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Mathematical modelling of the relationship between high blood pressure and diabetes: a multifactorial aprroach

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The increasing prevalence of high blood pressure (hypertension) and diabetes mellitus is a significant public health concern worldwide. These two chronic conditions often coexist and have been shown to amplify each other's adverse effects, leading to increased morbidity and mortality rates. Understanding the complex relationship between hypertension and diabetes is crucial for developing effective interventions and management strategies.

We propose a multifactorial mathematical model that integrates physiological, lifestyle, and environmental factors associated with hypertension and diabetes. The model is represented as a set of coupled ordinary differential equations (ODEs) decribe the change in the prevalence of hypertension, diabetes, and individuals with both conditions over time. Additionaly, we discuss potential applications of the model, limitations, and future direction for research in this area. Key components such as blood glucose and insulin dynamics, the renin-angiotensin-aldosterone system, and endothelial dysfunction, along with modifiable risk factors like diet, physical activity, and stress,are incorporated in the model. Additionally, the model considers the role of genetic predisposition and demographic factors in the development of these conditions.

References

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