
Objectives: This study evaluated a simple relaxation breathing exercise for acute improvement of postprandial glycemic and insulinemic status.

Design: Healthy human subjects were randomized to control breathing (CB; n = 13) or a relaxation breathing exercise (RB; n = 13) that was repeated every 10 minutes for the 30 minutes before and 90 minutes after consuming a glucose challenge (oral glucose tolerance test; OGTT; 75g/240mL). Blood samples were collected before, and 30, 60, and 90 minutes post OGTT for glucose and insulin analysis.

Results: Blood glucose at 0 minutes (pre-OGTT), and 30, 60, and 90 minutes post-OGTT with continued RB was 93.7 ± 1.9, 136.5 ± 8.1, 165.7 ± 8.1, and 130.2 ± 6.9 mg/dL, and 97.1 ± 2.4, 173.1 ± 8.4, 158.7 ± 11.1, and 137.1 ± 10.1 with CB, respectively. RB blood glucose was significantly lower at 30 minutes than CB. Glucose area under the curve (AUC) for CB and RB were not significantly different. Plasma insulin for both CB and RB was significantly increased relative to baseline at 30, 60, and 90 minutes. Insulin values for RB tended to be higher than CB at 30 and 60 minutes, although the difference was not statistically significant. Insulin AUC for CB and RB was not significantly different.

Conclusions: Relaxation breathing acutely improves the glycemic response of healthy subjects, and breathing pattern could be important for interpretation of glycemic index measurements.


Purpose: The purpose of the feasibility study was to compare the effects of music-assisted relaxation and imagery, administered via compact disc recording (MARI CD) without therapeutic intervention, to the effects of music therapy (MT), facilitated by a board-certified music therapist, on selected health outcomes of patients enrolled in diabetes self-management education/training (DSME/T).

Methods: A 3-group, parallel, randomized controlled trial with 199 patients, aged 30 to 85 years with type 1, type 2, or prediabetes was employed. Patients were enrolled in a study from 2 hospital sites and randomly assigned to: DSME/T alone, DSME/T plus MARI CD, or DSME/T plus MT. The MARI CD included researcher-selected music and spoken suggestions, while MT included therapeutic experiences with personally preferred relaxing and energizing music. Outcome measures included blood pressure, glycosylated hemoglobin (A1C), body mass index (BMI), trait anxiety, state anxiety, and stress.

Results: There were no statistically significant differences among the 3 conditions in blood pressure, A1C, BMI, trait anxiety, or stress. Significant changes over time were evident in the MT condition from pre- to post each session in systolic blood pressure, state anxiety, and stress. Blood pressure changes were compared pre- to postprogram for those patients with a comorbidity of hypertension between DSME/T alone and a combined music intervention group (MT and MARI CD). It was found that the music intervention group had a significantly larger decrease in systolic blood pressure. Themes derived from patient narratives further informed the data.

Conclusions: The study results support the relationship between DSME/T and improvement on all measured outcomes except blood pressure. Results suggest the feasibility of integrating MARI and MT with DSME/T to potentially lower systolic blood pressure of patients with diabetes and a comorbidity of hypertension. Collaboration between diabetes educators and board-certified music therapists is recommended.
Aim: Tactile massage (TM) is a gentle and superficial form of massage. A pilot study of patients with type 2 diabetes in primary care reported a reduction of 0.8% in glycosylated haemoglobin (HbA1c), whereas a randomized study comparing the effects of 10 weeks of TM once per week with relaxation exercises performed once per week as per instructions on a CD found no effects on TM on HbA1c in an intention-to-treat analysis. However, a significant reduction in waist circumference (WC) was found between the groups.

Methods: This was a secondary per-protocol analysis of the effect of TM (n = 21) compared with relaxation (n = 25) on other metabolic biomarkers. Anthropometrics (BMI and WC) and metabolic factors (HbA1c, S IFG, S insulin, S adiponectin, S leptin and IP ghrelin) were assessed. Insulin resistance (IR) was determined by modified homoeostasis model assessment (HOMA2-IR) using IP glucose and S insulin, and ratios of adiponectin-to-IP, adiponectin-to-HOMA-IR, adiponectin-to-WC and adiponectin-to-HbA1c were calculated at baseline, and at 10 weeks and 6 months after the intervention.

Results: Significant results adjusted for age, gender and changes in lifestyle and medical factors were shown for WC in women (−6.2 cm (95% CI: −10.4, −1.9)), but not in men. In addition, improvements in the TM group were found for adiponectin and ratios of adiponectin-to-IP and adiponectin-to-HbA1c levels.

Conclusion: Our data indicate that TM therapy may affect metabolic markers in type 2 diabetes despite the lack of significant effects on HbA1c. The clinical implications of our findings need to be evaluated in further studies.


Purpose: The aim of this study was to determine the effects of Tai Chi exercise on glucose control, neuropathy scores, balance, and quality of life in patients with type 2 diabetes and neuropathy.

Methods: A pretest-posttest design with a nonequivalent control group was utilized to recruit 59 diabetic patients with neuropathy from an outpatient clinic of a university hospital. A standardized Tai Chi for diabetes program was provided, which comprised 1 hour of Tai Chi per session, twice a week for 12 weeks. Outcome variables were fasting blood glucose and glycosylated hemoglobin for glucose control, the Semmes-Weinstein 10-g monofilament examination scores and total symptom scores for neuropathy, single leg stance for balance, and the Korean version of the SF-36v2 for quality of life. Thirty-nine patients completed the posttest measures after the 12-week Tai Chi intervention, giving a 34% dropout rate.

Results: The mean age of the participants was 64 years, and they had been diagnosed with type 2 diabetes for more than 12 years. The status was significantly better for the participants in the Tai Chi group (n = 20) than for their control (i.e., nonintervention) counterparts (n = 19) in terms of total symptom scores, glucose control, balance, and quality of life.

Conclusion: Tai Chi improved glucose control, balance, neuropathic symptoms, and some dimensions of quality of life in diabetic patients with neuropathy. Further studies with larger samples and long-term follow-up are needed to confirm the effects of Tai Chi on the management of diabetic neuropathy, which may have an impact on fall prevention in this population.


Objectives: To measure the frequency of herbal medicine use among patients with diabetes mellitus in Palestine; to determine demographic characteristics that may increase the likelihood of Complementary and Alternative Medicine (CAM) use and to find out how benefits, if any, were perceived by patients.

Method: Cross-sectional survey of patients attending the outpatient diabetes departments at 7 Governmental Hospitals. The method was based on semi-structured questionnaires.

Results: A total of 1,883 patients with diabetes were interviewed. Of the participants, 51.9% (n = 977) reported taking herbs primarily bought from Palestine (98%) and used in crude form mainly as decoctions (44.1%). The five most common herbal products used were: Trigonella berythea (Fabaceae) (n = 191, 19.6%), Rosmarinus officinalis (Lamiaceae) (n = 132, 13.5%), Olea europaea (Oleaceae) (n = 131, 13.4%), Teucrium capitatum (Lamiaceae) (n = 111, 11.4%), and Cinnamomum zeylanicum (Lauraceae) (n = 105, 10.8%). Most CAM users were above 40 years old 79.6% (n = 778), predominantly female (53.2%) and residents of refugee camps and rural areas (59.3, and 53.5, respectively). The recommendations of a family member or friend was the main factor prompting the use of CAM (40.2 and 37.1%). Most CAM users (71.7%) were satisfied with the perceived effects. Interestingly, 68% of patients recruited in the study did not disclose CAM use to their physicians or pharmacists.

Conclusion: Use of herbal therapies in diabetes is highly prevalent in Palestine. More than 70% of those using CAM (977, 51.9%) reported positive benefits including a feeling of slowing down disease progression, symptom relief, disease resolution or a reduction in the side effects of allopatic medication. Use of CAM should be explored with patients before clinical decisions are made. There is a need for health education relating to herbal use in conjunction with conventional medicines in diabetes.


Purpose: The rationale of the present review is to analyze the activity of Rosmarinus officinalis in the cardiovascular system.

Methods: A MEDLINE database search (from January 1970 to December 2011) using only rosmarinic acid as searched term.

Results: The references search revealed 509 references about rosmarinic acid in 40 years (the first reference is from 1970). There is a powerful prevalence of antioxidant and cancer studies. Other diseases are few cited, as inflammation, brain (Alzheimer and Parkinson disease) and memory, allergy, diabetes, atherosclerosis, and hypertension. It is necessary to consider the complete absence of studies on coronary artery disease, myocardial ischemia, heart failure or ischemia/reperfusion injury.

Conclusion: Rosmarinic acid is underestimated as an experimental cardiovascular drug and deserves more attention.
Abstract Service


**Objectives:** Oxidative stress as well as inflammation processes are engaged in diabetic vascular complications. Rosmarinic acid, a natural phenol antioxidant carboxylic acid, was found to have multiple biological activity, including anti-inflammatory and antitumour effects, which are a consequence of its inhibition of the inflammatory processes and of reactive oxygen species scavenging. The aim of this work was to study effects of rosmarinic acid administration on vascular impairment induced by experimental diabetes in rats.

**Methods:** Diabetes was induced by streptozocin (3 × 30 mg/kg daily, i.p.) in Wistar rats. Rosmarinic acid was administered orally (50 mg/kg daily). Ten weeks after streptozocin administration, the aorta was excised for functional studies, evaluation by electron microscopy and real time PCR analysis.

**Key Findings:** In the aorta of diabetic rats, decreased endothelium-dependent relaxation was accompanied by overexpression of interleukin-1β, tumour necrosis factor-α, preproendothelin-1 and endothelin converting enzyme-1. Structural alterations in the endothelium, detected by electron microscopy, indicated aortic dysfunction caused by diabetes. The diabetes-induced aortic disorders were prevented by rosmarinic acid administration.

**Conclusions:** Rosmarinic acid protected aortic endothelial function and ultrastructure against diabetes-induced damage. Both antioxidant and anti-inflammatory effects of rosmarinic acid seemed to participate in the mechanism of this protection.


An epidemic of metabolic disorders such as obesity and diabetes is rising dramatically. Using natural products as potential preventive and therapeutic interventions for these disorders has drawn worldwide attention. Rosemary has been shown to lower blood glucose and cholesterol levels and mitigate weight gain in several in vivo studies. However, the mechanisms are essentially unknown. We investigated the effects of rosemary extract on metabolism and demonstrated that rosemary extract significantly increased glucose consumption in HepG2 cells. The phosphorylation of AMP-activated protein kinase (AMPK) and its substrate, acetyl-CoA carboxylase (ACC), was increased by rosemary extract. Rosemary extract also transcriptionally regulated the genes involved in metabolism, including SIRT1, PPARγ coactivator 1α (PGC1α), glucose-6-phosphatase (G6Pase), ACC, and low-density lipoprotein receptor (LDLR). Furthermore, the PPARγ-specific antagonist GW9662 diminished rosemary’s effects on glucose consumption. Overall, our study suggested that rosemary potentially increases liver glycolysis and fatty acid oxidation by activating AMPK and PPAR pathways.


The cAMP/Protein kinase A/cAMP response element (CRE)-binding protein pathway is important for various physiological aspects including regulation of gluconeogenic gene expression. Rosemary, a well-known herb, has been reported to decrease blood glucose levels. We found that methanol extracts of rosemary suppressed forskolin (FSK)-stimulated luciferase expression under the control of CRE, as well as the promoters for cytosolic phosphoenolpyruvate carboxykinase (PEPCK-C) and glucose-6-phosphatase (G6Pase) catalytic subunit genes in human hepatoma HepG2 cells. Three abietane-type diterpenes and two flavonoids were isolated from the rosemary extracts. Among these, 7-O-methylrosmanol (1) and royleanonic acid (3) effectively suppressed FSK-induced luciferase expression under the control of the CRE, PEPCK-C and G6Pase gene promoters. PEPCK-C and G6Pase, which play a key role in the homeostatic regulation of blood glucose levels, are important for managing type II diabetes mellitus. Therefore, the ability of rosemary and its components to suppress cAMP responsiveness of the PEPCK-C or G6Pase gene may contribute to its antihyperglycemic activity.


**Background:** Despite the marked increase in cardiovascular risk factors in Spain in recent years, the prevalence and incidence of cardiovascular diseases have not risen as expected. Our objective is to examine the association between consumption of olive oil and the presence of cardiometabolic risk factors in the context of a large study representative of the Spanish population.

**Subjects and methods:** A population-based, cross-sectional, cluster sampling study was conducted. The target population was the whole Spanish population. A total of 4,572 individuals aged 18 years in 100 clusters (health centers) were randomly selected with a probability proportional to population size. The main outcome measures were clinical and demographic structured survey, lifestyle survey, physical examination (weight, height, body mass index, waist, hip and blood pressure) and oral glucose tolerance test (OGTT) (75 g).

**Results:** Around 90% of the Spanish population use olive oil, at least for dressing, and slightly fewer for cooking or frying. The preference for olive oil is related to age, educational level, alcohol intake, body mass index and serum glucose, insulin and lipids. People who consume olive oil (vs. sunflower oil) had a lower risk of obesity (odds ratio (OR) = 0.62 (95% confidence interval (CI) = 0.41–0.93, P = 0.02)), impaired glucose regulation (OR = 0.49 (95% CI = 0.28–0.86, P = 0.04)), hypertriglyceridemia (OR = 0.53 (95% CI = 0.33–0.84, P = 0.03)) and low HDL cholesterol levels (OR = 0.40 (95% CI = 0.26–0.59, P = 0.0001)).

**Conclusions:** The results show that consumption of olive oil has a beneficial effect on different cardiovascular risk factors, particularly in the presence of obesity, impaired glucose tolerance or a sedentary lifestyle.