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INVESTIGATING THE IMPACT OF DIABETIC NEPHROPATHY ON KIDNEY FUNCTION: A COMPARATIVE STUDY

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Introduction:
Diabetic nephropathy (DN) is a serious complication of diabetes mellitus, characterized by progressive kidney dysfunction. Studying renal biomarkers is crucial for understanding the pathophysiology of DN and developing effective management strategies. In this study, we compared glomerular filtration rate (GFR) calculated using the creatinine-cystatin C formula, levels of albuminuria, and concentrations of klotho protein in the blood between control group patients and those with diabetic nephropathy.

Keywords: Diabetic nephropathy, renal biomarkers, glomerular filtration rate, creatinine-cystatin C, albuminuria, klotho protein.

Methodology:
A comparative analysis was conducted on renal biomarkers in three groups: a control group and two groups of patients with diabetic nephropathy (DN1 and DN2). GFR was calculated using the creatinine-cystatin C formula, albuminuria levels were measured, and klotho protein concentrations were determined. Statistical analysis was performed to assess the significance of observed differences.The study included a total of 140 participants, with 20 in the control group, 60 in DN1, and 60 in DN2.

Results:
Our results revealed significant differences in all evaluated renal biomarkers between the control group and both diabetic nephropathy groups. In the control group, the mean GFR was 87.69 ± 12.94 mL/min/1.73m², albuminuria level was 5.4 ± 2.3 mg/24h, and klotho protein concentration was 355.347 ± 52.4 pg/mL.
In diabetic nephropathy group 1 (DN1), the mean GFR was 69.3 ± 6.63 mL/min/1.73m², albuminuria level was 53.7 ± 3.6 mg/24h, and klotho protein concentration was 295.12 ± 28.13 pg/mL. In diabetic nephropathy group 2 (DN2),

the mean GFR was 54.9 ± 3.14 mL/min/1.73m², albuminuria level was 61.8 ± 5.7 mg/24h, and klotho protein concentration was 142.3 ± 8.2 pg/mL.

Statistical analysis confirmed that the differences in all three renal biomarkers between the control group and both diabetic nephropathy groups were statistically significant ($p < 0.05$). Additionally, significant differences were observed between DN1 and DN2 groups for all evaluated biomarkers.

Discussion: Our findings demonstrate distinct patterns of renal dysfunction associated with diabetic nephropathy. The significant decrease in GFR, along with alterations in albuminuria levels and klotho protein concentrations, reflects the progressive renal impairment in diabetic nephropathy patients compared to controls. These findings align with existing literature on the multifaceted nature of renal dysfunction in diabetes mellitus.

The observed differences between DN1 and DN2 groups suggest varying degrees of disease severity and renal involvement. This heterogeneity underscores the importance of personalized treatment strategies tailored to the specific needs of diabetic nephropathy patients.

Conclusion: In conclusion, our study provides valuable insights into the alterations of renal biomarkers in diabetic nephropathy. The significant differences observed in GFR, albuminuria, and klotho protein levels between control group patients and those with diabetic nephropathy underscore the need for early detection and intervention to mitigate the progression of renal complications in diabetes mellitus.