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Effects of methanolic extract of *Crataegus oxyacantha* on blood homeostasis in rat

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ABSTRACT

We investigated the effects of the extract of C. oxyacantha in rats by monitoring blood homeostasis and body weight as well as toxicity. Animals were treated daily with an oral dose of 100mg/kg body weight for 12 weeks. The powder of the plant was extracted in Soxhlet apparatus with methanol. Changes in hepatic enzymes levels were not observed in C. oxyacantha treated rats after 12 weeks of treatment. The serum cholesterol, triglycerides and glucose levels and the count of leukocytes and platelets decreased significantly by 15.5, 22, 16.5, 35 and 32%, compared to control values, respectively; while haematocrit and haemoglobin levels increased significantly by 6.4 and 17.4%, respectively. In parallel, significant slowdown of the body weight evolution was observed in C. oxyacantha treated animals comparatively to the animal control group. These results support the traditional use of C. oxyacantha as a treatment of the dyslipidemia and the hyperglycaemia, and related abnormalities; however, indicate a relative toxicity of this plant.

Key words: *Crataegus oxyacantha*, methanolic extract, Biochemical and Haematological parameters.

INTRODUCTION

The medicinal plant occupy a prominent place in the treatment of several pathologies and is the key point of traditional medicine, modern medicine uses them not only for therapeutic reasons but also for the development of new therapeutic molecules [1]. The *Crataegus oxyacantha* is one of the most used plants in therapy, it has properties hypotensive [2] vasodilatory, antispasmodic, sedative, slightly hypnotic and anxiolytic effects [3,4]. It has also been used to fight against gout,

pleurisy, and the vaginal and as a antihaemorrhagics [5]. The majority of studies on this species, however, produce evidence of its cardiotonic properties[6]. Other studies also describe its activities: hypolipidemic[7], hypocholesterolemic, antiarterosclerotic [8], and cardioprotective [9].

In Morocco *C. oxyacantha* is consummate for traditional treatment of some pathologic and currently, in order to ensure support diabetes, traditional medicine uses this plant for its hypoglycemic effect, but the latter is used alone or in combination with other plants. On the other hand the cost of the management of this disease is increasingly a burden to society especially in countries in developing and in view of consequences caused by this disease [10; 11], and hence the importance of confirming the presence of this activity (hypoglycemia) and to define the safe level of use in assessing its impact on certain parameters of care for patients diabetes.

This study was therefore undertaken to determinate the effects of a chronic treatment of *C. oxyacantha* on blood biochemical and haematological parameters in rat.

EXPERIMENTAL SECTION

Preparation of the C. oxyacantha extract
C. oxyacantha plant samples were collected from the Tamara district of Morocco during the month of May, 2007. The plant was authenticated at the Department of Biology, Faculty of Science-Rabat. A specimen of the original collection was placed in the herbarium of the Faculty of Medicine and Pharmacy of Rabat.

Whole plant of *C. oxyacantha* was dried in shade and crushed to fine powder. The dried powder of the plant (200 g) was extracted in Soxhlet apparatus with methanol. The extract was evaporated to dryness *in vacuo* using a rotary evaporator at 70 ºC to give a yield of 33.2 %.

Experimental animals
The study was performed on adult Wistar rats (180-220 g), from breeding Laboratory of Pharmacology, Faculty of Medicine and Pharmacy of Rabat

The food was withdrawn on the day before the experiment; however, they were allowed free access to water. Throughout the experiments, the animals were handled according to the prescribed ethical guidelines of laboratory animals [12].

Animals were maintained on a 12 h light cycle and fed standard lab chow ad libitum. Rats were randomly assigned to two experimental groups of 12 animals each. The *C. oxyacantha* treated rat group (C-rats) received daily administrations of 100mg/kg body weight of *C. oxyacantha* by oral gavage (force-feeding) for 12 weeks period. Control rat animals (T-rats) were Control rat animals (T-rats) were treated in an identical fashion with 1 ml/kg body weight of water. Body weight was measured at J0 and 2, 4, 6, 8, 10 and 12 weeks.

Metabolic and haematological measurements
Metabolic and haematological measurements were realised at J0 and, 4, 8 and 12 weeks following of extract *C. oxyacantha* administration. The blood was obtained from the retro-orbital sinus (2 ml). Metabolic measurements were realised spectrophotometrically, and haematological parameters were determined automatically by ABX COBAS LO.

Statistical analysis.
All data are expressed as mean_SD. Student’s and ANOVA tests were applied.

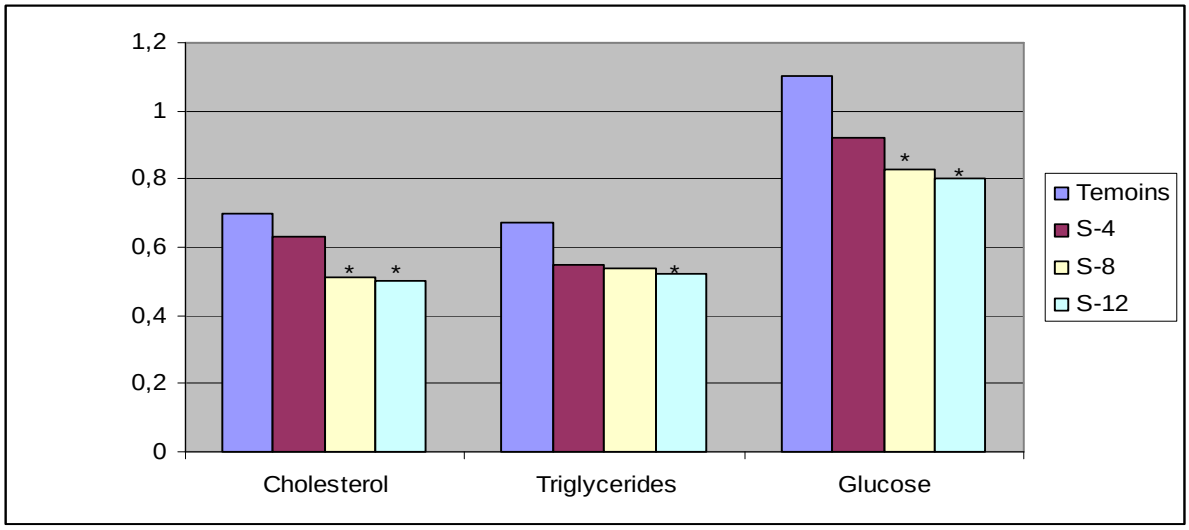
RESULTS

Biochemical parameters

Fig. 1 shows the effects of *C. oxyacantha* on the metabolism of plasma lipids and glucose. After 12 weeks of daily treatment (100mg /kg), serum cholesterol, triglycerides and glucose levels were decreased significantly by 15.5, 22, 16.5%, respectively when compared to the control values observed in control animals (P<0.05).

Fig.1: Effects of *C. oxyacantha* (100mg /kg/day) on plasma lipids and glucose in rat.

Rats were treated with C. oxyacantha seed extract (rats; n=12) for 12 weeks. Plasma lipid and glucose values are given for the 4, 8 and 12 weeks treatment points. Values are expressed as mean_SD. Values in control rats (T-rats) were similar at all points and are grouped for the sake of simplicity.



**Significantly different from T-rats group by Student's test, P<0.05.*

Table 1 illustrates the effects of *C. oxyacantha* on plasma hepatic enzymes, bilirubin, uric acid and creatinin in rats as a function of treatment time. After 12 weeks of daily treatment (100mg/kg), plasma key hepatic enzymes, bilirubin, uric acid and creatinin did not increase significantly compared to the control values observed in control animals.

Table 1: Effects of *C. oxyacantha* (100mg /kg/day) on plasma key hepatic enzymes, bilirubin, uric acid and creatinin in rat as a function of treatment time.

		Rats treatement time (Weeks)		
Parameter	**T-rats**	**4**	**8**	**12**
ASAT (U/l)	128 ± 59	120 ± 40	156 ± 76	171 ± 72
ALAT (U/l)	47.5 ± 9.2	41.1 ± 12.1	38.4 ± 14.6	43.4 ± 15.7
ALP (U/l)	213.2 ± 68.4	187.8 ± 61.4	149 ± 57.4*	139.4 ± 59.3*
bilirubin (mg/l)	1.34 ± 1.0	1.10 ± 0.94	1.50 ± 1.2	1.10 ± 0.7
Uric acid (mg/l)	15.8 ± 5.8	15.5 ± 5.13	17.1 ± 7.3	14.2 ± 4.2
Creatinin (mg/l)	5.9 ± 1.32	6.36 ± 0.87	5.21 ± 0.85	6.76 ± 0.77

T-rats, control rats group; ASAT, aspartate-aminotransferase; ALAT, alanine-aminotranferase; ALP, alkaline phosphatase; GGT, gamma-glutamyltransferase. Values are expressed as mean_SD (n=12).
** Significantly different from T-rats by Student's test, P<0.05.*

Haematological parameters

Table 2 illustrates the haematological parameters in *C. oxyacantha* treated rats as a function of treatment time. After 12 weeks of treatment, the leukocytes and platelets counts decreased

significantly when compared to the control values (P<0.01), whereas heamatocrit and haemoglobin level increased significantly (P<0.05).

Table 2: Effects of *C. oxyacantha* (100mg /kg/day) on haematological parameters

Parameter	T-rats	Rats treatement time (Weeks)		
		4	8	12
Erythrocytes (10^6/mm^3)	7.23 ± 1.03	7.1 ± 0.57	6.64 ± 0.44	6.89 ± 0.68
Leukocytes (10^3/mm^3)	7.25 ± 1.71	7.93 ± 1.6	7.6 ± 1.3	6.7 ± 1.5*
Platelets (10^3/mm^3)	743 ± 121	680 ± 82	570 ± 109**	554 ± 110**
Haematocrit (%)	40.99 ± 4.32	40.26 ± 2.49	40.73 ± 3.15	43.6 ± 3.11*
Haemoglobin (g/dl)	13.12 ± 1.45	13.53 ± 0.62	14.3 ± 0.94*	14.4 ± 0.64*

T-rats, control rats group; Values are expressed as mean_SD (n=12).
** Significantly different from T-group by Student's test, P<0.05.*
*** Significantly different from T-group, P<0.01.*

Effect on body weight

Fig. 2 shows the evolution of the mean body weight in the *C. oxyacantha* treated and control rat groups. The progression of body weight was not similar in both groups. Indeed, the *C. oxyacantha* treated rats had significantly lower body weights than their control rat counterparts; this effect is statistically significant from the 6 weeks treatment point onward (P<0.01).

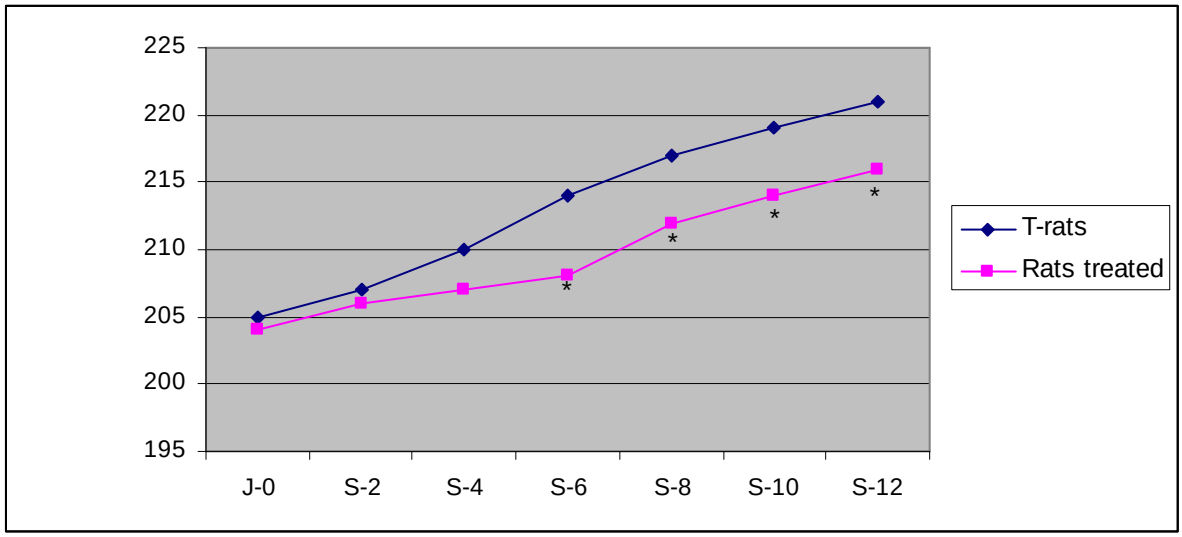


Fig 2: Effects of *Crataegus oxyacantha* (100mg /kg/day) on body weight evolution.
T-rats, control-rats group; (n=12). Values are expressed as mean_SD.
**Significantly different from T-rats group by Student's test, P<0.05.*

DISCUSSION AND CONCLUSION

The results obtained in the present study clearly show that *C. oxyacantha* chronic treatment was effective in influencing blood homeostasis in rat. Serum lipids and glucose levels, and leukocytes and platelets counts was decreased significantly, whereas the haematocrit and haemoglobin concentration was increased significantly. The serum key hepatic enzyme concentrations did not change significantly. In parallel, a slight slowdown of body weight was observed. The effect of *C. oxyacantha* on blood homeostasis is not without precedent. Previous studies have shown that treatment of *C. oxyacantha* significantly diminishes plasma glucose levels [11, 13]. Analogous results, accompanied with decreases in serum lipids level and body weight have also been observed [7, 8, 13, 14]. The slowdown of body weight evolution in *C. oxyacantha* treated rats might be related to the serum lipids and glucose levels decrease as a consequence of a possible

reduction in food intake by the drug administration. Other explanations are also possible, like a toxic effect.

In conclusion, these results support the traditional use of *C. oxyacantha* and its derived products as a treatment for the dyslipidemia and the hyperglycaemia, and related abnormalities; however, indicate a relative toxicity of this plant extract. Acute and chronic toxicity and the mode of the action of the *C. oxyacantha* must be studied.

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