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Original Research Article

# The Role of N-acetylcysteine in Diabetic Nephropathy Patients

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## Abstract

**Background:** Diabetes is a big issue in both developed and underdeveloped countries. The progression of the disorder results in extended hyperglycemia exposure of vascular tissues, leading in long-term microvascular/ macrovascular consequences in the health, one of which is nephropathy.

**Objective:** The goal of this study was to see how N-acetylcysteine affected microalbuminuria and HbA1c levels in diabetic nephropathy patients.

**Materials and Methods:** A randomized, open-label experiment with 58 diabetic nephropathy patients (50 men and 8 women) between the ages of 35 and 60 who have had diabetes for at least 5 years. Positive control and N-acetylcysteine groups were used to split the patients. For both the positive control and the N-acetylcysteine groups, there are 29 patients in each group for examination of the parameters during a three-month period.

**Results:** When compared to the positive control group, there was a substantial decrease in levels of microalbuminuria and HbA1c (glycosylated hemoglobin) after 4 months of N-acetylcysteine supplementation.

**Conclusion:** According to the findings of the study, N-acetylcysteine reduces microalbuminuria and HbA1c in diabetic nephropathy patients. As a result, N-acetylcysteine supplementation may help to avoid diabetic nephropathy.

**Keywords:** N-acetylcysteine, Glycosylated Hemoglobin, Microalbuminuria.

## Introduction

Diabetic nephropathy (DN) is one of the most common consequences of Type 1 and Type 2 diabetes. It is defined by the progression of proteinuria (> 300 mg/24h) to end-stage renal disease, with a substantial risk of cardiovascular morbidity and mortality in diabetes patients [1].

Angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, calcium channel blockers, Pioglitazone, and Rosiglitazone are currently available treatments for diabetic nephropathy. These medications delay the progression of renal disease but do not completely stop or reverse it. [2,4].

Ischemic renal failure and IgA, cyclosporine, and radio-contrast agent iothalamate induced nephrotoxicity are just a few of the benefits of N-acetylcysteine. [5,6]. The purpose of this research was to see how N-acetylcysteine affected diabetic nephropathy patients.

## Materials and Methods

Patients attending the medicine outpatient department (OPD)/diabetes clinic at Star Hospitals, Banjara Hills, Hyderabad, and Mahavir Institute of Medical College and Hospitals, Vikarabad, Telangana were recruited for the study, which was a randomized open-labeled controlled trial. The Institutional Ethics Committee (IEC/MIMS/Pro/Jan/2016/67) accepted the study procedure. The study procedure was given to the subjects, and everyone who took part in the study signed a written informed permission form.

### Study Design

The study comprised 58 diabetic nephropathy patients (50 men and 8 women) between the ages of 35 and 60 who had diabetes for at least 5 years. Pregnancy and lactation, allergic reactions, cardiogenic shock, pulmonary edoema, multiple myeloma, serum Cr >4 mg/dL, end-stage renal disease, diuretics, and non-steroidal anti-inflammatory medicines were all excluded from the study.

Patients were separated into two groups (29 each) based on treatment, with the first serving as a positive control and the second receiving N-acetylcysteine 600 mg orally twice daily for 12 weeks. Diabetes therapy was given to both groups.

Patients were instructed to take the pills with their lunch and dinner meals. Prior to therapy, and after treatment, the patient's urine and serum samples were estimated. The initial and end values were compared using a paired t-test. Statistical significance was defined as a P-value of less than 0.05.

## Results

Microalbuminuria and HbA1c (glycosylated haemoglobin) levels in control patients did not change significantly, whereas, in the N-acetylcysteine group, microalbuminuria and HbA1c levels decreased significantly 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.

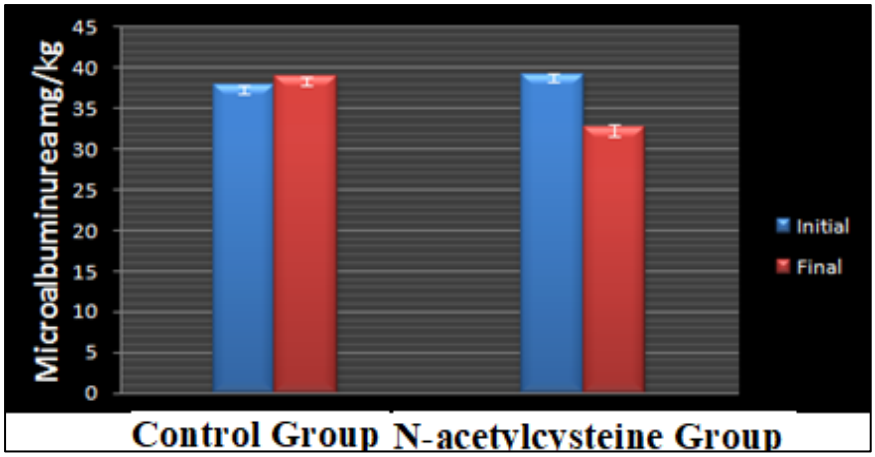


**Figure 1: Effect of N-acetylcysteine on microalbuminuria in patient with diabetic nephropathy**

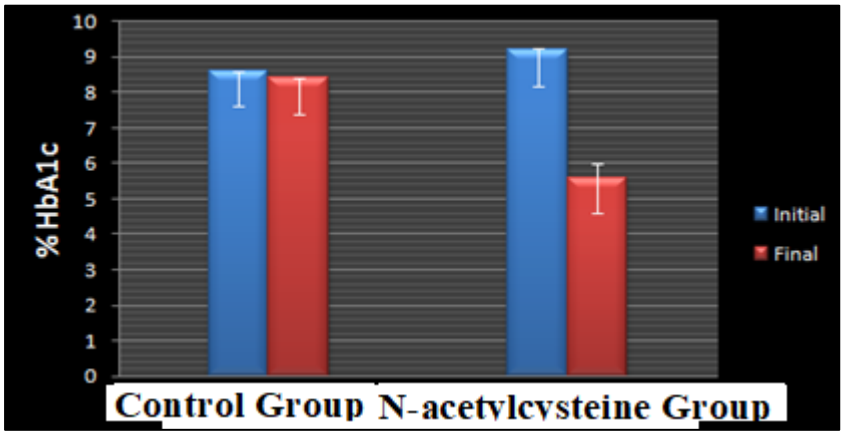


**Figure 2: Effect of N-acetylcysteine on HbA1c in patient with diabetic nephropathy**

## Discussion

Diabetic nephropathy is the most common cause of kidney deterioration and end-stage renal failure in people who have diabetes. While the specific origin of diabetic nephropathy is uncertain, oxidative stress in combination with chronic hyperglycemia may play a role in its progression. N-acetylcysteine dramatically lowers microalbuminuria and HbA1c in diabetic nephropathy, which could be related to up-regulation of antioxidant enzyme gene expression and down-regulation of genes linked with ROS formation, according to the current study [7] which is concordant with study done by Kasuvalu *et al*, N-acetylcysteine decreased free radicals and enhanced antioxidant enzymes in this study [8]. As a result, N-acetylcysteine supplementation may help to avoid diabetic nephropathy.

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