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Urea and creatinine clearances in the trimesters of pregnancy

L.F. Obika and B.O. Eiya

Physiology, University of Benin, Benin City, Edo, Nigeria

The aim of this study was to determine the glomerular filtration rate (GFR) in the three trimesters of pregnancy, using creatinine and urea clearances. A total of 108 healthy subjects between the ages of 18 and 37 years were divided into non-pregnant (28 ± 5 years, $n = 30$), 1st trimester of pregnant (28 ± 5 years, $n = 18$), 2nd trimester of pregnant (28 ± 4 years, $n = 30$), and 3rd trimester of pregnant (30 ± 4 years, $n = 30$) women. Serum and urine samples were collected in mid-trimester period. Creatinine and urea concentrations in serum and urine were determined using Jaffe's method (Bosnes et al. 1945) for creatinine, and the urease method (Martinek, 1964) for urea.

There was a significant increase (mean \pm SD) in creatinine clearance, but a significant fall ($p < 0.001$) in blood creatinine concentration in the three trimesters of pregnancy when compared with the control value. The increases of 43 ± 26 ml/min (non-pregnant vs. 1st trimester), of 39 ± 21 ml/min (1st vs. 2nd trimesters) and of 42 ± 25 ml/min (2nd vs. 3rd trimesters) of were similar. Similarly, there was a significant increase in the Urea clearances in the 1st, 2nd and 3rd trimesters of pregnancy, and remained elevated during pregnancy. In contrast, blood urea concentration increased significantly ($p < 0.01$) in the three trimesters, despite an increase in the 12 hour urine volume output.

The results in Table 1 show that Ccr and Cur increase and peak during the first trimester of pregnancy. Although there was a reduction in Ccr in the 3rd trimester compared to the 2nd trimester, the clearance remained significantly higher ($p < 0.05$) than in the non-pregnant women. This study agrees with other workers (Logoglu et al. 1990; Susan & Donna, 1992), who showed similar increases of GFR during pregnancy.

It is concluded that GFR increases and peaks during the first trimester of pregnancy and remains relatively stable till term. Table 1

	Non-pregnant, ml/min	Pregnant, ml/min		
		1st Trimester	2nd Trimester	3rd Trimester
Blood creatinine conc., mg/100ml	0.84 ± 0.21	0.52 ± 0.15	0.40 ± 0.12	0.50 ± 0.14
Creatinine clearance, Ccr, ml/min	97 ± 20	127 ± 18	162 ± 28	130 ± 28
Blood urea conc., mg/100ml	12.0 ± 4.0	16.1 ± 4.6	19.4 ± 4.8	16.7 ± 5.2
Urea Clearance, Cur, ml/min	62 ± 21	87 ± 10	96 ± 18	96 ± 12

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Where applicable, the authors confirm that the experiments described here conform with The Physiological Society ethical requirements.

PC2

Slowed leg blood flow kinetics in type 2 diabetes

O. Mac Ananey¹, D. O'Shea², H. Reilly¹ and M. Egana¹

¹Physiology, Dublin University Trinity College, Dublin 2, Ireland and

²Endocrinology, St Colmcilles Hospital Loughlinstown, Dublin, Ireland

OBJECTIVE: Exercise performance is impaired in people with type 2 diabetes even in the absence of cardiovascular complications. It appears that oxygen uptake (VO₂) kinetics during submaximal exercise are slowed in diabetics, factor that is likely to be associated with the exercise impairment. However the mechanisms for this slowed response are far from clear although they might be related to slowed skeletal blood flow responses.

AIM: of this study was to compare calf blood flow kinetic responses in women with type 2 diabetes and age and activity-matched nondiabetic obese & lean women following a moderately high intensity (70%MVC) calf plantar-flexion exercise. **METHODS:** Leg blood flow responses (venous occlusion plethysmography measured contraction by contraction) were measured in 9 diabetic, 8 nondiabetic obese and 8 nondiabetic lean women during three bouts of 6 minutes of isometric intermittent (6 s cycles, 2 s contraction, 4 s relaxation) one-leg plantar flexion exercise. To perform the kinetic analysis a biexponential equation was fitted to each subject's mean blood flow responses (averaged from the three trials).

RESULTS: The mean response time of the leg blood flow increase was prolonged in type 2 diabetic compared with lean and obese healthy subjects (43.5 ± 41.8 , 16.3 ± 6.8 and 15.5 ± 10.1 s, respectively, $P < 0.05$). In addition, the time constant of the second phase of the kinetic response was significantly longer ($P < 0.05$) in the diabetic compared to the obese and lean groups (55.2 ± 36.8 , 18.9 ± 10.4 and 18.9 ± 14.8 s, respectively). The rest of the kinetic parameters were not different among the three groups. Statistical significance was observed using one-way ANOVA.

CONCLUSIONS: The results suggest a slowed increase in calf blood flow in women with type 2 diabetes during high intensity plantar flexion exercise. A reduced vasodilatory capacity caused by vascular dysfunction during exercise might be related to this observation. Further studies are needed to study the mechanisms associated with the impaired muscle oxygen delivery in diabetes.

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