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Uncontrolled Levothyroxine Replacement Therapy in Primary Care: Frequency and Associated Biochemical and Hematological Findings

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Abstract

Hypothyroidism is one of the most common endocrine disorders worldwide. Despite well-established levothyroxine (LT4) replacement therapy, achieving biochemical euthyroidism remains challenging. This study aimed to determine the frequency of uncontrolled LT4 replacement therapy and its associated biochemical and hematological findings in adults with primary hypothyroidism followed in primary care. This retrospective study included 157 adults with primary hypothyroidism receiving LT4 replacement therapy who attended Kamiloba Family Health Center, Istanbul, Türkiye, for routine follow-up. Patients were divided into overtreatment, euthyroid, and undertreatment groups based on serum TSH concentrations using reference values from the Istanbul Public Health Laboratory (0.27 < TSH < 4.80). Demographic, biochemical and hematological parameters were compared among the groups. Of the 157 patients, 137 (87.3%) were women (female to male ratio, 6.85:1), and the mean age was 60.9 ± 15.3 years. 9 patients (5.7%) were overtreated, 48 patients (30.6%) were undertreated, and 100 patients (63.7%) were euthyroid. The frequency of uncontrolled LT4 replacement therapy was determined 36.3%. Biochemical uncontrolled LT4 therapy was observed to be more frequent in women than in men (p = 0.007). HDL cholesterol levels were significantly lower in both the overtreatment (48.1 ± 11.8) and undertreatment (48.4 ± 11.8) groups than in the euthyroid group (53.7 ± 12.3) (p=0.021). Among hematological parameters platelet indices showed the strongest association with biochemical control status. Platelet count (PLT) was highest in the overtreatment group (321.2 ± 89.2) (p = 0.021). Platelet distribution width (PDW) was highest in the undertreatment group (16.2 ± 0.3) (p = 0.024). Plateletcrit (PCT) was highest in the overtreatment group (0.31 ± 0.07) and showed borderline significance (p = 0.069). Mean platelet volume (MPV) was highest in the undertreatment group (10.6 ± 1) ; however, the difference was not statistically significant (p = 0.166). In this primary care study, more than one-third of patients receiving LT4 replacement therapy had biochemical evidence of overtreatment or undertreatment. Uncontrolled LT4 replacement therapy was associated with lower HDL cholesterol levels and alterations in platelet indices, suggesting a potentially unfavorable cardiometabolic profile. These findings highlight the importance of regular biochemical follow up to optimize LT4 replacement therapy in primary care.

Keywords: *Primary hypothyroidism, Uncontrolled levothyroxine replacement therapy, Primary care, Biochemical and Hematological Findings*

Introduction

Hypothyroidism is one of the most common endocrine disorders worldwide, affecting approximately 4 –10% of the adult population, with increasing prevalence among women and older individuals. Levothyroxine (LT4) replacement therapy remains the standard treatment and is highly effective in restoring euthyroidism when administered at an appropriate dose. Serum thyroid-stimulating hormone (TSH) constitutes the primary biochemical marker for monitoring treatment adequacy and guiding dose adjustments.

Despite the widespread availability of LT4 therapy and well-established treatment guidelines, achieving and maintaining biochemical euthyroidism remains a significant clinical challenge. Previous studies have demonstrated that a considerable proportion of patients receiving LT4 replacement exhibit persistently abnormal thyroid function tests, indicating either under-replacement or over-replacement. Such uncontrolled therapy may result from poor medication adherence, inappropriate dosing, drug-drug or drug-food interactions, gastrointestinal malabsorption, weight changes, aging, pregnancy or delayed follow-up in primary care settings.

Both insufficient and excessive LT4 replacement are associated with clinically important adverse outcomes. Persistent hypothyroidism has been linked to dyslipidemia, hypertension, cardiovascular disease, cognitive impairment, reduced quality of life, and increased healthcare utilization. Conversely, excessive LT4 replacement leading to suppressed TSH levels increases the risk of atrial fibrillation, osteoporosis, fractures, and cardiovascular mortality, particularly in elderly patients. Therefore, maintaining thyroid function within the recommended therapeutic range is essential for minimizing long-term complications (1 - 4).

Primary care physicians play a central role in the long-term management of hypothyroidism because the majority of patients receiving LT4 are followed outside specialized endocrine clinics. Consequently, evaluation of biochemical control in primary care provides valuable information regarding the quality of disease management and may identify opportunities to optimize treatment strategies. In addition to TSH abnormalities, accompanying biochemical findings — including lipid profile alterations, liver enzyme abnormalities, renal function changes, hematological parameters, electrolyte disturbances and hematological consequences — may provide further insight into the clinical significance of uncontrolled LT4 replacement.

Although numerous studies have investigated LT4 treatment outcomes, relatively few have focused specifically on the frequency of uncontrolled replacement therapy and its associated biochemical and hematological abnormalities in routine primary care practice. Understanding these laboratory patterns may improve recognition of patients at increased risk for treatment related complications and facilitate earlier intervention.

Therefore, the aim of the present study was to determine the frequency of uncontrolled LT4 replacement therapy among patients managed in primary care and to evaluate the accompanying biochemical and hematological findings associated with inadequate thyroid hormone control. By characterizing these laboratory abnormalities, we sought to provide clinically relevant information that may support more effective monitoring and individualized management of hypothyroid patients in everyday primary care practice.

Methods

This retrospective study was conducted at Istanbul Kamiloba Family Health Center between January 1, 2026, and June 1, 2026. The study included 157 adult primary hypothyroid patients receiving LT4 replacement therapy who presented for periodic check-ups between January 1, 2025, and December 31, 2025. Data were obtained from laboratory results of blood samples taken between 8:30 AM and 9:30 AM, after 12 hours of fasting. Patients were divided into overtreatment, euthyroid, and undertreatment groups based on serum TSH concentrations using reference values from the Istanbul Public Health Laboratory (0.27 < TSH < 4.80). The relationship between groups formed based on TSH values and basic biochemical and hematological values was investigated. The basic biochemical and hematological values evaluated were glucose, HbA1c, HDL cholesterol, LDL cholesterol, triglyceride, ALT, AST, GGT, ALP, LDH, CK, CRP, ferritin, urea, creatinine, uric acid, Ca, P, WBC, neutrophil %, lymphocyte %, Neutrophil Lymphocyte Ratio (NLR), RBC, HGB, HCT, RDW, PLT, MPV, PCT, and PDW.

Statistical analysis included calculations of the number, minimum, maximum, mean, and standard deviation for continuous variables. The normality of the data distribution was assessed using the Shapiro-Wilk test. For comparisons between groups, one-way analysis of variance (ANOVA) was used for data showing normal distribution, and the Kruskal-Wallis test was used for data not showing a normal distribution. In variables where a significant difference was found after the Kruskal-Wallis test, pairwise group comparisons were performed as a post hoc analysis using the Mann-Whitney U test. No significant differences were found in the variables tested using with one-way ANOVA.

Results

157 adult patients receiving LT4 replacement therapy for primary hypothyroidism were included in the study. 87.3% of the patients were female (n=137) and 12.7% were male (n=20). Primary hypothyroidism was more prevalent in women (female/male ratio = 6.85/1) in the study group. The mean age was 60.9 ± 15.3 years. 5.7% (n=9) of the patients were over-treated (TSH ≤ 0.28 mIU/L), 30.6% (n=48) were under-treated (TSH ≥ 4.80 mIU/L) and 63.7% (n=100) were euthyroid (TSH: 0.28 – 4.80 mIU/L). The frequency of uncontrolled LT4 replacement therapy was determined to be 36.3%. Biochemical uncontrolled LT4 therapy was observed more frequent in women than in men (p=0.007). Frequency of overtreated and undertreated patients in LT4 replacement therapy and the relationship between TSH related groups and gender is shown in Table 1.

The mean TSH value in all patients was 4.46 ± 5.45 mIU/L. Mean glucose level was 108.2 ± 35.5 mg/dL, HbA1c was 6.1 ± 1.3%, HDL cholesterol was 51.8 ± 12.3 mg/dL, LDL cholesterol was 125 ± 37.9 mg/dL, and triglyceride level was 144.9 ± 85.1 mg/dL. Descriptive statistics for all other biochemical and hematological parameters are presented in Table 2.

HDL cholesterol levels differed significantly between the groups (p = 0.021). It was found that HDL cholesterol levels were significantly lower in both the overtreatment group (48.1 ± 11.8) and the undertreatment group (48.4 ± 11.8), while HDL cholesterol levels were higher (53.7 ± 12.3 mg/dL) in the euthyroid group (Table 3).

Among hematological parameters, platelet indices showed the strongest association with biochemical control status. Platelet count (PLT) was highest in the overtreatment group (321.2 ± 89.2) (p = 0.021). Platelet distribution width (PDW) was highest in the undertreatment group (16.2 ± 0.3) (p = 0.024). Plateletcrit (PCT) was highest in the overtreatment group (0.31 ± 0.07) and showed borderline significance (p = 0.069). Mean platelet volume (MPV) was tended with to be highest in the undertreatment group (10.6 ± 1) ; however, the difference was not statistically significant (p = 0.166). Uncontrolled LT4 replacement therapy was found to have the greatest impact on platelet indices in blood counts (Table 3).

Although no statistically significant differences were observed, patients in the overtreatment group tended to have higher age, triglyceride, ALP, ferritin and NLR values, whereas those in the undertreatment group showed higher trigliserid, glucose, HbA1c, CK and LDH levels together with lower age, lower ferritin and lower NLR values. These trends may reflect potential metabolic, inflammatory and tissue-related alterations associated with suboptimal LT4 replacement. However, given the lack of statistical significance, these observations should be considered hypothesis-generating rather than conclusive and warrant confirmation in larger prospective studies (p > 0.05), (Table 3).

No statistically significant difference was found in LDL cholesterol, ALT, AST, GGT, CRP, Urea, Creatinine, Uric acid, Ca, P, WBC, Neu %, Lym %, RBC, HGB, HCT, RDW values (p > 0.05), (Table 3).

Table 1. Frequency of overtreated and undertreated patients in LT4 replacement therapy and the relationship between TSH related groups and gender.

		Overtreatment Group TSH ≤ 0.27 N / %	Euthyroid Group 0.27 < TSH < 4.80 N / %	Undertreatment Group TSH ≥ 4,80 N / %	Total	*p*
Gender	Male	0 / %0	8 / %5.1	12 / %7,6	20 / %12.7	< 0.007
	Female	9 / %5.7	92 / %58.6	36 / %22.9	137 / /87.3	
Total		9 / %5.7	100 / %63.7	48 / %30,6	157 / %100	

Table 2. Descriptive values of age, biochemical and hematological findings

	Minimum	Maximum	Mean ± SD	Unit
Age	19	90	60.9 ± 15.3	Year
TSH	0.04	41.40	4.46 ± 5.45	mIU/L
Glucose	62	300	108.2 ± 35.5	mg/dL
HbA1c	4.5	12	6.1 ± 1.3	%
HDL cholesterol	23	83	51.8 ± 12.3	mg/dL
LDL cholesterol	49	236	125 ± 37.9	mg/dL
Triglyceride	31	832	144.9 ± 85.1	mg/dL
ALT	6	81	17.7 ± 10.7	U/L
AST	8	55	18.3 ± 7	U/L
GGT	5	147	21.9 ± 19.1	U/L
ALP	27	240	80.7 ± 34.3	U/L
LDH	94	723	176.8 ± 66.8	U/L
CK	18	755	101.2 ± 91.2	U/L
CRP	0.23	91.68	5.31 ± 9.09	mg/dL
Ferritin	1.8	332	62.4 ± 55.7	µg/L
Urea	12.6	80.1	32.6 ± 10.5	mg/dL
Creatinine	0.44	1.65	0.78 ± 0.20	mg/dL
Uric acid	0.7	11.5	5.1 ± 1.5	mg/dL
Ca	8.3	10.8	9.4 ± 0.4	mg/dL
P	2.6	5.2	3.7 ± 0.5	mg/dL
WBC	3.98	13.60	7.58 ± 1.82	10^3/µL
Neu %	33.5	81.8	56 ± 9.1	%
Lym %	11.4	56.2	34.4 ± 8.8	%
N / L ratio	0.6	7.1	1.9 ± 1	-
RBC	3.24	6.57	4.63 ± 0.44	10^6/µL
HGB	8.9	17.2	13.1 ± 1.4	g/dL
HCT	29.4	53	40.6 ± 4	%
RDW	12.2	19.3	14.1 ± 1.1	%
PLT	111	493	268.5 ± 64.2	10^3/µL
MPV	7.5	14.7	10.5 ± 1.3	fL
PCT	0.13	0.47	0.28 ± 0.06	%
PDW	15.3	16.9	16.1± 0.4	fL

Table 3. Relationship between TSH and age, biochemical and hematological findings in LT4 replacement therapy.

	Overtreatment Group TSH ≤ 0.27 Mean ± SD	Euthyroid Group 0.27 < TSH < 4.80 Mean ± SD	Undertreatment Group TSH ≥ 4.80 Mean ± SD	*p*
Age	**66.3 ± 12**	62.3 ± 14.9	**57 ± 16.1**	**< 0.180**
TSH	**0.19 ± 0.09**	2.35 ± 1.12	**9.67 ± 7.42**	**< 0.000**
Glucose	**105.1 ± 10.4**	106.1 ± 28.2	**113.3 ± 49.4**	**< 0.581**
HbA1c	**5.9 ± 0.4**	6.1 ± 1.1	**6.4 ± 1.6**	**< 0.073**
HDL cholesterol	**48.1 ± 11.8**	53.7 ± 12.3	**48.4 ± 11.8**	**< 0.021**
LDL cholesterol	124.6 ± 32.6	123.4 ± 33.8	128.5 ± 46.9	< 0.904
Triglyceride	**159.1 ± 80.1**	133.9 ± 59.9	**164.7 ± 120.8**	**< 0.255**
ALT	19.4 ± 10.9	16.9 ± 8.8	18.8 ± 13.9	< 0.765
AST	18.6 ± 4.9	17.8 ± 6.2	19.1 ± 8.8	< 0.869
GGT	20.3 ± 12	19.9 ± 12.3	26.2 ± 28.8	< 0.964
ALP	**95 ± 32.6**	80.1 ± 28.8	**79.5 ± 43.9**	**< 0.113**
LDH	**154.7 ± 17.6**	175.1 ± 48	**183.8 ± 97.4**	**< 0.547**
CK	**59 ± 28.3**	93.6 ± 68.8	**123 ± 127.1**	**< 0.120**
CRP	5.8 ± 6	5.9 ± 10.7	4.1 ± 5	< 0.249
Ferritin	**76.2 ± 101.2**	63.8 ± 50.6	**56.9 ± 54.8**	**< 0.452**
Urea	33.7 ± 12.5	32.8 ± 10.7	32 ± 10.1	< 0.931
Creatinine	0.81 ± 0.18	0.77 ± 0.17	0.80 ± 0.24	< 0.757
Uric acid	5.2 ± 1.6	5.3 ± 1.6	4.9 ± 1.4	< 0.444
Ca	9.3 ± 0.6	9.4 ± 0.4	9.4 ± 0.5	< 0.812
P	3.7 ± 0.9	3.7 ± 0.5	3.8 ± 0.5	< 0.903
WBC	7.34 ± 1.72	7.66 ± 1.94	7.45 ± 1.58	< 0.939
Neu %	57.5 ± 11.2	56 ± 9.2	55.6 ± 8.6	< 0.831
Lym %	33.1 ± 11.2	34.4 ± 9.1	34.4 ± 8	< 0.986
N / L ratio	**2.1 ± 1.4**	1.9 ± 1	**1.8 ± 0.7**	**< 0.960**
RBC	4.59 ± 0.31	4.61 ± 0.43	4.67 ± 0.49	< 0.696
HGB	12.8 ± 1.2	13.1 ± 1.4	13.4 ± 1.5	< 0.393
HCT	40.3 ± 3.2	40.4 ± 4	41.1 ± 4	< 0.603
RDW	14.3 ± 1.2	14.1 ± 1.1	14.1 ± 1.2	< 0.815
PLT	**321.2 ± 89.2**	272 ± 62.1	**251.5 ± 58**	**< 0.021**
MPV	**9.7 ± 0.5**	10.6 ± 1.4	**10.6 ± 1**	**< 0.166**
PCT	**0.31 ± 0.07**	0.28 ± 0.06	**0.27 ± 0.06**	**< 0.069**
PDW	**15.8 ± 0.2**	16.1 ± 0.4	**16.2 ± 0.3**	**< 0.024**

Discussion

In a meta-analysis including seven studies involving 4230 patients aimed to evaluate the adequacy of LT4 replacement therapy in patients with known hypothyroidism. The results showed that approximately half of the hypothyroid patients were being treated as euthyroid. In real-world practice, it was noted that a significant number of patients are being overtreated or undertreated, leading to adverse health outcomes. To minimize inappropriate thyroid replacement therapies and optimize population-level health outcomes, it was emphasized that more effective thyroid monitoring strategies are necessary, focusing particularly on thyroid function monitoring in primary care settings (5).

In a study conducted at a tertiary university hospital and involving 500 adult patients with primary hypothyroidism, aimed to determine the frequency of patients treated with overdose and underdose in those who were not optimally treated. In conclusion TSH levels were not within the desired target range in 66.8% (n=334) of patients receiving LT4 replacement therapy. In 50.8% of patients TSH levels were higher than the desired target range (underdose), while in 16.0% of patients TSH levels were lower than the desired target range (overdose) (6).

In this study 5.7% (n=9) of patients were in the overtreatment group (TSH ≤ 0.27 mIU/L), 30.6% (n=48) were in the undertreatment group (TSH ≥ 4.80 mIU/L), and 63.7% (n=100) in the euthyroid group (0.27 < TSH < 4.80 mIU/L). The frequency of uncontrolled LT4 replacement therapy was determined to be 36.3%. It was found that approximately one-third of patients receiving LT4 replacement therapy in primary care were biochemically uncontrolled, with the majority (undertreatment to overtreatment ratio: 5.4 / 1) in the undertreatment group. The significantly lower frequency of uncontrolled LT4 replacement therapy in primary care compared to tertiary care may be indicative of positive outcomes of periodic follow-ups in family medicine.

A retrospective cohort study was conducted to examine the relationship between iatrogenic thyrotoxicosis and patient gender, including 20.724 patients aged 50 years and older. 77% of the patients were female. Women were found to be more likely to have low thyrotropin (TSH) levels compared to men (36.7% vs. 23.9%) (7). In this study 87.3% of the patients were women. And it is shown that biochemical uncontrolled LT4 therapy was observed to be more frequent in women than in men (p=0.007). Female gender has been identified that may be a potential risk factor for uncontrolled LT4 replacement therapy.

In this study HDL cholesterol levels were significantly lower in both the overtreatment and undertreatment groups than in the euthyroid group (p=0.021). This finding was thought that uncontrolled LT4 replacement therapy may be associated with an adverse cardiometabolic profile. In a study involving 20.487 patients that supports this result, investigated the relationship between hypothyroidism and cardiovascular disease (CVD) in both treated and untreated hypothyroid patients. The consequences of overtreatment or undertreatment in terms of cardiovascular risk were examined. In conclusion, it was stated that cardiovascular risk is increased in untreated hypothyroidism patients, but not in treated hypothyroidism patients. The effect of the low TSH duration (overtreatment) on cardiovascular risk in treated hypothyroidism patients was similar to the effect of the high TSH duration (undertreatment). The importance of initiating treatment and maintaining biochemical euthyroidism in hypothyroid patients in order to reduce the risk of CVD and death was emphasized (8).

In this study among hematological parameters platelet indices showed the strongest association with biochemical control status. PLT was highest in the overtreatment group (321.2 ± 89.2) (p = 0.021). PDW was highest in the undertreatment group (16.2 ± 0.3) (p = 0.024). PCT was highest in the overtreatment group (0.31 ± 0.07) and showed borderline significance (p = 0.069). MPV tended to be highest in the undertreated group (10.6 ± 1); however, the difference was not statistically significant (p = 0.166). Uncontrolled LT4 replacement therapy was found to have the greatest impact on platelet indices in blood counts. This results also may be associated with an adverse cardiometabolic profile.

Many studies have yielded findings that support this hematological results. In a retrospective study included 90 patients aged between 30-45 years (diagnosed with hypothyroidism (n=30), hyperthyroidism (n=30), and euthyroidism (n=30)) investigated the relationship between platelet indices and thyroid hormone levels. In conclusion statistically significant increase in PCT values was observed in hypothyroid patients compared to euthyroid patients. In hyperthyroid patients, a statistically significant increase in PLT, MPV, and PCT values was detected compared to euthyroid patients. This study demonstrated that platelet parameters can be considered reliable markers in hypothyroid and hyperthyroid patients and can be used as CVD risk assessment parameters due to abnormal thrombovascular activity (9).

In a prospective cross-sectional study conducted over an 8-month period on 60 hypothyroid patients and 60 normal adults as a control group aimed to evaluate the effect of hypothyroidism on platelet indices, including PLT, MPV, PDW, PCT, and P-LCR. And it is aimed to compare the results with age-matched normal euthyroid individuals. In conclusion, the male / female ratio in the study was 1:8.6. The mean age was 43. A statistically significant increase was recorded at hypothyroid patients in MPV ($p<0.03$) and PDW ($p<0.02$). No significant p-values were found between the groups in PLT ($p<0.22$), P-LCR ($p<0.48$), and PCT ($p<0.24$). MPV and PDW have been shown to be reliable markers among platelet parameters and can be used as CVD risk assessment parameters in patients with hypothyroidism (10).

In a retrospective study conducted on a total of 198 adult patients, 99 with hypothyroidism and 99 healthy controls, the relationship between hypothyroidism and RDW and MPV was investigated using thyroid function tests and complete blood counts. The mean RDW level was significantly higher in hypothyroidism than in the control group ($p<0.001$). The mean MPV level was significantly higher in hypothyroidism than in the control groups ($p<0.001$). In conclusion, high MPV and RDW levels have been observed in hypothyroid patients; this suggests that these parameters could be used as potential indicators of hypothyroidism (11).

Although no statistically significant differences were observed, patients in the overtreatment group tended to have higher age, trigliserid, ALP, ferritin and NLR values, whereas those in the undertreatment group showed numerically higher glucose, HbA1c,trigliserid, CK and LDH levels together with lower age, ferritin and NLR values. These trends may reflect potential metabolic, inflammatory and tissue-related alterations associated with suboptimal LT4 replacement. However, given the lack of statistical significance, these observations should be considered hypothesis-generating rather than conclusive and warrant confirmation in larger prospective studies.

In an observational cohort study, conducted using data from 17.684 patients receiving LT4 replacement therapy between 1993 and 2001, investigated the relationship between serum TSH concentration and morbidity from cardiovascular disease and fractures. In conclusion, it was determined that patients with high or suppressed TSH have an increased risk of CVD, dysrhythmia, and fractures, while those with low but unsuppressed TSH do not have this increased risk. It was stated that having low but unsuppressed serum TSH concentrations is safe for patients treated with LT4 (12). Lower HDL cholesterol levels and alterations in platelet indices and, although not statistically significant, elevated triglycerides observed in the uncontrolled LT4 replacement therapy groups, suggest a potentially unfavorable cardiometabolic profile in these patients. Trend of elevated ALP level observed in the overtreatment group (though not statistically significant) may contribute to be an indicator of bone resorption and potential fractures.

Environmental iodine deficiency is the most common cause of hypothyroidism on a worldwide basis. In areas of iodine sufficiency, such as the United States, the most common cause of hypothyroidism is chronic autoimmune thyroiditis (Hashimoto’s thyroiditis). Autoimmune thyroid diseases (AITDs) are characterized pathologically by infiltration of the thyroid with sensitized T lymphocytes and serologically by circulating thyroid autoantibodies (1). AITDs are disorders resulting from a dysregulation of the immune system, leading to an immune attack on the thyroid gland. AITDs are T-cell-mediated organ-specific autoimmune disorders. The prevalence of AITDs is estimated to be 5%. AITDs characterized by lymphocytic infiltration of the thyroid parenchyma. The clinical features of AITDs are thyrotoxicosis and hypothyroidism, respectively. The mechanisms triggering the autoimmune attack on the thyroid gland are still under investigation (13).

The most common causes of thyroid toxicosis include Graves' disease (GD), toxic multinodular goiter (TMNG), toxic adenoma (TA), and subacute granulomatous thyroiditis (SAT). In a study which retrospectively analyzed hospital records from the Endocrinology Clinic between 2016 and 2019, aimed to investigate the association of NLR, monocyte-lymphocyte ratio (MLR), platelet-lymphocyte ratio (PLR), and mean platelet volume (MPV) with these diseases. Data from 66 GD, 37 TA, and 35 SAT patients were included. These data were compared with data from a control group of 35 healthy individuals. PLR and NLR values were significantly higher in SAT patients compared to GD, TA, and control groups (14).

Although not statistically significant, this study was associated with elevated ferritin and elevated NLR in the overtreatment group and low ferritin and low NLR in the undertreatment group. Elevated ferritin, an acute phase reactant, and elevated NLR may be associated with the excess inflammation in the overtreatment group. Although not statistically significant elderly patients may be associated with overtreatment. Patients in the undertreatment group tended to have higher glucose, higher HbA1c, higher CK and higher LDH. These trends may reflect association between undertreatment and prediabetes, muscle wasting and tissue damage. These observations should be considered hypothesis-generating rather than comprehensive and warrant confirmation in larger prospective studies.

Conclusion

In primary care the frequency of uncontrolled LT4 replacement therapy was determined 36.3%. 5.7% (n=9) of the patients were overtreated, 30.6% (n=48) were undertreated, and 63.7% (n=100) were euthyroid. In this study more than one-third of patients receiving LT4 replacement therapy had biochemical evidence of overtreatment or undertreatment. Biochemical uncontrolled LT4 replacement therapy was observed more frequent in women. Uncontrolled LT4 replacement therapy was associated with lower HDL cholesterol levels and alterations in platelet indices, suggesting a potentially unfavorable cardiometabolic profile. These findings highlight the importance of regular biochemical follow up to optimize LT4 replacement therapy in primary care.

Conflict of Interest

None.

Ethical Committee Approval Number

2020/45-07

Name of the Ethical Committee

Biruni University

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