Can zinc reduce the disease burden of diabetes mellitus?

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Background: Diabetes mellitus is a prevalent chronic metabolic disorder characterized by hyperglycemia. Traditionally, this disease is managed with medication and dietary modifications. However, recent studies have shown the potential role of zinc in diabetes management. We explained the complex interplay between zinc deficiency, impaired glucose metabolism, and the progression of diabetes to elucidate the potential therapeutic benefits of zinc supplementation.

Methods: A comprehensive literature search using databases such as Google Scholar, PubMed, and Scopus was conducted to identify relevant studies published between November 2023 and February 2024. Keywords such as 'zinc in diabetes mellitus,' 'zinc supplementation,' 'zinc deficiency,' and 'diabetic complications and zinc' were utilized. Studies limited to human and experimental research that have investigated the association between zinc and the disease burden of diabetes have been conducted.

Results: Zinc plays a crucial role in many biological processes relevant to diabetes, such as insulin secretion, glucose uptake into cells, and antioxidant defense mechanisms. Serum zinc levels are lower in diabetic individuals than in healthy controls. A negative association between zinc levels and HbA1c ('r' = -0.33) was also reported. Several human studies have shown that zinc supplementation can improve fasting blood glucose levels, insulin levels, and lipid profiles in both types of diabetes mellitus patients. The impact of zinc supplementation on glycemic control in individuals with diabetes, however, was not always consistent.

Conclusions: Zinc plays an important role in glucose metabolism, and there is a potential link between zinc deficiency and the progression of diabetes. Maintaining adequate zinc levels through diet and supplementation is likely to reduce the progression and disease burden of diabetes. Additional large-scale clinical trials are necessary to establish the safety and efficacy of zinc supplementation for diabetic patients. Furthermore, dietary interventions aimed at preventing zinc deficiency and associated complications hold promise as preventative strategies.