

Optimizing Glycemic Control with AI-Guided Dietary Supplements: A Randomized Trial in Type 2 Diabetes

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Abstract : This study evaluated the efficacy of an AI-guided dietary supplement regimen compared to a standard physician-guided regimen in managing Type 2 diabetes (T2D). A total of 160 patients were randomly assigned to either the AI-guided group (n=80) or the physician-guided group (n=80) and followed over 90 days. The AI-guided group received 5.3 ± 1.2 supplements per patient, while the physician-guided group received 2.7 ± 0.6 supplements per patient. The AI system personalized supplement types and dosages based on individual genetic and metabolic profiles. The AI-guided group showed a significant reduction in HbA1c levels from $7.5 \pm 0.8\%$ to $7.1 \pm 0.7\%$, compared to a reduction from $7.6 \pm 0.9\%$ to $7.4 \pm 0.8\%$ in the physician-guided group (mean difference: -0.3% , 95% CI: -0.5% to -0.1% ; $p < 0.01$). Secondary outcomes, including fasting plasma glucose, HOMA-IR, and insulin levels, also improved more in the AI-guided group. Subgroup analyses revealed that the AI-guided regimen was particularly effective in patients with specific genetic polymorphisms and elevated metabolic markers. Safety profiles were comparable between both groups, with no serious adverse events reported. In conclusion, the AI-guided dietary supplement regimen significantly improved glycemic control and metabolic health in T2D patients compared to the standard physician-guided approach, demonstrating the potential of personalized AI-driven interventions in diabetes management.

Keywords : Type 2 diabetes, AI-guided supplementation, personalized medicine, glycemic control, metabolic health, genetic polymorphisms, dietary supplements, HbA1c, fasting plasma glucose, HOMA-IR, personalized nutrition

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