



The Relationship Between Hypothyroidism and Stress Urinary Incontinence: A Prospective Controlled Study

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Abstract

Aim: Thyroid hormones play a vital role in the regulation of multiple physiological systems, including the genitourinary system. We aimed to evaluate the relationship between thyroid hormone deficiency, which affects nearly all organs and systems, and stress urinary incontinence (SUI).

Methods: This prospective controlled study included patients with hypothyroidism, subclinical hypothyroidism, and a healthy control group. Demographic data and clinical characteristics such as the presence of, menopausal status, and number of vaginal deliveries were compared. Additionally, risk factors for stress incontinence were analyzed using multivariate analysis.

Results: Of the 65 patients included in the study, 21 were in the hypothyroid group, 16 were in the subclinical hypothyroid group, and 28 were in the control group. A statistically significant difference in the prevalence of SUI was observed only between the hypothyroid group and the control group. There was no significant difference in the severity of SUI between the groups.

Conclusion: Stress urinary incontinence is more common in patients with hypothyroidism compared to those with normal thyroid function. Elevated thyroid-stimulating hormone levels, menopausal status, and a higher number of vaginal deliveries are identified as risk factors for SUI.

Keywords: Hypothyroidism, thyroid hormones, female, urinary incontinence, delivery

Introduction

Hypothyroidism is a common endocrine disorder, with a reported prevalence ranging from 0.2% to 5.3% (1). It is approximately ten times more prevalent in women (2,3). The condition can adversely affect multiple organ systems, including the cardiovascular, musculoskeletal, endocrine, gastrointestinal, and neurocognitive systems (4-6).

Normal bladder function is maintained through the coordinated interplay of the nervous system, pelvic floor muscles, the urethrovesical angle, and the detrusor muscle. Disruptions in these components may impair bladder function and lead to the development of a variety of symptoms, including urinary incontinence. Neuropathy is among the neurological manifestations of hypothyroidism, and it may often present alongside other systemic

symptoms (7,8). In this respect, voiding dysfunction may be related to hypothyroidism.

Thyroid hormones are among the most important for maintaining homeostasis. It is also an essential hormone for the proper functioning of the nervous system, which is crucial for bladder function. We hypothesized that low levels of this essential hormone may be related to stress urinary incontinence (SUI). Therefore, the aim of this study was to evaluate the relationship between hypothyroidism and SUI.

Materials and Methods

Compliance with Ethical Standards

The study protocol was approved by the Clinical Research Ethics Committee of University of Health Sciences

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Turkey, Basaksehir Cam and Sakura City Hospital (approval no.: KAEK/2023.02.61, date: 13.03.2023). Written informed consent was obtained from all participants.

Study Design

We prospectively analyzed patients who were admitted to the internal medicine department between June 2023 and June 2024. Three groups were formed from these patients as follows: those newly diagnosed with hypothyroidism, those newly diagnosed with subclinical hypothyroidism, and healthy individuals. Patients with hypothyroidism were defined as having elevated thyroid stimulating hormone (TSH) and low free T4 levels, while patients with subclinical hypothyroidism were defined as having high TSH and normal free T4 levels.

Patients with a previous diagnosis of hypothyroidism or those currently using thyroid-related medications were excluded. In addition, patients with a history of surgery, medication use associated with urinary incontinence, and those who declined to participate in the study were excluded. The flowchart of enrolled patients is presented in Figure 1.

Demographic characteristics, educational status, history of abortion, hysterectomy, menopausal status, and SUI status of all patients were recorded prospectively. Additionally, the severity of SUI was measured with the incontinence severity index (9). Intergroup comparisons were conducted and factors associated with stress incontinence were evaluated.

Statistical Analysis

Statistical results were analyzed using the Statistical Package for the Social Sciences version 21.0 (SPSS Inc., Chicago, IL, USA). All continuous variables were stated as mean \pm standard deviation. The normal distribution of

the variables was tested with the Shapiro-Wilk test. The chi-squared test and the Kruskal-Wallis test were used for assessment of differences between groups. Multivariate and univariate logistic regression analyses were performed to explore parameters associated with SUI. P-value <0.05 was accepted as statistically significant.

Results

A total of 65 patients were included in the study. Of these, 21 (32%) were in the hypothyroid group, 16 (25%) were in the subclinical hypothyroid group, and 28 (43%) patients were in the control group.

The demographic data and general characteristics of all patients are presented in Table 1. The mean age of the patients was 59.8 ± 14.5 years, 53.7 ± 2.2 years, and 55 ± 9.1 years in the control group, hypothyroid group, and subclinical hypothyroid group, respectively ($p=0.210$). The mean body mass index of patients was 27.6 ± 5.6 in the control group, 30.2 ± 4.5 in the hypothyroid group, and 30.5 ± 5.7 in the subclinical hypothyroid group ($p=0.121$).

The mean number of natural vaginal deliveries per patient was 1.96 ± 1.7 in the control group, 1.81 ± 1.4 in the hypothyroid group, and 1.75 ± 1.5 in the subclinical hypothyroid group ($p=0.937$). Stress urinary incontinence was observed in 2 patients in the control group, 6 patients in the hypothyroid group, and 4 patients in the subclinical hypothyroid group. There was a statistically significant difference between the control group and the hypothyroid group ($p=0.012$). There was no statistically significant difference in the severity of SUI between the groups ($p=0.287$).

According to univariate and multivariate analysis, TSH levels, the number of natural vaginal deliveries, and menopause were found to be risk factors for SUI (Table 2).

Discussion

Hypothyroidism is a clinical syndrome resulting from thyroid hormone deficiency, affecting nearly all systems in the body. Thyroid stimulating hormone, secreted by the pituitary gland, has been shown to affect striated and smooth muscles, blood vessels, bone fibroblasts, and glomerular filtration (10-12). Given that these structures are distributed throughout the body, it is not surprising that hypothyroidism has widespread systemic effects. On the other hand, stress incontinence can be defined as the involuntary leakage of urine during activities that increase intra-abdominal pressure, such as laughing, coughing, sneezing, lifting heavy objects, or exercising. Stress urinary incontinence is a bothersome disease that negatively affects the social and sexual lives of patients (13,14). In this study, which explored the relationship between these two clinically significant conditions, we observed a higher prevalence of SUI among patients with hypothyroidism.

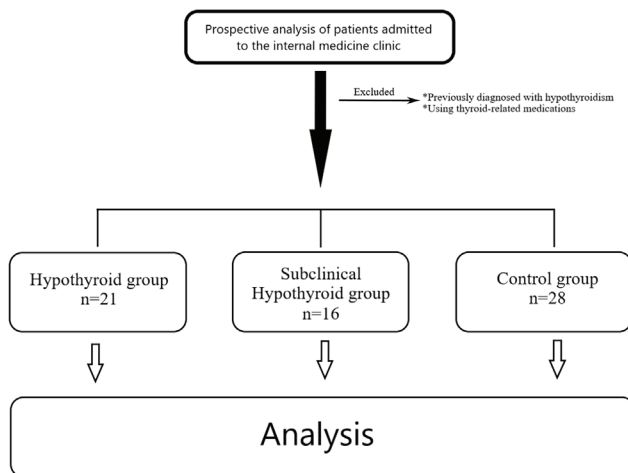


Figure 1. The flowchart of enrolled patients

Hypothyroidism has previously been examined in the literature as a potential contributing factor to urinary system disorders. Urinary retention cases due to hypothyroidism have been reported. Additionally, cases of paralytic ileus associated with bladder atony in hypothyroidism have been reported (15,16). Vahdatpour et al. (17) investigated

potential risk factors associated with SUI in their study. Similar to our study, they found that there is a direct relationship between SUI and hypothyroidism. In contrast, Demir et al. (18) in a cohort study, found no statistically significant relationship between SUI and hypothyroidism.

Various factors may play a role in the development of

Table 1. General characteristics of all patients

	Control n=28	Hypothyroid n=21	Subclinical hypothyroidism n=16	p-value
Age (Mean ± SD)	59.8±14.5	53.7±2.2	55±9.1	0.210 (Ψ)
BMI (kg/m ²) (Mean ± SD)	27.6±5.6	30.2±4.5	30.5±5.7	0.121 (Ψ)
Educational level				
Illiterate	5	3	2	0.993 (χ ²)
Qualified	18	14	11	
Highly qualified	5	4	3	
Diabetes mellitus (Yes/No)	4/24	4/17	3/13	0.839 (χ ²)
Pelvic organs prolapse (Yes/No)	1/27	0/21	1/15	0.717 (χ ²)
Hysterectomy (Yes/No)	8/20	7/14	3/13	0.638 (χ ²)
Menopause (Yes/No)	22/6	12/9	10/6	0.289 (χ ²)
Abortion (Yes/No)	2/26	2/19	1/15	0.924 (χ ²)
Natural vaginal delivery number (Mean ± SD)	1.96±1.7	1.81±1.4	1.75±1.5	0.937 (Ψ)
SUI status (Yes/No)	2/26 Φ Ω	6/15 Φ λ	4/12 λ Ω	0.025 (χ²) (*0.012) (*0.491) (*0.169)
Severity of SUI				
No	26	15	12	0.287 (χ ²)
Slight	0	2	2	
Moderate	1	3	1	
Severe	1	1	1	
Very severe	0	0	0	

χ²: Chi-squared test, Ψ: Kruskal-Wallis test, Φ: Comparing hypothyroid and control groups, λ: Comparing hypothyroid and subclinical hypothyroid groups, Ω: Comparing subclinical hypothyroid and control groups
SD: Standard deviation, SUI: Stress urinary incontinence

Table 2. Univariate and multivariate regression models to predict stress urinary incontinence

	Univariate Model			Multivariate Model		
		95% CI			95% CI	
	OR	Lower-upper	p-value	OR	Lower-upper	p-value
Age	1.23	1.052-1.448	0.059			
BMI	1.19	0.929-1.525	0.158			
TSH	2.07	1.344-3.195	<0.001	3.02	1.031 - 8.863	0.04
T4	0.22	0.015-3.458	0.286			
Natural vaginal delivery number	10.61	1.154-9.541	<0.001	10.34	1.193 - 27.078	0.03
Diabetes status	1.16	0.132-3.126	0.583			
POP status	0.40	0.008-3.021	0.222			
Hysterectomy history	2.80	0.252-4.805	0.899			
Abortion history	1.62	0.002-0.715	0.981			
Menopause status	0.05	0.004-0.564	0.015	0.08	0.009 - 0.695	0.02
Education status	4.93	0.688-35.367	0.068			

OR: Odds ratio, CI: Confidence interval, BMI: Body mass index, TSH: Thyroid stimulating hormone, POP: Pelvic organ prolapse

SUI, including weakened pelvic floor muscle contractions, strenuous exercise and physical activities, aging, menopause, number and mode of delivery, weight gain, constipation, chronic cough, and many others (19,20). In our multivariate analysis, we found that an increased number of vaginal deliveries and postmenopausal status are risk factors for SUI consistent with the literature. Hypothyroidism may contribute to muscle weakness, including dysfunction of the pelvic floor muscles. It can also cause a slowdown in metabolism, resulting in weight gain and increased abdominal fat, which can elevate intra-abdominal pressure on both the pelvic floor and the bladder.

In a recent study conducted by Zargham et al. (21) a higher prevalence of SUI was observed in patients with hypothyroidism, similar to our study. Similarly, they did not find a significant association regarding the severity of stress incontinence. The relationship between hypothyroidism and the development of muscle weakness may be related to changes in muscle structure. In an animal study, Sánchez-García et al. (22) demonstrated that hypothyroidism might cause the phenotypic shift in muscle fiber type from fast-twitch (type II) to slow-twitch (type I) fibers, promoting muscle weakness in female rabbits. Since the urethral sphincteric complex and the pelvic floor need to be rich in fast-twitch muscle fibers to prevent SUI when intra-abdominal pressure increases, hypothyroidism may be a contributing factor to SUI.

To the best of our knowledge, there are few studies in the literature that have evaluated SUI in patients stratified by the presence of hypothyroidism or subclinical hypothyroidism. Although we observed an increase in SUI in subclinical hypothyroidism, which is a mild form of hypothyroidism, we did not find a statistically significant difference.

Study Limitations

The present study is not without limitations. Our study includes a small number of patients. We did not use a validated questionnaire, such as the International Consultation on Incontinence Questionnaire-Female Lower Urinary Tract Symptoms. The post-treatment period for hypothyroidism has not been monitored to assess how SUI affects the condition. Despite these limitations, the subgroup analysis of hypothyroid patients in terms of stress incontinence and the prospective controlled nature of the study can be considered strengths of the study. prospective studies can be designed to investigate this subject.

Conclusion

Patients with hypothyroidism appear to represent a high-risk group for SUI. Elevated TSH levels, menopause, and a greater number of vaginal deliveries have been identified

as significant risk factors. A clearer understanding of the relationship between hypothyroidism and SUI may offer valuable insights for developing more targeted treatment strategies.

Ethics

Ethics Committee Approval: The study protocol was approved by the Clinical Research Ethics Committee of University of Health Sciences Turkey, Basaksehir Cam and Sakura City Hospital (approval no.: KAEK/2023.02.61, date: 13.03.2023).

Informed Consent: Written informed consent was obtained from all participants.

Footnotes

Authorship Contributions

Surgical and Medical Practices: O.C., Concept: O.C., Design: B.C., O.C., Data Collection or Processing: B.C., Analysis or Interpretation: B.C., O.C., Literature Search: B.C., Writing: B.C., O.C.

Conflict of Interest: No conflicts of interest were declared by the authors.

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