Evaluation of Renal functions in Obese children and adolescents: Is increasing GFR reflected Hyperfiltration and possible renal damage in future?

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Introduction: There is growing interest in the relationship between obesity and renal damage. Chronic kidney disease is accepted as important complications of obesity in adulthood. However, information on association between childhood obesity and renal functons is limited.
In this study, It is aimed to investigate the renal functions in obese children and adolescents

Patients and Methods:
We enrolled 107 obese children and adolescents and 47 normal-weighted children as a control group. Serum Cystatin-C, serum creatinin levels, 24 hours proteinuria, creatinin clearance(CrCl) and GFR were evaluated both in obese and control groups. Estimated GFR was measured by both creatinin based (Schwartz, Counahan-Barratt) and cystatin–C based (Filler) formulas. Metabolic parameters (blood glucose, insulin, lipids) were analysed in obese subjects. IDF criterias was used to determine of metabolic syndrome (MetS). Formulas were also calculated with "Fat Free Mass (FFM)- body surface area" when appropriate.

Results: The mean age of obese patients was 12,57 years; and 15 of 77 obese children (age between 10-16 years of age) had MetS. Serum cystatin–C was not different between obese and control groups. Obese patients with MetS have higher Cystatin-C level than without MetS. CrCl, Filler, and Counahan-Barratt measurements showed statistically significant increase in GFR of obese subjects than control subjects (Table 1). These increase is negatively correlated with duration of obesity. Only Filler equation showed statistically significant decrease of eGFR in patients with metabolic syndrome . Proteinuria levels were not different betweeen groups (Table 2).

GFR Formulas:

* Creatinin clearence: urine creatinin (mg/dL) x urine volume (mL)x1,73 / Serum creatinin x1440 x body surface area (m^2) (ml/dk/1,73m^2)
* Bedside Schwartz: 0,413 x height (cm) / serum creatinin (mg/dL)
* Filler: 1,62 x (1/Cystatin- C(mg/L))[1`123]
* Counahan-Barratt: 0,43 x height(cm) / serum creatinin (mg/dL)

Table 1:eGFR and Cystatin-C levels of subjects

	Obese Group (n=107)	Control group (n=47)	P values
GFR- Filler	138,88 26,11	118,06 26,66	**<0,001**
GFR- Bedside Schwartz	131,81 26	122,94 27,77	0,058
GFR-Counahan-Barratt	137,29 26,99	124,85 17,14	**0,001**
Cystatin-C	0,695 0,121	0,662 0,099	**0,104**

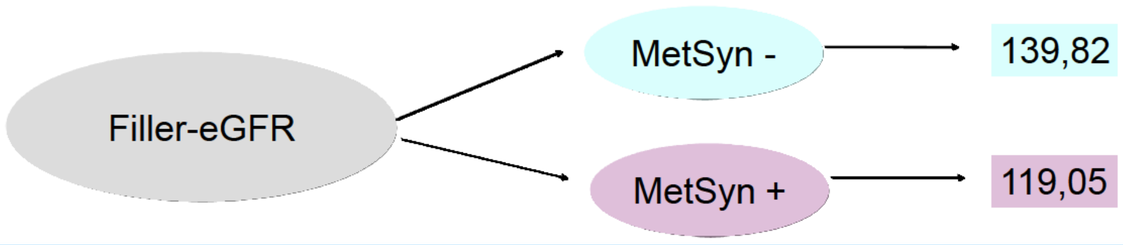

Table 2: Creatinin, Proteinuria and CrCl of subjects

	Obese Group (n=107)	Control group (=47)	P values
Creatinin (mg/dl)	0,5 Min:0,28 Max:0,88	0,5 Min:0,23 Max:0,91	0,709
Proteinuria (mg/m2/h)	1,8 Min:0,81 Max:5,5	1,78 Min:0,4 Max:6,93	0,927
FFM-proteinuria (mg/m2/h)	2,31 Min:1,2 Max:7,03	2,49 Min:0,496 Max:7,866	0,584
FFM	46,4 Min:21 Max:83,9	31,8 Min:16,1 Max:49,5	<0,001
CrCl	147 Min:51 Max:473	117 Min:71 Max:212	<0,001
FFM-CrCl	185 Min:65 Max:578	136 Min:86 Max:250	<0,001

Conclusion: In obese children and adolescents renal damage seems to be at functional level reflecting glomerular hyperfiltration without proteinuria. But, as obesity duration is incresed, eGRF is began to decrease, possibly begining with nephropathy. Although serum Cystatin-C levels can be useful for prediction of nephropathy only in obese children with MetS, GFR measurement is advantageous for detecting unfavorable effect of childhood obesity on renal functions either with or without MetS.

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