

Impact of Diabetes on Tuberculosis Outcomes and Prevention

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DESCRIPTION

Diabetes Mellitus and Tuberculosis (TB) are two chronic diseases with significant global health burdens. Individually, they pose substantial challenges to healthcare systems, particularly in low- and middle-income countries. However, when these two conditions intersect, they create a complex epidemiological landscape that exacerbates public health issues. Understanding the interplay between diabetes mellitus and TB is important for developing integrated approaches to prevention, diagnosis, and treatment. The connection between diabetes and TB is well-established. Diabetes mellitus, particularly type 2 diabetes, impairs the immune system, making individuals more susceptible to infections, including TB. Studies have shown that people with diabetes are two to three times more likely to develop active TB compared to those without diabetes. This heightened risk is due to several factors, including hyperglycemia, which impairs immune responses, and chronic inflammation, which can weaken the body's defense mechanisms.

The dual burden in high-prevalence areas

The dual burden of diabetes and TB is most pronounced in regions where both diseases are prevalent. For example, countries with high TB rates in sub-Saharan Africa, Southeast Asia, and the Western Pacific also face rising incidences of diabetes. The demographic transition in these areas, characterized by aging populations and increasing urbanization, contributes to the rising prevalence of non-communicable diseases like diabetes. This epidemiological shift complicates TB control efforts, as the co-existence of diabetes can lead to higher TB transmission rates, prolonged infectious periods, and increased mortality. The presence of diabetes in TB patients is associated with worse outcomes. Studies have demonstrated that TB patients with diabetes have a higher risk of mortality during treatment and after completion of therapy. Diabetes-induced immune dysfunction can lead to a higher bacterial load and more severe disease, contributing to increased mortality. Additionally, TB can exacerbate diabetes control, leading to a

vicious cycle of worsening health for individuals with both conditions.

Impact on tuberculosis diagnosis and treatment

The endocrine system, which involves the release of hormones into the bloodstream, also plays a significant role in the body's response to TB. Chronic infections like TB can lead to alterations in hormone levels, which can impact the immune response. Cortisol is a steroid hormone released by the adrenal glands in response to stress. Chronic TB infection can lead to elevated levels of cortisol, which has immunosuppressive effects. High cortisol levels can dampen the immune response, making it harder for the body to fight off the infection. TB can affect the thyroid gland, leading to changes in thyroid hormone levels. Hypothyroidism (low levels of thyroid hormones) can impair immune function, while hyperthyroidism (high levels of thyroid hormones) can exacerbate inflammation. Sex hormones such as estrogen and testosterone have been shown to influence immune responses.

Estrogen generally enhances immune activity, while testosterone has immunosuppressive effects. The balance of these hormones can impact susceptibility to and progression of TB. Leptin, a hormone primarily produced by adipose tissue, regulates energy balance and has immune-modulatory effects. Leptin deficiency, which can occur in chronic illnesses like TB, is associated with impaired immune function and increased susceptibility to infections. Policymakers need to prioritize the integration of TB and diabetes care within health systems. This integration involves training healthcare workers to recognize and manage both conditions, ensuring the availability of diagnostic tools and medications, and developing guidelines for the co-management of TB and diabetes. Public health campaigns should also raise awareness about the increased risk of TB among diabetic patients and the importance of glycemic control to prevent TB.

CONCLUSION

The interplay between diabetes mellitus and tuberculosis

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represents a significant challenge to global health. The synergistic effect of these diseases necessitates a coordinated approach to care and prevention. By understanding the epidemiological link and implementing integrated health strategies, we can mitigate the impact of this dual burden and improve outcomes for

affected populations. Addressing the combined threat of diabetes and TB requires concerted efforts from healthcare providers, policymakers, and communities to ensure a comprehensive and effective response.