

CHRONIC AUTOIMMUNE THYROIDITIS AND OBESITY

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ABSTRACT

Introduction

Chronic autoimmune thyroiditis (Hashimoto's thyroiditis) is the most common cause of hypothyroidism which may associate weight increase and changes in serum lipid levels. There is still controversy over the link between obesity and autoimmune hypothyroidism. The paper aims to assess obesity and lipid metabolism in patients with Hashimoto's thyroiditis, and to establish a correlation between TSH (thyroid-stimulating hormone), FT4 (free thyroxine) levels, and the titer of antithyroid antibodies.

Material and Methods

100 female and male patients diagnosed with Hashimoto's thyroiditis were included. According to BMI (body mass index), the patients were divided into three subgroups: normal BMI, overweight and obese group.

Results

31% of patients had normal BMI, 37% were overweight and 32% had obesity. TSH mean value was higher in the overweight (10.76 μ UI/mL) and obesity groups (7.58 μ UI/mL), as compared to normal BMI group (2.67 μ UI/mL). Similar results were obtained for anti-TPOAb (antithyroid-peroxidase antibodies) mean value. Antithyroglobulin antibodies (anti-TgAb) had higher values in patients with normal body weight: 431.23 U/mL compared to 212.37 U/mL in

RÉSUMÉ

Thyroïdite chronique auto-immune et obésité

Introduction

La thyroïdite auto-immune chronique (thyroïdite de Hashimoto) est la cause la plus fréquente d'hypothyroïdie caractérisée par un poids corporel fréquent et des modifications des taux sériques de lipides. Il existe toujours une controverse sur le lien entre l'obésité et l'hypothyroïdie auto-immune. L'article vise à évaluer l'obésité et le métabolisme lipidique chez les patients atteints de thyroïdite de Hashimoto et à établir une corrélation entre les taux de TSH (thyroïdostimuline), de FT4 (thyroxine libre) et le titre des anticorps antithyroïdiens.

Matériel et méthodes

100 patients féminins et masculins ayant reçu un diagnostic de thyroïdite de Hashimoto ont été inclus. Selon l'IMC (indice de masse corporelle), les patients ont été divisés en trois sous-groupes: l'IMC normal, le surpoids et l'obésité.

Résultats

31% des patients avaient un IMC normal, 37% avaient un excès de poids et 32% avaient de l'obésité. La valeur moyenne de TSH était plus élevée dans les groupes de surcharge pondérale (10,76 μ UI/mL) et d'obésité (7,58 μ UI/mL) que dans le groupe avec un IMC normal (2,67 μ UI/mL). Des résultats similaires ont été obtenus

overweight and 368.64 U/mL in obese patients. FT4 average value was lower in obese patients (1.15 ng/mL compared to 1.68 ng/mL in the normal weight and 1.53 ng/mL in overweight patients. There were no statistically significant correlations between BMI and TSH ($p = 0.2753$), FT4 ($p = 0.6156$, anti-TPOAb ($p = 0.3347$) and anti TgAb levels ($p = 0.154$). The correlation between TSH and total serum cholesterol was statistically significant ($p < 0.05$).

Conclusions

The presence of obesity in patients with Hashimoto's thyroiditis is directly related to hypothyroidism associated to autoimmunity. Thyroid autoimmunity may have some effects on hyperlipidaemia and obesity, independently of thyroid function.

Key words: thyroid, obesity, autoimmune thyroiditis, leptin.

List of abbreviations

TSH= Thyroid Stimulating Hormone

FT4= free thyroxine

TPOAb=thyroid peroxidase antibody

TgAb= thyroglobulin antibody

BMI= body mass index

TC= total cholesterol

TG= triglycerides

HDL- cholesterol=High Density Lipoprotein-cholesterol

INTRODUCTION

Chronic autoimmune thyroiditis is the main cause of primary hypothyroidism, characterized by complex metabolic changes involving lipid metabolism and weight gain. The link between autoimmunity and obesity is still controversial, an important role being attributed to primary hypothyroidism¹. The prevalence of thyroid autoimmune diseases in obese people varies between 8 and 29%^{2,3}. In terms of the link between obesity and chronic autoimmune thyroiditis, it is unanimously accepted the implication of adipokins secreted in the adipose tissue, such as leptin in thyroid autoimmunity, as well as their intervention in other systemic autoimmune disorders⁴. It seems that leptin level is associated with thyroid autoimmunity independently of bioanthropometric parameters. The high level of leptin in obesity is responsible for increasing TSH secretion, that induces adipocyte proliferation through the TSH receptor present at this level^{5,6}. There is also a hypothesis according to which thyroid autoimmunity can lead to hyperlipidemia independently of obesity^{7,8}. A positive correlation was

pour la moyenne anti-TPOAb (anticorps antithyroïdoxperase). Les anticorps antithyroïdoglobuliniques (anti-TgAb) ont des valeurs plus élevées chez les patients ayant un poids corporel normal: 431,23 U / ml comparé à 212,37 U / ml en surpoids et 368,64 U / ml chez les patients obèses. La valeur moyenne du FT4 était plus faible chez les patients obèses (1,15 ng / mL comparé à 1,68 ng / mL chez ceux avec poids normal et à 1,53 ng / mL chez les patients avec du surpoids) Il n'y avait pas de corrélation statistiquement significative entre IMC et TSH ($p = 0,2753$) $p = 0,6156$, anti-TPOAb ($p = 0,3347$) et anti-TgAb ($p = 0,154$) La corrélation était statistiquement significative ($p < 0,05$) entre la TSH et le cholestérol sérique total.

Conclusions

La présence de l'obésité chez les patients atteints de thyroïdite de Hashimoto est directement liée à l'hypothyroïdie associée à l'auto-immunité. L'auto-immunité thyroïdienne peut avoir des effets sur l'hyperlipidémie et l'obésité indépendamment de la fonction thyroïdienne.

Mots-clés: thyroïdite, anticorps, obésité.

found between thyroid antibodies levels and serum triglycerides, respectively a negative correlation between HDL cholesterol and anti-TPOAb in patients with chronic autoimmune thyroiditis^{9,10}.

Based on these data, we aimed to assess the BMI and lipid metabolism in a group of 100 patients with chronic autoimmune thyroiditis.

MATERIALS AND METHODS

We performed a retrospective descriptive study. A total of 100 patients with autoimmune chronic thyroiditis, aged between 18 and 75 years, were included. Thyroid function was assessed by determination of serum TSH, FT4, and thyroid antibody: anti-thyroglobulin antibodies and antithyroperoxidase antibodies. BMI, total cholesterol and triglyceride levels were measured in all the patients.

According to BMI, we divided the patients in three subgroups: subgroup A of 31 patients with normal BMI, subgroup B of 37 overweight patients and subgroup C of 32 obese patients. Microsoft Office Excell 2013 was used for data processing.

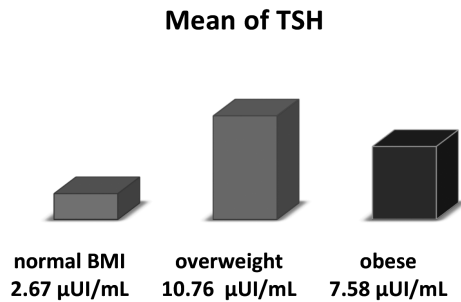


Figure 1: TSH levels in patients with chronic autoimmune thyroiditis. Normal range: TSH= 0.4-4 μIU/mL. TSH values are higher in overweight and obese patients.

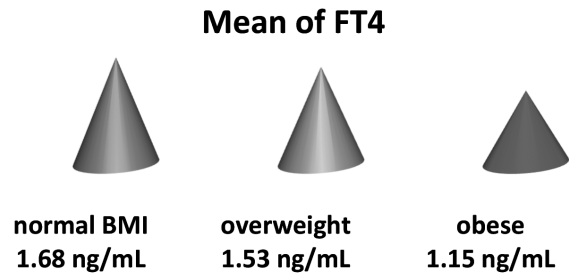


Figure 2: FT4 levels according to BMI. Normal range: FT4= 0.89-1.76 ng/dL. The lowest FT4 values were obtained in obese patients.

Correlations between BMI and TSH levels

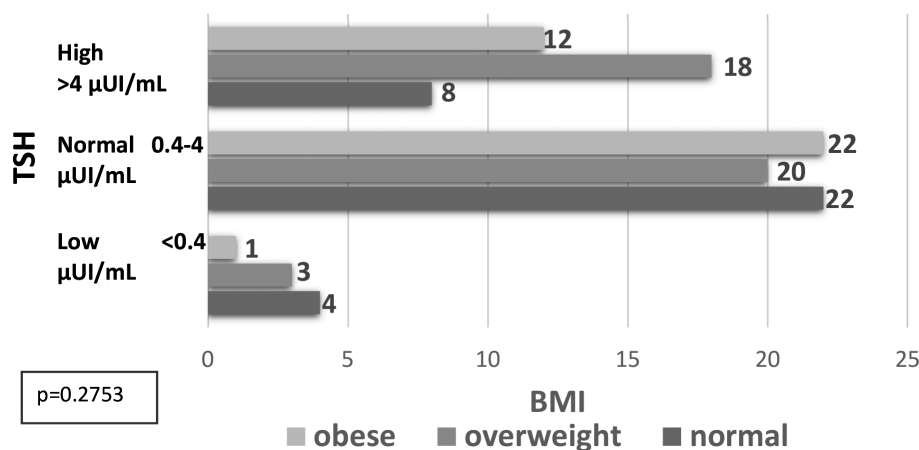


Figure 3: BMI and TSH levels in patients with chronic autoimmune thyroiditis. There is no significant correlation between BMI and TSH level.

RESULTS

The highest incidence of Hashimoto’s thyroiditis was encountered in the 50th-60th decade, only 4 cases were reported after age of 70 years. 93% of the patients were female and only 7% were male. The main complaints at the time of admission were astheno-dynamic syndrome, weight gain and headache. According to BMI, 31% of patients had normal BMI, 37% were overweight and 32% had obesity. In terms of thyroid function, 34% of patients had overt hypothyroidism, 58% had normal thyroid function under replacement treatment, and 8% were in the transient hyperthyroid stage.

Higher TSH values were obtained in the overweight (10.76 μUI/mL) and obesity group (7.58 μUI/mL), compared to the normal BMI group (2.67 μUI/mL) (Figure 1). Obese patients had lower FT4 (1.15 ng/mL) than overweight (1.53 ng/mL) or normal BMI patients (1.68 ng/mL) (Figure 2). For TPOAb,

higher values were seen in overweight (572.77 U/mL) and obese patients (567.72 U/mL), while TgAb were primarily elevated in normal patients (431.23 U/mL) compared to 212.37 U/mL in overweight and 368.64 U/mL in obese patients.

No statistically significant correlations were found between BMI and TSH (p = 0.2753) or FT4 levels (p = 0.6156) (Figure 3), nor between anti-TPOAb (p = 0.3347), anti-TgAb (p=0.154). and BMI (Figure 4). The most frequent metabolic changes occurred in lipid metabolism. Hypercholesterolemia was reported in 58% patients and hypertriglyceridemia in 17% of patients. Regarding lipid metabolism, a statistically significant correlation between TSH levels and total cholesterol has been found (Figure 5).

DISCUSSION

The link between obesity and thyroid function has been the subject of several clinical trials that have

Correlations between BMI and FT4 levels

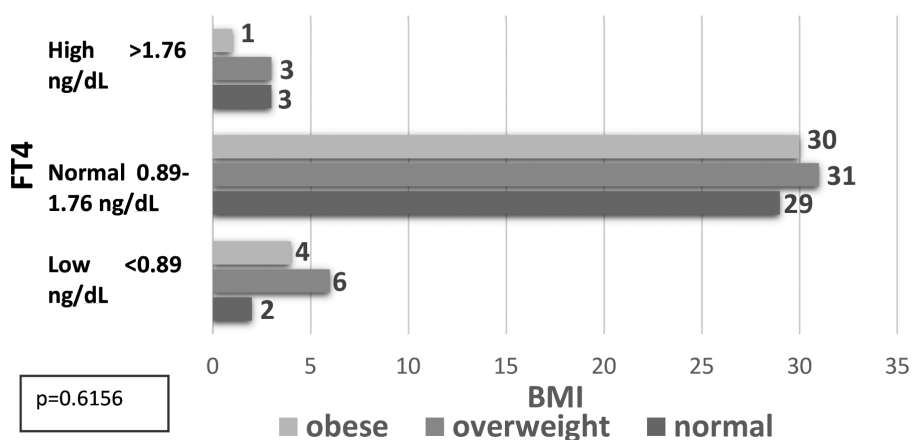


Figure 4: BMI and FT4 levels in patients with chronic autoimmune thyroiditis. The p index value denies the existence of a significant correlation between FT4 level and BMI.

made it possible to establish certain connections, but less clear issues remained^{11,12}. Thus, increased TSH reported in obesity would be a consequence of thyroid reset in response to weight gain, which means that increased TSH in an obese person does not signify a true hypothyroidism^{2,13,14}. According to some authors, the TSH level does not correlate with any body composition parameter, such as abdominal circumference and neither glucose or lipid metabolism. The low level of FT3 and FT4 in obese people is explained by the impairment of their metabolism^{15,16}. Other studies have found a positive correlation between obesity

and TSH level or between TSH and BMI, explained by direct TSH action on adipogenesis by stimulating preadipocytes differentiation or by leptin intervention^{17,18}. In the context of metabolic disorders specific to hypothyroidism, and correlated with obesity, an important role is attributed to insulin resistance¹⁹⁻²⁴.

In our study, the highest TSH values were recorded among overweight patients and the lowest values in the normoponderal group.

Obesity correlates with increased thyroid volume, especially among patients with positive anti-thyroid antibodies^{25,26}. In our study, 50% of the

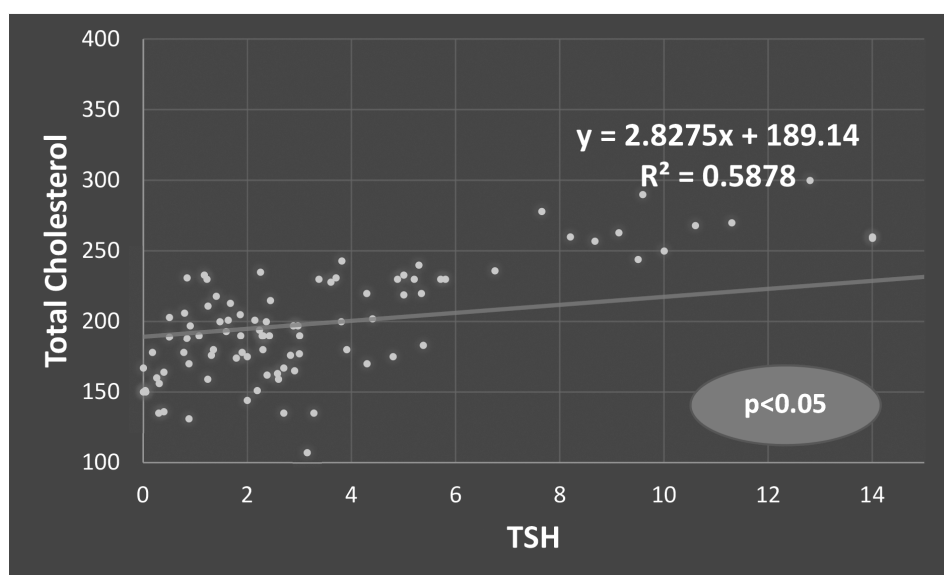


Figure 5: Correlation between TSH and total cholesterol

Legend: Correlation coefficient of $\pm 0.70-1.00$ = strong relationship; of $\pm 0.30-0.60$ = moderate; of $\pm 0.00-0.29$ = none (.00) to weak. Elevated TSH value correlates significantly with total cholesterol.

overweight and obese patients with elevated TPOAb showed increased thyroid volume, 28% had normal thyroid volume and 12% had atrophic thyroid. There was no significant correlation ($p < 0.05$) between thyroid volume, TSH value and thyroid antibodies levels.

Hypothyroidism also may be a risk factor for obesity, hyperlipidemia, and for atherosclerotic cardiovascular disease^{2,3,16,27}. In our study, the most common comorbidities were obesity, high blood pressure, type 2 diabetes and osteoporosis.

Subclinical hypothyroidism, as well as overt hypothyroidism, is associated with increased blood pressure, high triglyceride levels and low HDL-cholesterol levels^{28,29}. Only 7% of our patients had high blood pressure, so that a direct link between blood pressure and TSH value could not be established. Regarding triglycerides, in our group there was no statistically significant correlation with TSH value.

Regarding the relationship between obesity and thyroid autoimmunity, an important role is attributed to leptin. Through leptin, obesity would be involved in increasing the risk of autoimmune thyroiditis^{2,30-33}.

Further studies are needed to understand the link between obesity and autoimmune hypothyroidism.

CONCLUSIONS

The presence of obesity in patients with Hashimoto's thyroiditis is directly related to hypothyroidism associated to autoimmunity.

Thyroid autoimmunity may have some effects on hyperlipidaemia and obesity, independently of thyroid function.

Further controlled longitudinal studies are needed to better understand the mechanisms by which TSH level may have impact on body weight.

Compliance with Ethics Requirements:

„The authors declare no conflict of interest regarding this article“

„The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law. Informed consent was obtained from the patient included in the study“

Acknowledgments:none

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