Migration Letters

Volume: 20, No: S6(2023), pp. 378-384

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)
www.migrationletters.com

A Study of the Effect of Thyroid Hormone on Liver Enzyme Levels in Patients with Hypothyroidism

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Abstract

Background: The thyroid gland is one of the most important glands in the endocrine system, as it secretes hormones and controls the metabolism.It plays an important role in liver function, as there is a link between thyroid disease and irregular liver enzyme levels resulting from a low level of bilirubin and an increase in aspartate aminotransferase and alanine aminotransferase. Objective: Evaluation of the level of thyroid hormone (TSH) and liver enzymes AST and ALT in patients with hypothyroidism Patients. Materials and methods : The study included 60 patients suffering from hypothyroidism and 40 control groups in women only and in the age group from 22 to 44 years. Results: Note that people with hypothyroidism have a significant increase in AST and ALT.It also appeared that TSH is positively associated with ALT and AST. Conclusions: It has been found that elevated liver enzymes are associated with hypothyroidism.

Keywords: *Hypothyroidism, TSH, AST, ALT.*

INTRODUCTION

Hypothyroidism, one of the most common functional disorders of the thyroid gland, results from a decrease in the concentration of its hormones in the blood. The deficiency may be in T3, T4, or both, and to compensate for this deficiency, TSH secretion increases. [1, 2]. An iodine deficiency may cause hypothyroidism, as iodine is an essential element For the biosynthesis of thyroid hormones, so its deficiency leads to a decrease in the formation of thyroid hormones. This deficiency may have nutritional or metabolic causes, such as a disorder in iodine transport or [3]. Clinical symptoms include weight gain, fatigue, lethargy, chronic constipation, slowed metabolism, poor memory, abnormal heart rate, fertility problems, hair loss, a swollen neck, and swollen eyelids [4]. Hypothyroidism affects female more than males, and the risk of developing hypothyroidism increases with age[5]. A correlation exists between the liver and the thyroid gland, where thyroid hormones play a crucial role in the metabolic processes associated with bilirubin. On the other hand, the liver plays a significant role in the metabolic processes associated with thyroid hormones [6].

SUBJECTS AND METHODS

100 women participated in the study, 60 of whom had hypothyroidism. We visited Salah Al-Din Hospital in Salah Al-Din Governorate in Iraq, while the remaining 40 were healthy volunteers.

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Inclusion criteria

Patients in whom hypothyroidism has been discovered recently are women only and the age group is from 22 to 44 years.

Exclusion criteria

People who are treated with thyroid hormone, high blood pressure, and cardiovascular disease.

Sampling

The study's participants gave a blood sample of 3 ml, which was put in gel tubes and allowed to clot for 20 minutes. The serum was then extracted and centrifuged for 10 minutes at a speed of 3000 rpm to collect it. The obtained serum was then transferred into three separate panrov tubes and stored in a deep refrigerator at a temperature of -20 Celsius. Before conducting the tests, the serum samples were brought back to room temperature.

Assessment of serum TSH concentration:

A commercial kit was used to assess the level of TSH using the ELISA technique

Assessment of serum AST and ALT concentration:

A commercial kit was used to assess the level of AST and ALT using a spectrophotometer

Study enrollment procedures

Comprehensive data, encompassing variables such as age, gender, weight, hereditary factors, and additional pertinent factors, were meticulously documented.

Ethical consent

The research was carried out in adherence to the ethical principles derived from the Declaration of Helsinki. It was carried out with patients verbal and analytical approval before subjects were recruited in the study. The study protocol, as well as the subject information and permission form, underwent a thorough evaluation and received approval from the from the Central Scientific Research Ethics Committee at Tikrit University. Research approval number 4959 in date: 7/12/2022.

Statistical analysis : The SPSS statistical software package was employed in conjunction with the T-test to identify statistically significant differences.

RESULTS

Figure (1) and Table (1) showed an increase in the level of TSH in the serum of hypothyroidism significantly 18.30±3.301 compared to the control group 1.786±0.131

There was also a significant increase in serum AST and ALT in patients with hypothyroidism, as in Figure (2) (3) and Table (1) 20.10±3.5 and 23.3±5.4 compared to the control group 13.45±2.7 and 8.81±1.9, respectively.

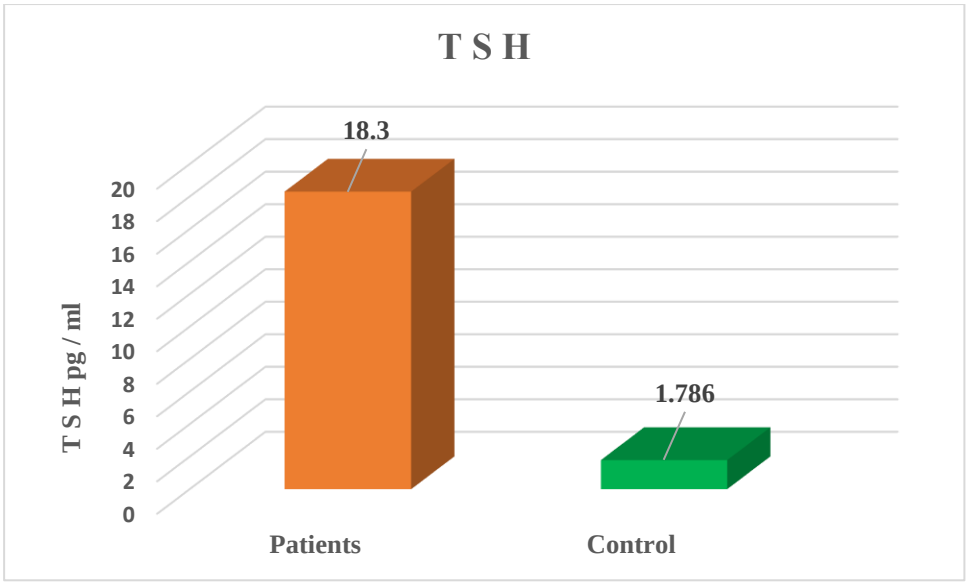

Figure 1: Assessment serum TSH (pg/ml) in Studied group

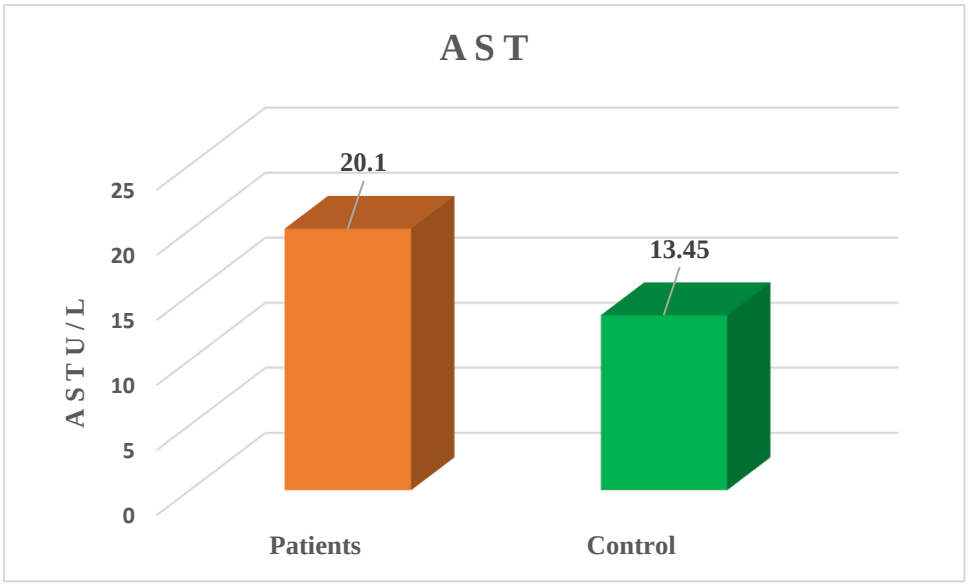

Figure 2: Assessment serum AST (U/L) in Studied group

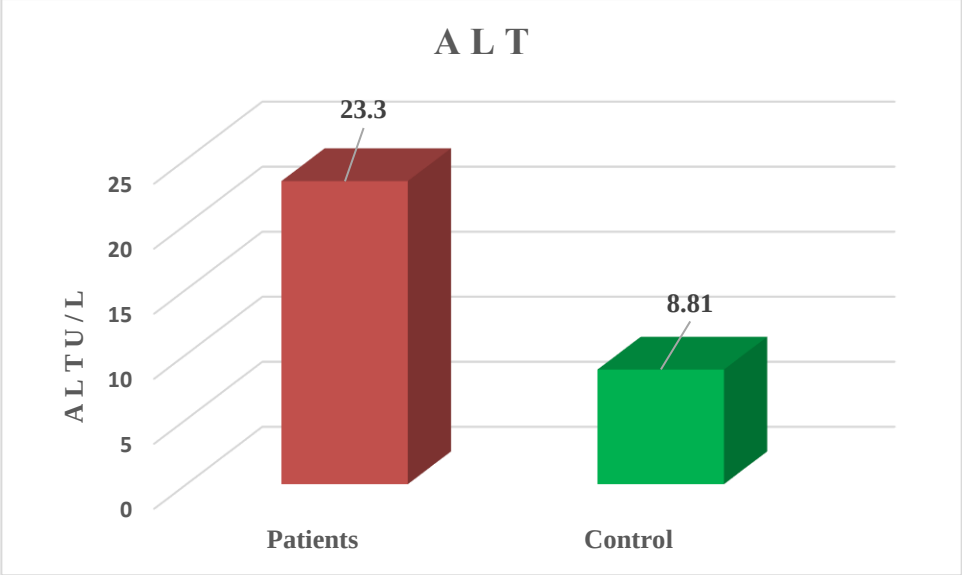

Figure 3: Assessment serum ALT (U/L) in Studied group

Table 1: Assessment levels TSH,AST and ALT in women with hypothyroidism and control group

Parameters	Mean ± SD		p-value
	Control	Patients	
AST (U/L)	13.45±2.7	20.10±3.5	0.01
ALT(U/L)	8.81±1.9	23.3±5.4	0.01
TSH(pg/ml)	1.786±0.131	18.30±3.301	0.01

DISCUSSION

Thyroid hormones influence tissue metabolism. Organs and enzymes are impacted when a change in hormone activity takes place[7]. This study showed an increase in liver enzymes AST and ALT in patients with hypothyroidism, where their values were 20.10±3.5 and 23.3±5.4 compared to the control group 13.45±2.7 and 8.81±1.9, respectively. The results of this study indicate a significant positive association between thyroid-stimulating hormone (TSH) levels and the levels of aspartate aminotransferase (AST) and alanine aminotransferase (ALT), as depicted in Figures 4 and 5.

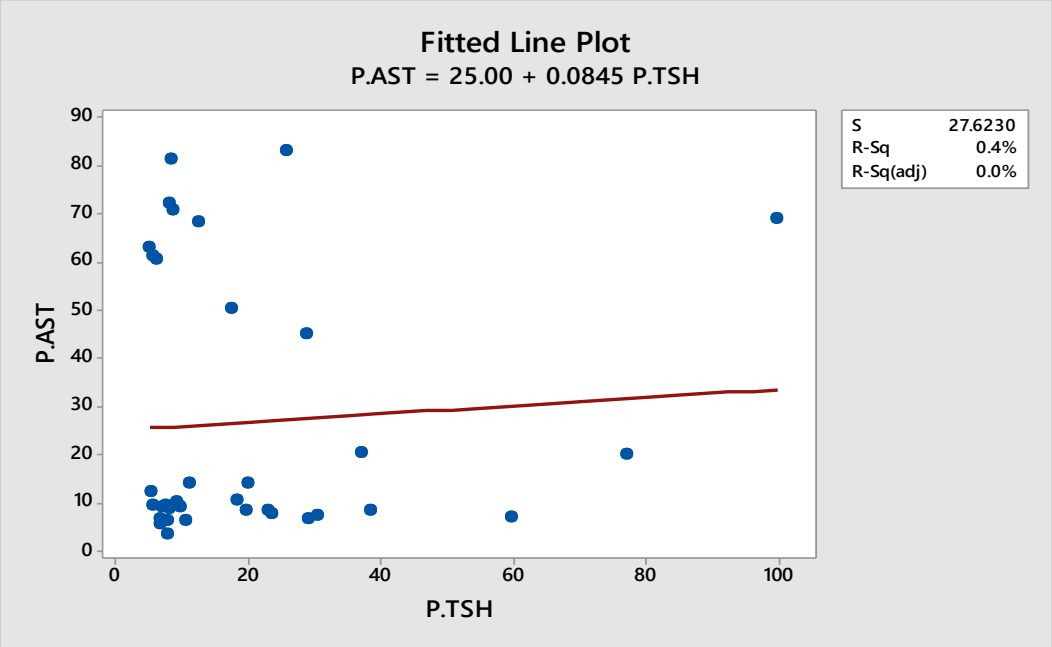

Figure 4: The relationship between TSH and AST

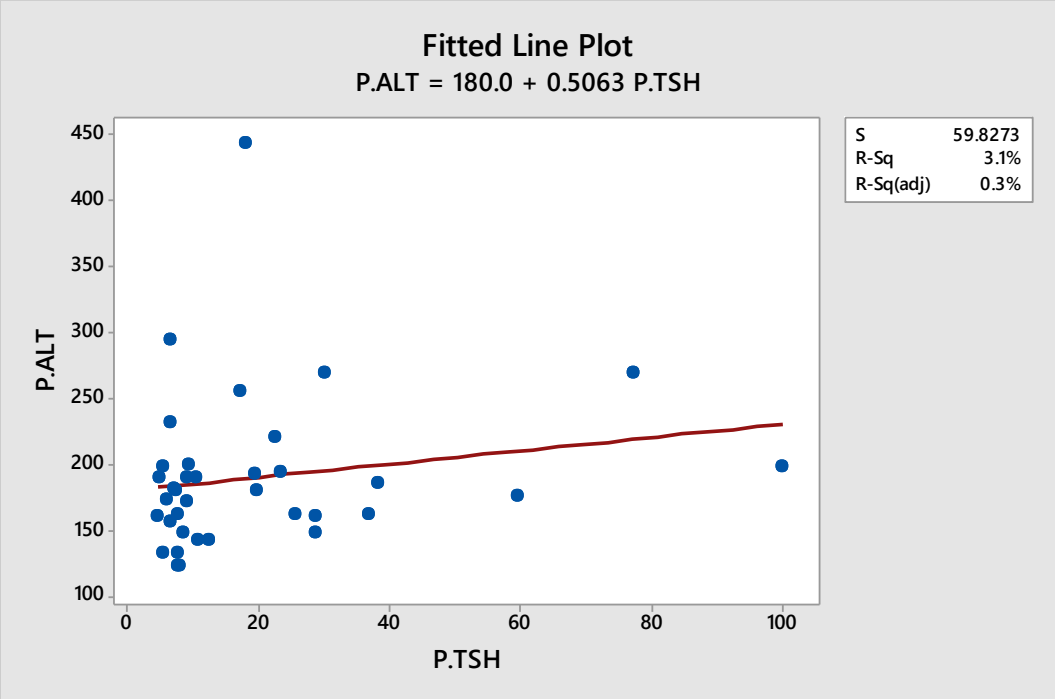

Figure 5: The relationship between TSH and ALT

Which shows that when a disorder occurs in the thyroid gland, an imbalance occurs in the metabolism of the cells of the body, which is reflected in an increase in liver enzymes[8]. The liver serves as the primary site for the metabolism of thyroid hormones, namely through processes such as oxidative deamination and iodine extraction from the thyroid gland. Within this metabolic pathway, and T4 is transformed into T3 [9-11]. The liver plays a crucial role in the synthesis of thyroid hormone-binding proteins, including albumin and thyroid hormone-binding globulin. [12]This study was consistent with the results of previous studies, which agreed that elevated liver enzymes are associated with patients with hypothyroidism [13-15]. This is due to the fact that the thyroid hormones are necessary for the growth and functioning of the organs and that any disorder affecting

the thyroid gland will cause an imbalance in the level of its hormones, which leads to an imbalance in metabolism

CONCLUSION

In conclusion, the results of this study indicate that a thyroid problem can have a notable impact on the metabolism of different cells, such as hepatocytes. This is evidenced by a rise in the biochemical parameters of liver function tests, specifically aspartate aminotransferase (AST) and alanine aminotransferase (ALT), in individuals with subclinical and overt hypothyroidism. This implies that it is advisable to regularly monitor liver and kidney function tests in individuals with hypothyroidism. Timely identification and intervention can effectively mitigate the potential consequences of the issue and prove beneficial in the overall care of individuals with thyroid conditions.

References

1. Weetman, A. and A. McGregor, Autoimmune thyroid disease: further developments in our understanding. Endocrine reviews, 1994. 15(6): p. 788-830.
2. Bashir, H., et al., Comparison of hematological parameters in untreated and treated subclinical hypothyroidism and primary hypothyroidism patients. Medical journal of the Islamic Republic of Iran, 2012. 26(4): p. 172.
3. Gaitonde, D.Y., K.D. Rowley, and L.B. Sweeney, Hypothyroidism: an update. South African Family Practice, 2012. 54(5): p. 384-390.
4. Chakera, A.J., S.H. Pearce, and B. Vaidya, Treatment for primary hypothyroidism: current approaches and future possibilities. Drug design, development and therapy, 2011: p. 1-11.
5. Tejomani, M., K. Meera, and K. Vasudha, Relevance of creatine kinase activity and serum creatinine levels in hypothyroidism. International Journal of Recent Trends in Science And Technology, 2013. 8(3): p. 263-269.
6. Hasan, B.F., N. Al Hudak, and I. Abd, Estimation of thyroid hormones and liver enzymes in hypo and hyperthyroidism in Iraqi women. Int. J. Pharm. Bio. Sci, 2016. 7(4): p. B707-713.
7. Mane, A. and V. Bhagwat, Serum enzymes and liver function tests in thyroid disorders. Biomedicine, 2011. 31(4): p. 517-522.
8. Groeneweg, S., et al., Therapeutic applications of thyroid hormone analogues in resistance to thyroid hormone (RTH) syndromes. Molecular and cellular endocrinology, 2017. 458: p. 82-90.
9. El-Kabbany, Z.A., et al., Thyroid and hepatic haemodynamic alterations among Egyptian children with liver cirrhosis. International Scholarly Research Notices, 2012. 2012.
10. Spadaro, L., et al., Alterations in thyroid Doppler arterial resistance indices, volume and hormones in cirrhosis: relationships with splanchnic haemodynamics. Ultrasound in medicine & biology, 2004. 30(1): p. 19-25.
11. HUANG, M.J. and Y.F. LIAW, Clinical associations between thyroid and liver diseases. Journal of gastroenterology and hepatology, 1995. 10(3): p. 344-350.
12. Khan, T.M., S. Malik, and I.U. Diju, Correlation between plasma thyroid hormones and liver enzymes level in thyrotoxic cases and controls in Hazara Division. Journal of Ayub Medical College Abbottabad, 2010. 22(2): p. 176-179.
13. Pandey, R., et al., Assessment of serum enzymes level in patients with thyroid alteration attending manipal teaching hospital, Pokhara. Thyroid, 2013. 10: p. 12.
14. Yadav, A., et al., Influence of thyroid hormones on biochemical parameters of liver function: a case-control study in North Indian population. Internet Journal of Medical Update-EJOURNAL, 2013. 8(1).

15. Targher, G., et al., Association between serum TSH, free T4 and serum liver enzyme activities in a large cohort of unselected outpatients. Clinical endocrinology, 2008. 68(3): p. 481-484.