

THE RELATIONSHIP OF BLOOD GLUCOSE TO THYROID HORMONES LEVELS IN PATIENTS WITH HYPERTHYROIDISM IN ELOBIED CITYAkram Hamed Awad Alla Elsukar*¹, Waleed Hajmusa Elttahir², Assla Mohammed Ahamd Abdalrhman³^{1,2}University of Kordofan, Faculty of Medicine and Health Sciences, Medical Laboratory Division, Clinical Chemistry Department.³Faculty of Medicine and Health Science, Medical Laboratory Sciences, University of Kordofan.

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ABSTRACT

Back ground: Hyperthyroidism is the condition that occurs due to excessive production of thyroid hormone by the thyroid gland. **Objective:** The study aimed to explain the relationship between T3 T4, TSH and HBA1C of 28 hyperthyroidism volunteers (as a test group) and 15 apparently healthy volunteers (as a control group). **Materials & Methods:** Descriptive case - control study conducted in hospitals and clinics in Elobied city, during the period from October 2015 to August 2016. Statistical package for social science (SPSS version 17) computer software was used for data analysis. **Results:** Serum T₃ and T₄ were significantly increased among cases compared with control P-values (<0.000 and <0.000) at 0.05 level of significance. TSH on the other hand was significantly reduced P-value (<0.000) at 0.05 level of significance. Furthermore, blood level of HBA1C was significantly correlated with T3 & T4 level. **Conclusion:** Hyperthyroidism massively affect on the mean values of HBA1C; hence regular check up for random blood glucose and HBA1C levels among patients with hyperthyroidism are valuable and helpful on diabetes mellitus control.

KEYWORDS: HBA1C, Elsukar, North Kordofan.**INTRODUCTION**

Triiodothyronine (T3) and its prohormone, thyroxine (T4), are tyrosine-based hormones produced by the thyroid gland that are primarily responsible for regulation of metabolism. T3 and T4 are partially composed of iodine. A deficiency of iodine leads to decreased production of T3 and T4, enlarges the thyroid tissue and will cause the disease known as simple goitre.^[1] The thyronines act on nearly every cell in the body. They act to increase the basal metabolic rate, affect protein synthesis, help regulate long bone growth (synergy with growth hormone) and neural maturation, and increase the body's sensitivity to catecholamines (such as adrenaline) by permissiveness. The thyroid hormones are essential to proper development and differentiation of all cells of the human body. Thyroid hormone leads to heat generation in humans.^[2]

Hyperthyroidism may be asymptomatic or present with significant symptoms. Some of the symptoms of hyperthyroidism include nervousness, irritability, increased perspiration, heart racing, hand tremors, anxiety, difficulty sleeping, thinning of the skin, fine brittle hair, and muscular weakness—especially in the upper arms and thighs. More frequent bowel movements may occur, and diarrhea is common.^[3]

Weight loss, sometimes significant, may occur despite a good appetite (though 10% of people with a hyperactive thyroid experience weight gain), vomiting may occur, and, for women, menstrual flow may lighten and menstrual periods may occur less often, or with longer cycles than usual.^[4]

PATIENTS, MATERIALS AND METHODS

This is a descriptive case - control study conducted in Elobied city capital of North of Kordofan State, during the period from October 2015 to August 2016. 28 patients with hyperthyroidism were selected after taking their consents as (test group). Each volunteer in this study was asked to come to El- Obied teaching hospital for medical assessment and sample collection. 15 apparently healthy subjects were selected as a control group who were age and sex matched to the test group. Clinical data was obtained from the history and recorded on a questionnaire. Clinical assessment of the study group was done by a medical doctor according to the questionnaire. Clinical history and diagnosis of the test group and the control group were done by a physician. After informed consent, and use of antiseptic alcohol swab for the skin (70% ethanol), 5 ml of venous blood was collected from each volunteer included in this study. Plasma was separated by centrifugation at 3000 rpm for

5 minutes at room temperature. The supernatant plasma was collected by means of micropipette in tightly sealed plain container and kept at (4 to 8) C° till used later. The plasma then allowed to warm at room temperature and investigated of study variables by using spectrophotometer and flame photometer. The precision and accuracy of all methods used in this study were checked in each patch analyzed by including commercially prepared control sera. The result was analyzed by SPSS (version 20). The mean and SD obtained and "t" test was used for comparison. Linear regression also used for comparison. P.value was obtained to assess the significance. P.value < 0.05 is considered significant and P.value < 0.01 is highly significant.

RESULTS

Table 1: Showed a significant difference between the mean levels of T3 among the the test group and the control group (Mean ± STD) (3.5±.201) ng/dl versus (0.91±1.02) ng/dl respectively; (P value = 0.004). as well revealed a significant difference between the means of the plasma level of T4 among the test group and control

group (Mean ± STD) (16.4±1.29) ng/dl versus (6.3±3.60) ng/dl respectively; (P value = 0.000). Furthermore this table exposed a significant difference between the mean levels of Thyroid stimulation hormone (TSH) among the the test group and the control group (Mean ± STD) (0.01±.968) miul/l versus (1.50±.000) miul/l respectively; (P value = 0.000). Also the table explained a significant difference between the mean of HBA1C percentage among the the test group and the control group (Mean ± STD) (7.00 ±1.26) % versus (3.4 ±2.04) % respectively; (P value = 0.024). In addition to that this table showed a significant difference between the mean levels of random blood glucose among the the test group and the control group (Mean ± STD) (117±15.5) mg/dl versus (101± 27.00) mg/dl respectively; (P value = 0.045).

Figure (1) and (2) Show the correlation between T₃, T₄ hormones and HBA1C. T₃ and T₄ hormones were positively correlated with HBA1C (r= 0.328 P.value e= 0.000) r= 0.282 p.value = 0.000) for T₃ and T₄ respectively.

Table1: The Mean values of biochemical parameters in control and cases of hyperthyroidism.

Variables	Control n=15	Case n = 28	P.value
Triiodothyronine T3 (ng/dl) Range	0.91±1.02 (0.70-1.50)	3.5±.201 (1.96-7.06)	0.004
Thyroxin T4 (ng/dl) Range	6.3±3.60 (3.80-7.90)	16.4±1.29 (10.9-24.0)	0.000
Thyroid stimulation hormone TSH (miul/l Range)	1.50±.000 (0.38-3.80)	0.01±.968 (0.01-0.01)	0.000
HBA1C (%) Range	3.4 ±2.04 (1.70-6.30)	7.00 ±1.26 (4-14)	0.024
Blood glucose RBG (mg/dl) Range	101± 27.00 (72-135)	117±15.5 (89-233)	0.045

- The table shows the mean ± SD, range in brackets () and probability (P. value).
- T-Test was used for comparison.
- P. value ≤ 0.05 is considered significant.

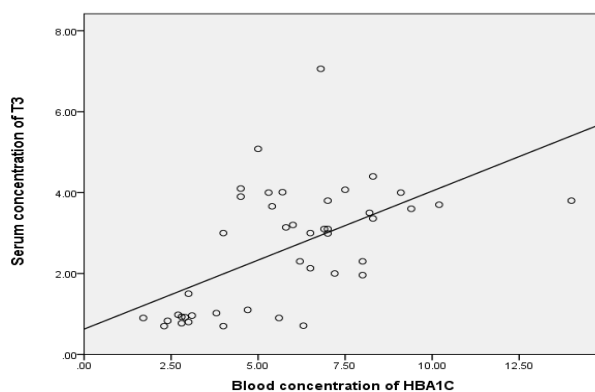


Figure 1: The relationship between serum concentration of T3 (ng/ml) with HBA1C (%) among patient with hyperthyroidism (r=0.328 P.value e= 0.000).

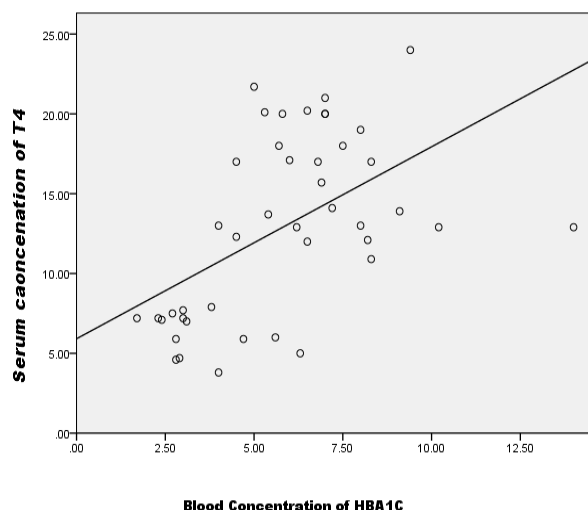


Figure 2: The relationship between serum concentration of T4 (ng/ml) with HBA1C (%) among patient with hyperthyroidism (r= 0.282 p.value = 0.000),

DISCUSSION

Hyperthyroidism is the condition that occurs due to excessive production of thyroid hormone by the thyroid gland. Hyperthyroidism is typically associated with worsening blood glucose control and increased insulin requirements.

This study revealed that, there was a significant difference between the mean levels of thyroid hormones (T_3 , T_4 and TSH) of the cases and with that of the controls group, P-values (0.004, 0.000 and 0.000) for the T_3 , T_4 and TSH respectively. This may attributed to thyroid tissue disease or thyroid stimulating antibodies. This finding confirmed by previous study conducted by Aleppo MD⁵, who reported that; hyperthyroidism major causes could be a disease affected both the thyroid and pituitary gland which alter the thyroid hormones levels and increase stimulation of TSH.

Also the results of this study showed a significant differences in the percentage of HbA_{1c} among cases when compared with that of the control group, resulting in P.value.(0. 024) and this may be as a result of the higher level of blood glucose and HbA_{1c} among cases group compared to normal controls appeared as changes of carbohydrate metabolism. This finding agree with previous study done by (Kim H B)⁶. Moreover in this study the status of random blood glucose in patients with hyperthyroidism was significantly different when compared with the control group, P-value (0. 045) and this finding agree with studies conducted by (Kim H B)⁶ who reported that; thyroid hormone stimulates glucose production from the liver and at high levels, induces liver insulin resistance.

Furthermor The present results in this study showed a significant positive correlation between the percentage of HbA_{1c} with T_3 and T_4 levels among patients with hyperthyroidism and this refelect the effect of Thyroid hormone (T_3 & T_4) on the long term monotering of diabetic patients This findings agree with pervious study.^[7]

CONCLUSION

From this study it was concluded that; the serum levels of T_3 & T_4 were significantly increase while the serum TSH was significantly reduced among patients with hyperthyroidism with significant difference on the levels of random blood glucose and HbA_{1c}. Hence the determination of HbA_{1c} and blood glucose are valuable in the assessing of patients with hyperthyroidism since their level were significantly changed.

RECOMMENDATIONS

- Thyroid patient should have regular checkup and monitoring of thyroid function test, Blood glucose and HbA_{1c}.
- There is little information about thyroid dysfunction in this country so we need for further research and study.

- The small size sample and the limited observation period do not allow definite conclusion from this data hence more comprehensive study with large population and long period would be more informative.

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