

## Documents

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**The Effect of Spice and Herbs Mixture on Electrolytes and Liver and Renal Function in Patients with Type 2 Diabetes Mellitus**

(2025) *International Journal of Nutrition Sciences*, 10 (2), pp. 168-175.

DOI: 10.30476/ijns.2025.104152.1349

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**Abstract**

Background: Diabetes has a prevalent nature and still presents a significant public health challenge. This study investigated the effect of spice and herbs on serum biochemical parameters in type 2 diabetes mellitus (T2DM). Methods: The spice and herbs procured from local market were processed by cleaning, washing, crushing, freeze-drying, formulating, and encapsulating in doses of 2, 4, and 6 grams. Thirty patients with T2DM were assigned to 3 equal groups to receive each mentioned dose fed for 30 days. On day 1 and 31, fasting blood samples were collected and analyzed for electrolytes (Na, K and Cl), urea, creatinine, liver enzymes (AST: aspartate aminotransferase, ALT: Alanine aminotransferase, ALP: alkaline phosphatase), fasting blood glucose (FBG), and lipid profile. The data were further statistically analyzed. Results: The electrolytes, urea, creatinine, and liver enzymes remained within the normal ranges after the consumption of spices and herbs. There was a reducing trend for HbA1c level after intake of spices and herbs. Total cholesterol and low-density lipoprotein cholesterol (LDL-C) decreased by-10.08-7.36% and high-density lipoprotein cholesterol (HDL-C) increased in 2 and 6 gram consuming groups; whereas it decreased in the 3 gram consuming group. The concentration of triglycerides (TG) decreased notably with increasing doses of spices and herbs. Conclusion: Consumption of spices and herbs mixture was demonstrated to have beneficial effects on kidney and liver function, blood glucose level and lipid profile in T2DM patients. These findings suggest the potential therapeutic value of incorporating spices and herbs into the management of T2DM. © International Journal of Nutrition Sciences.

**Author Keywords**

Herb; Liver function; Renal function; Spice; Type 2 diabetes mellitus

**References**

- Galicia-Garcia, U, Benito-Vicente, A, Jebbari, S  
**Pathophysiology of Type 2 Diabetes Mellitus**  
(2020) *Int J Mol Sci*, 21, p. 6275.  
PMID: 32872570
- Pandey, A, Tripathi, P, Pandey, R, Srivatava, R, Goswami, S.  
**Alternative therapies useful in the management of diabetes: A systematic review**  
(2011) *J Pharm Bioallied Sci*, 3, pp. 504-512.  
PMID: 22219583
- Abdulrazak, A, Tanko, Y, Mohammed, A  
**Effects of Clove and Fermented Ginger on Blood Glucose, Leptin, Insulin and Insulin Receptor Levels in High Fat Diet Induced Type 2 Diabetic Rabbits**  
(2018) *Niger J Physiol Sci*, 33, pp. 89-93.  
PMID: 30091738
- Mohan, R, Jose, S, Mulakkal, J  
**Water-soluble polyphenol-rich clove extract lowers pre-and post-prandial blood glucose levels in healthy and prediabetic volunteers: an open label pilot study**  
(2019) *BMC Complement Altern Med*, 19, p. 99.  
10.1186/s12906-019-2507-7. PMID: 31064377

- Tu, Z, Moss-Pierce, T, Ford, P  
**Syzygium aromaticum L. (Clove) extract regulates energy metabolism in myocytes**  
(2014) *J Med Food*, 17, pp. 1003-1010.  
PMID: 24999964
- Hosseini, SE, Khosrofar, M, Mehrabani, D  
**Perinatal and neonatal effects of rhizome extract of ginger on levels of insulin and ALT, AST, ALP on adult children of first-generation female rats**  
(2015) *J North Khorasan Univ*, 7, pp. 292-307.
- Lete, I, Allué, J.  
**The Effectiveness of Ginger in the Prevention of Nausea and Vomiting during Pregnancy and Chemotherapy**  
(2016) *Integr Med Insights*, 11, pp. 11-17.  
PMID: 27053918
- Nikkhah Bodagh, M, Maleki, I., Hekmatdoost, A.  
**Ginger in gastrointestinal disorders: A systematic review of clinical trials**  
(2018) *Food Sci Nutr*, 7, pp. 96-108.  
PMID: 30680163
- Hoseinzadeh, K, Daryanoosh, F, Baghdasar, PJ  
**Acute effects of ginger extract on biochemical and functional symptoms of delayed onset muscle soreness**  
(2015) *Med J Islam Repub Iran*, 29, p. 261.  
PMID: 26793652
- Indiarto, R, Subroto, E, Angeline, Selly  
**Ginger rhizomes (*Zingiber officinale*) functionality in food and health perspective: a review**  
(2021) *Food Res*, 5, pp. 497-505.
- Ülger, TG., Çakiroglu, FP.  
**The effects of onion (*Allium cepa* L.) dried by different heat treatments on plasma lipid profile and fasting blood glucose level in diabetic rats**  
(2020) *Avicenna J Phytomed*, 10, pp. 325-333.  
PMID: 32850290
- Zhao, XX, Lin, FJ, Li, H  
**Recent Advances in Bioactive Compounds, Health Functions, and Safety Concerns of Onion (*Allium cepa* L.)**  
(2021) *Front Nutr*, 8, p. 669805.  
PMID: 34368207
- Pereira, ASP, Banegas-Luna, AJ, Peña-García, J  
**Evaluation of the Anti-Diabetic Activity of Some Common Herbs and Spices: Providing New Insights with Inverse Virtual Screening**  
(2019) *Molecules*, 24, p. 4030.  
PMID: 31703341
- Kiani, HS, Ali, A, Zahra, S  
**Phytochemical Composition and Pharmacological Potential of Lemongrass (*Cymbopogon*) and Impact on Gut Microbiota**  
(2022) *AppliedChem*, 2, pp. 229-246.
- Mahmoud, MF, Ali, N, Mostafa, I  
**Coriander Oil Reverses Dexamethasone-Induced Insulin Resistance in Rats**  
(2022) *Antioxidants (Basel)*, 11, p. 441.
- Scandar, S, Zadra, C, Marcotullio, MC.  
**Coriander (*Coriandrum sativum*) Polyphenols and Their Nutraceutical Value against**

**Obesity and Metabolic Syndrome**

(2023) *Molecules*, 28, p. 4187.

PMID: 37241925

- Abeyasinghe, DT, Alwis, DDDH, Kumara, KAH  
**Nutritive Importance and Therapeutics Uses of Three Different Varieties (*Murraya koenigii*, *Micromelum minutum*, and *Clausena indica*) of Curry Leaves: An Updated Review**  
(2021) *Evid Based Complement Alternat Med*, 2021, p. 5523252.  
PMID: 34754314
- Ghasemzadeh, A, Jaafar, HZE, Rahmat, A  
**Evaluation of Bioactive Compounds, Pharmaceutical Quality, and Anticancer Activity of Curry Leaf (*Murraya koenigii* L.)**  
(2014) *Evid Based Complement Alternat Med*, 2014, p. 873803.  
PMID: 24693327
- Chaudhary, A, Sharma, S, Mittal, A  
**Phytochemical and antioxidant profiling of *Ocimum sanctum***  
(2020) *J Food Sci Technol*, 57, pp. 3852-3863.  
PMID: 32903995
- Widjaja, SS, Rusdiana, Savira M.  
**Glucose Lowering Effect of Basil Leaves in Diabetic Rats**  
(2019) *Open Access Maced J Med Sci*, 7, pp. 1415-1417.  
PMID: 31198445
- Kim, SH, Yoon, JB, Han, J  
**Green Onion (*Allium fistulosum*): An Aromatic Vegetable Crop Esteemed for Food, Nutritional and Therapeutic Significance**  
(2023) *Foods*, 12, p. 4503.  
PMID: 38137307
- Marefati, N, Ghorani, V, Shakeri, F  
**A review of anti-inflammatory, antioxidant, and immunomodulatory effects of *Allium cepa* and its main constituents**  
(2021) *Pharm Biol*, 59, pp. 287-302.  
PMID: 33645419
- Kim, SH, Jo, SH, Kwon, YI  
**Effects of onion (*Allium cepa* L.) extract administration on intestinal  $\alpha$ -glucosidases activities and spikes in postprandial blood glucose levels in SD rats model**  
(2011) *Int J Mol Sci*, 12, pp. 3757-3769.  
PMID: 21747704
- Shirazi, OU, Khattak, MMAK, Shukri, NAM.  
**Chromatographic evaluation of gallic acid, catechin and quercetin in methanolic extracts of selected formulations of spices and herbs**  
(2019) *Progr Nutr*, 21, pp. 246-251.
- Schenk, S, Saberi, M, Olefsky, JM.  
**Insulin sensitivity: modulation by nutrients and inflammation**  
(2008) *J Clin Invest*, 118, pp. 2992-3002.  
PMID: 18769626
- Mahomoodally, MF, Subratty, AH, Gurib-Fakim, A  
**Traditional medicinal herbs and food plants have the potential to inhibit key carbohydrate hydrolyzing enzymes in vitro and reduce postprandial blood glucose peaks in vivo**  
(2012) *ScientificWorldJournal*, 2012, p. 285284.  
PMID: 22654584

- Masoumi, SJ, Nekooeian, AA, Tanideh, N  
**Effect of allium porrum on streptozotocin-induced diabetes mellitus hyperglycemia and insulin resistance in male Sprague Dawley rats**  
(2020) *Onl J Vet Res*, 24, pp. 573-577.
- Mohtasham Amiri, Z, Tanideh, N, Seddighi, A  
**The effect of lithospermum officinale, silver sulfadiazine and alpha ointments in healing of burn wound injuries in rat**  
(2017) *World J Plast Surg*, 6, pp. 313-318.  
PMID: 29218280
- Tangvarasittichai, S.  
**Oxidative stress, insulin resistance, dyslipidemia and type 2 diabetes mellitus**  
(2015) *World J Diabetes*, 6, pp. 456-480.  
PMID: 25897356
- Hosseini, SE, Jahandidea, A, Mehrabani, D.  
**Effect of alcoholic extract of ginger during fetal life and breastfeeding on serum level of testosterone, LH, FSH and spermatogenic cells line in male mature offspring rats**  
(2015) *Gorgan J Med Sci*, 17, pp. 29-35.
- Khattak, MMAK, Mohd-Shukri, NA, Mahmood, T  
**Antidiabetic activity evaluation of polyherbal formulation in type 2 diabetes mellitus patients**  
(2024) *J King Saud Univ Sci*, 36, p. 103010.
- Zare, S, Arjmand, G, Eftekhari, MH  
**Adherence to Mediterranean-Dash Intervention for Neurodegenerative Delay (MIND) Dietary Pattern in Elderly with Type 2 Diabetes and the Correlation with Cognitive Functions and Metabolic Profile**  
(2023) *Int J Nutr Sci*, 8, pp. 102-108.
- Shahsavani, Z, Sohrabi, Z, Karamizadeh, M  
**Vitamin D and GUT Microbiota: A Review**  
(2020) *Int J Nutr Sci*, 5, pp. 50-56.
- Wickramasinghe, ASD, Kalansuriya, P, Attanayake, AP.  
**Herbal Medicines Targeting the Improved  $\beta$ -Cell Functions and  $\beta$ -Cell Regeneration for the Management of Diabetes Mellitus**  
(2021) *Evid Based Complement Alternat Med*, 2021, p. 920530.  
PMID: 34335803
- Jesch, ED, Carr, TP.  
**Food Ingredients That Inhibit Cholesterol Absorption**  
(2017) *Prev Nutr Food Sci*, 22, pp. 67-80.  
PMID: 28702423
- Li, Y, Wang, X, Shen, Z.  
**Traditional Chinese medicine for lipid metabolism disorders**  
(2017) *Am J Transl Res*, 9, pp. 2038-2049.  
PMID: 28559959
- Yashin, A, Yashin, Y, Xia, X, Nemzer, B.  
**Antioxidant Activity of Spices and Their Impact on Human Health: A Review**  
(2017) *Antioxidants (Basel)*, 6, p. 70.  
PMID: 28914764
- Li, S, Xu, Y, Guo, W  
**The Impacts of Herbal Medicines and Natural Products on Regulating the Hepatic**

**Lipid Metabolism**

(2020) *Front Pharmacol*, 11, p. 351.

PMID: 32265720

- Rahimlou, M, Yari, Z, Hekmatdoost, A  
**Ginger Supplementation in Nonalcoholic Fatty Liver Disease: A Randomized, Double-Blind, Placebo-Controlled Pilot Study**  
(2016) *Hepat Mon*, 16, p. e34897.  
PMID: 27110262
- Lan, Y, Wu, D, Cai, Z  
**Supra-additive effect of chronic inflammation and atherogenic dyslipidemia on developing type 2 diabetes among young adults: a prospective cohort study**  
(2023) *Cardiovasc Diabetol*, 22, p. 181.  
PMID: 37454077

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**Publisher:** Shiraz University of Medical Sciences

**ISSN:** 25381873

**Language of Original Document:** English

**Abbreviated Source Title:** Int. J. Nutr. Sci.

2-s2.0-105003393295

**Document Type:** Article

**Publication Stage:** Final

**Source:** Scopus

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