EVALUATION OF ABILITY OF URINARY PODOCALYXIN, NEPHRIN AND LIVER TYPE FATTY ACID BINDING PROTEIN FOR EARLY DIAGNOSIS IN RENAL INJURY IN ADOLESCENTS WITH TYPE 1 DIABETES

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BACKGROUND

Early identification of diabetic nephropathy (DN) is crucial because it creates opportunity for preventing the incidence of DN and/or even slows down the process of end-stage renal disease attributed to diabetes.

Currently, microalbuminuria is generally thought to be an early marker of DN in clinical practice. However, recently emerging evidences suggested that glomerular damage also presented in diabetes patients with normal albuminuria, who might easily missed diagnosis if only detecting microalbuminuria.

We aimed to determine the place of biomarkers that related different segments of the glomeruli, called podocalyxin (PCX), nephrin and liver type fatty acid binding protein (L-FABP), detecting diabetic kidney injury in normalalbuminuric and normotensive adolescents with type 1 diabetes.

STUDY DESIGN

One hundred thirty adolescents with type 1 diabetes were enrolled in the study. The inclusion criteria for the study were: absence of urinary tract diseases or infection, and no history of hypertension, fever, acute illness, and other renal diseases except DN. The patients had nephotoxic drug within 4 weeks also were excluded.

All subjects had intensive insulin therapy. Thirty healthy volunteers were randomly selected as controls. The inclusion criteria were: no history of hypertension, diabetes, renal disease or vascular disease, matched for age.

Three different study groups were created according to different variables (Figure 3).

RESULTS

The adolescents with type 1 diabetes and healthy subjects have similar auxological and descriptive data. GFR was in normal range in all subjects, and controls.

Urinary podocalyxin, nephrin, L-FABP levels were increased before the development of hyperfiltration, and were higher in diabetic subjects compared with nondiabetic healthy subjects (Figure 4).

Excretion of albumin in spot urine was similar among the groups created according to duration of diabetes.

Albumin excretion in the urine collected for 24 hours was increased with duration of diabetes. Similarly PCX in spot urine was associated with diabetes duration (r=0.752, p=0.001). The subjects had diabetes more than ten years had the highest level of PCX.

PCX was associated with mean HbA1c (r=0.24, p=0.01) (Figure 5).

Urinary nephrin and L-FABP levels were associated with glycemic control. (r=0.45, p=0.001 ve r=0.69, p<0.001). The diabetic subjects with poor controlled diabetes have increased levels of nephrin and L-FABP (Figure 5).

Excretion of albumin in both spot urine and 24-h collected urine was increased in the diabetics with poor control. On the other hand GFR was similar in both good controlled and poor controlled groups.

In subjects with microalbuminuria, urinary PCX, nephrin, L-FABP levels were extremely elevated compared with normalalbuminuric subjects. Nevertheless, increase of these urinary biomarkers were detected in normalalbuminuric subjects.

CONCLUSION

The present study demonstrates that elevated urinary podocalyxin, nephrin and L-FABP excretion may determine early kidney injury before microalbuminuria occurs. Besides, these biochemical markers may be useful for staging kidney injury, predicting kidney injury progression and monitoring response to therapy. Closer monitoring of diabetic patients with elevated urinary podocalyxin, nephrin, L-FABP levels and protective measures may prevent chronic kidney disease development.