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HYPOLIPIDEMIC AND HYPOGLYCEMIC AFFECTS OF TEUCRIUM POLIUM L. CAPITATUM EXTRACTS IN RATS

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ABSTRACT

This study was designed to investigate the chronic treatment of *Teucrium polium* L. *Capitatum* on serum glucose, and lipid profiles (serum total cholesterol, triglycerides), and plasma Na⁺, K⁺, urea concentrations. Ethanolic extract of *Teucrium polium* L. *Capitatum*, was administered orally (20-50 mg/kg body weight) in laboratory rats for 30 days. The different doses of *Teucrium polium* L. *Capitatum* on serum lipid profile viz. total cholesterol and triglycerides, glucose, and serum Na⁺, K⁺, urea concentrations were studied and compared against respective control groups. Serum cholesterol and triglyceride values decreased significantly ($p < 0.01$) in the test groups, but serum glucose values were unaffected by *Teucrium polium* L. treatment compared to non-treated control animals. According to the experimental findings, the decreased lipids clearly showed the antihyperlipidemic effect of *Teucrium polium* L. *Capitatum* apart from its antidiabetic effect.

Key words: *Teucrium polium* L., ethanolic extract, hypolipidemic activity, hypoglycemic propriety.

INTRODUCTION

Many herbs used for the treatment of diabetes in different systems of traditional medicine have shown hypoglycemic and antihyperlipidemic activities when tested on animal models.

Teucrium polium L. *Capitatum* (Lamiaceae), is a perennial herb that can measure 10-45 cm in height, the stems are numerous, robust, long woody, erect or straightened, the leaves are opposite sessile, or tuft, very short petioles, they measure 7-27 mm, the flowers are grouped in rounded oval head terminal, rarely white pourprines bloom from May to August, the fruit consists of 4 parts brown and decorated in their area network [1].

Traditionally, especially in the Mediterranean countries, *T. polium* L. *Capitatum* has been used as anti-ulcer, anti hypertensive, hypoglycemic, antispasmodic, anti-inflammatory, antinociceptive, antidiuretic, and antioxidant activity [2-8].

The aim of the present study was designed to observe the effects of this medicinal plant on blood biochemical parameters of the rats after chronic administration of the ethanolic extracts of *Teucrium polium* L. *Capitatum* in order to confirm its assumed beneficial property.

MATERIALS AND METHODS

Preparation of *T. polium* L. extract

The flowering tops and leaves of *T. polium* L. were collected from Biskra, Algeria, in early summer 2010, dried at room temperature and ground to a fine powder, and extracted with ethanol 95%. Then the liquid extract was concentrated on vacuum rotary evaporator to yield dry residue of 200g (47.76% yield) and was stored at 4 °C.

Phytochemical analysis

The extracts of *Teucrium polium* L. were subjected to the phytochemical tests for the presence of carbohydrates, flavonoids, tannins, phenolic compounds, saponins, and steroids. [9].

Experimental preparation

Experiments were performed on male albino rats (*Rattus rattus*) weighing 200-250g, were obtained from Pasteur institute, Algeria. They were maintained on standard light, temperature and feeding conditions for 10 days before the experiment. They were housed under standard conditions of temperature, humidity and dark light cycle (12h – 12h). and were allowed access to food and water ad libitum.

The ethanol extract of *T. polium* L. freshly dissolved in olive oil, and was administrated by garages using four groups of rats (n=3). The first group was treated control; the second one was treated with olive oil, while the third and the fourth ones were treated with 20mg/kg and 50mg/kg of *T. polium* L. respectively. Treatments were made using alternate daily injections for 30 days.

Studied activity

Blood biochemical parameters were measured including glucose, cholesterol, triglycerides, urea, Na⁺, K⁺.

Statistical evaluation

Results are expressed as means ± SEM, significant differences among the groups were determined by one-way ANOVA using STATIT CF, with Newman and Keuls test, with the significant level set at P<0.01.

RESULTS AND DISCUSSION

Phytochemical screening

The preliminary phytochemical screening of the hydro alcoholic extract of *T. polium* L. showed the presence of flavonoids, glycosides, saponins, carbohydrates, tannins, terpenoids and the absence of alkaloids in the extract.

Effects of *T. polium* L. on hypolipidemic activity

The current results demonstrates a significant (P<0.01) hypolipidemic effect of *T. polium* L. ethanolic extract at doses of 20 and 50mg/kg. (Table 1)

Table 1: Biochemical analysis of the rat blood after chronic treatment with *T. polium* L. extract

Biochemical parameters	Non- treated	Olive oil	20 mg/kg T. polium L.	50 mg/kg T. polium L
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Cholesterol (m mol/L)	0.72 ± 0.22	0.96 ± 0.05	0.34 ± 0.03	0.88 ± 0.12**
Triglyceride (m mol/L)	0.80 ± 0.33	0.39 ± 0.03	0.30 ± 0.04	0.32 ± 0.05**
Glucose (m mol/L)	0.75 ± 0.03	0.83 ± 0.03	0.87 ± 0.12	0.82 ± 0.06
Urea (m mol/L)	0.51 ± 0.14	0.62 ± 0.27	0.32 ± 0.06	0.71 ± 0.04
Na+(m Eq/day)	121.07 ± 2.10	89.17 ± 1.71	104.93 ± 10.07	70.03 ± 2**
K+ (m Eq/day)	26.43 ± 2.30	15.44 ± 0.99	24.00 ± 4.73	17.35 ± 5.05**
Note: (Data are expressed as means ± SEM) (n=3, **P<0.01).				

This could cause a 47.22% reduction in total cholesterol and up to a 37.5% reduction in serum triglyceride. In this context, the lipid-lowering effect of *T.polium* L. in rats is related to saponin content. Saponins lower the plasma LDL-cholesterol levels through an increased turnover of LDL-cholesterol in hepatic tissue which is then converted to bile acid and making it unavailable for intestinal absorption [10]. Saponins also are reported to lower triglycerides by inhibiting pancreatic lipase activity [11], the subsequent decline in VLDL-cholesterol levels could be directly correlated to a decline in triglyceride levels [12]. Whereas a significant decrease in triglyceride level was also found may be by enhancing the activity of lipase enzyme that hydrolyzes triglyceride or by increasing excretion of triglycerides via feces [13].

It seems also that antihyperlipidemic properties of *T.polium* L. extract may be attributed to some antioxidants such as flavonoids and terpenoids are known to scavenge free radicals, including hydroxyl and improve lipid profiles [14].

However a significant increase (P<0.01) of plasma cholesterol level was observed at a dose of 50mg/kg, several studies suggest that *T.polium* L. increases cholesterol level of diabetic rat [15]. Although it has been reported that the liver and kidney damage increase consequently cholesterol under the condition of prolonged herb administration. Besides raising insulin secretion also improve lipoprotein metabolism [16, 17]. This indicates that *T.polium* L. acts as antihyperlipidemic activity reducing the risk of atherosclerosis, heart attack and cardiovascular diseases.

Effects of *T.polium* L. on hypoglycemic activity

We didn't show any hypoglycemic effect of aqueous extract of *T.polium* L. (Table 1). Our results are considered as a part in accordance with [15, 16, 18] which showed that the blood glucose was unaffected by *T.polium* L. treatment, and on the other part, a significant reduce in glucose serum [19, 20] through enhancing insulin secretion by the pancreas [19].

Effects of *T.polium* L. on other blood composition

We observed also a significant reduction (P<0.01) in urea serum with 20mg/kg of *T.polium* L. treatment but the difference was not significant, these results must be taken as a reflection of renal nitric oxide production [21].

A marked decrease (P<0.01) in serum sodium and potassium were found after chronic treatment with 50mg/kg of *T.polium* L. compared to the negative control. (Table 1)

Further studies are warranted to confirm and characterize that the serum potassium concentration is a balance between intake, excretion and distribution between the intra- and extracellular space [22]. The normal transcellular distribution of potassium is maintained by at least two hormonal signals [23]. Insulin and β -adrenergic catecholamines promote the entry of potassium into muscle cells by stimulating Na⁺-K⁺-ATPase [24].

Comparison of weight between control and test groups before and after the experiment period

There were a significant difference ($P < 0.01$) in final body weight in rats. The body weight of the *Teucrium polium*-treated rats was found to be significantly lower as compared to control rats (Figure1).

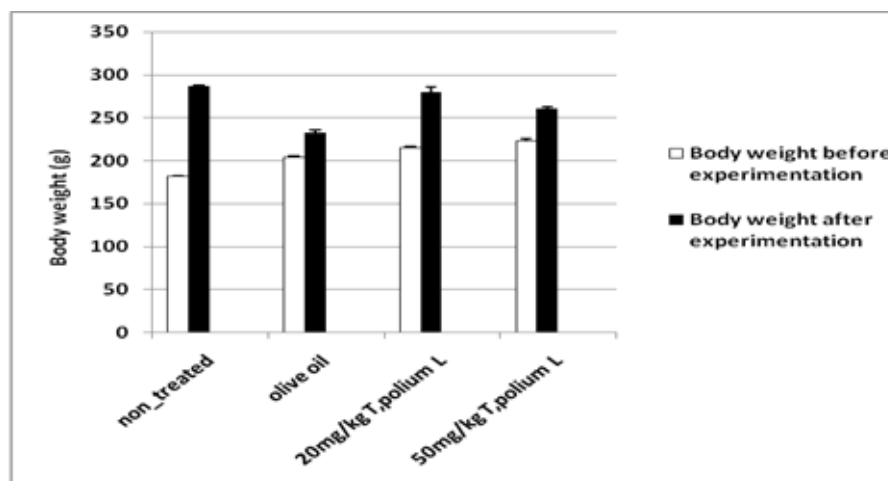


Figure1. Comparison of weight between control and test groups before and after chronic treatment with *T. polium* L. extract (n=3, ** $P < 0.01$).

CONCLUSION

The present investigation establishes a lipid-lowering effect of *Teucrium polium* L., and no hypoglycemic property was found in experimental animals. Although it shows that the plant extract induced a markedly reduced in plasma potassium and sodium concentrations. In addition, the rats treated by *T. polium* L. extract gained more body weight that controls rats, further studies to identify the active components and further verify their relevant pharmacological activities are warranted.

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