

Effects of Thyrotoxicosis on the Structure of Salivary Glands (Submandibular Glands) in Swiss Albino Mice (*Mus musculus*)

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Abstract

The goal of this study was intend to study the effects of induced thyrotoxicosis on the histological structure of submandibular gland.

Two groups of mature albino mice were used, the first group was injected (subcutaneous) daily with (0.2_0.4)ml normal saline for 11 days and used as control group, while the second group was injected daily with L_thyroxin (T4) 0.2mg /Kg (subcutaneous) for 11 days.

At the end of the treatment , supmandibular glands were processed for light microscopic examination .

The results have shown the presence of degenertaive changes of major submandibular acini cells in animal treated with thyroxin with diminishing amounts of connective tissue elements . Beside these change infiltration with inflammatory cells were observed . From this study we can conclude that there is a relationship between thyroid gland and submandibular gland , Which might regulated the secretory activity of saliva .

Key word : Thyrotoxicosis , Submandibular gland , Thyroxin

Introduction

Submandibular gland is a major salivary gland, located under either side of the floor of the mouth (1), it is composed mainly of serous acini, that play an important role in the secretion of saliva which contains inorganic compound, multiple proteins, glycoprotein

and enzymes that effect the conditions of oral cavity(2).It has also a role in the defense mechanisms against microbial growth on the both surface and mucosa (3).

Numerous studies illustrate morphological and histological changes in submandibular gland of autoimmune diseases such as HIV and Sjogren's syndrome where the body's immune system attaches the salivary glands causing significant inflammation , as well as with other systemic disease such as rheumatoid arthritis, diabetes and among alcoholics(4,5).

Newkirk et al . (6) examined the salivary gland complications associated with thyroid cancer . Since submandibular gland has not only cytoprotective function but also a defense mechanism activity (2), and the role of thymic hormone is well established in the metabolism activity of numerous body tissues (7) , yet to our knowledge no study devoted to the still prooly exploited aspect of the effects of induced thyrotoxicosis , which is the aim of the persent study .

Material and Methods

Mature albino mice were used in this study .Animals were isolated in a relatively controlled environment at a temperature of a bout 37 C They were given free access for tab water and food . The albino mice were divided into 2 groups (10 mice for each group) .

A .Group I: Animals were injected (S.C.) daily with (0.2-0.4)ml/sterilized normal saline 0.9% for 11 days and used as control group .

B. Group II: these animals were injected daily with L-thyroxin (T4,0.2 mg/kg S.C.) (8) , for 11 days.

At the end of the treatment, animals were weighted then scarified by spinal dislocation samples from salivary gland were taken and processed for light microscopic examination (9) .

Results and Discussion

Animals treated with thyroxin have shown a signification ($p > 0.05$) decrease in the body weight (from 26.13 ± 0.35 - 22.58 ± 0.4) (tab 1) . These changes reflect the effects of thyroxin injection on the metabolic activity of protein, lipid and carbohydrate (10,11) .

The histological examination evaluated the cellular damage of major submandibular acini cells and excretory duct ; these changes

include both cytoplasm component and nuclear material . Fig (1,3,4, and 5)represents these changes as follows :-

1. Fig (1) showed an enlargement of major submandibular acini of animal treated with thyroxine compared with the acini of control animal group (Fig 2) . The enlargement of the acini are due to the hypertrophy of the epithelial lining of acini , besides these changes pyknosis of major nuclei of the submandibular acini were observed with the diminishing in the connective tissue . These changes achieved by the over activity of metabolism (10,11) which might effect on the cytoplasmic organelles and break down large macromolecules caused changes in the cell osmosis and swelling.
2. Fig (3) showed a hazy , swollen and vacuolated animal treated with thyroxin . These changes might happen either when enzymes have degraded the cytoplasmic organelles lead to the vaculation of the cytoplasm , or it might be due to the accumulation of fat droplets as a metabolic injury (12) .
3. Fig (4)demonstrated a hyaline materil as clear glassy an amorphous eosinophilic precipitate in the capillary lumen and in the interlobular connective tissue. These changes reflect a local endothelial damage which might detected as a result of huperactivity of the thyroxin injection that generates toxic reactive oxygen spices and depletion of nitrous oxide . It will impair vasodilatation of blood vessels resulted to hypoxia and to direct tissue ischemia (7,13) .
4. As a result of the cell injury , an infiltration with inflammatory cells were markedly observed (Fig 4.5), these cells play an important role in defense mechanism (7) .

From this study we can conclude the followings :-

1. There is a relationship between thyroid gland and submandibular gland, which might aregulate the secretary acivitey of saliva.
2. Induced huperactivity of thyroid gland has damaging effects on epithelial cells of submandibular gland .

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Table (1) :Body weight of animal injected with thyroxin compared with the body weight of control animal

Group	Mean Body weight(gm) + SE	
	Zero time	End of treatment
Control group	25.84 ± 0.34	27.00 ± 0.29
Treated Group	26.13 ± 0.35	22.58 ± 0.46



Fig (1): Cross section of submandibular gland of animal treated with thyroxin → : Enlarged acini, → : connective tissue, ► :Pyknotic nuclei. (H & E) 400x

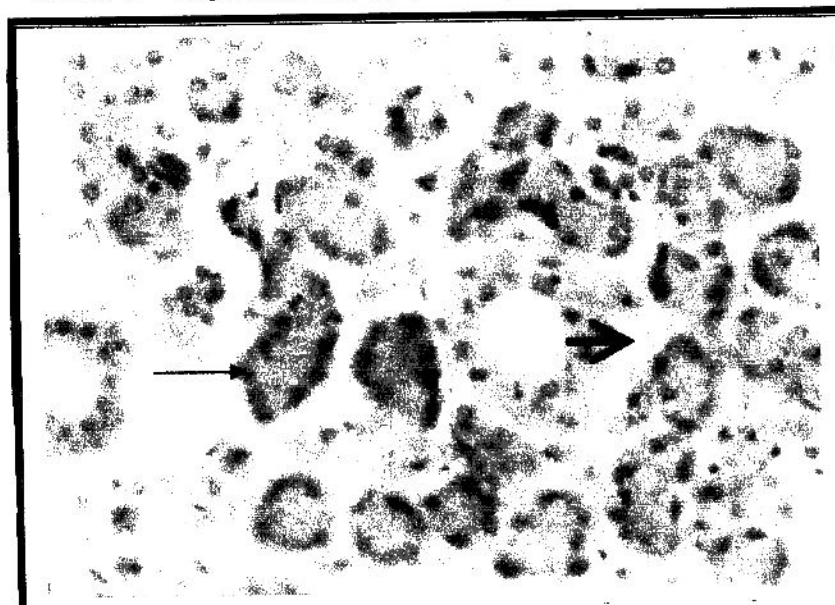


Fig (2): Cross section of submandibular gland of control animal, showing → :normal appearance of acini, → : connective tissue. (H & E) 400x

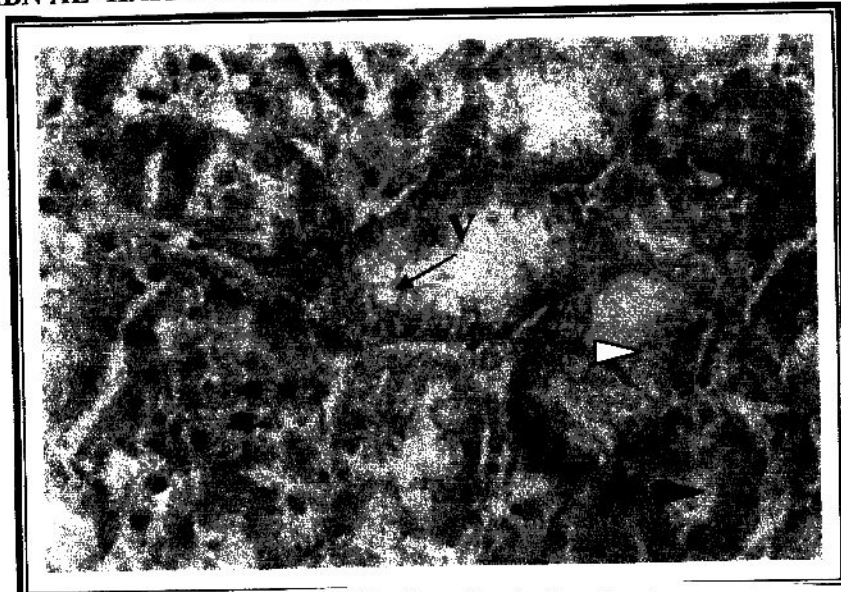


Fig (3): Cross section of submandibular gland of animal treated with thyroxin.
V: Vacuole, \blacktriangleright : Swollen acini, \blacktriangleleft : Hazy acini
(H & E) 400x



Fig (4): Cross section of submandibular gland of animal injected with thyroxin.
 \Rightarrow : Hyaline materials, I: Inflammatory cells.
(H & E) 400x

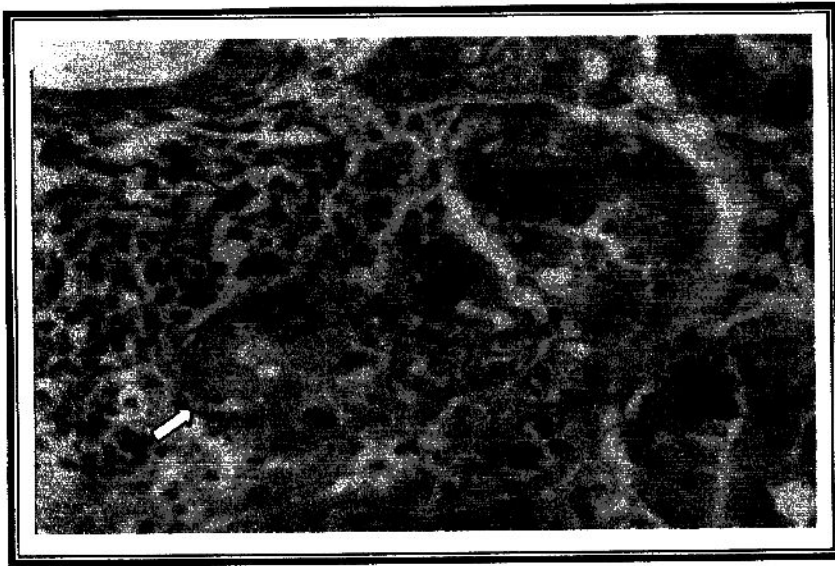


Fig (5): Cross-section of submandibular gland of animal treated with thyroxin.

**I: Inflammatory cells, V: Vacuole, \Rightarrow : Hyaline
(H & E) 400x**

مجلة ابن الهيثم للعلوم الصرفة والتطبيقية
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تأثيرات فرط الغدة الدرقية في التركيب النسيجي للغدة
اللعابية تحت الفكية في الفئران البيض السويسرية (*Mus*
(musculus)

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الخلاصة

تهدف الدراسة الحالية دراسة تأثير فرط نشاط الغدة الدرقية المستحدث في التركيب النسيجي للغدة اللعابية تحت الفك الأسفل.
استخدمت مجموعتين من الفئران البيض الناضجة في هذه الدراسة حققت المجموعة الأولى (تحت الجلد) يوماً ب(0.2_0.4) مليلتر محلول محلي مدة 11 يوماً واستخدمت كمجموعة سيطرة بينما حققت المجموعة الثانية يوماً بالثايروكسين (T4) (0.2 ملليغرام /كغم) تحت الجلد مدة 11 يوماً .في نهاية المعاملة عوملت الغدة اللعابية للتحضير للفحص بالمجهر الضوئي .
أظهرت النتائج وجود تغيرات تنكسية في غالبية خواص خلايا الغدة اللعابية في مجموعة الحيوانات المعاملة بالثايروكسين مع حصول نقصان في الأنسجة الضامة،فضلاً عن هذه التغيرات لوحظ ارتشاح للخلايا الانتهاجية .ونستنتج من ذلك أن زيادة إفراز الثايروكسين من الغدة الدرقية أو (إحداث فرط نشاط الدرقية) يؤدي إلى إحداث التأثير السلبي في الغدد اللعابية قيد الدراسة ومن ثم يؤثر في الفعالية الإفرازية لهذه الغدد.