

Thyroid Dysfunction and Platelet-Associated Immunoglobulins: Insights from a Multi-Center Study

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Abstract

Background: Thyroid hormone (TH) deficiencies or hypothyroidism, impact a significant portion of the world's population. This study investigates the connection between platelet-associated immunoglobulins (PAIgG) and thyroid dysfunction. **Materials and Methods:** From April to December 2022, a multicenter study with 55 patients suffering from thyroid issues was carried out. Analyses were conducted (ANA, PAIgG) and therapy regimens. The control group consisted of people with thyroid problems who did not receive medical intervention. With SPSS, statistical analyses were carried out. **Results:** Female sex and ANA positive among thyroid illness patients were substantially correlated ($p = 0.007$ and 0.04 , respectively). While there were no discernible variations in platelet counts between the research groups, thyroid patients did have a numerical rise in PAIgG levels. Platelet counts improved after treatment for underlying thyroid problems. **Conclusion:** The study's impact on hemoglobin and platelet levels supports the conclusion that early detection and care of hypothyroidism are essential for averting negative outcomes. Research on thyroid anomalies and their clinical implications has to be furthered, and the multicenter method improves the generalizability of findings in this regard.

Keywords: Thyroid dysfunction, platelet-associated immunoglobulins, autoimmune biomarkers, thyroxine, thyroid-stimulating hormone

الخلل الوظيفي للغدة الدرقية والأجسام المناعية المرتبطة بالصفائح الدموية: رؤى من دراسة متعددة المراكز

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المستخلص

يعاني جزء كبير من سكان العالم من نقص في هرمونات الغدة الدرقية (TH) أو قصور الغدة الدرقية. تبحث هذه الدراسة في العلاقة بين الأجسام المناعية المرتبطة بالصفائح الدموية (PAIgG) والخلل في وظيفة الغدة الدرقية. المواد والطرق: أجريت دراسة متعددة المراكز من أبريل إلى ديسمبر 2022 شملت 55 مريضاً يعانون من مشكلات في الغدة الدرقية. شملت التحاليل مؤشرات سريرية ومخبرية مثل (ANA، PAIgG)، وأنظمة العلاج المتبعة. وضعت مجموعة ضابطة من أشخاص لديهم مشكلات في الغدة الدرقية ولكن لم يتلقوا علاجاً طبياً. أجري التحليل الإحصائي باستخدام برنامج SPSS. النتائج: تبين وجود ارتباط كبير بين الجنس الأنثوي ووجود ANA إيجابي بين مرضى الغدة الدرقية ($p = 0.007$ و 0.04 على التوالي). لم تسجل فروقات ملحوظة في عدد الصفائح الدموية بين المجموعات، لكن سجل ارتفاع عددي في مستويات PAIgG لدى مرضى الغدة الدرقية. وقد تحسنت أعداد الصفائح الدموية بعد علاج مشكلات الغدة الدرقية الأساسية. الاستنتاج: تُعزز تأثيرات الدراسة على مستويات الهيموغلوبين والصفائح الدموية الاستنتاج القائل بأهمية الكشف المبكر والعلاج الفوري لقصور الغدة الدرقية لتفادي المضاعفات السلبية. لا بد من إجراء المزيد من الأبحاث حول اضطرابات الغدة الدرقية وتبعاتها السريرية، ويُعد النهج متعدد المراكز عاملاً مهماً في تعزيز تعميم النتائج.

الكلمات المفتاحية: خلل وظائف الغدة الدرقية، الغلوبولينات المناعية المرتبطة بالصفائح الدموية، المؤشرات الحيوية المناعية الذاتية، الثيروكسين، هرمون تحفيز الغدة الدرقية

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معلومات البحث

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Introduction

Hypothyroidism or deficiency of thyroid hormone (TH), is a common illness among people in general. levels of thyroid-stimulating hormone (TSH) beyond the upper limit of the reference range and levels of free thyroxine (T4) below the lower limit of the reference range are indicative of overt hypothyroidism. The 2.5th and 97.5th centiles of the circulating TH values in populations deemed healthy are usually used to establish the reference range [1] statistically. Depending on the criteria, hypothyroidism is thought to affect 0.3% to 3.7% of the USA population and around 0.2% to 5.3% of people in Europe. Subclinical hypothyroidism affects about 12% of adults [1]. Thyroid hormone controls almost every cell and organ in the human body's metabolism throughout life and is necessary for the proper development of several human tissues.

Triiodothyronine (T3) and thyroxine (T4) hormones are synthesized and released from the thyroid gland. Pituitary thyrotropin (TSH), which is triggered by the TSH-releasing hormone (TRH), controls this process in a negative feedback loop [2, 3]. Thus, achieving a normal euthyroid condition requires careful balancing of the physiological functions of the hypothalamus-pituitary and the thyroid gland, which is controlled in a logarithmic (TSH)/linear (T4 and T3) manner [4].

Endocrine hormones known as thyroid hormones (TH) have an impact on nearly all body cells. It is shown that TH excess (hyperthyroidism) and deficiency (hypothyroidism) affect growth, lipid and carbohydrate metabolism, fetal development, and the cardiovascular, central nervous, and reproductive systems [5].

A thyroxine hormone shortage is the cause of the very frequent medical disease known as

hypothyroidism. The hormone thyroxine controls the body's metabolism, and a lack of it can lead to issues with several organ systems. If untreated, it could have a serious negative impact on the body's health and eventually result in death [6]. In the general population, there are many cases of hypothyroidism with non-specific symptoms. Thus, the primary metabolic cause of hypothyroidism is determined. Circulatory TSH levels are elevated in primary hypothyroidism, meaning that they are higher than normal. Free blood thyroxine (fT4) levels are likewise lower than usual [4, 7].

A milder variety of hypothyroidism is called "subclinical hypothyroidism". TSH measures above the physiological range (5–10 mIU/L) and fT4 levels within the normal reference range [8]. Whether to test for thyroid dysfunction using the existing reference levels of TSH and fT4 is still up for debate. Since the assessments used to diagnose hypothyroidism rely upon these reference levels and form the base of hypothyroidism therapy, this issue is extremely significant from a clinical standpoint. For patients with hypothyroidism, levothyroxine replacement therapy is the usual course of treatment. Many people with hypothyroidism treated with levothyroxine have persistently reported complaints, even after reaching therapy targets. This raises the question of whether levothyroxine as an alternative to thyroxine is sufficient to treat everyone or if the use of alternative therapies like combination therapy using liothyronine preparations could be used as effectively [9].

The biological effects of thyroid After T4 and T3 detect metabolization products, some of which mediate biological actions, TH metabolites circulate in the bloodstream. Metabolites detected in the blood do not indicate tissue quantities and

precise levels are unclear owing to the cross-reactivity of thyroid hormone metabolites in the conventional immunoassays [10].

Antibodies bound to platelets are known as platelet-associated immunoglobulins or PAIgG. Patients with autoimmune thrombocytopenia, myelodysplastic syndromes, and other conditions including thyroid disorders have been discovered to have elevated levels of PAIgG [11, 12].

There have been several reported morphological and functional alterations in platelets in thyroid disease patients. When platelet-associated IgG (PAIgG) is present, familial or isolated autoimmune idiopathic thrombocytopenia (AITP) has been reported in patients with Graves' disease [13]. The purpose of the recent study was to measure the patients' values of PAIgG and to distribute the characteristics of patients with thyroid illness.

Ethical Approval:

Before the patients were included in the report, their valid consent was acquired. Before any samples were taken, the procedure was explained to each patient to make sure they understood what would happen. Patients knew they may refuse treatment legally.

Material and methods

A statistical comparison was made between the outcomes of the control group and the group of fifty-five patients who had thyroid disorders and were not receiving any medical attention. All of the cases were reviewed. From April to December 2022, all analyses and sample collection were placed at the Marjan Teaching Hospital in the province of Babil. 55 patients between the ages of 17 and 77 provided samples, and 5 milliliters of each serum were promptly frozen at -80 °C.

Statistical Analysis

The identifiable examination was completed using SPSS version twenty. (Means $\pm$ SD) were applied to the variables. Using SPSS, the correlation between the patient group and control group was completed; a p-value below or equal to 0.05 was deemed significant.

Results

Fifty-five individuals had thyroid illness. Features of thyroid illness patients as displayed in Table 1 and Figure (1).

Table (1): Basal characteristics of Patients with thyroid disease

Variables	Descriptives
Participants number	55
Age/ years	63 (18 – 88)
Female sex	59 (77.7%)
Hemoglobin	12.7 (6.1 – 16.8)
WBCs	6259 (2600 – 14800)
Platelets	18000 (2000 – 99000)
PAIgG	189.5 (43 – 1988)
Positive for anti-dsDNA	2 (3.7%)

Positive for ANA	29 (43.1%)
TPO-r agonist	19 (23.2%)
Glucocorticoids	54 (54%)

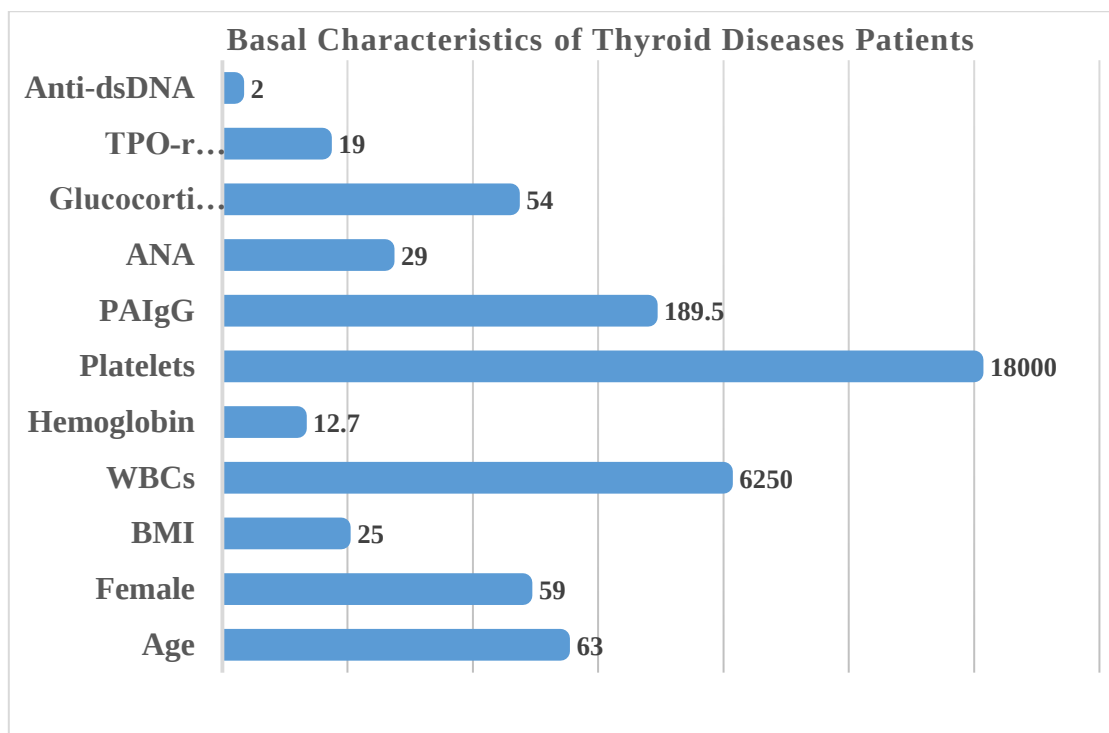


Figure (1): Distribution of basal characteristics of Patients with thyroid disease.

(55) people had thyroid disease during the research period, which lasted from April to December 2022. As revealed in Table 1, antinuclear antibodies (ANA) and female sex were positively related to thyroid disease ($p = 0.04$ and 0.007) respectively. Despite the thyroid condition, platelet counts did not fluctuate significantly between the two study groups. Patients with thyroid illnesses had a non-significant numerical tendency toward increased PAIgG measures, but there were no substantial changes in other markers or anti-dsDNA variants. Supplementary provides a list of every patient's characteristics. having the exception of hemoglobin level, there were no appreciable differences in the features of the patients having thyroid function data. distribution in figure (1) Features of patients suffering from thyroid

disorders in terms of when thyroid illness was diagnosed, patients who received a thyroid disease diagnosis were more likely to have ANA positive.

Discussion

Among the study patients, thyroid dysfunction was common. There were no notable changes in clinical outcomes, autoimmune biomarkers other than ANA, or platelet counts amongst patients with thyroid disease. Treatment for the underlying thyroid problem also increased platelet counts. This investigation is in line with those of several researchers [14-16]. While some investigations disagree with the research's findings [17], all studies concur with the findings of this study. Similar to how many significant advancements in biomedical science were influenced by our early

understanding of thyroid action, the current research on thyroid action has also been influenced by these breakthroughs. More than ever, the efforts of exceptional researchers from a wide range of disciplines and nations have advanced our understanding.

Future research on the intricacies of the thyroid's action will be facilitated by the recent mapping of the human genome, as well as the development of novel technologies like proteomics and genetic engineering.

We eagerly await a more comprehensive comprehension of the thyroid's functioning. This multicenter study, which included a sizable number of thyroid patients, validated the rising incidence of thyroid conditions, especially in non-toxic goiter [18-20]. Ultrasonography-measured thyroid volume is unrelated to circulation, but it does have a substantial correlation with the anticipated length of the disease. and should be devoted to the identification and monitoring of thyroid anomalies in patients with thyroids, especially about thyroid nodules and the likelihood of discovering thyroid cancer.

Conclusion

Several variables, or illness determinants, are taken into consideration while diagnosing hypothyroidism. Early diagnosis obtained by systematic examination by instructions is essential for initiating therapy early in the illness phase and preventing consequences. It was also vital to follow up on these analyses because the study discovered that it had an impact on hemoglobin and platelets, which is what was seen in the patients.

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