

# Evaluation of Serum Cystatin C Level in Patients with Diabetic Nephropathy

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## Abstract

**Background:** Diabetic Nephropathy is one of Diabetes mellitus complication at micro vascular level that lead to final stage of renal disease .It is has many features include function and morphologic changes of renal such as increase of albumin level in urine and increase density of glomerular basement membrane .Cystatin C is protein has low molecular weight and it is has many features such as freely filtrates by glomeruli and not affected by sex , diet and age .

**Objective of the Study:** Evaluation of serum Cystatin C concentration in DN patients.

**Materials and Methods:** This study was done on 50 patients with DN disease and 50 healthy persons (control ), the all subjects age within this study were more than 50 years of both genders, the disease duration was more than 10 years .After obtained serum , immediately used quantity method (immunoassay) for measured level of Cystatin C concentration .

**Results:** This study shows elevation of serum Cystatin C level in DN group compare with control group .  
**Conclusion:** This study confirms that serum cystatin C level can use as early marker to diagnosis of DN patients in early stage.

**Keywords:** Diabetes Mellitus, Diabetic Nephropathy, Glomerular Filtration Rate, Serum Cystatin C Level .

## Introduction

Diabetic Nephropathy (DN) is the one of complications of diabetes mellitus disease (DM) about the micro vascular level, the DN consider as one of primary renal disorders. It is determine by many factors that related with function and morphologic changes of renal such as increase of albumin level in urine and increase density of glomerular basement membrane(1) . The previous statistical study show that DM disease spreading widely in many populations , that effect about 330 persons per year . Glucose level elevation for short period can't cause tissue damage but when elevation for long period this lead to form many complication due to cause damage of tissue , that lead to organ function failure (2) .

High percent of DN patients arrive to end stage of kidney disease; these patients already require kidney transplantation or dialysis. The most DN patients have other complication because DN disease, for example high blood pressure and myocardial infraction, that leads to elevate mortality percent in population. According to some of previous comparison studies, the DN patients (especially DM type 1) have more mortality percent from non DN patients about 60% after 40 years of disease features appear.

So, the DM consider as high risk factor for developed renal disease (3).

CystatinC is protein 13.3kDa encoded by cst3 gene on chromosome 20 . Cystatin C classify as monomeric and non-glycosylated , also has other term such as neuroendocrine basic polypeptide and post gamma globulin, and has many chemical features such as isoelectric point 9.3 ,positive charge in body and hydrophobic signal on N-terminal (4). In Cystatin C molecule occur alteration in 3rd amino acid ,proline convert to hydroxyproline by hydroxylation process , and before it's secretion divided to 120 amino acid .The Cystatin C concentration level in blood about 0.9-9.9 mg/L but in urine about 0.09 mg/L (5) .

Cystatin C act as cysteine proteinases inhibitors of papain family (C1) and legumain family (C13) in monomer form by competitive, non covalent and reversibly binding style . The CystatinC inhibition of host cysteine proteinases and microbial cysteine proteinases in blood, in humans specially act in

cerebrospinal and seminal fluid. Also, there are some inhibitors for cysteine protease in extracellular fluid such as alpha-2-macroglobulin (6).

The monomer Cystatin C is active form, at pre-secretion stage from endoplasmic reticulum the monomer form convert to dimer by dimerization process and become inactive form. So, the Cystatin C has many roles in human body such as diagnosis role in renal, heart and neurology diseases (7).

This study include evaluate Cystatin C in DN patients and healthy persons at comparison study.

## Materials and Methods

This study was done on 50 patients with DN disease and 50 healthy persons (control), the all subjects age within this study were more than 50 years of both genders, the disease duration was more than 10 years. The sample collection was from all subjects as random style, and the blood separated without any addition to obtained pure serum. After obtained serum, immediately used quantity method (immunoassay) for measured level of Cystatin C concentration.

The t-test used for compared of Cystatin C level between DN and control groups according to mean  $\pm$  standard deviation (SD) and p-value (p-value  $> 0.05$  consider as significant value).

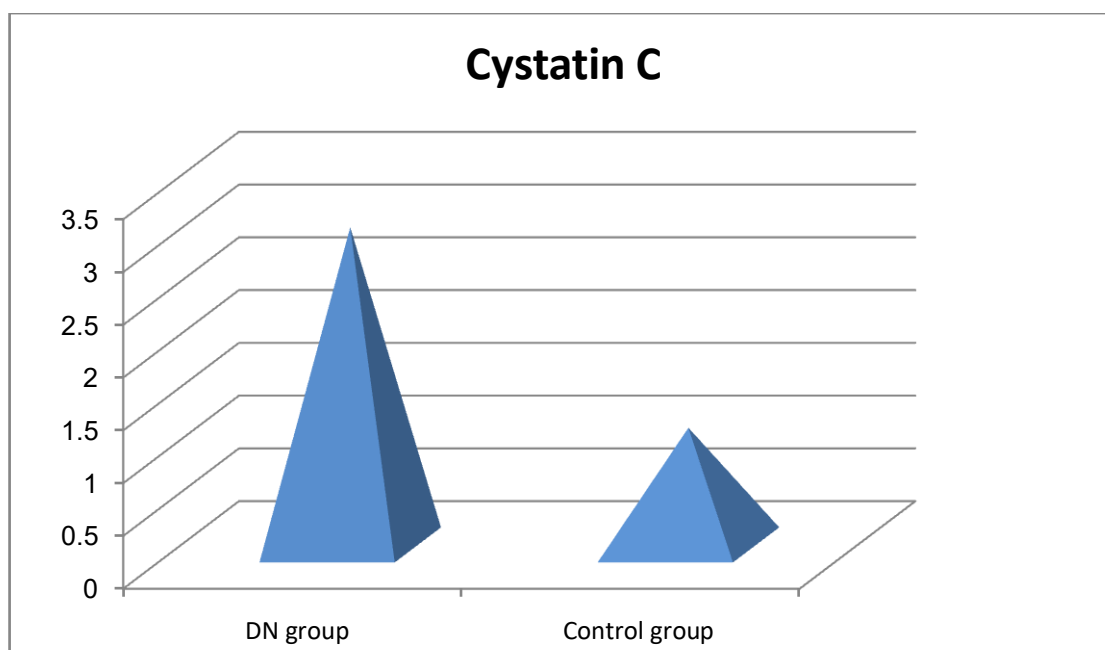
## Results

This study shows elevation of serum Cystatin C level in DN group compare with control group, Cystatin C mean  $\pm$  SD found in DN group was  $3.17 \pm 2.17$ , and in control group was  $1.11 \pm 0.59$ , with a P-value was  $<0.001$ . See table 1 and figure 1.

**Table 1:** Comparison of serum Cystatin C level between DN and control groups according to mean  $\pm$  standard deviation (SD)

Parameters	DN group (No. =50) Mean+SD	Control group (No. =50) Mean+SD	P-value
Cystatin C (mg/L)	$3.17 \pm 2.17$	$1.11 \pm 0.59$	$<0.001^*$

\*Significant value



**Figure 1** :Comparison of serum Cystatin C level between DN and control groups according to mean  $\pm$  standard deviation (SD)

## Discussion and Conclusion

Cystatin C is protein has many function in human body and it can pass from glomerular filtration membrane as free , also it can complete reabsorption in proximal tubule cells but not back to blood cycle and the renal can't secrete it . Therefore the Cystatin C level can use as indication of glomerular filtration rate (GFR) (8).

The GFR canuseful to determine in DN vascular injury in renal in early stage , this can reflect by increase of serum Cystatin C level , so it is more specificand sensitive to kidney function. This study results confirm significant elevation of serum Cystatin C level inDN group compare with control group .Many studies have confirmed correlation between decrease GFR and elevation serum Cystatin C level to establish negative correlation between them (9).

Guo JJ et al .,at 2017 in China show elevated Cystatin C level with other parameter such as elevated albumin in urine and glomerular filtration dysfunction with early stage of DN disease (7).Thereforeappear gradually increase in serum Cystatin C concentration with disease situations .Also, Kachhawa et al., at 2016 showed that serum Cystatin C level can used as early marker for assessment of kidney function in patients with DN disease (10).

Our study results agree with previous studies because the subjects in study were not have any primary renal disease, so the Cystatin C increase cause by DN disease only. Therefore, the serum Cystatin C level can useful as early indicator for evaluation renal function in DN patients.

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