

## تقييم أثر ليفوثيروكسين، والمستخلص الفينولي لنبات المديد في اضطرابات الغدة الدرقية المستحثة في ذكور الفار بواسطة الثايوريا

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### الملخص:

يعد جنس المديد *Convolvulus* من النباتات الزهرية الذي يعود الى العائلة الملتفة *Convolvulaceae*. وهو *Convolvulus arvensis* (لبلاب الحقول) من الحشائش البرية التي تمتلك مستخلصات ذات فعالية أحيائية. اشارة البحوث الى ان عقار الليفوثيروكسين *Levothroxin* يستخدم لمعالجة النقص الذي يحدث في نشاط هرمون الغدة الدرقية.

يشير المستخلص الفينولي للاجزاء الهوائية لنبات المديد الى وجود أثر محسن لتنظيم اضطرابات الغدة الدرقية في تجربة ذكور الفأر. يشير هذا البحث الى ان مستوى هرمونات الغدة الدرقية، ثالث يود الثيرونين ( $T_3$ ) و الثيروكسين ( $T_4$ ) يقل معنويا ( $p < 0.05$ ) في ذكور الفأر المعاملة فمويا (10 ملغم / كغم من وزن الجسم من الثايوريا *Thiourea* لمدة 10 أيام) ومستوى ( $T_3$ ) و ( $T_4$ ) يزداد معنويا ( $p < 0.05$ ) في ذكور الفأر المعامل فمويا بالثايوريا *Thiourea* ، وعقار الليفوثيروكسين بالتعاقب. كما تشير الدراسة الى زيادة معنوية ( $p < 0.05$ ) في مستويات ( $T_3$ ) و ( $T_4$ ) في مجموعة الفار المعامل فمويا (200 ملغم / كغم من وزن الجسم) بالمستخلص الفينولي لنبات المديد *C. arvensis*.

تشير الدراسة الى ان المستخلص الفينولي لنبات المديد *C. arvensis* يعطي نتائج مقارنة لعقار الليفوثيروكسين *Levothroxin* وهذا مايشير الى ان النبات قد يحتوي على مركبات بولي فينولية فعالة.

## Evaloution of effects Levothroxin, and phenolic extracts of *Convolvulus arvensis* on Thyroid hormonal disorders Induced in Male Mice by Thiourea

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### Abstracts

The Convolvulus was a genus from flowering plants which belong Convolvulaceae family. *Convolvulus arvensis* (field bindweed) was a species of bindweed which have extracts of biological activities. Many of the reports indicated Levothyroxine drugs It which are used to treat thyroid hormone deficiency.

The phenolic extract for aerial parts of *C. arvensis* was showed enhances effect for the regulation of Thyroid hormones disorders in male mice experimental. This study indicated that levels of Triiodothyronine ( $T_3$ ) and thyroxine ( $T_4$ ) thyroid hormones in serum mal mice significantly decreased ( $p < 0.05$ ) in a group of mice which receive orally (10 mg /kg b.w) of Thiourea for 10 day, and levels ( $T_3$ ), ( $T_4$ ) significantly increased ( $p < 0.05$ ) in a group of mice receiving orally thiourea than Levothroxin respectably. In this work there was found significantly increased levels ( $T_3$ ), ( $T_4$ ) ( $p < 0.05$ ) in a group of mice which receive orally (200 mg /kg b.w) of phenolic extracts of *C. arvensis*.

This study indicates that phenolic extracts of *Convolvulus arvensis* may be given the same results as compared with the Levothroxin that plant may have active polyphenolic compound.

**Key words:** Thyroid hormones disorders, Phenolic extracts, Levothroxin drugs, Thiourea, *Convolvulus arvensis*.

## Introduction

Disorders of Thyroid hormone are related with the imbalance of triiodothyronine ( $T_3$ ) and thyroxine ( $T_4$ ) hormones which are secreted directly into the blood by the thyroid gland, the graveness of thyroid hormonal disorders leads to some of the diseases like hypertension, disturb the Basal metabolic rate (BMR) of the body and diabetes. Around half the illness of thyroid gland disease include hyperthyroidism and the other include hypothyroidism (1,2,3,4,5, 6,7,8). Thyroid gland hormone ( $T_3$  and  $T_4$ ) is overactive this cases called Hyperthyroidism.

An overactive utilization of iodine ( $> 1000 \mu\text{g/d}$ ) may leads to fetal hyperthyroidism. A common symptom of the thyroid gland is muscle weakness, weight loss, an irregular heartbeat and fatigue(9). Thyroid gland does not give enough thyroid hormone this cases called hypothyroidism. Maternal and fetal hypothyroidism may happen when previously established inclination maternal iodine stores are lacking and there is deficient maternal iodine allow in early pregnancy. In this occasion, the maternal iodine adjust may get to be distinctly negative and may never be reestablished, even with inevitable iodine supplementation (10).Levothyroxine drug is a fundamental pharmaceutical for the treatment of underactive thyroid conditions and is generally recommended. Orally taken levothyroxine sodium is utilized as substitution treatment as a part of conditions portrayed by decreased or missing thyroid capacity, for example, nontoxic goiter, myxedema, cretinism, or hypothyroidism. The reduced or missing thyroid capacity may come about because of practical inadequacy, essential decay, halfway or finish nonappearance of the thyroid gland, or the impacts of surgery, radiation, or anti-thyroid agents (11).

Natural products are the chemical substances created by a living organism present in nature, This substances have attracted the attention, they usually have biological or a pharmacological activity for use in pharmaceutical medication discovery and medication design, living organism such as marine organisms, terrestrial plants, or microorganism .

Convolvulus arvensis is extremely helpful plant. Different pharmacological activities of this plant have been acclimated and it is present that plant contains an extensive variety of phytoconstituents which should be investigated increasingly and more(12).Despite the fact that step by step plant medications are increasing

much importance for their moderate and safe nature, scientific investigations of the plant extracts towards the relief of thyroid gland disorders are meager (1,2,3,4,5,6,7,8). often of the reports was showed the plant extracts effected on only one thyroid hormone (T3 or T4) (13,14) therefore, this study aims to found a plant extracts may be regulate the thyroid gland hormones, and compares this extracts with Levothroxin drugs.

## Materials and Methods

**The preparation of the plant extracts:** Aerial parts of *C. arvensis* were collected from different area of Wassit Province, the plant were cleaned, dried, powdered by using a grinder, and crude phenols were extracted from this plant according to Ribereau-Gayon (15) and Harborne (16) and were extracted Crude Phenols. 200 g of plant powder was separated into two equivalent amounts of, 300 ml of (1%) hydrochloric acid was added to one section, and 300 ml of distill water was added to the next, the two amounts were transferred for 5 minutes to electrical blender. At that point the two blends were transferred for 30-40 minutes to bubbled water bath, the two blends were cooled and sifted through muslin cloth, then transferred to a centrifuge( speed of 3000 rpm for 10 minutes). The two supernatants were blended. equivalent amounts of n-propanol was added to the blend and until the solution isolated into two layers sodium chloride was added. The lower layer removed with Ethyl acetic acid derivation by the separating funnel, and the dissolvable layer was dissipated in a revolving evaporator for (1-2) hours at 40°C. The upper layer was dissipated in a revolving evaporator for (1-2) hours at 40°C the dried material of both layers were blended and dissolved in 5ml of (96%) ethanol, then transferred to oven then was kept in cooler until utilize .

## Experimental design

This experiment was carried out to evaluate effects of levothroxin, and phenolic extracts of *Convolvulus arvensis* on thyroid hormonal disorders induced in male mice by Thiourea. Male mice which have weight of 12-20g, The male mice were divided into five experimental groups and each group which treatment orally for 10 day. Each group consisted of 5male mice. The animal were divided to:

Group I:negative control each animal treated with (0.5 ml) of distill water.

Group II: positive control each animal treated with (10 mg /kg b.w) of Thiourea.

Group **III**: Each animal treated with( 200 mg /kg b.w) phenolic extracts of *C. arvensis*.

Group **IV**: Each animal treated with (10 mg /kg b.w )of thiourea than (10 mg /kg b.w) of levothyroxine.

Group **V**: Each animal treated with (10mg /kg b.w) of Thiourea than (200 mg /kg b.w) phenolic extract of *C. arvensis*.

### Statistical analysis

Used SPSS software for Statistical analysis of data by using three-way analysis of paired samples T-test for comparison between different treatment.

### Results and Discussion

Results in Table(1)showed that levels of  $T_3$  in serum of mice significantly decreased in a group of mice receiving thiourea ( $1.14 \pm 0.018$ ) compared with control ( $1.21 \pm 0.177$ ) ( $p < 0.05$ ), and this improved by the researcher (17) was showed that levels of  $T_3$ , were significantly decreased in a mice groups which receiving ethylene thiourea, and indicated that the harmful impacts of ethylene thiourea in mice happened in the pituitary gland, thyroid gland, and liver.

**Table (1) Triiodothyronine ( $T_3$ ), thyroxine ( $T_4$ ) hormones levels of serum experimental male mice at ( $p < 0.05$ ).**

Group	Treatment	$T_3$	$T_4$
		Mean $\pm$ S.E.	Mean $\pm$ S.E.
<b>I</b>	Control	$1.21 \pm 0.177$	$2.21 \pm 0.028$
<b>II</b>	Thiourea	$1.14 \pm 0.018$	$1.99 \pm 0.002$
<b>III</b>	Phenolic extracts	$1.32 \pm 0.023$	$2.80 \pm 0.035$
<b>IV</b>	Thiourea + Levothroxin	$1.60 \pm 0.020$	$2.99 \pm 0.016$
<b>V</b>	Thiourea + Phenolic Extract	$1.50 \pm 0.020$	$2.86 \pm 0.002$

The results showed that levels of  $T_4$  significantly decreased in a group of mice receiving thiourea ( $1.69 \pm 0.002$ ) compared with control ( $2.21 \pm 0.028$ ) ( $p < 0.05$ ), this agrees with (17) showing that the harmful impacts of ethylene thiourea includes the thyroid gland, and this was showed the levels of  $T_4$  were significantly decreased in Serum of mice which receiving ethylene thiourea. levels of  $T_3$ ,  $T_4$  in serum of mice depended on type treatment.

This study indicates that both levels  $T_3$ ,  $T_4$  significantly increased in a group of mice receiving thiourea than Levodroxin ( $1.60 \pm 0.020$ ), ( $2.99 \pm 0.016$ ) ( $p < 0.05$ ) respectably. (18) indicated that Patients with hypothyroidism initially should be treated with synthetic levothyroxine.

Results in Table (1) showed that both levels  $T_3$ ,  $T_4$  significantly increased in a group of mice receiving only phenolic extracts of *C. arvensis* ( $1.32 \pm 0.023$ ), ( $2.80 \pm 0.035$ ) ( $p < 0.05$ ) respectively. However, most reports refer to used levothyroxine drugs for hypothyroidism, and this study indicated used levothyroxine drugs lead to increased  $T_3$ ,  $T_4$ , compared with control, phenolic extracts of plants given the same results, as compared with drugs, and the (19) indicated the plant *R. rosea* was viewed as a viable alternative treatment of the side effects for hypothyroidism in thyroid cancer patients when thyroid have been removed partially or totally.

The results indicates that both levels  $T_3$ ,  $T_4$  significantly increased in a group of mice receiving thiourea than phenolic extracts ( $1.50 \pm 0.020$ ), ( $2.86 \pm 0.002$ ) ( $p < 0.05$ ) respectively. As the results found polyphenolic compounds in the

aerial parts of *Convolvulus arvensis* were examined for their secondary metabolites. Polyphenolic compounds in the plant may be the determination by TLC and HPLC, such as phenolic acids and coumarins. It was recognized and affirmed that umbelliferon and scopoletin were found in coumarin portion. Occurrence phenolic acids In the portion includes chlorogenic, p-coumaric, protocatechuic p-ferulic, vannilic, caffeic, hydroxyphenylacetic, gentisic, salicylic acids and p-hydroxybenzoic, were available (20). The plants (*Nasturtium officinale*) and (*Brassica oleraceae* L.) were used for treatment of thyroid discords which eaten as iodine source, and were utilized as teas (21).

Leaf extract of the *Ficus carica* was computed increases or decreases in  $T_3$ ,  $T_4$  thyroid hormones, and shows its conceivable use in the regulation of

hypothyroidism. HPTLC analyses for leaf extract of *F. carica* was revealed presence of tyrosine which might be suggestive of thyroidal activity, and this depending on the mechanism of T3 and T4 formation in the body(22).

### Conclusion

This study Concludes that Phenolic extracts for *Convolvulus arvensis*, and levothyroxine drugs increase thyroid hormone T<sub>3</sub>, T<sub>4</sub>.

### Recommendation

The study recommends using medicine plants for the treatment of thyroid hormone disorders replacement, levothyroxine because that medicine plants do not have adverse side effects while levothyroxine has side effects.

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