

Probiotics, a Novel and Efficient Adjuvant Therapy in Improving Glycemic Status: An Umbrella Meta-Analysis

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Objectives: Probiotics exert several promoting effects on the glycemic status, however, the results of meta-analyses are inconsistent. As a result, this paper conducted an umbrella meta-analysis, across existing systematic reviews and meta-analyses of clinical trials to determine the definite effects of supplementation with probiotics on glycemic indices

Methods: Meta-analysis studies of randomized clinical trials examining the impacts of probiotics supplementation on glycemic indices were qualified in the current umbrella meta-analysis. A comprehensive systematic search of PubMed/Medline, Scopus, EMBASE, and Web of Science was carried out till August 2021. Effect sizes (ES) and corresponding confidence intervals (CIs) were employed to obtain the

overall effect sizes. I^2 statistics and Cochran's Q-test was used to detect the heterogeneity. The random-effects model was employed to conduct meta-analysis.

Results: 48 articles out of 693 in the literature search qualified for inclusion in the umbrella meta-analysis. Pooled effects of probiotics on fasting plasma glucose (FPG), hemoglobin A1C (HbA1c), homeostatic model assessment for insulin resistance (HOMA-IR), and insulin levels were reported in 45, 21, 35, and 33 articles, respectively. The analysis indicated a significant decrease of FPG (ES = -0.51 mg/dL; 95% CI: $-0.63, -0.38$, $p < 0.001$), HbA1c (ES = -0.32 mg/dL; 95% CI: $-0.44, -0.20$, $p < 0.001$), HOMA-IR (ES = -0.56 ; 95% CI: $-0.66, -0.47$, $p < 0.001$), and insulin levels (ES = -1.09 IU/mL; 95% CI: $-1.37, -0.81$, $p = 0.006$) by probiotics supplementation.

Conclusions: Probiotics have amending effects on FPG, HbA1c, HOMA-IR, and insulin levels. A < 8 -week period of probiotic supplementation in the moderate dosages (10^8 or 10^9 CFU) is an efficacious approach in improving glycemic parameters. Overall, probiotics could be recommended as an adjuvant anti-hyperglycemic agent.

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