(Maier et al., 1988)The patient's status in the last 72 hours is analyzed and the patient is asked to explain her/his condition with her/his own words. The scale is filled in by the interviewer and is based on the interviewer's momentary convictions. The score of each item is between 0-4 and the total score of the scale is between 0-56. Scaled as 0-5: no anxiety, 6-14: minor anxiety,> 15: major anxiety. The taken score of the patient was assessed according to the belonging range of the score.

SPSS 23 packaged software, Pearson's Chi-Square, Fisher-Freeman-Halton, Shapiro-Wilk, Kruskal-Wallis H tests were used for statistical analysis.

3. RESULTS

Among our study population, the median age was 41.50 (min-max = 20-72). 4 (12.90 %) patients in the hypothyroid group and 7 (22.58%) patients in the hyperthyroid group were female. When the three groups were compared, there was a statistical difference in cases with and without RLS (p= .042). We evaluated 16 patients with RLS in our study. The RLS-diagnosed patients were higher in the hypothyroid group than the hyperthyroid group (p= .730) (Table 1).

Table 1: Characteristics of the hypothyroid group, hyperthyroid group and control group

	GROUPS			**p-value**
	Hypothyroid group	**Hyperthyroid group**	**Control Group**	
Gender* n(%)				
Male	4 (12,90)	7 (22,58)	5 (16,67)	0,598
Female	27 (87,10)	24 (77,42)	25 (83,33)	
Age#	40 (25-72)	45 (22-66)	38 (20-72)	0,716
RLS * n(%)	12 (38,71)	4 (12,90)	-	**0,042**

*Data given in *frequency (percentage)* values. #Data given as median (min-max). **RLS:** Restless Legs Syndrome.

When the subsequent categorization of BDI into mild, moderate and severe was made, a significant difference was found between the three groups (p=0.010). Milder level of depression scores was higher seen in the hypothyroidism group (83.87 %), whereas the severe level of depression scores was higher seen in the hyperthyroidism group (16.13%) among the study population. No significant correlation was found between ESS, HAS, and ISI scoring systems and the presence of RLS (p=0.486) (Table 2).

Table 2: Insomnia Severity Index, Beck Depression Inventory and Hamilton Anxiety Scale Status in the hypothyroid group, hyperthyroid group and control group

		GROUPS			**p-value**
		Hypothyroid group	**Hyperthyroid group**	**Control Group**	
ESS n(%)	>=10	4 (12,90)	3 (10,00)	4 (13,33)	1,000
	<10	27 (87,10)	27 (90,00)	26 (86,67)	
	1,0	4 (12,90)	3 (9,68)	11 (36,67)	
	2,0	0 (0,00)	0 (0,00)	4 (13,33)	
	3,0	0 (0,00)	0 (0,00)	1 (3,33)	
HAS n(%)	non-existent	14 (45,15)	10 (32,26)	7 (23,33)	0,087
	minor	15 (48,39)	12 (38,71)	13 (43,33)	
	major	2 (6,45)	9 (29,03)	10 (33,33)	

BDI n(%)	mild	26 (83,87)	15 (48,39)	21 (70,00)	**0,010**
	moderate	4 (12,90)	11 (35,48)	9 (30,00)	
	severe	1 (3,23)	5 (16,13)	0 (0,00)	
ISI n(%)	insignificant	23 (74,19)	19 (61,29)	20 (66,67)	0,486
	subsidiary	6 (19,35)	6 (19,35)	8 (26,67)	
	moderate	2 (6,45)	6 (19,35)	2 (6,67)	

ESS: Epworth Sleepiness Scale, **HAS:** Hamilton Anxiety Scale, **BDI:** Beck Depression

No significant difference was found between the three groups in terms of the total score of PSQI 5 and below and above (p=0.541). Significant differences were found between the three groups in terms of subjective sleep quality, sleep latency and daytime functions in the component evaluations of PSQI (p=0.004, p=0.001, p=0.001) (Table 3). There was no significant difference in terms of others.

Table 3: Sleep quality status in the hypothyroid group, hyperthyroid group and control group

		GROUPS			**p-value**
		Hypothyroid Group	**Hyperthyroid Group**	**Control Group**	
Total PSQI score	<5	18 (58,06)	14 (45,16)	14 (46,67)	0,541
	>=5	13 (41,94)	17 (54,84)	16 (53,33)	
PSQI Component 1 n(%)	,0	4 (12,90)	1 (3,23)	12 (40,00)	**0,004**
	1,0	19 (61,29)	17 (54,84)	11 (36,67)	
	2,0	5 (16,13)	10 (32,26)	7 (23,33)	
	3,0	3 (9,68)	3 (9,68)	0 (0,00)	
PSQI Component 2 n(%)	,0	15 (48,39)	6 (19,35)	8 (26,67)	**0,001**
	1,0	3 (9,68)	11 (35,48)	13 (43,33)	
	2,0	9 (29,03)	3 (9,68)	7 (23,33)	
	3,0	4 (12,90)	11 (35,48)	2 (6,67)	
PSQI Component 3 n(%)	,0	12 (38,71)	13 (41,94)	16 (53,33)	0,361
	1,0	8 (25,81)	11 (35,48)	3 (10,00)	
	2,0	7 (22,58)	5 (16,13)	7 (23,33)	
	3,0	4 (12,90)	2 (6,45)	4 (13,33)	
PSQI Component 4 n(%)	,0	23 (74,19)	23 (74,19)	22 (73,33)	0,285
	1,0	6 (19,35)	4 (12,90)	1 (3,33)	
	2,0	1 (3,23)	1 (3,23)	4 (13,33)	
	3,0	1 (3,23)	3 (9,68)	3 (10,00)	
PSQI Component 5 n(%)	,0	2 (6,45)	4 (12,90)	3 (10,34)	0,452
	1,0	23 (74,18)	16 (51,61)	17 (58,62)	
	2,0	6 (19,35)	9 (29,03)	9 (31,03)	
	3,0	0 (0,00)	2 (6,45)	0 (0,00)	
PSQI Component 7 n(%)	,0	27 (87,10)	28 (90,32)	14 (46,67)	**0,001**
	1,0	4 (12,90)	3 (9,68)	11 (36,67)	
	2,0	0 (0,00)	0 (0,00)	4 (13,33)	
	3,0	0 (0,00)	0 (0,00)	1 (3,33)	

PSQI: Pittsburgh Sleep Quality Index. Data given in *frequency (percentage)* values.

4. DISCUSSION

In our study, we examined 92 cases to evaluate the frequency of restless legs syndrome (RLS) and its sleep disturbance in patients with thyroid dysfunction. We found a statically higher frequency of RLS disorder in the hypothyroidism group, whereas we did not found any significant relationship with day-time and night-time sleepiness and sleep quality among the study population.

Thyroid function disorders are the most common endocrine disorders in the world and our country. Thyroid hormone has vital importance on the maturation and function of the central nervous system. Although thyroid dysfunction does not cause structural damage to the brain, it can be associated with various psychiatric disorders, sleep disorders and physical diseases (Davis et al., 2007).

According to epidemiological studies, RLS can be seen in 1-15% of the general population (Yüksel et al., 2006). Indeed, in our study, the rate of RLS was 38% in the hypothyroidism group and 13% in the hyperthyroidism group. We did not diagnose RLS in the healthy-volunteers group.

Although it is accepted that there is dysfunction in the central-origin dopamine system in RLS, the etiopathogenesis is not fully clarified (Trenkwalder et al., 2018) .

Investigating thyroid dysfunction in RLS could be beneficial to understand underlying pathogenesis in RLS because of the very close and important relationship between thyroid gland activity and the brain. We could think that our study is very valuable that contributes to reveal the thyroid dysfunction in the etiology of RLS in this field.

Sleep disorder symptoms are almost viewed in common health problems. Thyroid gland dysfunction is linked to sleep disturbances and commonly insomnia due to effect irreversible and severe changes in central nervous systems. Firstly, insomnia is frequently seen in hyperthyroidism. Following the literature, in our study, when the assessment was made between three groups according to ISI, the number of patients with moderate ISI scores were higher in the hyperthyroid group than the other groups. Excessive Daytime Sleepiness (EDS) is the most common sleep-related symptom and its estimated prevalence in the community is up to 18%. In our study, EDS (ESS above 10) was found 12.9 % in the hypothyroid group and 10% in the hyperthyroid group.

In our study, we did not find any significant difference in terms of sleep quality between patients with hypothyroidism and hyperthyroidism. However, interestingly, we found only significant differences in sleep latency, daytime functions and subjective sleep quality of the lower components of sleep quality. The rate of prolonged sleep latency was significantly higher in patients with hyperthyroidism than the other groups. This situation might be explained about the symptoms of hyperthyroidism. The rate of those who stated that their subjective sleep quality as poor was 9% and it was significantly higher in both hypothyroidism and hyperthyroidism cases compared to healthy controls.

It is known that abnormal thyroid functions can affect mood and affect the course of mood disorders. In the literature, it is stated that psychiatric symptoms can occur in hypothyroid patients as seen in all chronic diseases (Bauer et al., 2001). Depression, dysmnesia, slowing of thought and concentration disorder are the most common psychiatric symptoms in hypothyroidism, indeed nonspecific symptoms are seen at the beginning (Whybrow et al.,1969). While the depressive mood is the most common psychiatric symptom, anxiety and sleep disorders commonly coexist. The researches reported that 33% of anxiety disorder and 43% depression occurred in hypothyroidism (Jain, 1972). It is known that there is a relationship between thyroid hormones and brain functions affecting receptor systems and biochemical reactions in the brain. Therefore, it is thought that any increase or decrease in thyroid hormone level might be related to the level of psychiatric symptoms. Another study suggested that severe psychiatric symptoms were seen in hypothyroid and subclinical hypothyroid patients compared to healthy controls apart from being affected by thyroid hormone levels (Eren et al., 2006). The most common psychiatric condition in hyperthyroidism (25%) is depression. In approximately 15% of cases, signs of depression can appear before hyperthyroidism symptoms. Anxiety disorders are frequently seen in hyperthyroidism as much as close to depression. Anxiety disorders and depression commonly occur during hyperthyroidism. Numerous hypotheses

have been asserted concerning the mechanism of which thyroid disorders increase the risk of developing psychiatric disorders. Marangell et al. hypotetized that there is a relationship between neurotransmitter activity and thyroid hormones (Marangell et al., 1997). However, in our study, the number of patients who has severe levels according to the BDI was more in hyperthyroidism cases by the studies that have been carried out; whereas there was no significant difference between the groups in Hamilton Anxiety Scale comparisons contrary to common belief.

5. CONCLUSION

In daily polyclinic practice, many physicians routinely require thyroid hormones from patients with sleepiness, insomnia, depressive, anxiety signs and restless legs syndrome symptoms. For this reason, we think that this study of ours is valuable and there is a need for new studies with more number of cases related to the medical conditions.

Disclosures

The authors have no conflicts of interest to disclose.

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