Evaluation the validity of metalloproteinase 9 in Nephrotic Syndrome patients in AlNajaf province

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Abstract. Background: Nephrotic syndrome is a medical disorder characterized by large proteinuria (more than 40 mg/m\textsuperscript{2} hourly) that causes hypoalbuminemia (below than 30 g/L), which leads to edema, hyperlipidemia, and additional complications. The renal glomerulus's injured basement membrane causes increased permeability. A variation in glomerular permeability is the cause of this condition. Materials and methods: 70 patients were randomly chosen to participate in the clinical study. (35 Males and 35 Females) with autoimmune disease and nephrotic syndrome attending the kidney disease center in AlSadder Teaching City in AlNajaf province, Iraq. It was carried out from November 2022 to July 2023. The ages of patients was range of 1-50y. Results: The consequences show a significant decrease ($P \leq 0.05$) in Metalloproteinase -9 (MMP9) level in nephrotic patients in relating with control groups moreover demonstrate a significant decline ($P \leq 0.05$) in metalloproteinase -9 (MMP9) level in nephrotic patients in compare with control group at different age groups and results furthermore display significant effect ($p \geq 0.05$) in metalloproteinase -9 (MMP9) level between groups of ages also reveal no significant effect ($P \geq 0.05$) in metalloproteinase 9 in females and males in nephrotic patients and significant reduction ($P \leq 0.05$) in metalloproteinase 9 level in both nephrotic patients in comparing with control groups. show a significant increase ($P \leq 0.05$) in Metalloproteinase -9 (MMP9) level in nephrotic patients in rural groups than urban groups. Conclusion: The present study concluded that was found significantly decreased in nephrotic patient and increased in rural nephrotic patients than in urban patients.

1 Introduction

Nephrotic Syndrome (NS) is one of the greatest public types of kidney disease and a clinical syndrome characterized by excessive proteinuria that produces hypoalbuminemia, which in turn causes hyperlipidemia, edema, and numerous problems. It is one of the primary reasons of endstage renal failure in both children. It results from increased permeability, particularly from thrombo-embolic or pathogenic agents, through the compromised basement membrane in the renal glomerulus. An abnormality in glomerular permeability is the source of it, and it may be linked to medication usage, neoplasia, diabetes, systemic lupus erythematosus, or
congenital infections [1, 2]. Primarily, it is brought on by an intrinsic renal illness in the kidneys. A single spot urine sample containing two grams of protein per gram or a urinary loss of three grams or more of proteins per day are considered examples of nephrotic-range proteinuria [3]. Adults and children of any gender and race may be afflicted with the nephrotic syndrome. Additionally, nephritic syndrome or its usual form may coexist with it. The latter indicates hematuria and decreased renal function due to glomerular inflammation. In youngsters, facial edema is the initial sign of nephrotic syndrome, which later spreads to the whole body. Dependent edema can occur in adults. Fatigue and appetite loss are two more typical symptoms [4].

Matrix metalloproteinase-9 (MMP-9) (gelatinase B) is a 92 kDa zinc-dependent endopeptidase, it is a significant component of gelatinase and one of the early indicators of glomerular dysfunction. It is already established that the degree of nephrotic syndrome and other glomerular disorders can be predicted by the urine excretion and activity of these indicators. Originating from glomerular podocytes, MMP-9 affects glomerular functioning by breaking down the glomerular basement membrane's type IV collagen. While MMP-9 lacks expression in the glomerulus under ordinary circumstances, it is expressed in a variety of pathological conditions and during development. The amount of MMP-9 may have a significant role in the etiology of renal disorders [5, 6].

2 Materials and Methods

The study was directed on randomly certain 70 patients (35 Females and 35 Males) with autoimmune disease and nephrotic syndrome attending the kidney disease center in AlSadder Teaching City in AlNajaf province-Iraq. It was carry out from November 2022 to July 2023. The age of patients was range of 1-50y. Doctors who served as consultants diagnosed the patient. A questionnaire was used to collect patient data, which included name, sex, age, and weight. Thirty people who appeared to be control subjects (15 Males and 15 Females) were involved as healthy group. The ages ranges were analogous to that of patients. Each patient and control participant provided 5(ml) of venous blood samples, which were drawn using plastic syringes and a disposable needle. After 10 minutes of clotting at room temperature, the blood was separated and placed into fresh, disposable tubes after centrifuging it for 10 minutes at 6000 rpm. Human metalloproteinase 9 was determined using the sandwich enzyme immunoassay technique [7].

3 Results

3.1 Metalloproteinase 9 level between nephrotic patients and control groups

The outcomes in figure (1) display a significantly decrease (P≤ 0.05) in Metalloproteinase -9 (MMP9) level in nephrotic patients in comparing with control groups.
3.2 Comparison levels of Metalloproteinase 9 between nephrotic patients and control groups according to age

The outcomes in figure (2) illustrate significantly decrease (P≤ 0.05) in metalloproteinase -9 (MMP9) levels in nephrotic patients at different age groups (0-10y, 11-20y, 21-30y, 31-40y and 41-50y) compared to the control group at different age groups (0-10y, 11-20y, 21-30y, 31-40y and 41-50y) respectively and outcomes similarly display significant effect (p≥ 0.05) in metalloproteinase -9 (MMP9) level between groups of ages.

3.3 Comparison levels of Metalloproteinase 9 between nephrotic patients and control groups according to gender

The consequences of figure (3) expose no significant effect (P≥ 0.05) in metalloproteinase 9 in females and males in nephrotic patients and significant reduction (P≤ 0.05) in metalloproteinase 9 level in both nephrotic patients in comparing with control groups.
3.4 Metalloproteinase 9 level between nephrotic patients according to place of living

The outcomes in figure (4-2) display a significant elevate (P≤ 0.05) in Metalloproteinase -9 (MMP9) level in nephrotic patients in rural groups than urban groups.

4 Discussion

Changes in metalloproteinase 9 level

Matrix Metalloproteinase-9, the ECM protease, was found significantly decreased in nephrotic patient. In our study, a decrease of MMP-9 was noted this agree with study of Bauvois et al., [8] showed a significant, decline in plasma levels of MMP-9 and the study Liu etal., [9] show levels of active MMP-9 were significantly reduced and the study of Uchio etal., [10] indicate In ICGN mice, decreased MMP activity might have a role in the expansion of renal fibrosis. According to Tomita et al.,[11] impaired expression of MMP-9 causes extended collagen deposition in the GFB. In a transgenic mouse model, Jacot et al.,[12]
observed that reduction in the expression of MMP-9 mRNA is responsible for sclerosis of the mesangium. Another study by Adhikary et al.,[13] in anti-GBM Ab- induced glomerulosclerosis, also reported a reduced expression of MMP-9 mRNA. Thus, impaired activity of MMP-9 is an important causative factor for the development of glomerulosclerosis.

Our results supported the first theory wherein the MMP expression and activity are diminished, resulting in ECM augmentation and subsequent sclerosis and death of GBM. Reduced MMP-9 activity decreases the ECM remodeling and leads to accumulation of ECM. This further leads to sclerosis. MMP-9 is a vital enzyme required for tissue remodeling, organogenesis, embryogenesis. MMP-9 degrades GBM and induces aberrant mesangial proliferative alterations [14]. MMP-9 induces fibrosis, which irreversibly impairs glomerular functioning. MMP-9 cleaves osteopontin, a macrophage chemoattractant, activating transforming growth factor-β (TGF-β), a cytokine that causes kidney fibrosis [5]

5 Conclusions
The present study concluded that was found significantly decreased in nephrotic patient and increased in rural nephrotic patients than in urban patients.

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References