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# Tuberculosis and Associated Transient Hyperglycaemia in Peri-Urban South Africa: Implications for Diabetes Screening in High Tuberculosis/HIV Burden Settings

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**Abstract :** Background: South Africa remains a high tuberculosis (TB) burden country globally and the burden of diabetes – a TB risk factor is growing rapidly. As an infectious disease, TB also induces transient hyperglycaemia. Therefore, screening for diabetes in newly diagnosed tuberculosis patients may result in misclassification of transient hyperglycaemia as diabetes. Objective: The objective of this study was to determine and compare the prevalence of hyperglycaemia (diabetes and impaired glucose regulation (IGR)) in TB patients and to assess the cross-sectional association between TB and hyperglycaemia at enrolment and after three months of follow-up. Methods: Consecutive adult TB and non-TB participants presenting at a TB clinic in Cape Town were enrolled in this cross-sectional study and follow-up between July 2013 and August 2015. Diabetes was defined as self-reported diabetes, fasting plasma glucose (FPG) ≥ 7.0 mmol·L$^{-1}$ or glycated haemoglobin (HbA1c) ≥ 6.5%. IGR was defined as FPG 5.5– < 7.0 mmol·L$^{-1}$ or HbA1c 5.7– < 6.5%. TB patients initiated treatment. After three months, all participants were followed up and screened for diabetes again. The association between TB and hyperglycaemia was assessed using logistic regression adjusting for potential confounders including sex, age, income, hypertension, waist circumference, previous prisoner, marital status, work status, HIV status. Results: Diabetes screening was performed in 852 participants (414 TB and 438 non-TB) at enrolment and in 639 (304 TB and 335 non-TB) at three-month follow-up. The prevalence of HIV-1 infection was 69.6% (95% confidence interval (CI), 64.9–73.8 %) among TB patients, and 58.2% (95% CI, 53.5–62.8 %) among the non-TB participants. Glycaemic levels were much higher in TB patients than in the non-TB participants but decreased over time. Among TB patients, the prevalence of IGR was 65.2% (95% CI 60.1 - 69.9) at enrollment and 21.5% (95% CI 17.2-26.5) at follow-up; and was 50% (45.1 - 54.94) and 32% (95% CI 27.9 - 38.0) respectively, among non-TB participants. The prevalence of diabetes in TB patients was 12.5% (95% CI 9.69 – 16.12%) at enrolment and 9.2% (95% CI, 6.43–13.03%) at follow-up; and was 10.04% (95% CI, 7.55–13.24%) and 8.06% (95% CI, 5.58–11.51) respectively, among non-TB participants. The association between TB and IGT was significant at enrolment (adjusted odds ratio (OR) 2.26 (95% CI, 1.55-3.31) but disappeared at follow-up 0.84 (0.53 - 1.36). However, the TB-diabetes association remained positive and significant both at enrolment (2.41 (95% CI, 1.3-4.34)) and follow-up (OR 3.31 (95% CI, 1.5 - 7.25)). Conclusion: Transient hyperglycaemia exists during tuberculosis. This has implications on diabetes screening in TB patients and suggests a need for diabetes confirmation tests during or after TB treatment. Nonetheless, the association between TB and diabetes noted at enrolment persists at 3 months highlighting the importance of diabetes control and prevention for TB control. Further research is required to investigate the impact of hyperglycaemia (transient or otherwise) on TB outcomes to ascertain the clinical significance of hyperglycemia at enrolment.

**Keywords :** diabetes, impaired glucose regulation, transient hyperglycaemia, tuberculosis
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