

The Effect of the Water Extract of Soybean Seeds in Two Different Doses on Hyperthyroidism

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ABSTRACT:

The study was conducted to determine the effect of the water extract of soybean seeds on the levels of FT3 and FT4 in the serum of adult Albino mice in which hyperthyroidism was introduced, and to highlighting its therapeutic efficacy.

The study included 40 Albino mice belonging to the strain "Balb / c". Mice were distributed into four experimental groups (10 mice in each group).

The first group was the physiological control. It was dose with 0.9% Nacl as a physiological solution until the end of the experiment. The second group was a pathological control that was administered with Levoteroxin LT4 at a dose of 100 µg / 100 g for 10 consecutive days.

Whereas, the third and fourth groups were treated with 300 mg / kg and 500 mg / kg, respectively, from the extract of the water soybean seed after introducing hyperactivity for four consecutive weeks. At the end of the dose period, animals were drugged, and blood samples were drawn by stabbing the heart.

Results showed that the soybean seed extract can be considered a natural treatment for hyperthyroidism. The effect of the 300 mg / kg dose was more effective compared to the effect of the 500 mg / kg dose.

Keywords: Hyperthyroidism, water extract, soybean seeds, FT4 and FT.

I. INTRODUCTION

Plant kingdom provided an inexhaustible source of medicinal plants, that were initially used in its raw form. With the development of science, methods of their using developed and diversified. Where the active substances of each plant were extracted and isolated, and their health effects were determined in order to use them instead of pharmaceutical drugs which have side effects [1], and which heal the target organ but cause damage to some of the non-target organs, therefore the negative effects of the

pharmaceutical drugs may be similar to its positive [2].

Thyroid disorders are the most common of endocrine disorder, which is mainly divided into hypothyroidism and hyperthyroidism.

The incidence of subclinical thyroid disease reached to (5 -9 %), while the incidence of clinical thyroid disease reached to (0.8 - 7.5 %) [3].

Its hormones regulate metabolic processes and oxygen consumption by body cells [4].

It also plays an important role in the growth and development of the functions of the heart, nervous and reproductive system and the rate of basic metabolism ([5], [6]).

Based on the effects of its important physiological hormones, the thyroid gland has been classified as the center of human and structural development [7].

Soybeans are known to be a unique vegetable protein source because they are equivalent to animal protein due to its content of all amino acids, low fat and cholesterol-free [8].

Thus, it can be considered as a healthy vegetable protein source with little harm compared to animal protein.

Soybean (*Glycine max* (L.) Merrill) is a legume plant, native to East Asia. According to re. [9], it contains: 36% proteins, 30% carbohydrates, 20% fats, 9% water, 0.17-6.16% soaps, 3 mg per gram of dry weight isoflavones, which are known as phytonutrients belonging to the family of macronutrients flavonoids, with its distribution is very limited in the plant kingdom due to the lack of the enzyme converting the flavone precursor to isoflavones, which is called Calquenizomeraz in the majority of its plants.

Soy isoflavones are available in two forms as to re. [10]: free glycone: daidzein-glycitein genistein, and glycoside: genistin-daidzin-glycitin.

It is the best source of B vitamins in addition to its content rich in calcium, magnesium, iron, phosphorus and potassium [11]. It has been classified by FAO as Oilseeds [12].

It takes the first place globally in terms of cultivated area and production among the major oil seed crops [13].

Several research reports have confirmed an association between excessive intake of soybeans and hypothyroidism ([14], [15], [16], [17]). Based on this correlation, this study aimed to study the possibility of controlling excessive thyroid hormonal secretions by extracting the water soybean seed.

II. MATERIALS AND METHODS

A. Plant substance:

The pure soybean seeds "sb-44 variety" was obtained from the Public Authority for Agricultural Research in Damascus.

B. Experiment Animals:

In this study, 40 adult females from Albino Female Mice (*musculusMus*), Balb / c, obtained from the Scientific Research Center in Damascus (Barzeh), 4-5 weeks ages. Mice left in the laboratory for 8-12 weeks, to adapt with experiment conditions.

Animals were placed in special plastic crates with a floor furnished with sawdust in the animal house of the Faculty of Pharmacy - Tishreen University, with a temperature of around 22-28 °C and a good ventilation.

The lighting was 12 light - 12 dark. Food was whole wheat and water provided freely and continuous and in sufficient quantities for the duration of the experiment.

C. Experimentally Hyperthyroidism:

Oral dosage of LT4 from IDM International Oral Company, 100 mcg Levothyroxine Sodium at a dose of 100 µg / 100 g for 10 consecutive days [18]. Each pill was crushed and dissolved in distilled water.

D. Extract Preparing:

Extract was prepared as a method of [19], as following:

Soybean seeds were crushed with an electric mill. 20 g of powder was added to 400 ml distilled water. The previous ingredients were mixed with a magnetic mixer for an hour.

It was then left for 24 hours at laboratory temperature. The product was filtered using several layers of medical gauze. The filter was distributed on 10 ml plastic tubes and centrifuged at 3000 rpm for 10 minutes. The precipitator was ignored. The filter

produce was filtered a second time using Whatman's 0.1cm permeability filter papers to obtain a clear solution. The produce was dried at 40°C, then saved on refrigerator until use.

E. Experiment Design:

Albino female mice were randomly divided into four groups (in each group 10 mice) as follows:

The first experimental group (G1) was treated with a physiological solution of NaCl (0.9 %) throughout the experiment period.

The second experimental group (G2) was administered with Levoteroxin LT4 at a dose of 100 µg/ 100 g for 10 consecutive days.

The third experimental group (G3) was 300 mg / kg for four consecutive weeks after introducing hyperparathyroidism within it with a dose of LT4 for 10 days.

The fourth experimental group (G4) at a dose of 500 mg / kg for four consecutive weeks after the introducing of hyperthyroidism within the dose of LT4 for 10 days.

F. Blood Samples Collect:

Blood was taken through a stabbing of the heart using insulin syringes after the experimental animals were anesthetized with chloroform.

The taken blood was then placed in dry, anticoagulant-free plastic tubes. The serum was separated by centrifugation at a speed of 4000 rpm for 10 minutes. It was placed in sterile and clean tubes by micropipette, and kept at (-20 ° C) for later biochemical tests.

G. Hormones Measurements:

Kit from the German company "SIEMENS" was used to determine the levels of the studied hormones, using the device IMMULITE 1000 systems.

H. Statistical Analysis:

Results were statistically analyzed using Statistical Package For Social Sciences (SPSS) and Excel 2010.

III. RESULTS and DISCUSSION

A. Comparison between the mean values of thyroxine FT4 in the studied groups:

Results showed that mean of FT4 increased significantly (P <0.05) in the pathogenic control which is introducing hyperthyroxine, and decreased significantly (P <0.05) after treating with soybean seeds extract by the studied doses (Table 1, Figure 1).

Table (1): Means of FT4 and the significant differences between the studied groups

the group	Mean ± SD	MSE	F	p-value	Result
physiologic control	B1.29±0.08	0.078	13.88	0**	significant
pathogenic control	C1.84±0.09				
300 mg/ kg of the extract	A0.96±0.1				
500 mg/ kg of the extract	AB1.17±0.09				
LSD 5%	0.27				

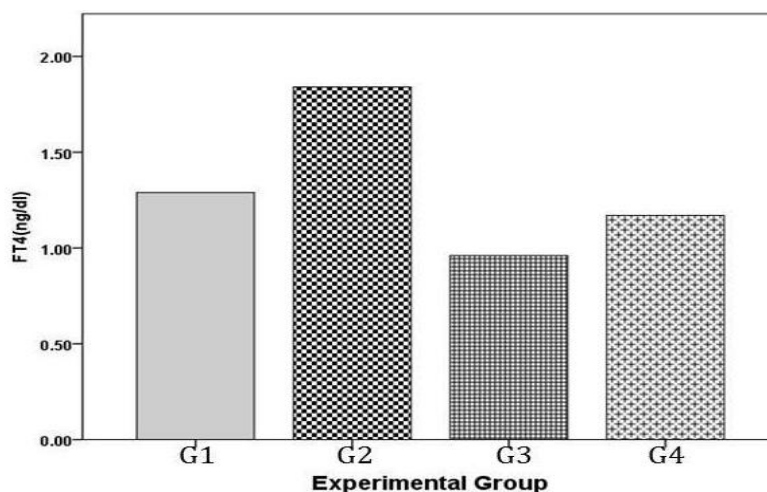


Figure (1): The effect of the two doses of soybean seed extract in means of FT4 compared with the physiologic and pathogenic control

Table (1) showed significant differences between the pathogenic control and each of the third and the fourth groups, which treated with water extract of soybean seeds, 300 and 500 mg/ kg, respectively. Results also showed no significant differences between the effect of the two doses of extract.

The treatment percentage of the two studied doses of the extract:

Results showed decreasing in means of FT4 under treating with 300 and 500 mg/ kg compared to the pathogenic control, with a values attained (47.83 and 36.41 %), respectively. So, the dose (300 mg/ kg) was the most effective in reduction means of FT4 compared to the dose (500 mg/ kg) (Table 2).

Table (2): The treatment percentage of the two studied doses compared with pathogenic control

The dose	The treatment percentage (%)
300 mg/ kg of the extract	- 47.83
500 / kg of the extract	-36.41

B. Compare means of FT3 among the studied groups: decreased significantly ($P < 0.05$) after treating with the soybean seed extract at the studied doses (Table 3, Results showed that mean of FT3 increased significantly ($P < 0.05$) in the pathogenic control, and Figure 2).

Table (3): Means of FT3 and the significant differences between the studied groups

the group	Mean ± SD	MSE	F	p-value	Result
physiologic control	B304.9±22.68	3342.83	13.42	0**	significant
pathogenic control	C421.9±12.14				
300 mg/ kg of the extract	A239.7±15.15				
500 mg/ kg of the extract	AB288.2±17.91				
LSD 5%	52.75				

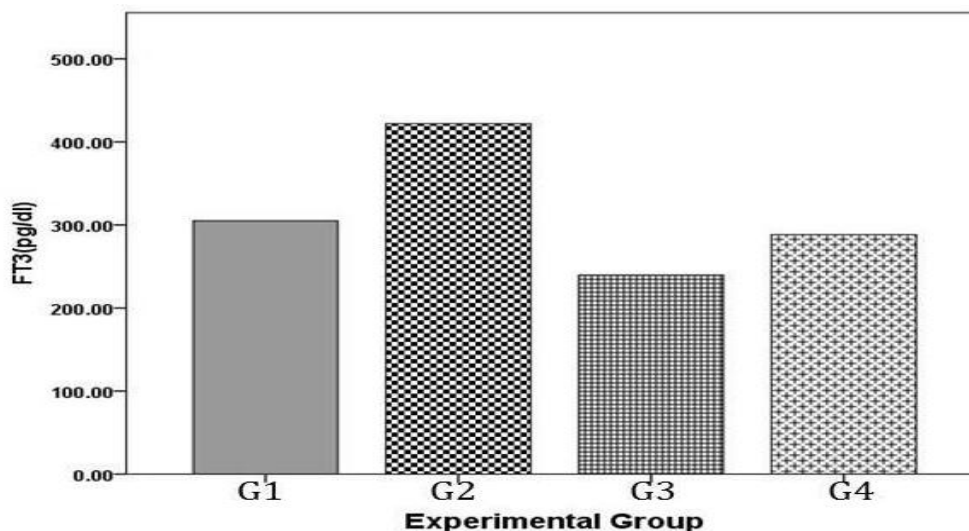


Figure (2): The effect of the two doses of soybean seed extract in means of FT3 compared with the physiologic and pathogenic control

Results showed significant differences between the pathogenic control and each of the treating groups (300 and 500 mg/ kg), and no significant differences between the two doses (Table 3).

The treatment percentage of the two studied doses of the extract:

Results showed reduction in FT3 values in the pathogenic control when it treated with 300 and 500 mg/ kg with a rate of 43.19 and 31.69 %, respectively. Therefore, the dose 300 mg/ kg of the extract was the most effective in reduction FT3.

Table (4): The treatment percentage of the two studied doses compared with pathogenic control

The dose	The treatment percentage (%)
300 mg/ kg of the extract	- 43.19
500 mg/ kg of the extract	-31.69

Results indicate to possibility to use the water extract of soybean seeds as a natural cure for Hyperthyroidism, due to its effect on thyroid hormones reduction. Where the thyroid disorders are the most common and risky of endocrine disorder [20], because of interference of its physiological hormones with act of other endocrine. So, the scientific researches highlight some plants which may be contribute in treating these disorders.

Levels of FT4 and FT4 increase significantly after oral treatment with LT4 for 10 days by 100 µg/ 100g, due to hyperthyroidism in albino females mice. This agree with each of ([21], [18], [22]). Where this drug gives artificial teroxine hormone directly to the thyroid, it is similar to the natural hormone T4 physiologically and chemically [23].

Results agree with re. [8] who refer to the inhibition effect of soybean of iodine taken, and inhibition act of thyroid on other hand, which mean reduction in thyroid hormones through adding it by 40 % to feed of male mice.

Also re. [17] refer to the effect of esoflavones soybean which inhibition iodine taken. Re. [24] refers to that adding soybean to the daily food of male mice by 50 % for 9 weeks causing reduction in teroxine levels.

Results also agree with re. [25] and [15] who indicated to the inhibition effect of soybean to levoteroxine absorption. These in general due to ability of flavones especially esoflavones to inhibit thyroidal peroxidase, then inhibit iodizing the tyrosine which reduction thyroid hormones secreting ([26], [27], [24]).

In this hand, re. [14] refer to the effect of esoflavones of soybean causing hypothyroidism. It was notable that soybean considers a major source of esoflavones in food ([11], [10]). Whereas re. [28] refer to that the expected explanation of these inhibition effect due to the mechanism which soybean esoflavones interference with thyroidal peroxidase activity which depends on iodine existing. It was notable that esoflavones classified as anti-thyroid, then inhibit it, that causing hypothyroidism in the case of hyper taking esoflavones for a long time.

Re. [29] refer to that big amount of soybean esoflavones increase liver- receiver of thyroid, but decrease correlation between thyroid receiver and DNA, which mean reduction of correlation with the target genes, then the genes will not be able to play its physiological role.

On other hand, the effect of hormones reduction is due to the big antioxidant activity of the water extract of soybean seeds [30]. Where

hyperthyroidism is a functional disorder associates with oxidation effort case, it acts to increasing production of the interaction oxygen ([22], [31]).

Depending on the previous results, it was notable that the effect of the dose (500 mg/ kg) was reflect to what was expected, less than the dose (300 mg/ kg). The reduction of effect with increasing of the dose may be due to its concentration of some materials such biotin. Where re. [32] refer to existing of 0.32 mg/ kg biotin in soybean seed. Re. [33] indicated to ability of biotin to causing a biochemical thyroidal poison due to its interference with thyroid function, associating with increasing the levels of FT4 and FT3. That also agree with [34], [35], [36].

IV. CONCLUSION

The water extract of soybean seed has an effective effect in treating hyperthyroidism through its ability on reduction the free teroxine levels FT4, and FT3 in the serum by a little doses. It conflicts to its negative effect by a big doses on the hyper secrete gland, where it caused a temporary biochemical thyroidal poison, related with biotins in body.

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