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RELATIONSHIP BETWEEN THYROID FUNCTION TESTS AND BODY MASS INDEX IN THE ELDERLY

THESIS
SUBMITED IN PARTIAL FULFILMENT FOR MASTER DEGREE (GERIATRICS)

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Contents

List of tables

INTRODUCTION AND AIM OF WORK

Introduction

Thyroid gland is an endocrine gland which controls the function of many body systems and metabolism through the secretion of its hormones T3 and T4.

Thyroid dysfunction is relatively common in elder patients but clinical presentation varies. It may be obvious from classic presenting symptoms or it may be asymptomatic and discovered accidentally **(wallace and Hofmann, 1998)**.

Many older patients have abnormal TSH levels without other alterations in the level of serum thyroid hormones, conditions termed subclinical hypothyroidism (isolated elevation of TSH level) and subclinical hyperthyroidism (isolated suppression of TSH level); subclinical hyperthyroidism is less common **(Samuels, 1998)**.

The prevalence of subclinical hyperthyroidism is higher according to a study made upon the elderly of Taiwan **(Chuang et al, 1998)**.

Body mass index (BMI) is defined as the body weight divided by the height square.

There is an age related decrease in the body height, and in case of women, also there is reduced body weight and lean body mass with old age **(Suominen, 1997)**.

The aim of this work is to study the correlation between BMI and thyroid function tests in elderly.

REVIEW OF LITERATURE

Thyroid Function in the Elderly

Thyroid Hormone in the Elderly:

Aging is associated with significant changes in the anatomy of the thyroid gland and the physiology of the hypothalamic-pituitary-thyroid axis. In addition, tissue responsiveness to thyroid hormone may also be altered with age **(Moordian, 1995)**. At present the international literature confirms that in the elderly there is a reduction of the activity of the hypothalamic-hypophyseal-thyroid axis association with an adaptation of hormone production. Moreover the thyroid gland undergoes anatomical (weight) and physiological age-related adaptation to the reduction of thyroid function. T3 and T4 plasma levels present in old people are comparable to younger subjects, however, in the elderly a reduction of T4 peripheral degradation occurs which equilibrates its low production. Thus the progressive reduction of thyroid activity in the old men must be explained as an adaptation to the new metabolic

rhythm associated with a reduced TSH secretion and with a smaller body mass in elderly **(Messina et al., 1997)**.

Serum T3 is found to be lower in the elderly **(Burrow et al., 1975; Olsen, 1978)** and is confirmed by **Brunnell and Bahuon (1972) and Hesch et al. (1976)**. rT3 is found to be elevated in old age **(Rudorff et al., 1976)**. Serum T4 is found to be normal in the above mentioned studies. **Snyder and Utigen (1972)** use subjects with no history of thyroid disease, have no obvious illness and are not receiving any medication. They still show a decrease in T3 and elevation in rT3 and normal T4.

Wenzel and Horn (1975) and **Hesch et al. (1977)** show a decrease in T3 but also show a decrease in T4 levels in serum. Decrease in T4 is also demonstrated by **Hermann et al. (1974)**. **Harmann et al. (1984)** also shows that in healthy aging men there is a small decrease in total T4 concentration and a modest increase in T4 serum binding which together give a statistically significant reduction in free thyroxine index (FT4I). It was also shown that there is a modest decrease in serum T3

concentration and free T3 index (FT3I) which is not associated with a rise in serum rT3 concentration.

Hesch et al. (1975) postulate that the normal range for both hormones varies considerably due to absence of standardization of different assay methods, regional difference (that is, iodine intake) and population difference.

Frolkis and Valuera (1978) conclude that extra-thyroidal metabolism of thyroid hormones with aging decreases T3 while T4 remains unchanged. This is also proved by **Sawin et al. (1979) and Rosenthal et al. (1987)** and attribute this to decreased peripheral conversion of T4 to T3. Thus measuring level of T3 and T4 in the serum is not a good indicator of changes of thyroid function in the elderly owing to the difficulty in defining a normal range of their values in the elderly as is concluded by **Sawin et al. (1979)**.

Britton et al. (1975) show that T3 level decreases after the age of 80. While **Stepanes et al. (1977)** report that T3 level is reduced after the age of 70. However it has been suggested that there is a need for careful clinical screening of elderly