

## Antioxidants and Insulin Sensitivity in Diabetes Mellitus

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Sir,

Diabetes mellitus (DM) is a chronic disease that places tremendous economic burden on patient as well as health care system. It is a disorder that simultaneously affects multiple organ systems and can lead to plethora of complications. Most of the current therapies (oral hypoglycemic drugs and insulin) are aimed at improving the insulin secretion or at decreasing the glucose production by the liver. However these therapies are not able to tackle the basic pathology of the disease i.e. insulin resistance. Another problem is that most of the oral hypoglycemic drugs lose their efficacy over prolonged treatment and have to be replaced by insulin. Antioxidants, by their unique mechanism of action, can be used to tackle this problem. So in the present study we studied the effect of antioxidant supplementation on insulin sensitivity.

Various clinical trials have been performed to assess the effects of antioxidants on insulin sensitivity. The roles of  $\omega$ -3 fatty acids,  $\alpha$ -lipoic acid (ALA), and vitamin E were investigated in various trials and it was proven that they improve insulin sensitivity.[1-3]

However, the above trials are limited by small sample size and none of the trials compared the effects of two or more

antioxidants at the same time. Therefore, the present study was planned to assess the comparative effects of three different antioxidants on insulin sensitivity, reflected by parameter homeostatic model for assessment of insulin sensitivity (HOMA-IR). HOMA – IR is an indicator of insulin sensitivity. A decrease in HOMA – IR value is considered as an improvement in insulin sensitivity.

Our objectives were to assess the effects of antioxidants, *viz.*, vitamin E,  $\omega$ -3 fatty acids, and ALA, on endogenous insulin sensitivity in patients of type 2 DM. This study was a prospective, randomized, double-blind, placebo-controlled, single-center study with a sample size of 100 diagnosed DM patients.

The patients were randomized into four groups as follows:

- Group I (n = 25) ALA group
- Group II (n = 25)  $\omega$ -3 fatty acid group
- Group III (n = 25) vitamin E group
- Group IV (n = 25) placebo group

All the groups were given the respective drug for 90 days.

There was a statistically significant decrease in HOMA – IR levels in Group I (alpha-lipoic acid) Group II (omega-3 fatty acids) and Group III (vitamin E) at visit 2 compared to visit 1. Group IV (Placebo)

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**Table 1: Change in HOMA IR within the groups**

Groups	Gr. I ( $\alpha$ - lipoic Acid)	Gr. II (Omega-3 fatty acid)	Gr. III (Vitamin E)	Gr. IV (Placebo)
Visit 1	3.73 $\pm$ 0.65	3.76 $\pm$ 0.74	3.78 $\pm$ 0.77	3.99 $\pm$ 0.49
Visit 2	3.07 $\pm$ 0.20	3.11 $\pm$ 0.43	3.09 $\pm$ 0.30	3.66 $\pm$ 0.76
p value	0.05*	0.031*	0.045*	0.062

\* p &lt; 0.05

showed a decrease which was not statistically significant.

The present study was designed to evaluate the effect of supplementation of antioxidants –  $\alpha$ -lipoic acid,  $\omega$ -3 fatty acids, and vitamin E – in patients of type 2 DM who had documented insulin resistance. A significant improvement was observed in values of HOMA – IR among the three treatment groups at the end of 3 months, while no significant improvement was noted in the placebo group in comparison with respective baseline values.

It has been postulated that a variety of stimuli in diabetes such as hyperglycemia, elevated free fatty acids, cytokines and others are responsible for increase production of reactive oxygen species and oxidative stress. These increase oxidative causes increase phosphorylation of insulin receptor resulting in decrease insulin action (insulin resistance). Antioxidant decreases this insulin resistance by these neutralizing reactive oxygen species.

The results of this study demonstrate that the antioxidants –  $\alpha$ -lipoic acid,  $\omega$ -3 fatty

acids, and vitamin E – may be used in patients with type 2 DM. Also, since the antioxidants differed in their effects on parameters of insulin sensitivity, combining these drugs might prove as an attractive option in patients with type 2 DM.[1-4]

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