



Effect of soybeans on pre pubertal development of thyroid gland in albino rats (Light Microscopic Study):

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ABSTRACT:

Introduction: The thyroid gland is a very important gland to our body health, The thyroid gland uses iodine from foods to make two main hormones: thyroxin and triiodothyronine. Thyroid hormones affect every cell and all the organs of the body as They Regulate the rate at which calories are burned, affecting weight loss or weight gain, and Can slow down or speed up the heartbeat.

Aim of work: The study aimed to investigate soybean meal effect on the histological structure of the thyroid gland.

Material and method: For this purpose, 30 male albino rats were divided into two groups each of 15 rats, as following (G1): normal control rats, were provided with water and food ad libitum (G2): were given a high dose of soybean meal (40%) from the daily diet from Postnatal Day "PND" 21. For each group, animals were sacrificed at the age of 6 weeks.

Results: The results concluded that consumption of soybean at the prepubertal life stage decreased thyroid gland activity.

Conclusion: The present study concluded that high doses of the soybean adversely affect the thyroid gland structure and function at the prepubertal life stage.

Keywords: Soybean, Histology, Function, Thyroid, Puberty.

Introduction

The thyroid gland is a butterfly-shaped gland that lies in the front of the neck, it extends from the level of the fifth cervical vertebra to the first thoracic. The gland is H shaped and is formed by two lateral lobes, each lobe has a superior and inferior pole connected by an isthmus, thyroid lobe is 12-15 mm in height, overlying the second to fourth tracheal rings⁽¹⁾.

The thyroid gland is a very important gland to our body health, the thyroid gland uses iodine from the foods to make two

main hormones: thyroxin and triiodothyronine. The hypothalamus and the pituitary communicate to maintain T3 and T4 balance. Thyroid parenchyma is composed of rounded epithelial follicles of different sizes. The thyroid is the only endocrine gland in which secretory product is stored in large quantity. Follicles lined by simple cuboidal epithelium. Para follicular cells are scattered among the follicular cells they are called clear cells because they have pale cytoplasm, they are found

the thyroid parenchyma was composed of different sized follicles with an increase in the size of the follicles and colloid content than the control group. The follicular wall lining changed from cuboidal to flat cells in most of the follicles.

Light microscopic examination with Masson trichrome revealed increased connective tissue in between the follicles.
 1- Follicular epithelium 2- Follicular lumen
 3- Colloid material

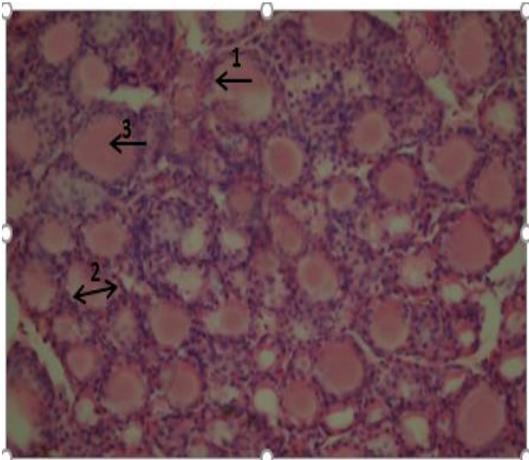


Figure1:Sections of the thyroid gland from the groups I: control at 6W, which shows normal follicles structure lined by cuboidal epithelium with the normal amount of colloid material (H&E x400).

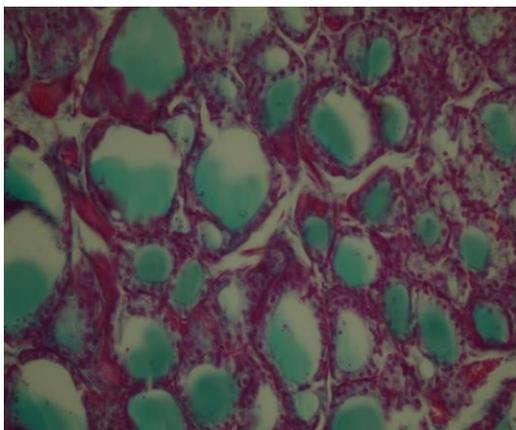


Figure2:Sections of the thyroid gland from the groups I: control at 6W, in which showing normal follicles structure with normal collagen fibers (Masson x400)

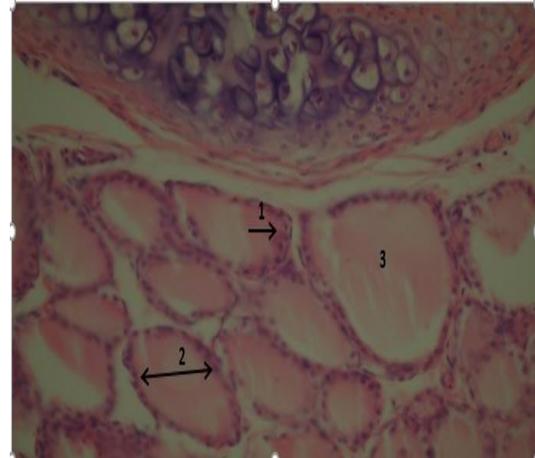


Figure 3: Sections of the thyroid gland from the group's II: treated with 40% soybean at the age of 6ws, which shows accumulation of colloid with flattening of epithelial cells, more cold follicles (H&EX400).

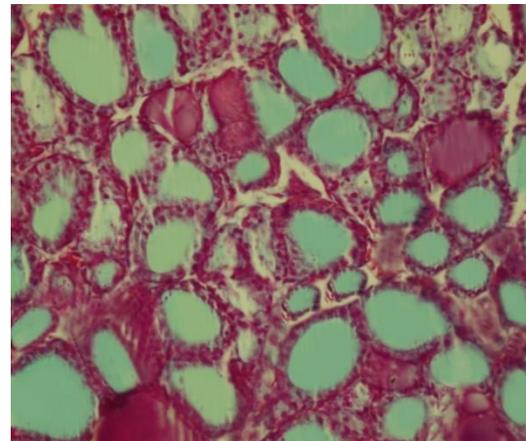


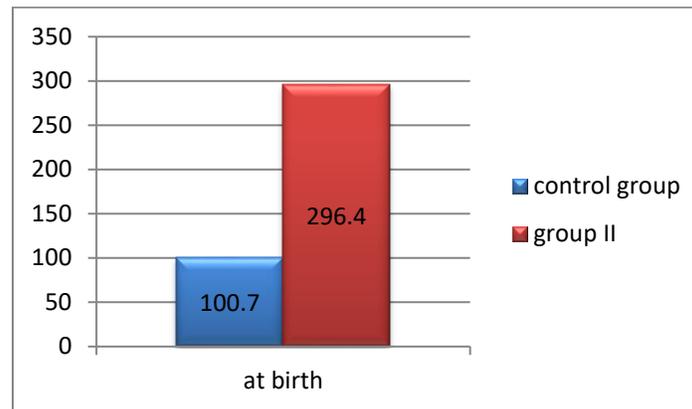
Figure 4: Sections of the thyroid gland from group II: treated with 40% soybean at 6ws of age, which shows a slight increase in collagen fibers than the control group(Masson x400).

Morphometric and statistical studies:

Follicular Diameter:

1. Age 6weeks:

The average follicular diameter (arbitrary units, pixels) in the control group was (100.7 ± 27.4) , while in group II it was (296.4 ± 175) with a highly significant increase (p-value 0.000) from the control group (**histogram.1**).



Histogram .1: showing mean follicular diameter of the three groups at 6weeks of age.

DISCUSSION:

Thyroid follicles are formed of small spherical groupings of cells 0.02–0.9mm in diameter, they have a rich blood supply, nerve and lymphatic. Colloid filling the thyroid follicles consists of an iodinated glycoprotein named thyroglobulin, each follicle is surrounded by a single layer of follicular cells when stimulated by thyroid-stimulating hormone (TSH), they synthesize thyroid hormones T3 and T4 using thyroglobulin contained in the colloid. Follicular cells vary in shape from flat to cuboid to columnar, depending on the activity of the gland⁽⁹⁾.

Soy foods gain significant attention due to their importance in the prevention of diseases, especially cancer, heart disease, and osteoporosis^(10,3)

Thyroid enlargement due to excessive soy protein diet especially in children and women has been shown to increase free T4 and TSH levels in animals, whereas T3 is not affected⁽¹¹⁾.

A previous review revealed that soy foods may inhibit the absorption of thyroid hormone medications needed in the treatment of hypothyroidism⁽³⁾

Soybeans have long been accused of goiter induced by diet, However, the mechanism is not fully understood. Recently,

it was reported that thyroid peroxidase (TPO)-catalyzed reactions were inhibited by isoflavones which are necessary to thyroid hormone synthesis also increase phase II enzymes such as glutathione S-transferase (GST), quinone reductase (QR), and uridine diphosphate glucuronyl transferase (UDP-GT) which make thyroid hormones inactive⁽¹²⁾

Iodine is not only a major constituent of thyroid hormones but also a regulator of thyroid gland function. Diets deficient in Iodine produce goiter and promote thyroid cancer. In regard to induction of thyroid enlargement in rats, a dramatic increase was reported between defatted soybean (DS) intake and iodine deficiency (ID) rats, in which DS substantially influenced thyroid hormone levels with ID within 5 weeks⁽¹³⁾.

In the present study, the soy treated groups at the age of 6ws showed that the thyroid follicles had flat epithelium with a significant increase in the diameter of the follicular lumen and a marked increase in colloid material. the results of the present study were in acceptance with seam et al.,(2015).⁽⁷⁾

