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A Prevalence of Thyroid Disorders at Al-Wahat Region of Libya During 2022

Hamdy AB. Matter [1*], Tariq M Ayad [1], Yasser Nofal [1], Ali Inwajy [2]

1 Chemistry Department- Faculty of arts and science- Benghazi University.

2 General Department- High Institute of Science and Medical Technology.

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الملخص

تمت دراسة 1272 حالة تحليل لهرمونات الغدة الدرقية خلال عام في منطقة الواحات / ليبيا، وتبين من خلال الدراسة الإحصائية لهذه الحالات أن 10.5 ٪ منها يعانون من اضطراب في هرموناتها وأن 40٪ من هذه الحالات تعاني من نقص في هرموناتها ، وأن 60٪ منها تعاني من فرط في نشاط الغدة الدرقية، وبلغت نسبة النساء اللاتي يعانين من اضطراب في هرموناتهن 81٪ بينما بلغ عدد الرجال 19٪، وقد بلغت نسبة النساء المصابات بارتفاع النسب 48٪ والمصابات بانخفاض النسب 33٪، وبلغت نسبة الذكور المصابين بارتفاع النسب 13٪ والمصابون بانخفاض النسب 6٪، وقد تبين أن النسب المرتفعة والمنخفضة تزداد بشكل ملحوظ على نحو يشبه تقريبا التوزيع الطبيعي من عمر 30 وحتى 70 لمجمل حالات اضطراب الغدة الدرقية بوسط حسابي مقداره 44 عام، وانحراف معياري للقيم المرتفعة مقداره 17.5 وللمنخفضة 18.9 بمعامل اختلاف متقارب 39.7 و42.9 وكان العمر الأكثر شيوعا (المنوال) للحالات المرتفعة هو 40 عام وللحالات المنخفضة هو 30 عام، أن النسب المرتفعة أكبر من النسب المنخفضة لديهن، وأن الوسط الحسابي في الحالتين هو سن الأربعين تقريبا، والقيم الأكثر شيوعا للحالات المرتفعة لديهن عند 42 عام بينما في الحالات المنخفضة لديهن حوالي 37 عام، وكذلك الوسيط في الحالات المرتفعة هي حوالي 45 عام بينما في القيم المنخفضة حوالي 30 عام، وأن النسب المرتفعة أعلى عند الذكور من النسب المنخفضة، ويبلغ الوسط الحسابي للحالات المرتفعة 49 عام بينما يصل في الحالات المنخفضة إلى 60 عام، وبانحراف معياري S = 20.2 للحالات المرتفعة، S=27.7 للحالات المنخفضة، و أنه لا يوجد ارتباط بين الحالات المرتفعة أو المنخفضة بين الرجال والنساء كما وضحه قياس معامل الارتباط لبيرسون.

الكلمات المفتاحية: هرمونات الغدة الدرقية، قصور الغدة الدرقية، نشاط الغدة الدرقية، معامل ارتباط بيرسون.

Abstract

About 1272 cases of thyroid hormones were examined. The study was conducted during the year 2022 in the Al-Wahat region / Libya, it was found that 10.5% suffer from a disorder in their hormones, 40% of these cases suffer from a deficiency in their hormones, and 60% of them suffer from an excess. The number of women who suffer from a disorder in their hormones was 81%, while the number of men was 19%, 48% of women with high, and those with low was 33%. In addition, 13% of the males with high and those with low was 6%. It was found that the high and low % increase as the normal distribution from the age of 30 to 70 for all cases of thyroid gland disorder with a mean of 44 years and a standard deviation S = 17.5 for high values, and 18.9 for low values. The variation coefficient of 39.7 and 42.9, and the most common age was (The mode) for the high is 40 years and for the low is 30 years. In other words, the high is greater than the low for them, and the mean in both cases is the age of 40. The most common values for the high are at 42 in general, while in low they have about 37 years, and the median in high is about 45 years, while in low is about 30 years. The high is higher for males than the low and the mean for high is 49 years, while for low is 60 years, and S = 20.2 for high and S = 27.7 for low, and there is no correlation between high or low between men and women as indicated by the measurement of Pearson's correlation coefficient.

Keywords: thyroid hormones, hypothyroidism, thyroid activity, and Pearson correlation coefficient.

1. INTRODUCTION

The thyroid gland is an endocrine gland found in vertebrates. The thyroid gland secretes three hormones, which are thyroid hormones. Thyroid hormones affect the rate of metabolism and protein synthesis. They also affect growth and development in children. Calcitonin plays a role in the balance of calcium within the body.

***Correspondence**: Hamdy AB. Matter

Hamdy.matter@gmail.com

The secretion of thyroid hormones is regulated by thyroid-stimulating hormone (TSH), which is produced by the anterior pituitary gland, which in turn is regulated by Thyroid-releasing hormone (TRH) produced by the hypothalamus.

Hypothyroidism left untreated can cause a number of health problems including an enlarged thyroid gland, an increase in renal cholesterol in the blood, low-density lipoprotein cholesterol and triglycerides, heart and metabolic diseases,[1] premature birth and middleweight,[2] blood pressure depression and the risk of generalized depression.[3-5] In addition to long-term effects on behavior in children such as cognitive deficits, later on, autism or with autistic-like traits,[6, 7] and brain fog,

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fatigue, and cognitive symptoms,[8] Idiopathic pulmonary and hepatic fibrosis,[9] female sexual dysfunction,[10] schizophrenia,[11] and autoimmune diseases.[12] Furthermore, thyroid abnormalities increase the risk of compounded adverse outcomes for COVID-19 and affect the patient's age. Having a thyroid disorder or hypothyroidism, but not hyperthyroidism, has a poor outcome for COVID-19,[13] Levothyroxine. Treatment for hypothyroidism may reduce the risk of breast cancer in women with hypothyroidism.[14] Maternal hypothyroidism when corrected before birth does not affect hearing in clinical infants.[15]

Hyperthyroidism is a common endocrine disorder in which the thyroid gland produces too many hormones, which speed up the metabolism. Antioxidant supplements can be used to improve thyroid function in hyperthyroid patients by increasing antioxidants and restoring the balance of antioxidants, oxidative stress,[16] and patients with asthma are more likely to develop hyperthyroidism.[17] Also, patients with atrial fibrillation associated with hyperthyroidism have a high risk of stroke, and systemic embolism such as non-thyroid atrial fibrillation,[18] and treatment is associated with Radioactive iodine for hyperthyroidism increases the risk of death.[19] Pulmonary hypertension levels may be an independent risk factor for patients with hyperthyroidism.[20] Hyperthyroidism may lead to many health problems such as ejaculation, impotence in both sexes, [21,22] menstruation problems, [23] increased cardiac output, increased systolic blood pressure, increased levels of renin, angiotensin, and aldosterone,[24] and increases the risk of stroke. Alzheimer's disease [25] as well as the risk of atrial fibrillation,[26] malignant tumors, [27,28] and increased risk of venous thromboembolism.[29]

In this study, standing on the prevalence of thyroid disease in Al-Wahat/ Libya and the extent of its impact on women, children and men, and which of them had the highest impact and at what age due to the distance of Al-Wahat/ Libya from the sea and the lack of fish and seafood intake in their food culture, which exposes them to iodine deficiency and perhaps a strike thyroid gland more than other areas.

2. MATERIALS AND METHODS

Al Wahat is located to the south of the city of Ajdabiya, about 250 km, and it consists of three main regions, which are Jalou, Awjila, and Ajkharah. These three main oases are under study. The study relied on official data from the laboratories located in the Al-Wahat region, and a comprehensive census of cases of hyperthyroidism and hypothyroidism in women and men. Moreover, frequency tables for age groups to determine which groups are more affected, and statistical analyses of the results, deduce what the research results indicate and make recommendations based on those results. Among these statistical indicators (SI) are the following:

Variation coefficient CV and we get from the relationship:

$$CV = \frac{S}{X} \times 100 - - - - - - - (1)$$

Where S is the standard deviation, and we get from the relation:

$$S = \sqrt{\frac{\sum (X - x)^{2} * f}{\sum f - 1}} \quad - - - - - (2)$$

and X is the mean, which is the average of the values, and we get it from the relationship:

$$X = \frac{\sum f * x}{\sum f} - - - - - - - - - - (3)$$

The Med. is the value that mediates the values after arranging them in descending or descending order, and we get it from the relationship:

$$Med = \frac{\frac{n}{2} - f_1}{f2 - f1} \times L - - - - - - - - - - (4)$$

The Mode, which is the most frequent, and we get it from the relationship: Mod. = A+ x

$$\frac{x}{l - x} = \frac{f - f1}{f - f2} - - - - - - - - - - - - - (5)$$

and Skewness by mode SK_1, and it shows the torsion of the graphic curve from the normal distribution curve, to indicate the direction of the phenomenon to the right, which is a positive torsion, or to the left, which is a negative torsion, and we get it from the relationship:

$$SK_1 = \frac{X - Mod.}{S} \quad - - - - - - - - - - - - (6)$$

and Skewness by med. SK_2. And we get it from the relation:

$$SK_2 = \frac{X - Med.}{S} \quad - - - - - - - - - - - - \quad (7)$$

Pearson's Correlation Coefficient:

$$r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\left(\sum x^2 - \frac{(\sum x)^2}{n}\right)\left(\sum y^2 - \frac{(\sum y)^2}{n}\right)}} - - - (8)$$

Most thyroid function tests are performed on serum and are based on automated assays: currently total T_4 and T_3 (TT_4 and TT_3) concentrations are measured by competitive immunoassay methods employing immunofluorescence or chemiluminescence, but since several conditions (drugs, pregnancy, nonthyroidal illness, genetic alterations).[30]

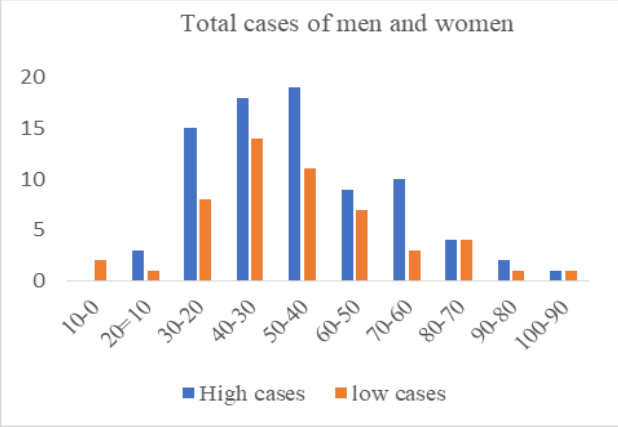


Fig.1. Shows the high and low cases of thyroid hormone in different age groups.

The percentage of infection to total cases is 10.5%.

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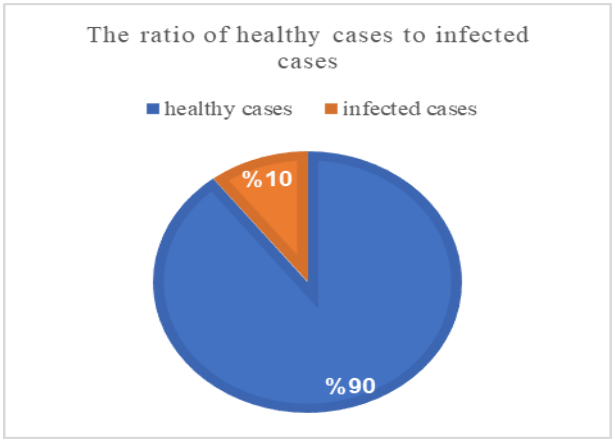


Fig. 2. Shows the ratio of healthy cases to infected cases.

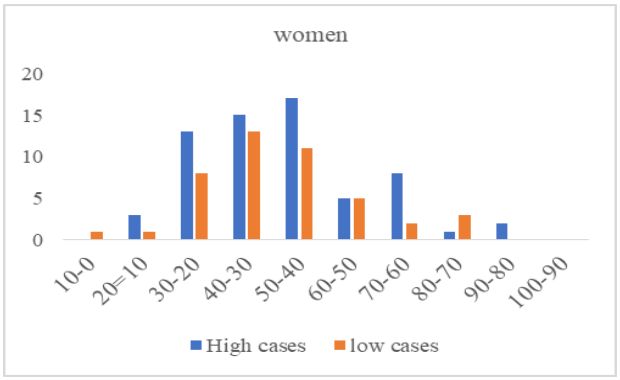


Fig. 3. Shows the high and low cases of thyroid hormone in different age groups of women.

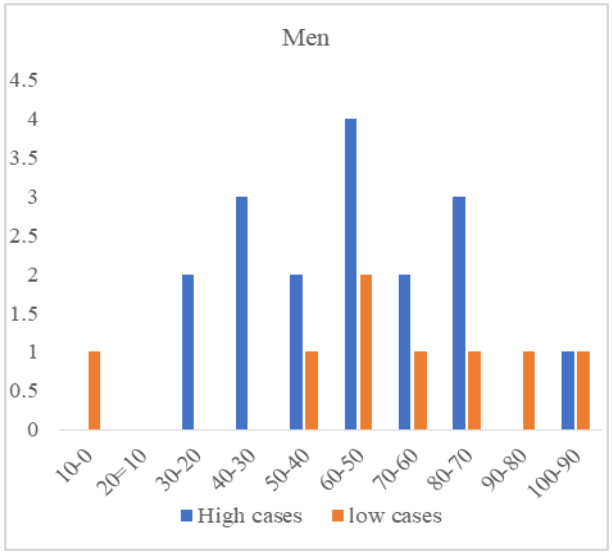


Fig. 4. Shows the high and low cases of thyroid hormone in different age groups of males.

Pearson coefficient for cases of high levels of thyroid hormone in males and females = 0.02

Pearson coefficient for cases of low levels of thyroid hormone in males and females = -0.03

Table 1. Shows the results of the statistical processes for the high and low cases for both males and females.

	(SI)	S	X	CV%	Mod.	Med.	SK_1	SK_2
M &F	H	17.5	44	39.7	40.9	42.1	0.17	0.32
	L	18.9	44	42.9	30.6	40.9	0.7	0.49
F	H	16.2	42	38	41.4	45.3	0.06	- 0.2
	L	15.4	41	37.5	37.1	30.7	0.25	0.67
M	H	20.2	49	41.2	55	53.75	-0.29	-0.7
	L	27.7	60	46.1	55	56.6	0.18	0.36

3. RESULTS AND DISCISSION

About 1272 samples of thyroid were taken from laboratories located in the Al-Wahat region / Libya in a period estimated at 2022. The results showed that there is a defect or disorder in the thyroid hormones in males and females; 133 cases out of a total of 1272 cases representing 10.5 % as shown in **Fig. 2**, and 60% of them suffer from a rise in thyroid hormones. However, 40 suffer from a deficiency. The number of affected women was 108 cases, and the percentage of women with thyroid disorders reached 81% of those infected, while the number of infected cases of the males was 25, which is 19% of the affected cases. On the other hand, the percentage of women with a high thyroid hormone reached 48% and a decrease in thyroid hormone was 33%, however, the percentage of males with a high thyroid hormone reached 13% and a decrease in thyroid hormone was 6%. The patients were classified into females and males, with high and low thyroid hormone according to age groups. Frequency tables were made to study the cases, a statistical study was conducted to find out which age groups are susceptible to infection, and is there a correlation between women's infection with adrenal glands? For goiter and infection of males, the tables and figures show the following:

Fig. 1. shows that the high and low percentages increase significantly in a way that is almost similar to the normal distribution from the age of 30 to 70 for all cases of thyroid gland disorder, with the mean = 44 years and S = 17.5 for high values and S =18.9 for low values, with a close coefficient of difference of 39.7 and 42.9. The most common age (module) for high cases is 40 years and for low cases is 30 years. The SK_1 in low cases was much higher than that of high cases, which indicates its continuity over a long period of time.

It is clear from **Fig. 3.** that the high levels of thyroid hormone are greater than the low levels, and that the mean in both cases is the age of about forty. The most common values for high cases are at 42 years, while in low cases they have about 37 years, and the same is the median in high cases. is about 45 years old, while in low values is about 30 years. The torsion coefficient is higher in low cases than in high cases, which makes the torsion negative. In other words, it turns to the left in high cases, while it turns to the right strongly in low values.

Fig. 4. shows that high levels of thyroid hormone are higher in males than low levels. The mean for high cases is 49 years, while in low cases it reaches 60 years, with S = 20.2 for high cases and S = 27.7 for low cases, which indicates heterogeneity

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of values. In low cases, SK_1 of high values is negative, which indicates that injuries occur at older ages, unlike women who suffer from infection at lower ages and more numbers than men.

4. CONCLUSION

This study concluded that women are more likely to suffer from thyroid disorders than men, where the incidence rate was about 80% for women while about 20% for men. This defect appears in them at an early age 30 to 40 years compared to men with an average age of 50 to 60 years. However, there was no association between high or low cases in men and women.

5. RECOMMENDATIONS

1. We recommend the need to conduct laboratory tests to detect the extent of activity or inactivity of the thyroid gland, especially for women, due to the negative effects of hypothyroidism or hyperactivity on them.
2. Conducting periodic analyzes of the thyroid gland when there are symptoms of hyperactivity or lethargy, or if there are no symptoms, in order to take precaution and treat it early and avoid its bad effects, especially on women.
3. Eat foods that contain iodine in cases of hypothyroidism to stimulate the production of its hormones.

6. REFERENCES

1. Su, X., Peng, H., Chen, X., Wu, X., & Wang, B. (2022). Hyperlipidemia and hypothyroidism. Clinica Chimica Acta.
2. Alavi, E. R., Rafiei, N., Rafiei, R., & Farokhi, E. (2021). Prevalence of transient congenital hypothyroidism among neonates. Annals of Medicine and Surgery, 72, 103083.
3. Ramezani, M., & Hezaveh, Z. S. (2022). The Effect of Synbiotic Supplementation on Thyroid Hormones, Blood Pressure, Depression and Quality of Life in Hypothyroid Patients: A Study Protocol for A Randomized Double-Blind Placebo Controlled Clinical Trial. Clinical Nutrition ESPEN.
4. Airaksinen, J., Komulainen, K., García-Velázquez, R., Määttänen, I., Gluschkoff, K., Savelieva, K., & Jokela, M. (2021). Subclinical hypothyroidism and symptoms of depression: Evidence from the National Health and Nutrition Examination Surveys (NHANES). Comprehensive psychiatry, 109, 152253.
5. Gonzalez-Navarro, B., Gonzalez-Parreño, S., Perez-Aznar, A., Miralles-Muñoz, F. A., Lizaur-Utrilla, A., & Vizcaya-Moreno, M. F. (2022). Negative Influence of the Subclinical Hypothyroidism on Improvement in Patient-Reported Outcomes After Total Knee Arthroplasty. The Journal of Arthroplasty.
6. Northcutt, K. V., Leal-Medina, T. S., & Yoon, Y. S. (2021). Early postnatal hypothyroidism reduces juvenile play behavior, but prenatal hypothyroidism compensates for these effects. Physiology & Behavior, 241, 113594.
7. Hu, C., Wang, S., Wu, D., Yan, C., & Wu, M. (2022). Subclinical hypothyroidism in pregnancy rats impaired offspring's spatial learning and memory and the cerebellar development. Biochemical and Biophysical Research Communications.
8. Ettleson, M. D., Raine, A., Batistuzzo, A., Batista, S. P., McAninch, E., Teixeira, M. C. T., ... & Bianco, A. C. (2022). Brain fog in hypothyroidism: understanding the patient's perspective. Endocrine Practice, 28(3), 257-264.
9. Zhang, Y., Zhao, M., Guo, P., Wang, Y., Liu, L., Zhao, J., ... & Zhao, J. (2021). Mendelian randomisation highlights hypothyroidism as a causal determinant of idiopathic pulmonary fibrosis. E Bio Medicine, 73, 103669.
10. Shen, M., Li, X., Wu, W., Dou, R., Mei, X., Xu, W., ... & Zhao, S. (2021). Is There an Association Between Hypothyroidism and Sexual Dysfunction: A Systematic Review and Cumulative Analysis. Sexual medicine, 9(3), 100345.
11. Zhao, Y., Wen, S. W., Qin, Y., Liu, Y., Gao, Y., Retnakaran, R., ... & Zhai, D. (2021). Association between valproate treatment for acute phase schizophrenia and risk of new onset hypothyroidism. Schizophrenia Research, 235, 12-16.
12. Permatasari, C. A., Zahraini, H., & Marpaung, F. R. (2022). Hypokalemic periodic paralysis and renal tubular acidosis in a patient with hypothyroid and autoimmune disease. Annals of Medicine and Surgery, 75, 103389.
13. Damara, F. A., Muchamad, G. R., Ikhsani, R., Syafiyah, A. H., & Bashari, M. H. (2021). Thyroid disease and hypothyroidism are associated with poor COVID-19 outcomes: A systematic review, meta-analysis, and meta-regression. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 15(6), 102312.
14. Huang, C. H., Wei, J. C. C., Chien, T. C., Kuo, C. W., Lin, S. H., Su, Y. C., ... & Yeh, M. H. (2021). Risk of breast cancer in females with hypothyroidism: A nationwide, population-based, cohort study. Endocrine Practice, 27(4), 298-305.
15. Mohiyuddin, S. A., Apoorva, H. M., Prasad, K. N. V., & Munikrishna, N. (2021). Hearing outcome in infants following correction of maternal hypothyroidism during pregnancy. International Journal of Pediatric Otorhinolaryngology, 142, 110597.
16. Sultana, R., Shahin, A. D., & Jawadul, H. M. (2022). Measurement of oxidative stress and total antioxidant capacity in hyperthyroid patients following treatment with carbimazole and antioxidant. Heliyon, 8(1), 8651.
17. Gau, S. Y., Huang, J. Y., Yong, S. B., & Wei, J. C. C. (2021). Higher risk of hyperthyroidism in people with asthma: Evidence from a nationwide, population-based cohort study. The Journal of Allergy and Clinical Immunology: In Practice.

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18. Kim, K., Yang, P. S., Jang, E., Yu, H. T., Kim, T. H., Uhm, J. S., ... & Joung, B. (2021). Increased risk of ischemic stroke and systemic embolism in hyperthyroidism-related atrial fibrillation: A nationwide cohort study. American heart journal, 242, 123-131.

19. Yan, D., Chen, C., Yan, H., Liu, T., Yan, H., & Yuan, J. (2021). Mortality risk after radioiodine therapy for hyperthyroidism: a systematic review and meta-analysis. Endocrine Practice, 27(4), 362-369.

20. Song, X., Yang, K., Chen, G., Duan, W., Yao, D., Li, S., ... & Liu, L. (2021). Characteristics and risk factors of pulmonary hypertension in patients with hyperthyroidism. Endocrine Practice, 27(9), 918-924.

21. Tannenbaum, J., Youssef, M., Attia, A. S., Hsieh, T. C., & Raheem, O. (2021). Hyperthyroidism as an Underlying Cause of Premature Ejaculation. Sexual medicine reviews.

22. Pan, Y., Xie, Q., Zhang, Z., Dai, Y., Lin, L., Quan, M., ... & Zhao, S. (2020). Association Between Overt Hyperthyroidism and Risk of Sexual Dysfunction in Both Sexes: A Systematic Review and Meta- Analysis. The Journal of Sexual Medicine, 17(11), 2198-2207.

23. Koyyada, A. (2020). Clinical study on interpretation of hypo and hyperthyroid disorders with various menstrual disturbances. Current Medicine Research and Practice, 10(4), 139-142.

24. Rivas, A. M., Pena, C., Kopel, J., Dennis, J. A., & Nugent, K. (2021). Hypertension and hyperthyroidism: association and pathogenesis. The American Journal of the Medical Sciences, 361(1), 3-7.

25. Li, L. X., Yang, T., Guo, L., Wang, D. Y., Tang, C. H., Li, Q., ... & Zhang, L. L. (2020). Serum tau levels are increased in patients with hyperthyroidism. Neuroscience Letters, 729, 135003.

26. Higa, S., Maesato, A., Ishigaki, S., Suenari, K., Chen, Y. J., & Chen, S. A. (2021). Diabetes and endocrine disorders (hyperthyroidism / hypothyroidism) as risk factors for atrial fibrillation. Cardiac Electrophysiology Clinics, 13(1), 63-75.

27. Jonklaas, J. (2020). Infiltration of the thyroid gland by non-thyroid malignancy: A literature review reveals this to be an unusual cause of hyperthyroidism. Journal of Clinical & Translational Endocrinology, 20, 100221.

28. Alvarez, A. L., Mulder, M., Handelsman, R. S., Lew, J. I., & Farra, J. C. (2020). High rates of underlying thyroid cancer in patients undergoing thyroidectomy for hyperthyroidism. Journal of Surgical Research, 245, 523-528.

29. Srisawat, S., Sitasuwan, T., & Ungprasert, P. (2019). Increased risk of venous thromboembolism among patients with hyperthyroidism: a systematic review and meta-analysis of cohort studies. European Journal of Internal Medicine, 67, 65-69.

30. Dufour, D. R. (2007). Laboratory tests of thyroid function: uses and limitations. Endocrinology and metabolism clinics of North America, 36(3), 579-594.

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