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# Hypothyroidism induced by carbimazole in diabetic mice and its Management Using Parsley and Eruca sativa oil.

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***ABSTRACT:*** *Hypothyroidism induced by carbimazole in diabetic mice was studied in 20 animals and partially protective by using parsley and Eruca sativa oil . Animals was divided into 4 groups :*
*Animals of group I received normal saline only as a control group. Group II, III, and IV received intraperitonally a single dose of 100 mg / kg body weight of alloxan to induce diabetes . Groups II, III , IV treated daily with carbimazole (0.6 mg/kg ) for period of 60 days to obtain a clinical-physiological status of thyroid dysfunction in the animals , group III received oil of Arugula (Eruca sativa) herb as (0.02 ml/kg) mice body weight .While group IV received crud of parsley (Petroleum crispum) leaves .The results show an enlarged (Goiter) follicles a In group II and with varied sizes filled by a variable quantity of colloidal material . While group III and IV ,thyroid lobes returned more or less to normal size, the architecture of thyroid follicular arrangement appeared normal follicles .Our conclusion is recommending the use of by Parsley and Eruca sativa as a combination therapy with antithyroid drugs to achieve a very ideal and effective treatment of such metabolic disorders concerning thyroid gland .*

***Key words:*** *hypothyroidism, carbimazole, diabetes, parsley, Eruca sativa*

## I. Introduction

Diabetes mellitus is an important health problemaffecting major populations worldwide. It is characterizedby absolute or relative deficiencies in insulinsecretion and/or insulin action associated with chronic hyperglycemia and disturbances of carbohydrate, lipid, and protein metabolism..[1][2][3].Effective blood glucose control is the key for preventing or reversing complications and improving the quality of life for patients with diabetes. Thus, sustained reductionof hyperglycemia will decrease the risk of developing microvascular complications and mostlikely reduce the risk of macrovascular complications.[4][5] . The adoption of a sedentary lifestyle, the consumption of non-traditional foods, and a genetic predisposition to the disease are thought to be the major underlying causes of the epidemic.[6]

Thyroid diseases and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice [7]. Diabetes and thyroid disorders have been shown to mutually influence each other and associations between both conditions have long been reported since 1979 [8}.Since then, several studies in different countries were conducted to estimate the prevalence of TD in diabetic patients. There is great variability in the prevalence of TD in general population (9).Thyroid disorders remain the most frequent autoimmune disorders associated with type 1diabetes [10].

Carbimazol is an imidazole antithyroid agent classified as a pro-medicament drug and.After being absorbed by the body, generating an antithyroid action that works against hyperthyroidism (excessive production of thyroid hormones) and thyrotoxicosis (inflammation of the thyroid gland) (11).Nowadays, besides conventional approaches, comprehensive complementary medicine (CAM) modalities are attaining more and more popularity in the world.[12] More than 2000 years ago, symptoms such as polyuria and polydipsia were regarded as important morbid manifestations in ancient China and in the Egyptian Ebers papyri, Greek Epidemics Book III of Hippocrates , .[13] which spurred people to learn about diabetes.(14).The term "functional food" was first introduced in Japan in the mid-1980s and refers to foods containing ingredients that aid specific bodily functions in addition to being nutritious.[15] Generally, they are considered as those foods intended to be constituted as part of a normal diet, and that contain biologically active components, which offer the potential of enhanced health or reduced risk of disease [16].

## II. Materials and methods

The present study was conducted with 20 maturemale albino mice, weighing about 25-35 gm., wasisolated in a relatively controlled environmentaltemperature of about 25 °C. in the animal breedingcenter /college of medicine / university f Baghdad. Animals were given food ad labium and free access to water.

Animals were divided into 4 groups I, II, III, IV. Animals of group I received normal saline only as a control group. Group II, III, and IV received intraperitonally to a starved animal in a single dose of 100 mg / kg body weight of alloxan to induce diabetes (17).Groups II, III , IV treated daily with carbimazole (0.6 mg/kg ) (18) dissolved in 50 ml of water for period of 60 days to obtain a clinical-physiological status of thyroid dysfunction in the animals.Inaddition to alloxan and carbimazole, group III received oil of Arugula (Erucasativa)herb as (0.02 ml/kg) mice body weight ( 19).

While group IV received crudofparsley (Petroleumcrispum)(20) leaves were purchased from thelocal market in Baghdad, with the food for period of 8 weeks.

Animals were sacrificed every weeks of treatment and thyroid tissues obtained for histological evaluation, and were placed in 10% buffered formalin followed embedded in paraffin, and stained with hematoxylin and eosin (H&E).

## III. Results

Histopathological examination of thyroid tissue of control and different experimental groups shows: control group demonstrated normal architectural appearance ofround or ovalfollicles, with different sizes and coated, most ofthe times, by low cuboidal epithelium and filledwith little vacuolated and little dense colloid (Fig. 1A).

In animals treated with carbimazole( hypothyroid group), thyroids presentedaltered enlarged (Goiter) follicles and with varied sizes, filled by avariable quantity of little dense and veryvacuolated colloid. Coating cells were cuboidaland sometimes columnar, the follicles possessed copious amount of homogenous,eosinophilic colloid material (Fig. 1B ).

There were also pools of follicular cells devoidof lumen (interfollicular adenomatosis) andfollicles coated by one or more layers of cellsforming papillary projections for the lumen(intrafollicular adenomatosis) (Fig.1C).Thesefindings confirm the action of carbimazole on thyroid and, consequently, the success of thehypothyroidism induction.After treatment of hypothyroid rats by Parsley and Eruca sativa for 8 weeks thyroid lobesreturned more or less to normal size, the architecture of thyroid follicular arrangement appeared normal follicles are linedwith high cubical cells. More follicles showed normalcolloidal content (FiguresID).

## IV. Disscussion

In the present study, carbimazole was used to induce hypothyroidism in mice. After absorption of carbimazole it is converted to the active form methimazole. Methimazole prevents the thyroid peroxidase enzyme from coupling and iodinating the tyrosine residues on thyroglobulin, hence reducing the production of the thyroid hormones T3 and T4 (21), with subsequent increase in TSH and TSH which in turn was known to work on thyroid gland resulting in hyperplasia and hypertrophy of follicular cells, acondition known as nodular goiter (22,23).It also agreed with results of Haiying et al. (24) who found that hypothyroid subjects were diagnosed with biochemical parameters of T3 and T4 below the normal ranges, and TSH above the normal rangseveral authors described carbimazole as a good indicator of antithyroid drugs (25 ,26).

Parsley and Eruca sativa oil given orally significantly increases the concentration of T4 and T3 and decreases the TSH in hypothyroid rats as compared to untreated rats. It is apparent that recovery of thyroid parenchyma is related to protection offered by Parsley (27) and Eruca sativa (28) against hyperplasic changes well known to be associated with hypothyroid status. The therapeutic effect of them against carbimazole induced hypothyroidism was most probably related toits antioxidant effect proved by many investigators .

Thus it could be suggested that the mechanism of action could be in part due to antioxidant defense system that may protect the gland against carbimazole toxicity.

## V. Conclusion

Our conclusion is recommending the use of Parsley and Eruca sativa as a combinationtherapy with antithyroid drugs to achieve a very ideal and effective treatment of such metabolic disorders concerning thyroid gland .

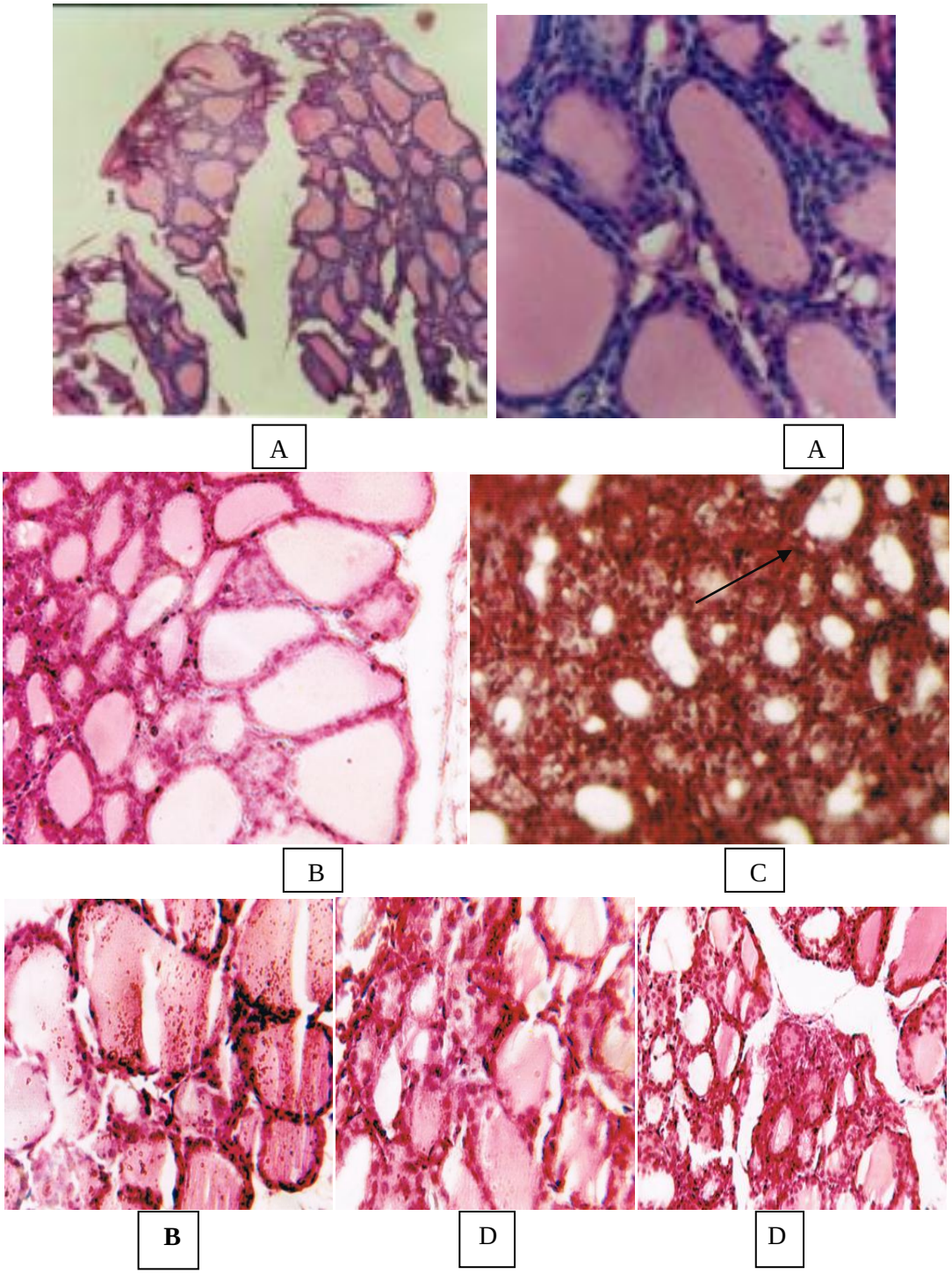


**Figure 1:thyroid tissue. H&E.Showing. 1A (X4) , (X40):normalLobules, large round or oval follicles of variable shapes, with different size,completely filled with colloid material and coated, most of the times, by low cuboidal epithelium .. 1b (X40) hypothyroid group: thyroids presented altered follicles and with varied sizeslinned with low cuboidalor apparently flattened epithelium indicative of hypothyroid status., filled by a variable quantity of little dense and very vacuolatedcolloid…IC (X40) There were also pools of follicular cells devoid of lumen (interfollicular adenomatosis)( arrow →) . 1d (X40) follicle treated with Arugula and parsleyreturned more or less to normal size, follicular arrangement appeared normal. Follicles are lined with high cubical cells.**

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