



Investigating the Role of Thyroid Hormones in Type 2 Diabetes Mellitus

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Introduction

Type 2 Diabetes Mellitus (T2DM) occurs mostly in adults, and it is manifested when there is a functional insulin deficit due to an imbalance between insulin sensitivity and levels⁽¹⁾. One prevalent chronic endocrine problem that frequently coexists with T2DM is thyroid disease. Studies have shown that individuals with T2DM have greater rates of thyroid problems than the general population⁽²⁾. Furthermore, it has been observed that people with thyroid abnormalities have a higher prevalence of T2DM. In T2DM, it has been reported that hyperthyroidism impairs glycemic control most probably through elevated hepatic glucose production⁽³⁾.

Aim

The aim of this study was to investigate whether thyroid hormones impacted glucose profiles through performing correlation analysis with biochemical parameters.

Methodology

The present study was a retrospective descriptive clinical study. Data were collected from a total of 40 individuals attending Salwa and Saad Al Abdullah primary care clinics between March and May in 2021. The study cohort included 20 individuals diagnosed with T2DM and 20 individuals without T2DM. Clinical, and laboratory data including fasting blood glucose (FBG), glycated hemoglobin (HbA1C), insulin as well as thyroid hormone profiles; thyroxine (FT4), triiodothyronine (FT3) and thyroid stimulating hormone (TSH) were obtained from medical records. The Spearman correlation coefficient test was used to determine associations between study variables.

Results

No correlation was obtained between TSH and insulin (Figure 1, a). There was a positive correlation between TSH and HbA1C and TSH and FBG (Figure 1, b & c). There was no correlation between FT3 and insulin in diabetic plasma (Figure 2, a). Conversely, there was an inverse correlation between FT3 and HbA1C (Figure 2, b). On the other hand, there was a positive correlation between FT3 and FBG (Figure 2, c). There was a negative correlation between FT4 and insulin (Figure 3, a). However, there was no correlation between FT4 and HbA1C (Figure 3, b). In contrast, there was a positive correlation between FT4 and FBG (Figure 3, c)

References

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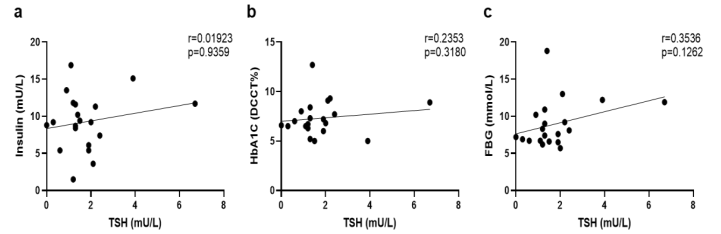


Figure 1. Correlation analysis between TSH and biochemical parameters in diabetic plasma. a) Correlation between TSH and insulin. b) Correlation between TSH and HbA1C. c) Correlation between TSH and FBG.

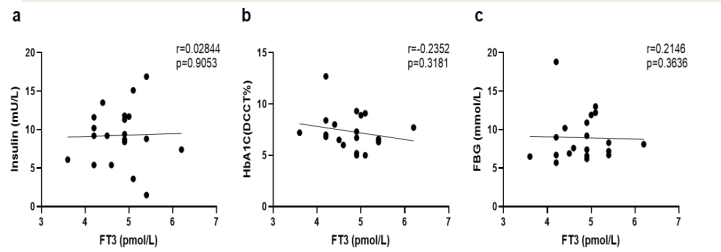


Figure 2. Correlation analysis between FT3 and biochemical parameters in diabetic plasma. a) Correlation between FT3 and insulin. b) Correlation between FT3 and HbA1C. c) Correlation between FT3 and FBG.

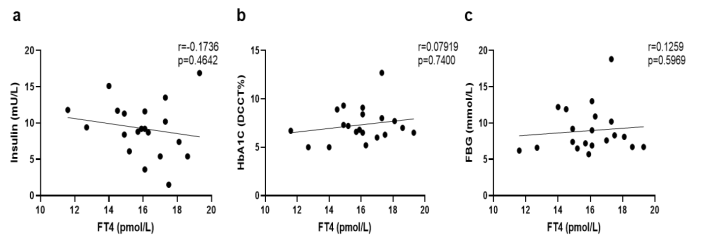


Figure 3. Correlation analysis between FT4 and biochemical parameters in diabetic plasma. a) Correlation between FT4 and insulin. b) Correlation between FT4 and HbA1C. c) Correlation between FT4 and FBG.

Discussion

In diabetic individuals, a positive correlation was detected between thyroid hormone profiles (TSH, FT3, and FT4) and FBG. This is not surprising, given the effect of thyroid hormones on glucose metabolism. indeed, thyroid hormones are known to increase glucose levels by increasing the rate of liver gluconeogenesis and glycogenolysis⁽³⁾. These results confirm that increased levels of thyroid hormones in diabetic patients worsen hyperglycaemia and could possibly enhance the risk of T2DM complications such as diabetic nephropathy and neuropathy as hyperglycaemia is a major cause of diabetic complications⁽⁴⁾.

Conclusion

From the results obtained, we can conclude that all thyroid hormones are positively correlated with FBG in diabetic plasma and that these results are in agreement with the literature. Overall, we recommend that diabetic patients regularly check their thyroid hormone profile in order to avoid elevations in glucose that could lead to hyperglycaemia and worsen diabetic complications.