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Development of the proteinuria dosage

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Abstract

The 24-hour urine proteinuria or albuminuria ratio is still prescribed for protein detection in urine, despite the fact that it has been replaced by the albuminuria or protein/creatininuria ratio. The use of this ratio eliminates the misinterpretation of 24-hour urine proteinuria. The objective of this development is to clarify the importance of the ratio for the search for albumin or protein in the urine. We conducted a review of the literature focusing on different diagnostic recommendations.

Indeed, 24-hour urine collection is tedious and prone to many errors. The ratio is therefore a simple, reliable and standardized indicator for assessing proteinuria except in acute renal failure patients. The correlation between these ratios and 24-hour urine has been demonstrated in several studies in various populations and is currently considered to be the most adequate measure for proteinuria quantification despite the variability in creatinine excretion. The Kidney Disease Improving Global Outcomes recommendations therefore suggest the use of the albumin/creatinine ratio and the protein/creatinine ratio on a 1st morning urine sample to test for proteinuria.

Keywords: Albuminuria; Creatininuria; proteinuria

1. Introduction

The ratio albuminuria/creatininuria or proteinuria/creatininuria is recommended for protein testing in the urine. The ratio is a simple test to avoid certain collection and interpretation errors that may be encountered for 24-hour urine, which is now only indicated in acute renal failure. The objective of this development is to clarify the importance of the ratio for the search for albumin or protein in the urine.

1.1. Proteinuria

Proteinuria is defined as urinary excretion of protein greater than 150 mg per day [1] outside of pregnancy. Proteinuria can be of glomerular, tubular or overload origin.

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A number of glomerular abnormalities result in urinary loss of albumin and immunoglobulins. Proteinuria of tubular and overload origin consists of low molecular weight proteins. There is also what is called "hemodynamic" proteinuria, which is physiological, often transient or intermittent, relatively benign [2]. Proteinuria research allows the nosological diagnosis of chronic kidney disease; the evaluation of the progression of chronic kidney disease and the effectiveness of therapeutic management; and the assessment of the risk of cardiovascular disease [3,4].

1.2. Albuminuria

Albuminuria is defined as urinary albumin excretion greater than 30 mg daily [2]. Albuminuria is associated with cardiovascular and renal risks and is one of the earliest markers of glomerular pathologies. It is the predominant urinary protein in most diseases.

1.3. Creatininuria

The 24-hour creatininuria dosage is used to evaluate the accuracy of 24-hour proteinuria. Creatininuria varies according to the patient's age and muscle mass.

In women under 60 years of age, creatininuria is estimated to be 132 to 176 $\mu\text{mol/kg/day}$.

In men it is 176 to 221 $\mu\text{mol/kg/day}$, and in people over 80 years, it is 88 $\mu\text{mol/kg/day}$ [1].

1.4. 24-hour proteinuria

The 24-hour urine collection is tedious and more difficult, but it does allow the glomerular filtration rate to be calculated [5]. 24-hour urine collection also allows quantitative measurement of protein. To evaluate the quality of urine collection, it is advisable to measure the concentration of urinary creatinine, as many false positives and negatives are linked to often incomplete collections. It is no longer recommended from the beginning [6].

1.5. Albuminuria/creatininuria or protein/creatininuria ratio

It is simple and reproducible, but for a correct interpretation it is necessary to take into account the urinary excretion of proteins and creatinine [2]. It is done on the first morning urination in the middle of the stream avoiding intense physical exercise 72 hours before the dosage. The albuminuria/creatininuria ratio is normally less than 3mg/mmol and the protein/creatinine ratio less than 15 mg/mmol. It is used in conjunction with the glomerular filtration rate to assess the relative risk of progression to renal failure and to determine the management of patients. The Kidney Disease Improving Global Outcomes (KDIGO) recommendations therefore suggest using the albumin/creatinine ratio first, and then the protein/creatinine ratio for the search for proteinuria because of its accuracy and ability to detect early stages of diabetic nephropathy [6,7].

2. Conclusion

24-hour proteinuria is still a much sought-after test in the laboratory, despite the fact that it is no longer recommended from the outset. Its interpretation is subject to several errors if the condition of the collection has not been respected. The 24-hour urine proteinuria test has been superseded by the ratio of albuminuria or proteinuria/creatininuria to morning urine. However, with the ratio, one must always consider the different factors that can influence the dosage of albuminuria or proteinuria in order not to get an erroneous result.

Compliance with ethical standards

Acknowledgments

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