

## Metformin-Associated Vitamin B12 Deficiency in Patients with Type 2 Diabetes in Sub-Saharan Africa: A Narrative Review

Wairagu A

Kenya Diabetes Study Group (KDSG). Email: [annewairagu@gmail.com](mailto:annewairagu@gmail.com)

### Abstract

**Background:** Metformin, a key therapy for T2DM in Sub-Saharan Africa (SSA) where T2DM is prevalent has been linked to VitB12 deficiency mainly due to malabsorption.

**Objectives:** To determine the prevalence of and risk factors for metformin-associated vitamin B12 deficiency in patients with T2DM in SSA and to provide an overview of the available guidelines on screening and treatment of vitamin B12 deficiency associated with metformin therapy.

**Methods:** *Literature search:* PubMed, MEDLINE, SCOPUS, AJOL, EMBASE and Cochrane Library databases were searched for relevant articles between January 2002 and December 2022. Additional articles were searched in Grey literature as well as manual searches in reference lists and citations. Clinical practice guidelines on diabetes management from SSA region were searched using key search words.

*Inclusion criteria:* Studies assessing effects of metformin on vitamin B12 in patients with T2DM in countries in SSA and all available clinical practice guidelines on diabetes management from SSA.

*Exclusion criteria:* Studies with insufficient data, review articles and non-English articles or guidelines.

*Data extraction and synthesis:* From articles: Relevant data including publication information, study characteristics, intervention details and outcome measures. Quality assessment of the articles was performed using the Center for Evidence-Based Management (CEBMA) (2014) Tool from guidelines: Relevant data including screening,

diagnosis, and monitoring vitamin-B12 status and treatment of vitamin B12 deficiency.

**Results:** *Article selection:* Initial search yielded 24 articles. After screening titles and abstracts, 13 articles were eligible for full-text review but only seven met the inclusion criteria. All were cross-sectional studies except one case-control study. *Guidelines selection:* Twenty-two guidelines from 18 countries were retrieved.

*Key findings:* N=1075 . Prevalence: 5-41%.

*Risk factors:* High metformin dose, long duration of metformin therapy and diabetes, advanced age, high BMI and body weight, better glycaemic control, non-black ethnicity

*Guidelines:* Few, non-evidence-based, non-recommending routine screening and treatment.

**Conclusions:** The prevalence of vitamin B12 deficiency amongst metformin-treated T2DM in SSA varied considerably. The risk factors identified included; high dose metformin, a longer duration of metformin and diabetes, non-black ethnicity and a good glycaemic control. Guidelines for the screening, monitoring and treatment of vitamin B12 associated with metformin therapy are generally lacking in SSA and were not evidence-based.

**Recommendations:** Selective screening in high-risk symptomatic individuals with T2DM on metformin therapy. There is a need to conduct randomized clinical trials in SSA for evidence-based guidelines development.

**Key words:** Metformin, Biguanide, Vitamin B12 deficiency, Type 2 diabetes mellitus, Sub-Saharan Africa, Guidelines, Screening, Treatment