NDT Plus (2011) 4: 217–222

NDT PLUS
Nephrology Dialysis Transplantation

Letters to the Editor

Advance Access publication 7 March 2011

Effects of continuous and intermittent trainings on exercise-induced hematuria and proteinuria in untrained adult females

Sir,

Exercise can induce temporary proteinuria (18–100%) and hematuria (20–100%), which usually resolve within 24–48 h [1]. Proteinuria is mainly influenced by exercise intensity rather than duration, while hematuria depends on both duration and intensity [2, 3]. Most investigations regarding this issue have been conducted on professional athletes with a particular type of exercise. This study was designed to compare the effects of intermittent and continuous (without interval rest) trainings on exercise-induced urinary abnormality in untrained (no training in prior 3 months) single female runners (20–29 years). Of 90 student volunteers, 45 otherwise healthy females who had normal basal urine samples were enrolled in the study. Physical characteristics of the participants included age: 22.9 ± 1.99 years; body mass index: 23.5 ± 4.3 kg/m^2 and $VO2_{max}$: 37.38 ± 8.4 mL/kg/min. The participants were randomly divided into: intermittent training Group A, continuous training Group B and control Group C (each, $n = 15$). All participants performed an exhaustive running (up to maximal capacity) [4], then immediately and 1 h later urine samples for evaluation of hematuria and proteinuria were collected. Two days later, training groups were separately scheduled for intermittent and continuous trainings (each session consisted of a 10-min warming up, distance running with 1:3 ratio for work to recovery periods in Group A only and a 10-min cooldown exercise) three times per week for 12 weeks (Table 1) [4, 5].

Two days after the last session, all participants did an exhaustive running session again and urine samples were collected. The participants were not in menstrual cycle during any of the samplings. First post-exhaustive (PE) samples showed hematuria by phase-contrast microscopy in 100% of participants, which decreased to 75% (only in training groups) after a training programme; however, this difference was not statistically significant ($P = 0.083$). Mean urinary protein at different stages of the study were obtained: basal, first and second (PE) in Group A: 40.96 ± 11.6, 175.7 ± 15.93 and 175.1 ± 15.87; Group B: 39.98 ± 10.9, 168.8 ± 11.18 and 168.2 ± 11.4 and Group C: 42.89 ± 8.9, 169.5 ± 10.9 and 169.4 ± 10.9 (mg/day). Despite significant urinary protein elevation following exhaustive exercise in all groups ($P < 0.05$), no significant difference was found between pre- and post-training values in Groups A and B and also between groups ($P = 0.095$, 0.061). Exercise-induced hematuria is attributed to various mechanisms including increased body temperature, hemolysis, free radicals, lactic acidosis and catecholamine release [2]. It seems that physical training may have a protective influence on red cell passage through the glomerular basement membrane (GBM), whereas proteinuria remains unchanged [2]. We conclude that adaptive mechanisms against sudden increase in body temperature, dehydration, renal ischemia and red cell peroxidation may modify the influence of hemodynamic alterations on GBM, while charge selectivity permeability remains unchanged. Further research regarding this issue, particularly in males, and with larger samples is recommended.

Conflict of interest statement. None declared.

[1]Sport Physiology Department, Faculty of Physical Education and Sport Sciences, Azad University, Karaj, Iran
[2]Clinical Department, Akhavan Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran
[3]Nephrology Department, Shahed University, Mustafa Khomeini Hospital, Tehran, Iran

Mojgan Mousavi[1]
Suzan Sanavi[2]
Reza Afshar[3]

Correspondence and offprint requests to: Suzan Sanavi; E-mail: s2sanavi@yahoo.com

Table 1. Protocol of training in Groups A and B

		Training intensity[a]	
Study period (weeks)	Distance (m)	Group A	Group B
1–2	1600	80–85%	60–65%
3–4	1800		
5–6	2400	85–90%	65–70%
7–8	2800		
9–10	3000	90–95%	70–75%
11–12	3200		

[a]Based on maximal heart rate.

References

1. Gilli P, De Paoli Vitali E, Tataranni G et al Exercise-induced urinary abnormalities in long-distance runners. *Int J Sports Med* 1984; 5: 237–240
2 Bellinghieri G, Savica V, Santoro D. Renal alterations during exercise. *J Ren Nutr* 2008; 18: 158–164
3 Afshar R, Sanavi S, Fakharian MA *et al.* The pattern of proteinuria following Karate (kumite) competitions. *NDT plus* 2008; 5: 376
4 Battinelli T. Physique, Fitness, and Performance. 2nd edn. 5. Boca Raton, FL: CRC Press, Taylor & Francis Group, 2007; 73–80
5 Naylor L, Watts K, Sharpe J *et al.* Effect of resistance and circuit exercise training on left ventricular diastolic function in obese adolescents. *Med Sci Spo Exer* 2006; 38: S414

doi: 10.1093/ndtplus/sfr011