

Supplementation of Mixed Spices for Thirty Days Improved Blood glucose levels and lipid profiles in a group of T2DM patients – A Quasi-Experimental Study Design

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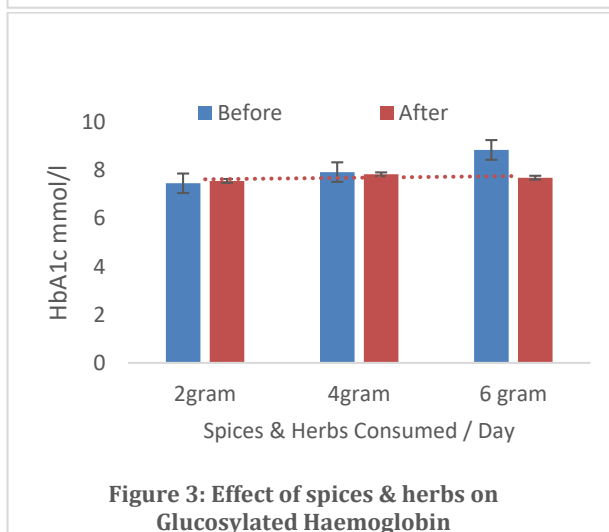
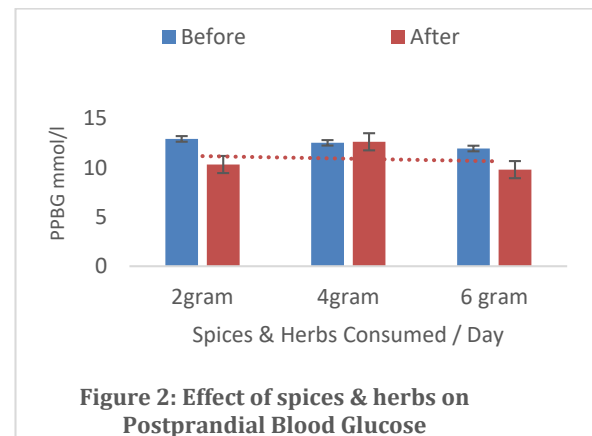
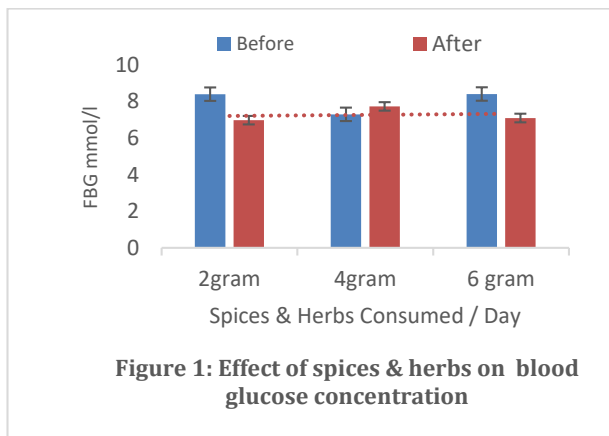
Abstract

This study was designed to explore the potential efficacy of cloves, ginger, onion, lemon grass, coriander, curry leaves, holy basil, and bunching onion in the management of T2DM patients. The selected spices and herbs were procured from local markets of Kuantan, Pahang. They underwent a thorough process of cleaning, washing, crushing, freeze-drying, formulation, and encapsulation into doses of 2, 4, and 6 grams. Thirty T2DM patients (10 patients per group) were recruited from the Medical Outpatient Department of Hospital Tengku Ampuan Afzan, Kuantan, Pahang, to participate in the study. Over 30 days, these patients were administered orally the prepared doses of mixed spices and herbs. Participants who met health criteria or had stable health conditions apart from diabetes to ensure they could safely participate in the study. Participants had a confirmed diagnosis of type 2 diabetes at age 18 or over. Participants who did not meet the health criteria or had unstable health conditions apart from diabetes and were not safe to participate in the study were excluded. Participants who were not confirmed with type 2 diabetes. The respondents who were on treatments/medications, with comorbidities, or complications related to diabetes were excluded from the study. This study protocol was approved by the Kulliyah Postgraduate and Research Committee (KPGRC) and the IIUM Research Ethics Committee (IREC) and was registered in the National Medical Research Registry Malaysia (NMRR) Research ID: 17783. Informed consent was obtained from all the patients on day 1 of the recruitment of the patients for the study. The purpose of the study was explained, and they were included in the study only with their willingness. This study adopted a quasi-experimental design, forgoing the inclusion of a control group. It was structured as a self-controlled study spanning 30 days of the experimental phase and 30 days dedicated to follow-up observations. The absence of a control group allows for a comprehensive focus on the effects of the interventions within the participant group. This design intended to track and analyse the impact of the spices and herbs on the participants on the blood parameters. The participants were allocated a dosage based on a 2, 4 & 6 gram wet weight equivalent of the spices and herbs in their encapsulated form, adjusted to match the dry matter. These doses were administered thrice daily, evenly spread over the day to ensure consistent intake. The overall duration of the feeding period span over 30 days. Upon obtaining informed consent from the patients, blood samples were collected on days 0 and 31. These samples were promptly processed for further analysis immediately after collection in the hospital laboratory. On day 1 and day 31, fasting blood

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samples were collected from the participants and subjected to analysis for various parameters, including fasting blood glucose (FBG), post-prandial blood glucose (PPBG), glycosylated haemoglobin (HbA1c), and lipid concentrations using clinical analyzer with appropriate kits accordingly. The data obtained were compiled and subjected to statistical analysis including descriptive and correlation analysis. The data was expressed as mean \pm SD and the difference in the means was ascertained at 95 % confidence interval ($P < 0.05$).

The outcomes of this study revealed intriguing correlations between the administered doses of mixed spices & herbs and several crucial blood parameters. Notably, there were negative correlations observed between the doses and various markers. Looking at the effect on the fasting blood glucose (FBS), post-prandial blood glucose (PPBS), and HbA1c concentrations exhibited negative correlations with the administered doses, with correlation coefficients of -0.12, -0.11, and -0.02, respectively (Figures 1-3).



Furthermore, the study unveiled negative correlations between the doses and total cholesterol (TC) as well as low-density lipoprotein cholesterol (LDL-c), with correlation coefficients of -0.34 and -0.41, respectively. The implications of these correlations might be substantial and may suggest a potential link between the administered doses of spices & herbs and improvements in lipid profiles. Potentially, this could significantly impact the cardiovascular risk associated with T2DM. Although a negative association was also observed with triglycerides (TG), the correlation coefficient (-0.06) was comparatively weaker than that observed for TC and LDL-c (Figures 4-7).

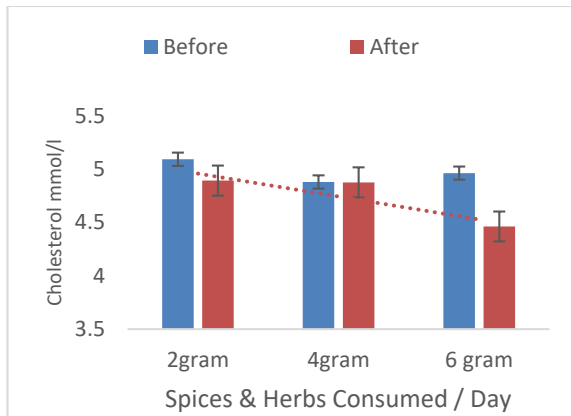


Figure 4: Effect of spices & herbs on Cholesterol Concentration

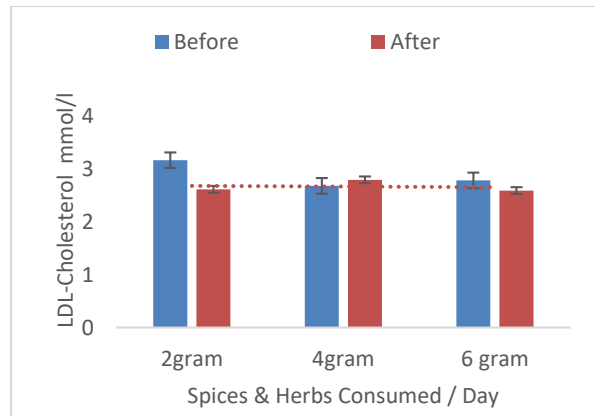


Figure 5: Effect of spices & herbs on LDL-Cholesterol

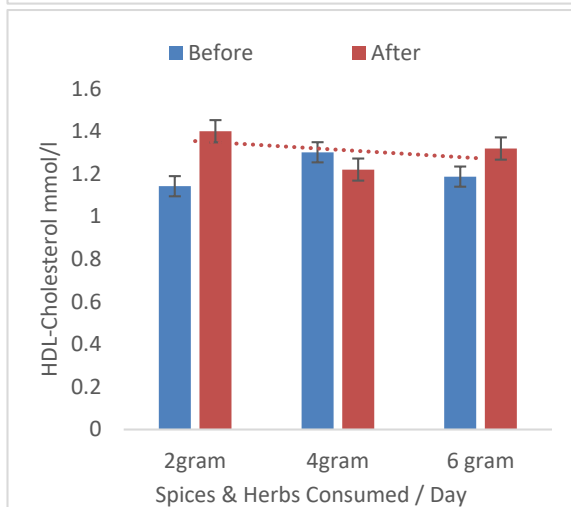


Figure 6: Effect of spices & herbs on HDL-Cholesterol

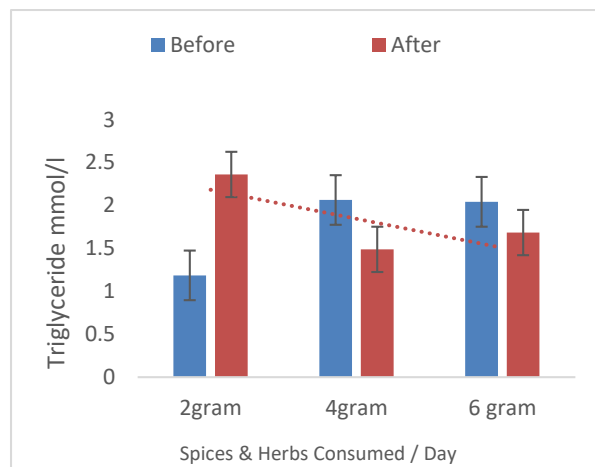


Figure 7: Effect of spices & herbs on Triglyceride Concentration

In conclusion, this study sheds light on the potential efficacy of a combination of cloves, ginger, onion, lemongrass, coriander, curry leaves, holy basil, and bunching onion in improving blood glucose levels and lipid profiles among T2DM patients. The observed negative associations between the administered doses of these spices and herbs and various blood parameters emphasize their potential role in complementary or alternative approaches to managing T2DM. Further research is warranted to unravel their mechanisms of action and optimize their clinical utility.

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