A study of effects of vitamin C & vitamin E supplementation in hypertensive & diabetics in tertiary care hospital

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Abstract---Background: Antioxidants scavenge free radicals to reduce oxidative stress in diabetes and hypertension. Our aim of our study was use of vit-C and vit-E on blood glucose, glycosylated haemoglobulin, serum lipid levels in diabetic and hypertensive patients. Materials & Methods: This is a prospective interventional study in known Diabetic and Hypertensive subjects. The equal subjects (N=140 each) were divided into two groups, diabetic group (group I) and hypertensive group (group II). Each Group were divided into Control Group who received standard treatment of Diabetes with Oral Hypoglycaemic drugs & anti-hypertensive drugs (n=70) & Test Group which received supplementation with antioxidants tablet Limcee (Vitamin C) of 500 mg & Tablet Evion (Vitamin E) of 400 mg orally in addition to standard treatment for 12 weeks. Blood samples were collected before and after supplementation for 12 weeks, blood sugar, HbA1c, lipid profile and blood pressure were measured. Data collected analyzed by SPSS 22. P values of <0.05 was considered significant. Results: Total Number of subjects was 280, out of which 140 participants 65.7 % were males in test group and 34.2% were females. Maximum number (77.5%) of hypertensives in Test Group 1 & 34.2% were females. The mean value of DBP was 97.32+ 10.61 mm of Hg in control group II as compared to 92.82 +9.25 mm of Hg in test group II, which was statistically significant (P<0.03*) before starting & after starting supplementation (table 1). The lipid profile was significant changes in control group II and test group II except VLVL

was insignificant changes in between groups before starting & after starting supplementation. The mean value of fasting blood sugar having statistically no significant change, the post prandial sugar and HbA1c in pre & post supplementation in control & test group I shows statistically significant difference (p<0.05) on comparison. Conclusion: Supplement of Vit- C and Vit- E was beneficial in reducing the BP in hypertensive. In future will give Vit- C and Vit- E separately.

Keywords---antioxidants, vitamin C, vitamin E, diabetes, hypertension, neuropathic.

Introduction

Antioxidants protect cells from damage of free radicals unstable e.g. like Vit- C & Vit E reduce oxidative stress produced by free radicals on ROS (reactive oxidative species). A free radical can be defined is molecular species capable of independent existence that contains unpaired electrons in atomic orbital. The recent growth in the knowledge of free radicals and reactive oxygen species (ROS) in biology is producing a medical revolution that promotion new age of health and disease management.[1] Series of experimental studies have shown that oxidative stress through free radical generation also plays a major role in diabetes and hypertension during metabolism & phagocytosis, cigarette smoking, chronic alcohol in hypertension with unpaired free radicals are produced which can oxidize bio molecules leading to tissue injury and cell death. The damage can lead to diseases of CNS (Parkinsonism, Alzheimer's diseases, Huntington's diseases, multiple sclerosis), CVS (Myocardial infarction, atherosclerosis, hypertension), diabetes mellitus, peptic ulcer and cataract.[2]

Antioxidants scavenge free radicals to reduce oxidative stress in diabetes mellitus and hypertensive resist phagocytosis of Vitamin-C a water-soluble vitamin was capable of scavenging cell damaging free radical, because it acts as electron donor.[3] It regulates catabolism of cholesterol to bile acids, it is important in lipid regulation. It has observed that antioxidants may reduce hypertensive, by protecting body from nitric oxide which protective blood vessels. As oxidative stress is increased in diabetes mellitus, the basal Vit- C level in shown to be reduced in diabetes mellitus patients. Some studies have confirmed that by adding Vit- C in diet helped to reverse diabetic processes caused by free radicals, resulting in lowering blood pressure levels. The body cannot manufacture vit- C on its own, nor store it so its dose is increased so it is advisable to take vit- C foods in diet.

Vit- E is a fat-soluble vitamin helps to neutralize potentially damaging free radicals in body. Vit-E protects cell membrane as well as repairing skin & muscles and RBC's healthy. It can slow or stop the chain reactions caused by free radicals and protect our cell from harm of free radicals.[4] A diet with plenty of fruits seeds gains and vegetable effect on hyperglycemic patients. Hyperglycemia has been shown to attenuate, endothelium depended endothelial induced in active diabetic patients and role of free radicals is suggested by observation that administrative of a mixture of vit-C (2g) and vit-E (800 weeks) to revive endothelial

function.[5,6] Our aim of our study was use of vit-C and vit-E on blood glucose, glycosylated haemoglobulin, serum lipid levels in diabetic and hypertensive patients.

Materials and Methods

The Prospective Interventional study was conducted in our tertiary care hospital for a duration of two & half years from November 2017 to April 2020.The study was started from taking Ethical Clearance. The subjects were divided into Group I (Diabetic) & Group II (Hypertensive) 140 subjects each. Each Group were divided into Control Group who received standard treatment of Diabetes with Oral Hypoglycaemic drugs & anti-hypertensive drugs (n=70) & Test Group which received supplementation with antioxidants tablet Limcee (Vitamin C) of 500 mg & Tablet Evion (Vitamin E) of 400 mg orally in addition to standard treatment for 12 weeks. Patients attended Medicine OPD in our tertiary hospital medicine department, Greater Noida for treatment of Diabetes & Hypertension were recruited. Details of the study had been given to patients & a written Informed Consent from willing patient was taken & procedure was explained. Patients were randomly divided every odd number was allotted to Control group & even numbers were allotted to Test group. The Inclusion Criteria included had the following criterion:

- Patients who gave an written informed consent
- Patients with age group-18-60yrs
- Diabetics with (HbA1C>6.5%)
- Blood Pressure>140-80mg.

The Excluded patients were who had complications-as nephropathy, retinopathy, neuropathies, non-healing ulcers, atherosclerosis & stroke. Anthropometric measurement was taken. Blood pressure was taken by mercury sphygmomanometer, respiratory, cardiovascular, CNS, abdomen examination was collected in a prevalidated & preapproved data collection sheet. Two venous blood samples were collected one at beginning of study & one after 12 weeks under aseptic precautions for blood counts-Plasma glucose levels (fasting & post prandial), Glycosylated haemoglobin & lipid profile were done on Sysmex XP-100 cell counter, Glycosylated haemoglobin by Biorad D-10 anlyser. Cut off values of fasting blood sugar is 70-110 mgldl, post prandial blood sugar is 100-120 mgldl, total Cholesterol of 180-200 mgldl & LDL cholesterol is 60-120mgldl.

Statistical analysis

Data was collected in Excel sheet & analyzed by IBM-SPSS version 22.0 & data was represented by cross tabulations, frequencies, ratio histogram. Scatter plots are used in different parametric & nonparametric measurements. Tests done are Pearsons Correlation test, independent t-test, ANOVA test & Spearmen correlation test was done. P valve <0.05 was considered significant.

Results

Out of 280 total subjects 140 participants about 65.7 % were males & 34.2% were females in test Group I. Maximum number (77.1%) of hypertensives were males & 20 % were females. The mean value of SBP was 161.48+10.85 mm of Hg in control group II as compared to 165.67 +11.43 mm of Hg in test group II, which was statistically significant (P<0.027*). The mean value of DBP was 97.32+ 10.61 mm of Hg in control group II as compared to 92.82 +9.25 mm of Hg in test group II, which was statistically significant (P<0.03*) before starting & after starting supplementation (table 1). The lipid profile was significant changes in control group II and test group II except VLVL was insignificant changes in between groups before starting & after starting supplementation (table 2). Table 3 showed that the comparison of control & test group I shows the mean + SD of fasting blood sugar having statistically no significant change, the post prandial sugar and HbA1c in pre & post supplementation in control & test group I shows statistically significant difference (p<0.05) on comparison.

Discussion

Diabetes Mellitus is a group of metabolic disorders, patients have symptoms of increased sugar for a long time[7] if it is left untreated then it can lead to frequent micturition, increased appetite & so many diseases.[2] Long standing complications are CVS complications, foot ulcers, kidney disease, stroke, damage to eye, coagulation impaired.[2,8] Hypertension which is essential hypertension due to lifestyle disorders due to increase in salt intake in our diet, excess of body weight, alcohol & smoking[1,5] which in 90% of cases is Primary Hypertension. Secondary hypertension is due to kidney disease, Cushing's syndrome, glucose intolerance, coarctation of aorta, pheochromocytoma, hyperthyroidism, renal artery stenosis, Crohn's disease, obesity & sleep apnea.

In our study more diabetic patients were males (65.7%) compared to females (34.2%). The prevalence of Hypertension & Diabetics was highest in age group 51-60 yrs in both control & test group. These findings are similar to findings published by Okoduwa et al[9] who had similar findings with increased prevalence of Diabetics & Hypertensives with increasing age. In our study it was observed there is a significant reduction in post prandial blood sugar & HbA1c (%) in test group supplemented with Vitamin C & E for 3 months. In recent studies, it is proved that Vitamin C improves nitric oxide bioactivity[10,11] which is a potent vasodilator and can reduce the BP. This is seen to a lesser extent in our study due to the time factor and fewer subjects. Clinical studies show the BP reducing effect of Vitamin C, particularly in elderly patients.[11,12] In a Primary Prevention Project, where hypertensive patients were treated with Vitamin E, there were no clinically relevant effects on BP.[13]

Another trial including supplementation with Vitamins C and E proved that the urinary microalbumin excretion and BP were decreased in the study group.[14] In another study, using 2 g of Vitamin C for 90 days showed a decrease of total cholesterol (TC), which, in turn, may decrease the BP.[15] Certain studies have also shown that Vitamin E, 600 or 1200 mg/day for 2 months[16], play a role in decreasing oxidative stress in Type 2 diabetes. Studies have shown that Vitamin E

significantly reduces plasma low-density lipoprotein (LDL) oxidation by 60% in diabetic patients.[17] However, limitations of my study were other trace elements as Vitamin D, Zinc, Sellilum & Magnesium were not given in test group. Combined doses of Vitamin C & E are given orally not separately to evaluate Diabetics & Hypertensive.

Conclusion

Supplementation of combined doses of Vitamin C & E in addition to normal lifestyle modification had improved post prandial blood sugar & HbA1C levels & blood pressure which is proved to be beneficial on endothelium-dependent vasodilatation & arterial stiffness in untreated, essential hypertensive patients. So further research studies with longer duration & higher doses of vitamins can be given earlier requires further clarification. This will help life of the patients in future with minimum cost.

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Table 1

Comparison of Blood Pressure (SBP & DBP) Control group II and Test Group II values in Hypertensive subjects

Blood pressure	Control Group II with Treatment without supplementation (2nd reading after supplementation Mean + SD	Test Group II with treatment with supplementation (2nd reading after supplementation) Mean + SD	P value
SBP (mm Hg)	161.48+10.85	165.67 +11.43	<0.027*
DBP (mm Hg)	97.32+ 10.61	92.82 +9.25	<0.01*

Table 2

Comparison of lipid profile improvement in control group2 & test group 2

Lipid profile parameters	Control group II with treatment without supplementation (2nd reading after 3 months) Mean + SD	Test group II with treatment without supplementation (2nd reading after 3 months) Mean + SD	P value
Total cholesterol (mg/dl)	162.47 +10.95	168.47 +9.85	<0.01*
Triglycerides (mg/dl)	137.88+9.20	140.86+9.36	0.05*
HDL (mg/dl)	32.35+3.80	37.83 +3.74	<0.01*
LDL (mg/dl)	109.45+ 8.12	118.63+8.83	<0.01*
VLDL (mg/dl)	33.18+3.45	32.29+3.16	0.11

Table 3

Comparison of blood sugar & HbA1c levels in diabetic patients of control group1
with test group 1

Blood sugar & HbA1c levels	Control group 1 on treatment without supplementation (2nd reading after months) Mean + SD	Test group 1 on treatment with supplementation (2nd reading after 3 months) Mean + SD	P value
Fasting Blood Sugar levels (mg/dl)	143.95+ 17.02	145.8+18.42	0.68
Post Prandial Blood Sugar levels (mg/dl)	266.05+38.33	258.2+36.6	<0.01
HbA1c (%)	7.65+0.43	7.37+0.45	<0.01