

Visualizing Hypothyroidism: Unveiling Symptoms and Related Factors through Interactive Data Visualization

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1 Introduction

Hypothyroidism is a common endocrine disorder that can have significant implications for patients overall health and well-being. Understanding the potential associations between hypothyroidism and other medical conditions is crucial for effective diagnosis, treatment, and patient management. In this study, we aimed to investigate the relationship between hypothyroidism and hypertension, as well as congestive heart failure (CHF), using the MIMIC-III dataset, a large publicly available electronic health record database. We developed a visualization tool specifically designed to analyze and explore the relationships between hypothyroidism and various diseases within the MIMIC-III dataset. This tool allowed us to efficiently navigate and visualize the complex interactions between hypothyroidism, hypertension, and CHF, providing valuable insights into their associations.

Moreover, the visualization tool facilitated the identification of patterns and trends beyond the primary associations of hypothyroidism with hypertension and CHF. By leveraging the extensive dataset and interactive visualization capabilities, we were able to explore potential secondary relationships between hypothyroidism and other diseases, uncovering intriguing leads for further investigation. The tool's flexibility and user-friendly interface enable researchers and clinicians to delve deeper into the complex interplay between hypothyroidism and various comorbidities, providing a valuable resource for future studies and clinical decision-making.

2 Our results

Our visualizations confirmed a positive correlation between hypothyroidism and hypertension, with a higher prevalence of hypertension observed among patients with hypothyroidism compared to those without. This finding suggests a potential interplay between thyroid dysfunction and cardiovascular health.

Furthermore, our analysis revealed a significant gender difference in the co-occurrence of hypothyroidism and hypertension. Among patients with hypothyroidism, a higher proportion of women exhibited concurrent hypertension compared to men. Specifically, 51% of women with hypothyroidism had hypertension, whereas the corresponding proportion among men was 37%. This gender disparity highlights the importance of considering sex-specific factors in understanding the complex relationship between thyroid function and cardiovascular health.

In addition to hypertension, we discovered a noteworthy association between hypothyroidism and congestive heart failure (CHF). Among patients with hypothyroidism, 33% had CHF, whereas among patients without hypothyroidism, the prevalence of CHF was 21%. This

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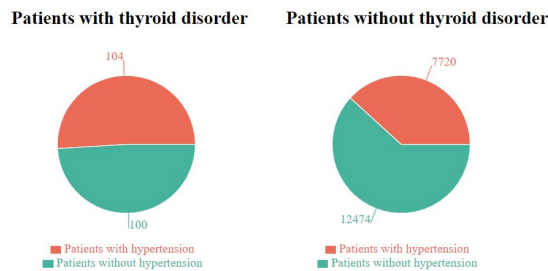


Figure 1: Comparison of patients with hypothyroidism and hypertension with patients without hypothyroidism but with hypertension

substantial difference suggests a potential link between hypothyroidism and the development or exacerbation of CHF, further emphasizing the importance of thyroid function assessment in patients with heart failure.

While our study provides important insights into the relationship between hypothyroidism, hypertension, and CHF, several limitations should be acknowledged. The study population consisted primarily of critically ill patients admitted to an intensive care unit, which may limit the generalizability of the findings to other populations. Additionally, the retrospective nature of the study design and reliance on electronic health records introduce potential sources of bias and incomplete data. Future prospective studies involving larger and more diverse populations are needed to confirm our findings and establish causality.

In conclusion, our study utilizing the MIMIC-III dataset and our powerful visualization tool demonstrates a positive correlation between hypothyroidism and hypertension, as well as a significant association between hypothyroidism and congestive heart failure. The gender disparity observed in the co-occurrence of hypothyroidism and hypertension underscores the need for further investigation into sex-specific factors in these relationships. These findings contribute to our understanding of the complex interactions between thyroid function and cardiovascular health, providing valuable insights for clinicians in the diagnosis, management, and treatment of patients with hypothyroidism and associated comorbidities.

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