



Evaluation of Effect of Vitamin-E on Blood Glucose and Serum Lipids in Type-2 Diabetes Mellitus Treatment

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ABSTRACT

Background: Diabetes mellitus(DM2) is one of the common metabolic disorders. According to previous studies, vitamin-E may have a positive effect on glycaemic control in diabetes patients. **Objectives:** the aim of this study was to evaluate the effect of vit-E on fasting blood glucose(FBS), post prandial blood glucose (PPBS), lipid profile in type 2 DM. **Materials and Methods:** the study included 80 DM2 patients. Among them 50 were randomly selected to supplement with vit-E capsule orally (1000 IU/day) and 30 age-matched patients were supplemented with placebo for 6weeks. FBS, PPBS, Total Cholesterol, Triglyceride, Low density Lipoprotein, High Density Lipoprotein, Very Low Density Lipoprotein were measured before and after supplementation and results were analyzed. **Results & Conclusion:** A significant decrease in FBS, TG, LDL was seen in group supplemented with 1000 I.U. vit-E /day, which indicate vit-E may be beneficial in DM2 patients.

KEYWORDS : –

Introduction

Diabetes mellitus type 2 (DM2) is becoming a global public health challenge for the 21st century, as a non-communicable disease[1]. DM2 is a common metabolic disorder resulting from defect in insulin secretion or action or both and is characterized by hyperglycemia often accompanied by glycosuria, polydipsia, polyurea[2, 3, 4]. The prevalence shows DM2 incidence is increasing sharply, reaching pandemic proportions influencing world health care system. Different researches evident that a majority of patients are not achieving the targeted blood glucose level causing a high prone for vascular complications[5]. Hyperglycemia in DM2 causes oxidative stress, by damage to lipoprotein, components of cell membrane, chromosomal DNA, which may increase the atherosclerosis risk [6,7].

Vitamin E(vit-E) is a fat soluble antioxidant, found virtually in all cell membranes, neutralizes the free radicals, which reduces reactive oxygen species (ROS) production[8]. Different studies reported that in T2DM patients' serum vit-E level is lower as compared to healthy individuals [9, 10, 11]. Several studies also postulate that vit E has beneficial effects in DM2 and different diseases[12, 13]. Still there are limited studies of its effect on glycaemic control and vascular risk factors in Indian population[14], and this study was designed to know the effect of oral vit E supplementation on glycaemic control and lipid profile in patients with DM2 from Khurda district, Odisha.

Materials & Methods

The design was prospective randomized controlled trial, involving type 2 DM patients attending Endocrinology Department, IMS & SUM Hospital, Bhubaneswar. The study duration was between Aug 2013- Aug 2014. A total of 123 DM2 patients taking insulin as their treatment were enrolled for the study. DM2 patients of either sex with or without macro- and micro-vascular complications and taking insulin were included in this trial. Patients age less than 25 years, uncontrolled hypertension, myocardial infarction, stroke within one month before enrollment, known allergy to vit-E were excluded from the study. Out of 123 enrolled patients, 43 were excluded as they were taking oral antidiabetic drugs also. Out of 80 T2DM cases, 50 were randomized to supplement with vit-E (1000 IU) for a period of 6 week and were grouped (I + E) group that is intervention group. Rest 30 was taken as control that is without vit-E supplementation, grouped as only I group. Their fasting blood sugar (FBS), post prandial blood sugar (PPBS), lipid profiles were measured before and after the supplementation of vit-E. Blood samples were collected by venous puncture in heparinized sample collecting tube and plasma was separated by centrifugation at 3000 rpm for 30 minute. FBS and PPBS were determined by glucose oxidase method. Serum TCh, TG, HDL was estimated using semi autoanalyser, TRANSASIA, ERBA, CHEM-5-PLUS. VLDL was calculated

by using Friedewald's equation. VLDL= TG/5. LDL was estimated by direct enzymatic end point method. Diet, physical activity and other medicinal strategy remained unchanged during the course of study. Patients' compliance to the vitamin supplementation was monitored by continuous contact by phone. Statistical analysis was performed by using SPSS 11.5 version software. Data are represented as mean \pm SD. Difference between baseline and after 6 weeks values within group were checked by paired student's t-test and between groups by unpaired t-test. The P-value of less than 0.05 was taken as statistically significant.

Results

The Table-1 shows the value of both group and their P-values, when tested between both I+E and I-groups putting student's unpaired t-test. All data are presented as mean \pm standard deviation (M \pm SD). The difference of FBS in both insulin with vit-E group and only insulin treated groups are not significant, which shows our study groups are from same population. The FBS level decreased significantly in I+E group (P<0.001) than the insulin alone group. The PPBS level (mg/dl) in both groups before starting treatment shows no significant difference. When compared between both groups, it shows a insignificant decrease in PPBS level. The Tg level (mg/dl) significantly more in case of I+E group than I-group alone. However total cholesterol levels, HDL, LDL, VLDL levels comparison shows no significant difference between both groups, both before and after treatment.

Parameters	I + E (0 wk)	I (0 wk)	P	I + E (6 wk)	I (6 wk)	P
FBS (mg/dl)	162.98 \pm 32.88	175.07 \pm 31.84	Ns	141.80 \pm 20.24	167.47 \pm 32.67	0.001
PPBS (mg/dl)	216.28 \pm 50.72	215.07 \pm 32.59	Ns	199.50 \pm 38.51	205.07 \pm 36.77	Ns
Tg (mg/dl)	161.94 \pm 59.33	147.97 \pm 43.30	Ns	149.48 \pm 54.07	164.33 \pm 49.48	0.001
TCh (mg/dl)	183.04 \pm 47.24	179.07 \pm 36.57	Ns	177.14 \pm 42.51	180.47 \pm 33.93	Ns
HDL (mg/dl)	40.56 \pm 4.97	42.57 \pm 5.26	Ns	41.70 \pm 5.15	42.00 \pm 3.72	Ns
LDL (mg/dl)	105.32 \pm 43.59	108.27 \pm 36.01	Ns	102.44 \pm 38.81	107.47 \pm 32.24	Ns
VLDL (mg/dl)	31.96 \pm 12.49	32.53 \pm 8.90	Ns	28.72 \pm 10.44	31.60 \pm 9.35	ns

The table-2 shows the values of both groups and their P-values, when tested within the same groups before and after the treatment putting

student's paired t-test. It shows after 6 weeks of supplementation of vitamin E with insulin, the fasting blood sugar decreased very much significantly ($P < 0.001$). While in only insulin treated case, the decrease is insignificant decrease. The TCh, HDL, LDL level within the groups, before and after treatment, shows no significant difference. But VLDL level decreased significantly in I + E group after 6 weeks of therapy. But however the rate of decrease is not significant as compared to insulin alone group.

Parameters of both groups and P-values tested within group by student's paired t-test						
Parameters	I + E (0 wk)	I + E (6 wk)	P	I (0 wk)	I (6 wk)	P
FBS (mg/dl)	162.98 ± 32.88	141.80 ± 20.24	0.001	175.07 ± 31.84	167.47 ± 32.67	Ns
PPBS (mg/dl)	216.28 ± 50.72	199.50 ± 38.51	0.001	215.07 ± 31.59	205.07 ± 36.77	Ns
Tg (mg/dl)	161.94 ± 59.33	149.48 ± 54.07	0.01	147.97 ± 43.30	164.33 ± 49.48	0.05,
TCh (mg/dl)	183.04 ± 47.24	177.14 ± 42.51	Ns	179.07 ± 36.57	180.47 ± 33.93	Ns
HDL (mg/dl)	40.56 ± 4.97	41.70 ± 5.15	Ns	42.57 ± 5.26	42.00 ± 3.72	Ns
LDL (mg/dl)	105.32 ± 43.59	102.44 ± 38.81	Ns	108.27 ± 36.01	107.47 ± 32.24	Ns
VLDL (mg/dl)	31.96 ± 12.49	28.72 ± 10.44	0.05	32.53 ± 8.90	31.60 ± 9.35	Ns

Discussion

From this study, it was found that vit-E supplementation significantly decreases FBS and PPBS level in comparison to only insulin treated group. The TG and VLDL levels also decreases significantly with 6 weeks of vit-E supplement in DM2. However the study fails to find any significant change in TCh, HDL and LDL levels. According to Saksomboon N et al, vit-E supplementation did not improve glycaemic control in the full set of type 2 diabetes patients. It was effective only in a subgroup of patients with inadequate glycaemic control at baseline ($HbA1c \geq 8\%$) and in those whose baseline serum vit E levels were below normal ranges [15]. We observed that serum FBS was significantly reduced after vit-E supplementation in intervention group as compared with controlled group. This result is in agreement with some previous reports on type 2 diabetic patients [12, 13, 16-18]. According to V.G. Kuchake et al, treatment with combination of vit E plus vit C significantly lowers the HbA1c level in patients with diabetic nephropathy[19]. According to Paolisso et al, fasting blood glucose level was improved after 900 IU/day vit-E supplementation for 3 months. According to Gokkusu C. et al, blood glucose levels were improved after 800 IU/day vit E supplementation for one month[18, 17]. However, some studies did not show any changes in blood glucose levels after vitamin E supplementation in DM2 treatment[13, 20-22]. We also observed that lipid profile was significantly reduced in intervention group as compared to the controlled group after vit-E supplementation. This result is in agreement with some previous reports on type 2 diabetic patients [12, 13, 16-18]. SPACE study in haemodialysed patients, who have very high levels of oxidative stress, demonstrated significant cardiovascular benefit from vitamin E [23]. Researchers in New Zealand found that high-dose vitamin E appeared to temporarily improve insulin resistance - a precursor to DM2 among adults, who were overweight [24]. The improvement was short-lived, but another diabetes risk factor, namely elevations in a liver enzyme called alanine transferase, changed for the better throughout the six-month study. "These results suggest that vitamin E could have a role to play in delaying the onset of diabetes in at-risk individuals," said Dr. Patrick Manning and colleagues from the University of Otago in Dunedin in the journal Diabetes Care [2]. There was no evidence that diabetes risk factors including age, BMI, postmenopausal hormone use, multivitamin use, physical activity, alcohol intake, and smoking status modified the effect of vitamin E on the risk of type 2 diabetes [25].

Conclusion

Vitamin -E Supplementation with 1000 IU/day of in addition to the normal diet and insulin treatment schedule may help in improving plasma glucose and lipid profile in patients with type 2 DM patients.

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