THE CHARACTERISTICS OF URINARY IODINE EXCRETION AND HEMOGLOBIN ON HYPERTHYROIDISM WOMEN

[1]MUTALAZIMAH, [2]SETIA ASYANTI

[1]Department of Nutrition, Faculty of Health Science, Muhammadiyah Universityof Surakarta,
[2]Faculty of Psychology, Muhammadiyah University of Surakarta
E-mail: [1]mutalazimah@ums.ac.id, [2]setia_asyanti@ums.ac.id

Abstract— Hyperthyroidism is a phenomenon that is now often found in areas of endemic iodine deficiency. This conditions caused by the hyperactivity of the thyroid gland, increase in metabolism of energy and nutrients, and influences to occurs of anemia and iodine deficiency. The objective of this study was identify of urinary iodine excretion (UIE) and hemoglobin (Hb) level on women of childbearing age with hyperthyroidism and compared with euthyroid subjects. This observational study was conducted in the sub district of Prambanan Sleman regency, consisted of 31 subjects with hyperthyroidism and 81 euthyroid subjects, beginning with measurement of thyroid stimulating hormone (TSH) and free thyroxine (FT4). UIE were measured by acid digestion method, while the hemoglobin was measured by cyanmet technique. Analysis of differences in UIE and Hb were tested using independent t test. The results showed that UIE level on both of groups spread on the deficit, optimal and excessive category, category anemia and normal also occurs in both groups. Independent t test analysis proved there was no difference in UIE level (p = 0,384) and in Hb level there was difference (p = 0.011) between hyperthyroidism subjects and euthyroid subjects.

Keywords— Hyperthyroidism, Women, UIE and Hemoglobin.

I. INTRODUCTION

As in hypothyroidism, iodine deficiency is also the factor that causes the most dominant in hyperthyroidism, compared with the other factors[1], due to iodine deficiency which had an important role in the long term through a variety of mechanisms also cause clinical hyperthyroidism, when TSH decreased and thyroxine increases or subclinical hyperthyroidism, when TSH decreased but thyroxine level is normal[2,3].

Various problems related to iodine and thyroid disorders in the adult group, occur 4-10 times more often in women than men, especially on childbearing women [1,4,5,6]. Mutalazimah*et al.* (2013), found 26%cases of subclinical hyperthyroidism, in women of childbearing age in Sub district of Cangkringan, SlemanRegency, Yogyakarta [7]. This study supports theabout the existence of subclinical hyperthyroidism, which is marked by the tendency of decrease in TSH on the subject in endemic areas of iodine deficiency [1,8].

Hyperthyroidism is a condition caused by a disruption of the thyroid gland function, is closely related to the metabolism of iodine as the main mineral, as a constituent part of the thyroxinehormone in thyroglobulin and also related to iron metabolism and anemia [9]. Hyperthyroidism occurs when the thyroid gland has over activity, and then increaseenergy metabolism (hypermetabolic) [10]. Hyperthyroidism can be caused by iodine deficiency, through the iodine induced hyperthyroidism (IIH) mechanism, it is also found in countries with adequate iodine intake, such as America, Germany and Australia. The factors may be related with IIH are iodine prophylaxis in endemic areas, iodineexcess as antithyroid drug therapy, the excess of drugs containing high iodine levels [11,12]. Conversely, iodineexcess as a cause of hyperthyroidism, is explained as thethyroid autoimmunity mechanism through Jod Basedow effect [3,13,14].

This study aims to find hyperthyroidism in childbearing women in endemic areas of iodine deficiency, as well as measuring UIE and hemoglobin levels and compared to euthyroidsubjects.

II. MATERIALS AND METHODS

A total number of 31 cases of hyperthyroidism subjects and 81 cases of euthyroid subjects were studied in this research. The ages ranged from 18-45 years. Thyroid status was obtained by measuring TSH and FT4 were analyzed using ELISA techniques in the department of clinical pathology laboratory of Dr. Sardjito hospital. The TSH and FT4 level for defining the hyperthyroidism in subjects were <0.4 mU/L, and> 1.8 ng / dl. UIE was measured by acid digestion method and Hbwas measured by cyanmetHbmethods. Statistical analysis to distinguish UIE and Hb levels in hyperthyroid subjects and euthyroidsubjects used independent t test and differences with p value less than 0.05 were considered significant. This research had to get ethics committee approval from the Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine, University of GadjahMada in Yogyakarta.

III. RESULT

A. TSH and FT4

In This study, blood parameters of 112 subjects were investigated. The comparison of TSH and FT4 characteristics betweeneuthyroid subjects and hyperthyroidism subjects, shown in Table 1.

Table 1. The Characteristics ofTSH and FT4

Statistics	Euthyroid (n = 81)		Hyperthyroid (n = 31)	
	TSH (mU/L)	FT4 (ng/dL)	TSH (mU/L)	FT4 (ng/dL)
Mean	0.98 ± 0.56	0.98 ± 0.16	0.17 ± 0.16	1.13 ± 0.36
Median	0.85 (0.40-3.69)	0.96 (0.53-1.50)	0.12 (0.004-0.426)	1.14 (0.45-1.95)

The mean TSHof hyperthyroid subjects(0.17 ± 0.16 mU/L) waslower than euthyroid subjects(0.98 ± 0.56 mU/L). While the mean of FT4 levelof hyperthyroid subjects (1.13 ± 0.36 ng/dL)was higher than euthyroid subjects (0.98 ± 0.16). The same comparisons of median TSH and FT4 between hyperthyroid subjects andeuthyroid subjects, the median TSH ofhyperthyroid subjects was 0.12 (0.004 to 0.426) lower than euthyroidsubjects was0.85 (0.40 to 3.69), whereas the median FT4 of hyperthyroid subjects was higher at 1.14 (0.45 to 1.95) than euthyroid subjects was 0.96 (0.53 to 1.50).

B. UIE and Hb

Investigation of UIE and Hb level of euthyroid subjects and hyperthyroidism subjects, shown in Table 2.

Table 2.The category of UIE and Hb

Variable	Euthyroid (n = 81)	Hyperthyroid (n = 31)
	n (%)	n (%)
UIE		
Deficiency (<100 µg/L)	14 (82.4)	3 (17.6)
Optimal (100-199 µg/L)	26 (72.3)	10 (27.7)
Excessive (> 300 µg/L)	41 (69.5)	18 (30.5)
Hb		
Anemia (< 12 g/dl)	53 (85.5)	9 (14.5)
Normal(≥ 12 g/dl)	28 (56.0)	22 (44.0)

Based on the category UIE, both of hyperthyroidism subjects andeuthyroidsubjects, spread in three categories deficiency, optimal and excessive, but for the deficiencycategory, euthyroid subjects had greater percentage than hyperthyroidism subjects, while the percentage of excessive category, hyperthyroidism subjects was higher than euthyroidsubjects. Similarly, in the category of Hb level, the percentage of anemia was higher in the euthyroid group.Characteristics of statistical parameter from UIE and Hb was presented to describe interpretation (Table 3.)

Table 3.Characteristics of statistical parameter UIE and Hb

Variable	Euthyroid (n = 81)	Hyperthyroid (n = 31)	p value
UIE (µg/L)			
Mean	236.0 ± 158.36	264.8 ± 145.59	0.384
Median	202.0 (0-774)	278 (3-607)	
Hb (g/dl)			
Mean	11.52 ± 1.38	12.30 ± 1.49	0.011
Median	11.49 (9.15–14.78)	12.53 (9.28-14.55)	

Based on the mean and median UIE, the two groups included in the category of excessive (> 200 µg/L). The mean and median UIE of hyperthyroidism subjects was greater than euthyroid subjects, but was not significant (p = 0.384). The level of Hb in both groups was showed the the significant differences (p = 0.011).

IV. DISCUSSION

Interpretation of serum TSH, in this study is defined by the reference interval 0.4 to 4.0 mU/L, while the FT4 approximately 0.8 to 1.8 ng/dL [15,16]. Theexcessive phenomenon and hyperthyroidism in endemic areas of iodine deficiency, associated with IIH, were caused by the factors, the iodine supplementation in endemic areas, antithyroid drug therapy, the excessive of drugs containing highiodine levels, such as amiodarone and expectorants including glycerol and organidin, contrast media such as tomography or arteriography, drinking water with excessive iodine, the use of antiseptics on the food and beverage industry, especially dairy products, food and beverage industries with raw materials rich in iodine such as seweeds or their fortification yodium[11,12].

The descriptive statistics obtained median UIElevelof hyperthyroid group was 278 (3-607) µg/Land euthyroid group was 202.0 (0-774). This result showed that the median has exceeded the threshold for determining iodine deficiency endemicityarea when greater than 50µg/L.

Although not significantly different, the two groups were also found in iodine deficiencycategories, when associated with hyperthyroidism, iodine deficiency can trigger through the mechanism of thyroid immugenicity and thyroid autoantibodies were also exacerbated by the consumption of foods that are goitrogenic [17]. Meanwhile hemoglobin level was found a significant difference between the group of hyperthyroidsubjects and euthyroidsubjects, when examined more deeply this is related to the mechanism of hematological abnormalities often found in patients with hyperthyroidism, although the mechanism of pathogenesis is not yet known certainty, but presumably related to excessive thyroid hormone, besides eritropoisis process is not working optimally, could also suspected due to the displacement of red blood cells as a result of the immune system or toxic mechanisms that cause hemopoietic stem cell dysfunction [9]. The incidence of anemia in patients with hyperthyroidism are also associated with the risk of celiac and diare [18].

CONCLUSIONS

Thecategory of UIE in both groups spread in deficiency, optimal and excessive. In both groups also were found anemia and normal subjects. There was no difference of UIE level in euthyroid and

hyperthyroid subjects and there was difference in hemoglobin level in euthyroid and hyperthyroid subjects. Therefore, it is important to improve thyroid function of hyperthyroidism subjects by pay attention to prevent the determinant factors of hyperthyroidism.

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