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Original Research

Association of Anti TPO antibodies with Serum LDH, Insulin, Cortisol and Atherogenic Index of Plasma in Subclinical Hypothyroid Patients at Tertiary Care Center

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Abstract

Introduction- subclinical hypothyroidism is a condition when TSH is elevated with a normal range of free T4 and T3 and hypothyroid individuals are more prone for cardiovascular disorders and diabetes. studies shows that Atherogenic Index of Plasma is a good marker for for cardiovascular disease [1,2] and by hypothesising that hypothyroid individuals with positive anti TPO antibodies may show cross reactivity with beta cell and to compensate antigen antibody reaction a stress condition there is increased in the level of serum cortisol level and LDH this study was conducted. **Aim**- To estimate serum anti TPO antibodies, LDH, cortisol, and insulin & To calculate Atherogenic index of plasma. **Material Methods**-a cross-sectional observational study conducted at the department of Biochemistry GMC, Datia, total 60 subclinical hypothyroid individuals of age 18 to 70 years were selected and grouped into anti TPO positive negative group and access their serum TSH,T4,anti TPO antibodies, cortisol insulin and LDH. Inclusion criteria- American thyroid association criteria for subclinical hypothyroidism, exclusion criteria was patient on thyroxine and steroid therapy, smoking, heart disease and diabetes **Result**-patients with positive anti TPO antibodies have shown positive correlation with serum LDH level and negative correlation with serum insulin, cortisol and AIP while the other group have positive correlation with all parameters. **Conclusion**- this study helps to understand the association between anti TPO antibodies and serum cortisol, LDH and AIP in subclinical hypothyroid individuals, this will uncover the endocrinal relation and therapeutic strategies for individuals of hypothyroidism with positive anti TPO antibodies.

Key words- Atherogenic Index of Plasma (AIP), Anti TPO antibodies, Subclinical hypothyroidism.

Introduction

Hypothyroidism is more common in females with a prevalence of 7.5%-8.5%, than males.[1,2]Subclinical hypothyroidism is a condition when thyroid stimulating hormone (TSH) is elevated with a normal range of free triiodothyronine(T4) and thyroxine(T3). Hashimoto's Thyroiditis (HT) is a autoimmune disease, and is considered as the commonest cause of hypothyroidism and anti-TPO antibody detection are the most specific and sensitive for the diagnosis of the disease.[2] Several studies have found that hypothyroidism is associated with insulin resistance, dyslipidemia and chronic inflammation which in turn, increases the risk for atherosclerosis.[3,4]Atherogenic index of plasma (AIP) is a marker for small dense lipoprotein (sdLDL) it is a log of TG and HDL-C Thus, by hypothesising that hypothyroid individuals with positive anti TPO antibodies may show cross reactivity with beta cell which may lead to increase insulin and compensatory increased in the level of serum cortisol and LDH level. Thus, this study was aimed to acess the association of thyroid autoimmunity with insulin, AIP, cortisol and LDH in newly diagnosed Hashimoto's Thyroiditis subjects, at a tertiary care hospital, GMC Datia.

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Aim and Objectives

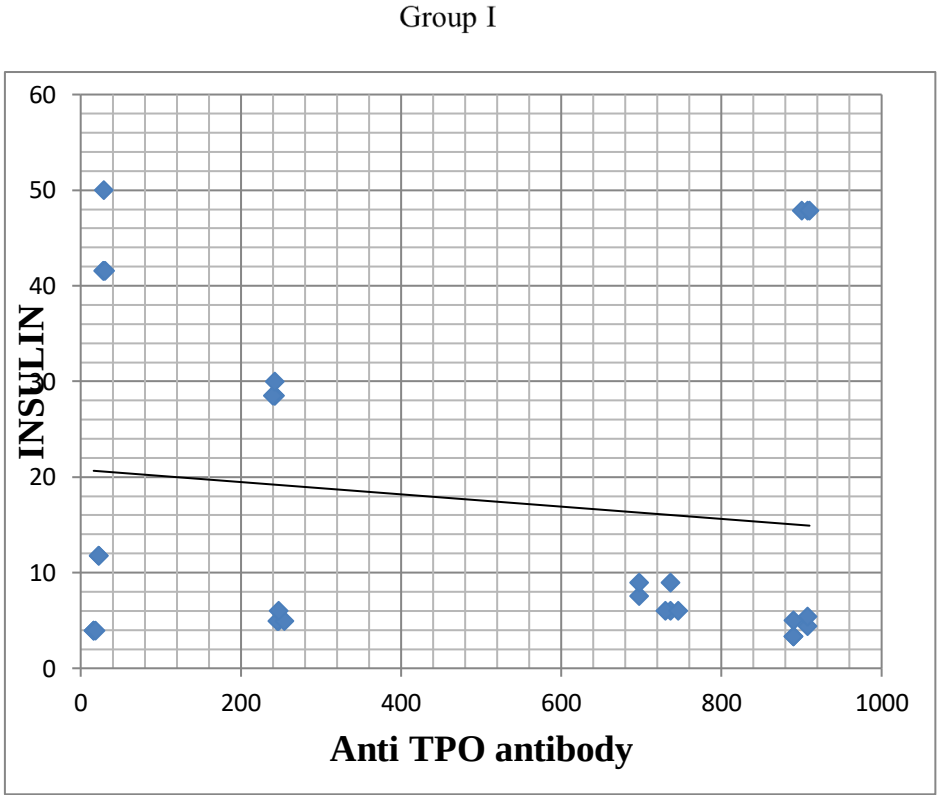
i. To estimate serum thyroid profile, anti TPO antibodies, LDH, cortisol, insulin lipid profile and
ii. To calculate Atherogenic index of plasma

Material and methods

This was observational cross-sectional study carried out in the Department of Biochemistry , this was from October 2024 to February 2025 sample Size- By applying purposive sampling method for collection of samples total 60 subclinical hypothyroid individuals of age 18 to 70 years attending the OPD at GMC Datia were selected for the study and categorise into two groups, patients who had elevated serum TSH levels, with normal fT4 and fT3 with raised serum anti-TPO antibodies (more than 10 IU/mL) were categorized as Hashimoto's thyroiditis and kept in group I while subclinical hypothyroidism with anti TPO antibodies level less than 10 IU/mL were categorise in group II. inclusion criteria American thyroid association criteria was used for subclinical hypothyroidism ,exclusion criteria was history of smoking, diagnosed cases of hypothyroidism, diabetes mellitus, heart disease, renal disease, patient on thyroxine, antilipidemic drugs, steroid therapy and pregnant femalesLaboratory Estimation - lipid profile was done to calculate the AIP, serum cortisol, insulin ,thyroid profile and LDH were measured and all the parameters were measured in the Biochemistry laboratory by using autoanalyser Beckmen coulter and AIP is calculated by Czech online calculator which is log(TG/HDL-c).Statistical analysis- two groups were created group I is for subclinical hypothyroidism with high anti TPO antibodies and group II for subclinical hypothyroidism with anti TPO antibodies less than 10 IU/mL, ms excel was used to analyse the data, pearson correlation is used to see the correlation between parameters and AIP is calculated by Czech online calculator which is log(TG/HDL-c).

Result

In present study serum TSH,fT4,fT3,anti TPO antibodies,cortisol insulin,LDH, TG and HDL were measured and AIP is calculated by online calculator and result of the present study in group I individuals shows a positive correlation between anti TPO antibodies with LDH having r value 0.27 and a weak negative correlation with serum cortisol, insulin and AIP with r value -0.02,-0.04 and -0.26 respectively, while in group II anti TPO antibodies shows a positive correlation with LDH, cortisol, insulin and AIP with r values of 0.34,0.01, 0.24 and 0.13 .The correlation among various parameters under investigation in group I & II all are depicted in graph 1 to 8.



Graph 1- Correlation of insulin & anti TPO antibodies in Group I

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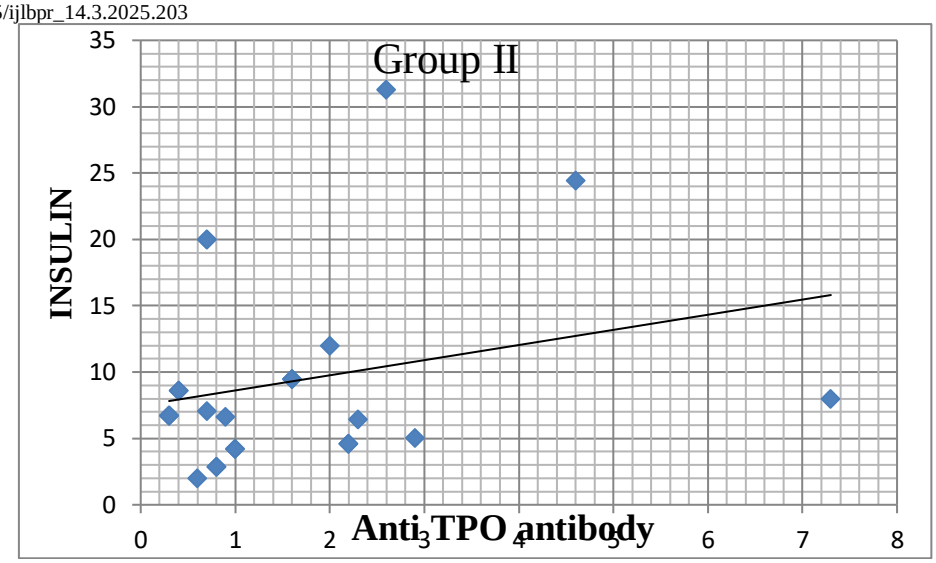
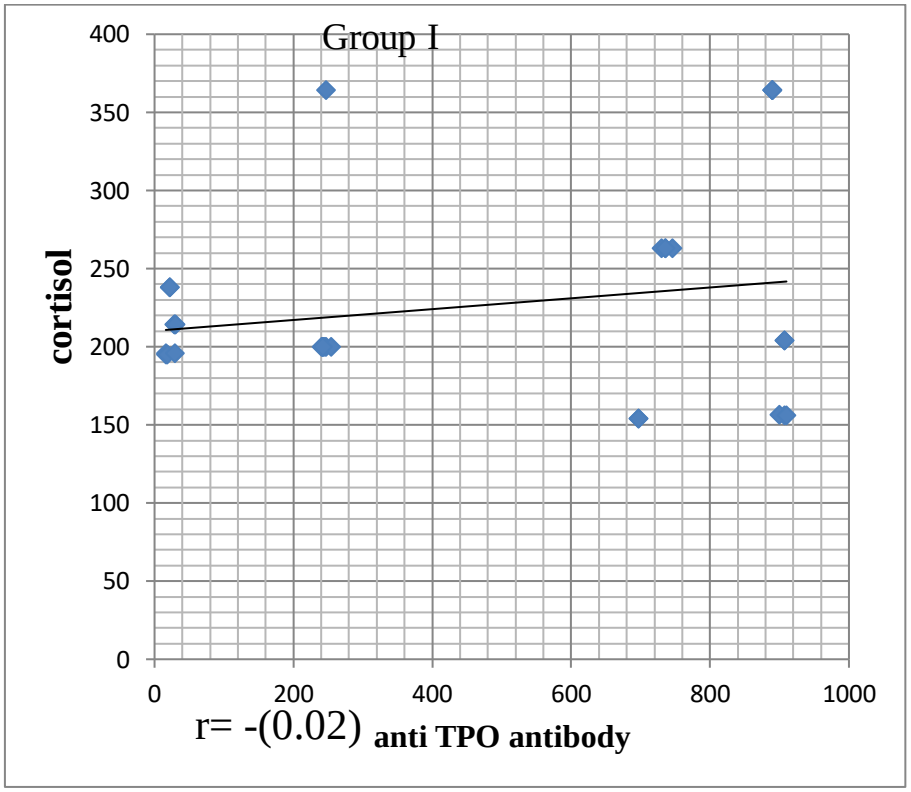


Graph 2- Correlation of insulin & anti TPO antibodies in Group II



Graph 3- Correlation of Cortisol & anti TPO antibodies in Group I

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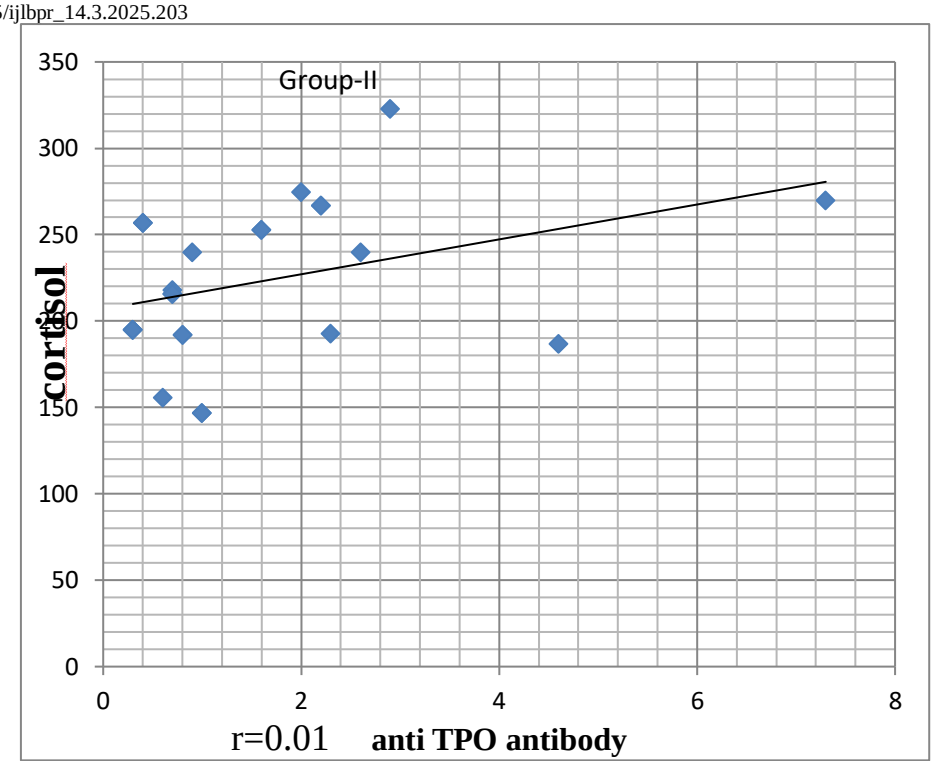
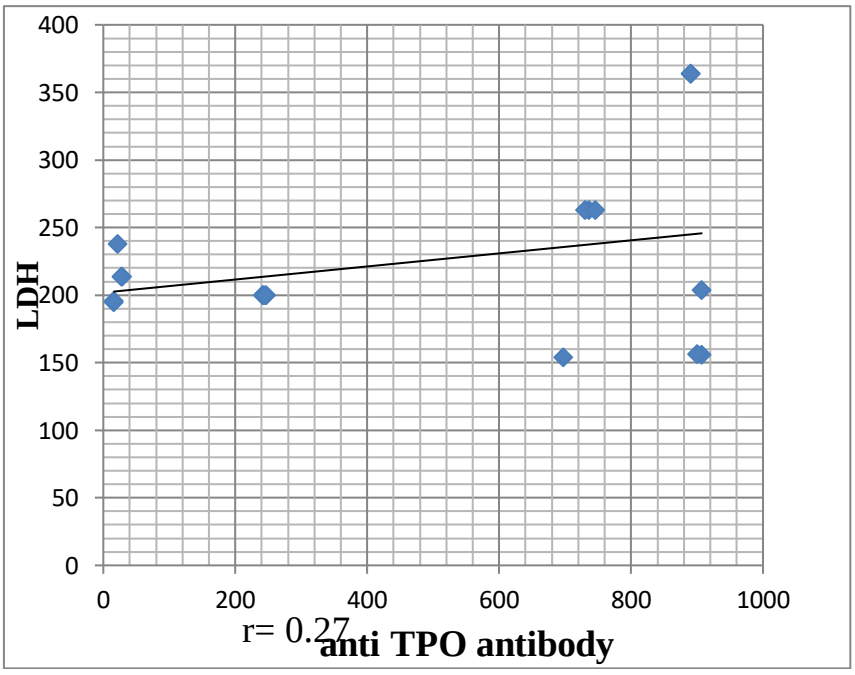


Graph 4- Correlation of Cortisol & anti TPO antibodies in Group II

Group I



Graph 5- Correlation of LDH & anti TPO antibodies in Group I

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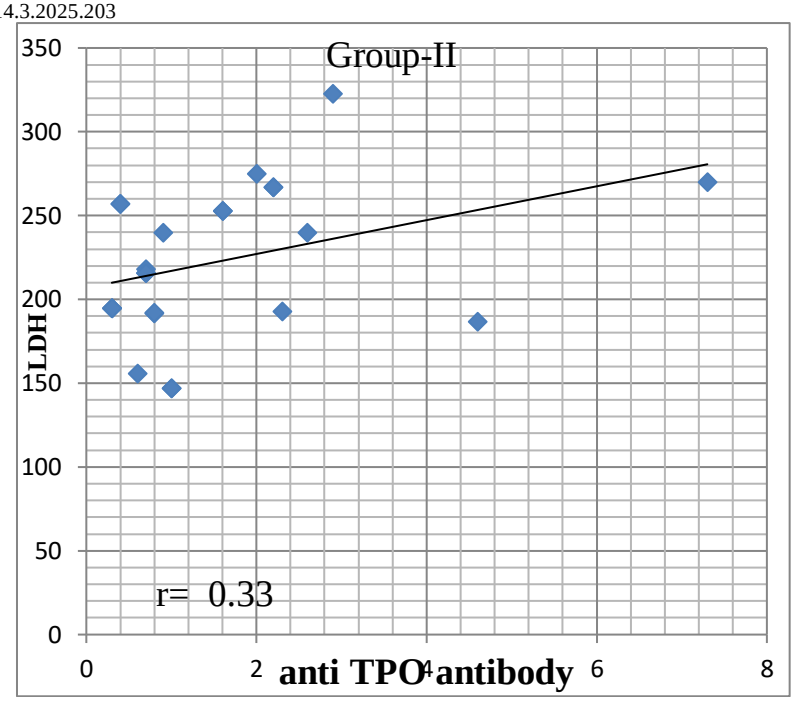
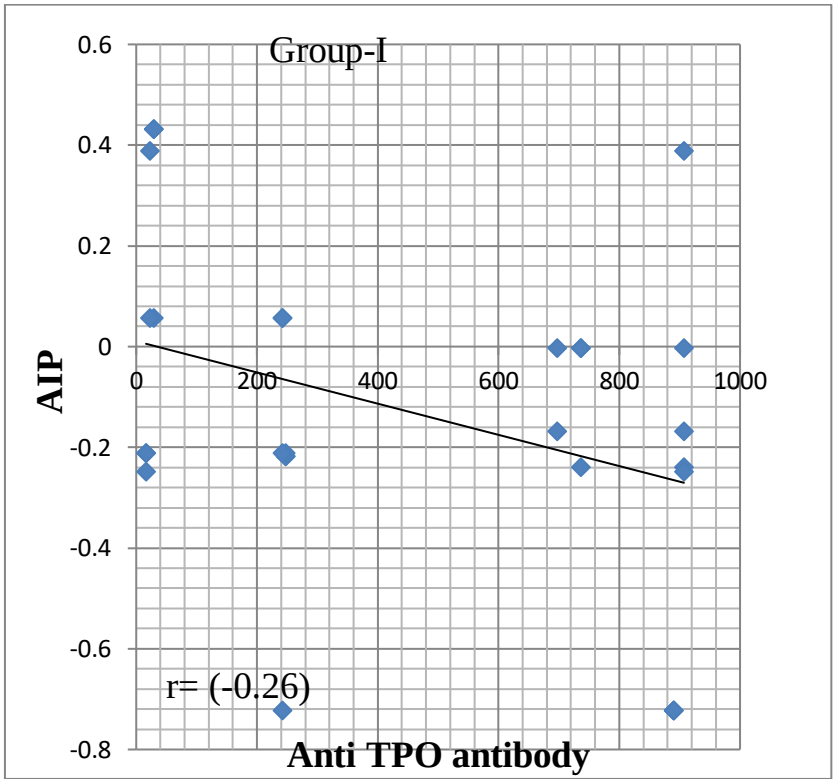


Graph 6- Correlation of LDH & anti TPO antibodies in Group II



Graph 7- Correlation of AIP & anti TPO antibodies in Group I

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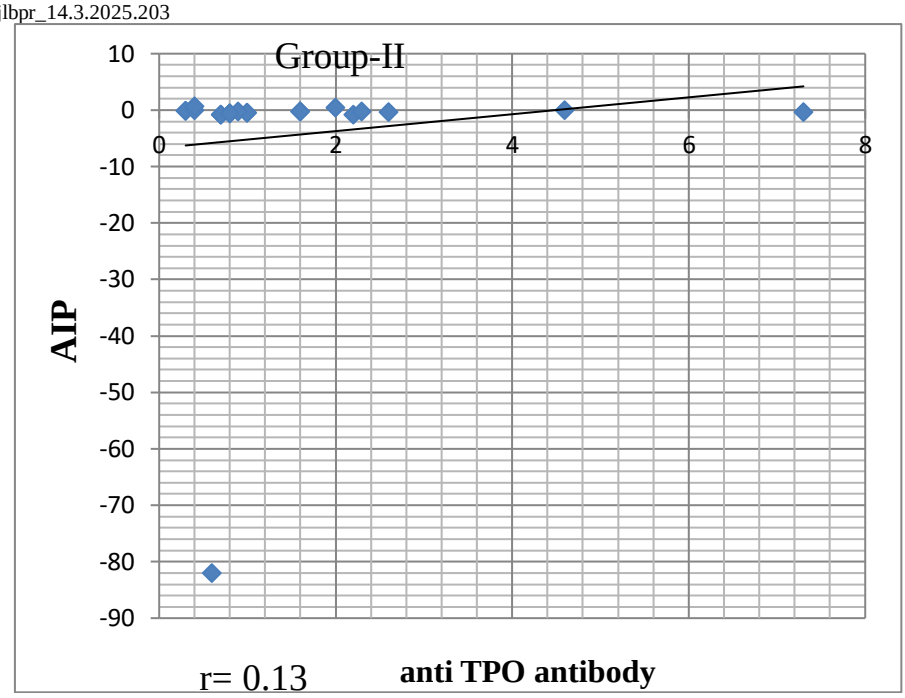

Graph 8- Correlation of AIP & anti TPO antibodies in Group II

Discussion

Present study shows a weak negative correlation between anti TPO antibody with insulin in group I while positive correlation is seen in group II. Similar study was conducted by Maratou E et al[6] Mazaheri et al[3]. and Liu J, et al.[4]Same result was found by Maratou et al and negative correlation can be explained by low glucose absorption, decreased adrenergic activity and reduction in glycogenolysis and gluconeogenesis in hypothyroid individuals other studies showed the positive correlation between anti TPO antibody with insulin which was not seen in the present study.

Present study also found the weak negative correlation with serum cortisol in group I and positive correlation with group IISimilar study was conducted by Canaris GJ et al[6] and seema R et all. Finding of these studies was in favour of the result found in group II individuals of present study. This observation suggests a compensatory mechanism to mitigate the metabolic consequences of thyroid hormone deficiency but not able to explain the finding in group II individuals of present study which may be due to effect of anti-TPO antibodies on HPA axis. In our study we found a positive correlation of anti TPO antibody with LDH in both the groups. study conducted by Griffith PD et al.[7] showed the positive correlation between serum LDH and hypothyroidism, in our study LDH activity is correlating with hypothyroidism but not with anti TPO antibodies.Present study found the weak negative correlation between anti TPO antibody and AIP in group I and positive correlation with group II Similar study was conducted by Walsh JP et al[7], Mazaheri et al[3]. and Liu J, et al.[4] Walsh JP et al show that thyroid auto antibodies do not have a clear effect on atherosclerosis and finding of other study was opposite with the result found in the present study Other findings of present study was hypothyroidism is more common in females than males. Study conducted by Mazaheri et al[3] ,Liu J et al.[4] and Canaris GJ et al[6] Showed that hypothyroidism is more common in females. Limitation of study-Above variation may be due to the limitation of our study, as the smaller sample size which was not sufficient to find out actual /real correlation to make the findings more generalizable.

Conclusion

This study helps to understand the association between anti TPO antibodies and serum cortisol, LDH and AIP in subclinical hypothyroid individuals, this will uncover the endocrinal relation and therapeutic strategies for individuals of hypothyroidism with positive anti TPO antibodies, more studies are required to make generalization of the findings

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