ROLE OF OMEGA-3 FATTY ACID IN PATIENTS WITH DIABETIC NEPHROPATHY

Santhosh Kumar N, *Kalaivanam. K
Dept. of Biochemistry, Shridevi Institute of Medical Sciences & Research Hospital, Tumkur, Karnataka, India.

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ABSTRACT

Diabetes mellitus has been a major problem in developed and developing countries. The progression of disorder cause prolonged exposure of vascular tissues to hyperglycaemia resulting in long-term microvascular/ macrovascular complications in the health; and nephropathy is one of them. The present study was designed to evaluate the Effect of Omega-3 Fatty Acid on microalbuminurea and HbA1c level in patients with diabetic nephropathy. A randomized, open controlled clinical trial which includes 58 diabetic nephropathy patients (50 men and 8 women) aged between 35–60 years who had diabetes for at least 5 years. The patients divided in to two groups such as positive control and Omega-3 Fatty Acid group. Each group contains 29 patients for evaluation of the parameters for four months follow-up for both control as well as Omega-3 Fatty Acid group. After 4 months of supplementation of Omega-3 Fatty Acid, it was found that, there is a significant decrease in values of microalbuminurea and HbA1c (Glycosylated haemoglobin) when compare to the positive control group. The result of study concludes that, the Omega-3 Fatty Acid significantly lowers urinary albumin excretion rate (UAER) and HbA1c in patients with diabetic nephropathy. So therefore supplementation of Omega-3 fatty acid may prevent the diabetic nephropathy.

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INTRODUCTION

Diabetic nephropathy (DN) is one of the main complications associated with Type I and Type II diabetes. It is characterized by the development of proteinuria (> 300 mg/24h) culminating in end stage renal disease with a particular high risk of cardiovascular morbidity and mortality in diabetic patient [1]. The currently available treatments for diabetic nephropathy includes angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, calcium channel blockers, which slow the progression of renal disease, but do not totally stop or reverse existing disease [2,3]. Additionally, Pioglitazone and Rosiglitazone are used in the treatment of diabetic renal disease but have adverse cardiac effects [4]. Research indicates that diet plays a significant role in the progression of diabetic renal complications; however, specific suggestions for improvements in diet are lacking [5].

Omega-3 fatty acids are essential fatty acids, as humans cannot synthesize them de novo and must depend on dietary source. Omega-3 fatty acids possess many beneficial effects such as anti-inflammatory effect [6, 7] and treatment of cardiovascular disease [8], IgA nephropathy [9], and nephrotoxicity produced cyclosporine [10]. Epidemiological studies suggest that Omega-3 fatty acids slow the progression of renal dysfunction, e.g., prevent the decline in creatinine clearance in healthy older people [11] lessens the risk of albuminuria in young type 1 diabetic patients [12] and slows the progression of albuminuria in older patients with type 2 diabetes [13]. Furthermore, dietary Omega-3 fatty acids have been shown to have renoprotective effects in experimental models of diabetes [14]. The present study has been designed to determine the effect of Omega-3 fatty acid in patients with diabetic nephropathy.

MATERIALS AND METHODS:

The present study was randomized; open controlled trial was conducted in a tertiary care hospital where patients attending the medicine outpatient Department (OPD)/diabetes clinic were recruited for the study. The study protocol was approved by Institutional Ethics committee Shridevi Institute of Medical Sciences & Research Hospital. The study protocol was explained to the subjects and written informed consent was taken from all the subjects who participated in the study.

Study design:

Depending upon the treatment, patients were divided into two groups, first group consider as positive control and second group received omega 3 fatty acid capsules (Abbey Health Care Private Limited, West Bengal, India). The two groups received treatment of diabetes and hypertension. Each patient received one tablet of Omega-3 fatty acid 640 mg/kg per day for period of four months. The patients were advised to take tablets with dinner meals. The patients urine and serum samples were estimated prior to the treatment and at end of the treatment.

Statistical analysis:

Results are expressed as Mean±S.D. Paired t – test was used compare the initial and final values. P value < 0.05 was considered as Statistical significance.

RESULTS:

In control patients there is no significant decrease in microalbuminuria and HbA1c (Glycosylated haemoglobin) while in Omega-3 fatty acid group significant decline in microalbuminuria and HbA1c from 39.2 ± 0.08 to 32.6 ± 0.42 (Fig no: 1) and 9.2 ± 0.03 to 5.6 ± 0.4 (Fig no: 2) respectively.

Fig 1: Effect of Omega-3 fatty acid on microalbuminurea in patient with diabetic nephropathy
DISCUSSION:

Diabetic nephropathy is the most common cause of progressive renal damage and end stage renal failure in patients with diabetes mellitus. While the exact cause of diabetic nephropathy remains unknown, oxidative stress coupled with chronic hyperglycemia may have an important role in the development of nephropathy. Based on various study, the researchers observed that individuals with diabetes have significant defects of antioxidant protection, which may enhance their susceptibility to oxidative stress [15, 16]. Oxidative stress plays an important role in the development of late diabetic complications. Chronic hyperglycemia increases oxidative stress and considerably modifies the structure and function of proteins and lipids due to glycoxidation and peroxidation [17]. These modified products could contribute to the morphological and functional abnormalities seen in the kidney of patients with diabetes [18].

The present study, omega-3 fatty acid significantly reduces microalbuminurea and HbA1c in diabetic nephropathy may be due to up-regulate the gene expression of antioxidant enzymes and down-regulate the gene expression of genes associated with ROS production [21] which is concordant with study done by Kasuvalu et al, in which the omega-3 fatty acid reduced free radicals and increased antioxidant enzymes [22, 23].

CONCLUSION

Apart from the managing diabetes mellitus alone, it becomes imperative to control its associated complications such as nephropathy. Our finding indicates that, the Omega -3 fatty acid significantly lower the microalbuminurea and HbA1c compared to the positive control may be due to its action on antioxidant systems, so therefore supplementation of Omega -3 fatty acid may prevent the diabetic nephropathy.

The mechanism of Omega -3 fatty acid remains speculative; therefore further studies are required to unravel the exact pathway involved in significant decrease of microalbuminurea and HbA1c and to shed more light on the anti nephropathy action of Omega -3 fatty acid.

REFERENCE


