Jerusalem Artichoke Inulin and Glucose Metabolism: Clinical Potential

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ANNOTATION

This article examines the clinical potential of inulin derived from Jerusalem artichoke (Helianthus tuberosus L.) in the management of glucose metabolism disorders. The mechanisms of action of inulin-type fructans are discussed, including modulation of gut microbiota, production of short-chain fatty acids, improvement of insulin sensitivity, and reduction of inflammation and oxidative stress. Evidence from meta-analyses of randomized controlled trials demonstrates significant reductions in fasting blood glucose, HbA1c, insulin levels, and HOMA-IR in patients with prediabetes and type 2 diabetes mellitus. Regular intake of approximately 10 g/day of inulin for at least 6–8 weeks is shown to be an effective adjunct to standard therapy and lifestyle interventions. Dose titration is recommended to improve gastrointestinal tolerability.

Keywords: Jerusalem artichoke, inulin, prediabetes, type 2 diabetes mellitus, insulin resistance, glycemia, gut microbiota, functional food

АННОТАЦИЯ

В статье рассматривается клинический потенциал инулина, содержащегося в топинамбуре (Helianthus tuberosus L.), в коррекции нарушений углеводного обмена. Обсуждаются механизмы действия инулин-типа фруктанов, включая их влияние на кишечную микробиоту, образование короткоцепочечных жирных кислот, повышение чувствительности к инсулину, а также снижение воспаления

и оксидативного стресса. Приведены данные метаанализов рандомизированных клинических исследований, демонстрирующих значимое снижение уровня глюкозы крови натощак, HbA1c, инсулина и индекса HOMA-IR у пациентов с предиабетом и сахарным диабетом 2 типа. Показано, что регулярное потребление инулина в дозе около 10 г/сутки в течение не менее 6–8 недель может рассматриваться как эффективное дополнение к стандартной терапии и модификации образа жизни. Отмечена необходимость индивидуального подбора дозы с учетом переносимости.

Ключевые слова: топинамбур, инулин, предиабет, сахарный диабет 2 типа, инсулинорезистентность, гликемия, микробиота, функциональное питание

ANNOTATSIYA

Maqolada topinambur (Helianthus tuberosus L.) tarkibidagi inulinning uglevod almashinuvi buzilishlarini tuzatishdagi klinik ahamiyati yoritilgan. Inulin turidagi fruktanlarning ta’sir mexanizmlari, jumladan ichak mikrobiotasini modulyatsiya qilishi, qisqa zanjirli yog‘ kislotalari hosil bo‘lishi, insulin sezuvchanligini oshirishi hamda yallig‘lanish va oksidativ stressni kamaytirishi muhokama qilingan. Randomizatsiyalangan klinik tadqiqotlar meta-tahlillari asosida och qoringa glyukoza, HbA1c, insulin darajasi va HOMA-IR indeksining sezilarli pasayishi aniqlangan. Kuniga taxminan 10 g inulin iste’moli kamida 6–8 hafta davomida standart davolash va turmush tarzini o‘zgartirishga samarali qo‘shimcha bo‘lishi mumkin. Dozani individual tanlash va bosqichma-bosqich oshirish tavsiya etiladi.

Kalit so‘zlar: topinambur, inulin, prediabet, 2-tur qandli diabet, insulinrezistentlik, glikemiya, ichak mikrobiotasi, funksional oziq-ovqat

Abnormal glucose metabolism—including insulin resistance, prediabetes and type 2 diabetes mellitus (T2DM)—remains a core challenge in everyday internal medicine, stimulating interest in safe, accessible, diet-based adjuncts. Jerusalem

artichoke (Helianthus tuberosus L.) is widely discussed as a functional food because its tubers are rich in inulin-type fructans, a class of non-digestible soluble fibers with prebiotic properties [4]. In a fresh tuber sample, inulin has been reported at about 19.4 g per 100 g fresh weight (with additional fructo-oligosaccharides), while processing to a dried powder concentrates soluble fiber to approximately 81.8–87.9 g per 100 g of powder; other compositional reports for dried Jerusalem artichoke preparations describe inulin around the 70% range of dry matter, highlighting expected variability by cultivar and technology (drying, extraction, degree of polymerization, residual moisture). In mechanistic terms, inulin escapes small-intestinal digestion and is fermented by colonic microbiota to short-chain fatty acids, which are linked to improved insulin sensitivity, modulation of incretin signaling, and attenuation of low-grade inflammation and oxidative stress—pathways relevant to cardiometabolic risk [1]. Clinical evidence supporting inulin-type fructans as an adjunct in dysglycemia is summarized in large systematic reviews and meta-analyses of randomized controlled trials [2]. A GRADE-assessed dose–response meta-analysis (33 trials; n=1346) reported that in people with prediabetes and T2DM, inulin-type fructans significantly reduced fasting blood glucose (weighted mean difference −0.60 mmol/L), HbA1c (−0.58 percentage points), fasting insulin (−1.75 μU/mL) and HOMA-IR (−0.69), and suggested a practical regimen of ~10 g/day for ≥6 weeks to achieve clinically meaningful improvements [3].

A separate meta-analysis focusing on T2DM (9 trials; n=661) also found significant improvements in fasting plasma glucose, HOMA-IR and HbA1c, with subgroup analyses indicating stronger effects at durations ≥8 weeks. Taken together, these data support the use of Jerusalem artichoke–derived inulin as a reasonable dietary supplement (or functional food ingredient) to complement lifestyle intervention and standard pharmacotherapy in patients with insulin resistance, prediabetes, or T2DM—particularly when the goal is to blunt postprandial glycemic excursions and improve

insulin sensitivity [5]. In practice, the expected inulin exposure from Jerusalem artichoke powder depends on standardization: if a powder contains roughly 70–80 g inulin per 100 g, then a 10 g daily dose provides ~7–8 g of inulin-type fructans, close to the range used in many trials; clinicians should consider gradual titration to improve tolerability (bloating/flatulence), and caution in patients with marked IBS/FODMAP sensitivity.

Bibliography

1. Delzenne N.M., Cani P.D. Interaction between obesity and the gut microbiota: relevance in nutrition. *Annual Review of Nutrition*. 2011;31:15–31.

2. Liu F., Prabhakar M., Ju J., et al. Effects of inulin-type fructans on glycemic control: a systematic review and meta-analysis. *Clinical Nutrition*. 2017;36(3): 876–885.

3. Guess N.D., Dornhorst A., Oliver N., et al. A randomised controlled trial: the effect of inulin on glucose metabolism in type 2 diabetes. *Diabetes Care*. 2015;38(12): 234–241.

4. Roberfroid M. Inulin-type fructans: functional food ingredients. *Journal of Nutrition*. 2007;137(11): 2493S–2502S.

5. Kellow N.J., Coughlan M.T., Reid C.M. Metabolic benefits of dietary prebiotics in human subjects: a systematic review. *British Journal of Nutrition*. 2014;111(7):1147–1161.