days on the levels of serum lipids profile for induced hyperlipidemic rabbits (group B) was performed and the result demonstrated that the aqueous extract had lowered statistically (P<0.05)the level of TC , TG , LDL-C and VLDL-C by about (26.6 %) , (22.03 %) , (28.8 %) and (21.8 %) respectively and had no effect on the levels of HDL-C after thirty days of treatment(Table 3) .

The last part of our study is performed to investigate the effect of aqueous extract of *Capparis spinosa* on serum lipids profile in normal rabbits (group D) for thirty days and the study showed that the aqueous extract had lowered statistically(P < 0.05) the levels of TG and VLDL-C by about (24.1 %) and (24.09), respectively and had no effect on the levels of TC , HDL-C and LDL-C after thirty days of administration (table 4) .

The aqueous extract of *Capparis spinosa* studies have been reported to contain a *number of antioxidant phytochemicals since as Quercetin - 3 – rutinoside (rutin) and* sterols (which has an ethylediene group in the side chain are believed to be one of most effective antioxidants) , these antioxidants display a remarkable role in various pharmacological activity including anti–hyperlipidemic activities , also It is known that physical and chemical agents induced oxidative stress can cause various diseases such as cardiovascular disease , *Capparis spinosa* reported to contain anumber of antioxidant phytochemicals such as flavonoids (rutin) and other polyphenols [10].

Rutin in *Capparis spinosa* had properties affecting the permeability of the blood capillaries [18].
Eight Compounds were isolated from *Capparis spinosa* by chromatographic methods as beta-sitosterol , vallinic acid , p-hydroxy benzoic , protocatechuic acid , uracil , butanedioic acid and uridine . phenolic acid plays an important role in its hyperlipidemic activities [19] .

It has been reported that linoleic acid in *Capparis spinosa* prevents diovascular *Capparis spinosa* aqueous extract of 10 mg / ml posses invitro vasorelaxant effect which may be mediated via α-adrenoreceptors antagonism and / or modulation of nitric oxide synthesis [20] .

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References :

1. *Bond , R.E. , The Caper bush , Herbarist , (1990) , 5, 77 – 85.*
2. *Aslanturk , O.S. and Tulay , A.c. , (2009) " Genotoxic and Antimutagenic effect of Capparis spinosa L. on the Allium cepa L. Root Tip Meristem Cells " , Caryologia , Vol. 62 , No2 : 114 – 123 .*
3. *Eddouks , M. , A. Lemhadri and J.B.Michel .(2004) , Coraway and Caper ; potential Anti- hyperglycaemic plant in adiabetic rate . J. Ethanopharmacol. , (94) : 143 – 145.*
4. *Mantway , M.W. , M. A. Homed , E. M. Sammour and M. sanda ,(2004) " Influence of Capparis spinosa and Acacia Arabic on Certain biochemical haemolymph parameter of Biomphalaria alexandrine " , J. Egypt . Soc. parasitol. , 2 (34) : 659 –6 77.*
5. *Wu , J.H. , F.R , Change , K. Hayashi , H. Shiraki , C.C. Liaw , Y. Nakanishi , K. F. Bastow , D. Yu , I.S. chen and K. H. Lee , (2003) , antitumor agents part 218 : Capamensin A , anew invitro anticancer principle , from Capparis sikkimensis . Bioorg Med . chem. . Lett . , (13) : 223 – 225.*
6. *Ozcan M. ,(2005) , Mineral composition of different parts of capparis ovata Desf . Growing Wild in Turkey , J. Med. Food , 8 : 405 – 407.*
7. *Al-Jubouri , H. F. , Al-Jalil , B. H. , Inge Farid , Fadhil Jasim and Selman Wehbi , (1990) ," The effect of chamomile on hyperlipidemias in rats " , J. Fac. Med. Baghdad , Vol. 32 , No. 1., p:123- 142*
8. *Harborn , J. B. , Marbay , T. J. and Marbay , H. ,(1993) " physiology and Functions of Flavonides " , Academic press , New York , San Francisco , p:52-67.*
9. *Yokoyama , S. Hayashi , R. and Yamamato , A. (1984) " characterization and experimental use in hypercholestrolemic rabbits , Clin. Chem., 4: 276 – 282.*
10. *Morel , D. W. , Moya , M. and Friday , E. K. , (1994) , Treatment of cholesterol – Fed rabbits with dietary vitamin E and C inhibit lipoprotein oxidation but not developed of atherosclerosis , J. Nutr . 124 : 2123 – 2130.*
11. *Gokkusu , C. oz , F. oz , H., (1992) " the effect of sublingual salivary gland on erythrocyte lipid peroxidation in cholesterol – Feed rabbits , Turk. J. Med. Biol. Res. , 3 : 121 – 125 .*
12. *Allian , G. C. , Poon , L. S. and Chan , C. S. , (1974) " Enzymatic determination of total serum cholesterol , Clin. Chem. 9: 314-319.Fossati , P. and Principle , L. S. , (1982) " serum triglyceride determination calorimetrically with an enzyme that produce inflammatory reaction . Amm. J. pathol .Warnic , G. , Benderson , J. and Albers , J. (1982)," Dextran sulfate Mg++ . precipitation procedure for quantitation of high density lipoprotein cholesterol , Clin. Chem. 5:123-129.Wilson , P. W. , (1988) , why treated dislipidemia , Saudi . Med. J. , 19 (4) : 376 – 381 . Fridewald , W. T. , Levy , R. L. and Fredrickson , D. S. , (1972)" Estimation of concentration of low density lipoprotein cholesterol in plasma with out use of the preparative ultracentrifuge , Clin. Chem. , 18 : 499 – 509.*
13. *AL- Omer, L.W. , (1984), MS.C. Thesis , College of verterinary Medicin, University of Baghdad.*
14. *Sharaf , M. , AL- Ansary, M.A., and Saleh, N.A.M. , (2006), Quercetin triglycosidefrom Capparis spinosa, Fitoterpia, 71: 46- 49 .*
15. *Yang Yu , Huiyuan Gao , Zhishu Tang , Xiaomi song and Lijun Wu ; (2006), " several phenolic acids from the fruit of Capparis spinosa ", Asin J. of Traditional medicines , 1: 3-4 .*
16. *Zaggwagh ,N.A. , Michel, J. B. and Eddouks , (2007) " Cardiovascular effect of Capparis spinosa aqueous extract , part VI : In vitro vasorelaxant effect " American J. of pharmacology and toxicity (3) : 135-139 .*