Calculated creatinine clearance using the CKD-EPI-formula shows a reliable prediction and high correlation to 24-h-urine in patients with diabetes mellitus but underrates systematically potentially leading to withdrawal or non-prescription of oral antidiabetics

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Introduction

To reliably assess the glomerular filtration rate is of vital importance if oral antidiabetics are part of the therapy. We compared the CKD-EPI model, a clinically established calculation model to assess creatinine clearance (CreaClear) with specimens from 24-h urine.

Method

Inpatients with Diabetes mellitus (DM) of a university hospital received a 24-h urine collection (24hClear) to assess the CreaClear. Since mid 2013 calculated CreaClear using the CKD-EPI-formula (EPI) is available. From the years 2014 and 2015 CreaClear of a total of 615 patients was assessed simultaneously with both methods. Implausible collection specimens (creatinine excretion in 24-h collection <8 or >22mmol/24h) were not included (n=268), as well as patients with an unclear type of DM (n=6). Correlation (Cor) was calculated (Pearson, significance level $p<0.01$) and mean values (MV) compared with the T-test (significance level $p<0.05$)

Results

341 persons were analyzed (n=120 diabetes type1 (DM1), n=285 type 2 (DM2), n=12 pancreas diabetes (DMpankr). 74(18%) had a 24hClear in the range from 40 to 60 ml/min (DM1 16%, DM2 81%, DMpankr 3%). Mean values and correlations are displayed in Table 1.

In regression analysis 24-h creatinine excretion is negatively associated with an overestimation of EPI ($p<0,001$).

Table 1: Comparison of measured and calculated Creatinine-Clearance

	EPI (SD) ml/min	24hClear (SD) ml/min	Correlation	Δ (ml/min)
Total	62.8(32.4)	75.1(37.3)*	0.88	12.3
DM1	82.1(32.2)	94.7(38.2)*	0.83	12.6
DM2	54.1(29.2)	66.0(33.8)*	0.87	11.9
DMpankr	75.8(23.8)	97.1(26.5)*	0.85	21.3

*** p < 0.001**

Conclusions

Calculated values of creatinine clearance by the CKD-EPI-formula compared to values from 24-h urine collection retrieved from routine data of a hospital demonstrated a high correlation. CKD-EPI produced lower values in 80% of the cases underrating in the range from 11(DM2) to 21(DMpancr) ml/min. Relying on CKD-EPI may lead in the therapeutically critical range of 40 to 60 ml/min creatinine clearance to withdrawal or non-prescription of oral antidiabetics, offers on the other hand a “buffer”, which may prevent drug induced complications. The relatively large difference of both methods for persons with pancreas diabetes is caused by the reduced muscle mass in those.