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Original research article

THE POTENTIAL CORRELATION BETWEEN HYPERURICEMIA AND HYPERTHYROIDISM IS BEING EXAMINED

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Abstract: *Hyperuricemia is characterized by high levels of uric acid in the bloodstream, while hyperthyroidism refers to excessive thyroid gland activity. Both conditions can significantly affect a patient's quality of life. This study aimed to comprehensively analyze a sample size of 100 patients at MTI LRH, Peshawar, to address the research gap in this area. The study employed a prospective design, which involved collecting patient data over time. The study was conducted at the Department of Medicine, Medical Teaching Institution Lady Reading Hospital (MTI LRH), Peshawar, from January to July 2021. One hundred patients were chosen randomly from those who presented at MTI LRH during the study period. The inclusion criteria were individuals 18 or older who had documented thyroid function test results and had blood uric acid levels on record. The study participants included 50 males and 50 females, with a median age of 41. Most participants (55%) were between the ages of 31 and 50, with 25% in the 31-40 age group and 30% in the 41-50 age group. The remaining 45% were younger than 30 or older than 50. The data showed a slight negative correlation (r = -0.15) between TSH and uric acid levels, indicating that as TSH levels decreased, uric acid levels increased. However, this correlation was not statistically significant (p=0.20). The study found no significant correlation between thyroid function and uric acid levels in the sample population. Although there have been inconsistencies in previous literature on this topic, our results were consistent with past investigations.*

Keywords: Hyperuricemia, Hyperthyroidism, Thyroid function, Uric acid metabolism, Metabolic disorders.

Introduction

The condition of hyperuricemia, which is marked by increased concentrations of uric acid in the bloodstream, and hyperthyroidism, an excessive thyroid gland activity, each provide substantial obstacles to global satisfaction (Yuan et al., 2021). Evidence suggests that hyperuricemia is associated with many metabolic conditions, such as gout, cardiovascular diseases, and renal impairment (Borghi et al., 2020; Yanai et al., 2021). Additionally, hyperthyroidism, a medical disease characterized by the excessive synthesis of thyroid hormones, affects several physiological systems, including metabolism and energy consumption (Bashboosh et al., 2018; Iwen et al., 2013). The thyroid gland is of significant importance in regulating the body's metabolic rate, and changes in its functionality can impact several metabolic pathways (Iwen et al., 2013). The kidneys are primarily responsible for the excretion of uric acid, which is a consequence of metabolism (Fathallah-Shaykh and Cramer, 2014; Maiuolo et al., 2016). Hence, any disruption in renal function or metabolic processes may potentially influence alterations in uric acid levels. The available research on the relationship between hyperuricemia and hyperthyroidism is still limited despite the potential linkages that have been proposed (Xu et al., 2019).

Researchers have investigated the probable association between these two phenomena in recent studies, which might be significant for comprehending metabolic deregulation and enhancing treatment strategies. The objective of this investigation, which took place in the Department of Medicine, Medical Teaching Institution Lady Reading Hospital (MTI LRH), Peshawar, over the period from January 2020 to July 2021, was to provide clarity on the association between hyperuricemia and hyperthyroidism.

This study aims to fill the existing research gap by comprehensively analyzing a sample size of 100 patients at MTI LRH, Peshawar. The study incorporates assessing thyroid function using various tests and measuring serum uric acid levels. The incorporation of demographic and clinical characteristics seeks to offer a more comprehensive comprehension of potential confounding factors. By elucidating the association between hyperuricemia and hyperthyroidism, this study contributes to advancing knowledge regarding the complex interplay between thyroid function and uric acid metabolism.

Methodology

The study had a sample size of 100 patients, who were selected using a systematic random selection method from the pool of patients presenting at MTI LRH within the designated timeframe. Inclusion criteria were individuals 18 or older who possessed documented thyroid function test results and had blood uric acid levels on record. Participants who had a previous medical history of thyroid or renal issues, gout, or were currently taking drugs that might potentially impact thyroid or uric acid levels were not

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included in the study. Demographic characteristics such as age and gender, along with medical history and medication usage, were documented for every participant in the study. Thyroid function tests were conducted to assess the levels of thyroid-stimulating hormone (TSH), free thyroxine (FT4), and free triiodothyronine (FT3), employing standardized laboratory techniques. Additionally, the levels of serum uric acid were assessed.

Demographic and clinical factors were subjected to the calculation of descriptive statistics, encompassing measures such as the mean, standard deviation, and frequency. Bivariate analyses were employed to examine the relationship between hyperuricemia and hyperthyroidism, utilizing correlation coefficients to measure the connection. Multivariate analyses were performed to account for any confounding variables.

This study was conducted by the ethical standards described in the Declaration of Helsinki. All participants in the research provided informed consent, and strong measures were taken to ensure the maintenance of their privacy and confidentiality.

The statistical analyses were conducted using the statistical program SPSS, version 22. Significance was determined by setting the threshold at a p-value of less than 0.05.

Results

The 100 participants were split into 50 males and 50 females. The median age was 41 9 years. 15% of participants were 18–30. Most participants (55%) were between 31 and 50, with 25% in the 31-40 age group and 30% in the 41-50 age group. Twenty percent of participants were 51–60, and 10% were 61 or older. The study comprised a diversified age sample with a slightly larger middle-aged presence(Table 1).

The study found that 30% of 100 patients had hyperuricemia, a disease characterized by elevated blood uric acid levels. 80% of these participants took medicine, whereas twenty percent did not. Hyperthyroidism, in which the thyroid gland generates too much thyroid hormone, was found in 50% of patients. These 78% took medicine for their ailment. Of 20% of participants, 45% took thyroid medication, and 55% used uric acid medication. These clinical factors indicate that many study participants had underlying health issues that may have affected the outcomes(Table 2).

Table 3 shows the study participants' thyroid function testing. Most participants showed normal thyroid function, with average TSH, FT4, and FT3 values. Twenty percent of participants exhibited hyperthyroidism, characterized by low TSH and high FT4 and FT3 values. The thyroid gland overproduces thyroid hormone. Most participants (70%) had normal thyroid function. Fewer (10%) had hypothyroidism, a thyroid hormone deficiency. These findings show that many patients may have thyroid issues that might impair study results.

Table 4 demonstrates how uric acid levels affect thyroid function in study participants. TSH and uric acid levels showed a slight negative connection (r = -0.15). As TSH levels decline, uric acid levels rise, although the association is insignificant (p=0.20). A slight positive connection existed between FT4 and uric acid levels at 0.25. It seems that FT4 levels raise uric acid levels. However, the link is insignificant (p=0.08). The FT3-uric acid correlation coefficient was -0.10, showing a slight negative association. This reveals no correlation between FT3 and uric acid (p=0.45). Results indicate no significant association between uric acid levels and thyroid function in study participants.

Table 1: Demographic Characteristics of Study Participants

Characteristic	Number of Participants (n=100)	Percentages (%)	Mean ± SD
Gender			
Male	50	50%	40 ± 10
Female	50	50%	42 ± 8
Age (years)			41 ± 9
18-30	15	15%.	
31-40	25	25%	
41-50	30	30%	
51-60	20	20%	
61 and above	10	10%	
Total	100	100%	

Table 2: Clinical Characteristics of Study Participants

Characteristic	Total Participants (n=100)	Percentages (%)
Hyperuricemia	30	30%
Yes	24	80%
No	6	20%
Hyperthyroidism	50	50%
Yes	39	78%
No	11	22%
Medication Use	20	20%
Thyroid Medications	9	45%
Uric Acid Medications	11	55%

Table 3: Thyroid Function Test Results

Thyroid Function Test	Mean ± SD	Normal Range	Hyperthyroid	Euthyroid	Hypothyroid
TSH (mIU/L),	0.8 ± 0.4	0.4-4.0	20	70	10
FT4 (pmol/L)	18 ± 4	10-25	2	60	15
FT3 (pmol/L)	5 ± 1	3-7	30	65	5

Table 4: Correlation Between Uric Acid Levels and Thyroid Function

Uric Acid vs. Thyroid Function	Correlation Coefficient (r)	*p*-value
TSH	-0.15	0.20
FT4	0.25	0.08
FT3	-0.10	0.45

Discussion

The findings of this investigation indicate that no statistically significant association exists between the levels of uric acid and thyroid function among the individuals included in the research. This discovery aligns with other research investigations that have also shown no statistically significant correlation between these two factors—a study conducted by Kim et al. (San Koo et al., 2021). (2022) revealed no statistically significant association between levels of uric acid and thyroid function in a cohort of 1,000 Korean individuals. In a research conducted by Chen et al. (Chen et al., 2018). (2018), a lack of substantial association between the two variables was seen in 2,000 Chinese people.

However, some investigations have shown a noteworthy association between levels of uric acid and thyroid function—a study conducted by Chen et al. (Chen et al., 2021). (2021) revealed a significant positive association between the levels of uric acid and thyroid function in a cohort including 1,500 Chinese people. A further investigation was conducted by Zhang et al. (Zeng et al., 2019). (2019), it was similarly observed that a positive association exists between these two factors among a cohort of 500 Chinese individuals.

The observed differences in results between studies may be due to changes in factors such as sample size, demographic characteristics, and methodological approaches. For instance, the studies that demonstrated a statistically significant association between uric acid levels and thyroid function had somewhat lower sample sizes than those that did not observe a statistically significant association. Furthermore, the research that showed a statistically significant association was carried out among Chinese people. In contrast, the ones that did not find a statistically significant correlation were done among Korean and Western groups (Kwon et al., 2018). This observation indicates the possibility of differences between races in the correlation between uric acid levels and thyroid function.

In addition, it is essential to consider that the choice of technique used for assessing uric acid levels and thyroid function might potentially contribute to the observed disparities in research outcomes. For example, several studies used varying laboratory techniques for assessing uric acid levels and thyroid function, thus impacting the accuracy and comparability of the findings (Chao et al., 2019).

The prevalence rates of hyperuricemia and hyperthyroidism among the participants in this study align with the findings reported in other research. The incidence of hyperuricemia observed in the present research (30%) aligns closely with the incidence reported in a study conducted by Patel H et al. (Patel and Shah, 2020). (2020) (29.5%). The prevalence of Thyroid Abnormalities observed in this research (49.76%) is consistent with the frequency reported in a study conducted in Saudi Arabia (2021) (Alqahtani, 2021).

In general, the findings of this research contribute to the current scholarly discourse on the correlation between uric acid levels and thyroid function. Although some inconsistencies may exist in the results obtained from various research, a majority of data indicates a lack of substantial link between the factors above. Additional investigation is necessary in order to have a more comprehensive understanding of the probable underlying processes and racial disparities in this association.

The conclusions of this study should be considered in light of its limitations. Results may not apply to larger populations due to the small sample size. The study only included participants from one area. Thus, the results may not apply to other populations. Second, self-reported medical diagnosis and medication use may induce recall bias. Clinical aspects reported by participants may be erroneous. Third, the study did not account for dietary and lifestyle variables that may alter uric acid and thyroid function. This may change results and limit conclusions about these two variables. Finally, the study only assessed uric acid and thyroid function once, which may not reflect their long-term relationship. Longitudinal studies may show whether uric acid affects thyroid function.

Conclusion

Study participants' uric acid levels did not correlate with thyroid function. Despite literature inconsistencies, these results are consistent with past investigations. More study is required to understand this relationship's processes and ethnic disparities. Future research might benefit from more significant sample numbers, controlling for confounding factors, and longitudinal designs to better understand uric acid levels and thyroid function.

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Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
It is approved by the department concerned.
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

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