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Original article

## The effect of vitamin C and/or E supplementations on type 2 diabetic adult males under metformin treatment: A single-blinded randomized controlled clinical trial



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### ABSTRACT

**Background and aim:** Recently, there has been an increasing interest in the influence of antioxidant vitamins on the efficacy of oral hypoglycemic therapy in type 2 diabetic patients (T2DM). This single-blinded randomized controlled clinical trial aimed to investigate the effect of vitamin C and/or E supplementation on the efficacy of oral hypoglycemic therapy in T2DM Palestinian male patients from the Gaza Strip.

**Methods:** Forty T2DM male patients aged 40–60 years on metformin treatment were randomly divided into four groups, each group received an additional one of the following daily oral supplements for 90 days: placebo; vitamin C; vitamin E and vitamin C plus vitamin E. After overnight fasting, venous blood specimens were collected from all individuals into K3-EDTA tubes and serum tubes for measuring the biochemical and hematological parameters of the study at baseline and after 90 days of vitamins supplementation.

**Results:** The results revealed that vitamin C and/or E improve fasting blood sugar (FBS), HbA1c, lipid profile, insulin, homeostasis model assessment of insulin resistance (HOMA-IR), reduced glutathione (GSH); and Quantitative Insulin Sensitivity Check Index (QISCI) compared with diabetic patients group that received placebo.

**Conclusion:** This study provided additional evidence on the beneficial effects of supplementing antioxidant vitamins in T2DM which could improve the clinical condition and attenuate or prevent diabetic pathogenesis and complications that, secondly to poor glycemic control, could attribute to the imbalance between the decline in the endogenous antioxidants and increasing production of the reactive oxygen species leading to the oxidant-mediated damage present in the diabetic context.

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## 1. Introduction

Diabetes mellitus is a complex, chronic common endocrine metabolic disorder necessitating incessant medical care with multifactorial risk-reduction approaches beyond glycemic control. It results from defects in insulin secretion, action, or both and associated with many microvascular and macrovascular

complications, especially in the two main classes: Type 1 and Type 2 diabetes mellitus. Diabetes is a major public health problem and one of four priority non-communicable diseases (NCDs) targeted for intervention by world health campaign and foundations. The essential pathology is the flaw of normal glucose metabolism resulting in hyperglycemic state. Type 2 diabetes mellitus (T2DM) is the most common and prevalent form of diabetes and is an important risk factor for cardiovascular associated morbidity and mortality. The disease has two main pathophysiological disorders: insulin resistance and pancreatic  $\beta$ -cell dysfunction [1]. Insulin resistance is associated with the impaired ability of insulin to transport glucose from the blood stream into the cells, while in the case of  $\beta$ -cell

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