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Vitamin E Supplementation and Glycaemic Control in Diabetic Rats: A Systematic Review and Meta-Analysis

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Vitamin E, a fat-soluble antioxidant, has been used in diabetes management. This study systematically reviewed and meta-analyzed the effect of vitamin E on blood glucose in diabetic rats, comparing its efficacy with untreated controls and standard antidiabetic drugs. The review followed PRISMA guidelines with diabetic rats as population. The intervention was vitamin E supplementation, with untreated and drug-treated rats as controls, and the primary outcome was blood glucose concentration. Databases (AGRIS, DOAJ, EBSCO, Google Scholar, ProQuest, PubMed, ScienceDirect, Scopus) were searched until January 2025. Keywords and MeSH terms related to "diabetes mellitus," "rats," "vitamin E," and "glucose" were combined with Boolean operators. Meta-analysis was performed in Review Manager using a random-effects model, with standardized mean differences (SMDs) and 95% confidence intervals (CIs). Subgroup analysis was based on treatment duration. Publication bias was assessed with funnel plots. Risk of bias was evaluated using the SYRCLE tool. Thirteen studies were included. Vitamin E significantly reduced blood glucose compared with untreated diabetic rats (SMD: 2.27; 95% CI: 0.94–3.59; $p = 0.0008$). A significant effect was observed for 1–4 weeks but not beyond 4 weeks. Compared with standard antidiabetic drugs, vitamin E was less effective (SMD: -3.86; 95% CI: -5.45 to -2.28; $p < 0.00001$), with significance at 1–4 weeks but not >4 weeks. High heterogeneity indicated variability in study design and interventions. Vitamin E shows moderate hypoglycemic effects compared to no treatment but is inferior to standard antidiabetic drugs, suggesting potential adjunct use, with duration influencing efficacy.

Keywords: Vitamin E, Diabetes mellitus, Blood glucose, Meta-analysis

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