

URINARY PROTEIN PARAMETERS IN KARATE ATHLETES

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SUMMARY

The purpose of this research is to evaluate the effect of selective fighting competitions (kumite) on urinary albumin, total protein, β_2 -microglobulin, creatinine, sodium and potassium levels in male members of the professional national karate team. A questionnaire was presented to 40 champions, with necessary explanations. They were invited to a national team selection camp, and 18 subjects, who had frequently won championships, who were in good-health, and free from using drugs or ergogenic aids, and with similar participation were selected to be tested. They were aged 19 yrs old, with an average body weight of 67 kg, and average height of 170 cm. Their urine samples were examined 24 hours before and following competition to obtain aforementioned parameter levels. Statistics were performed using the SPSS software. Urinary total protein, albumin, creatinine, β_2 -microglobulin contents were meaningfully affected following karate competitions, whereas sodium and potassium levels were not altered to such an extent.

Key words: Karate athletes, urinary total protein, albumin, creatinine, β_2 -microglobulin, sodium, potassium, exercise

ÖZET

KARATECİLERDE İDRAR PROTEİNİ PARAMETRELERİ

Bu çalışmanın amacı ulusal profesyonel erkek karate takımı sporcularında kumite müsabakalarının idrar albümin, total protein, β_2 -mikroglobülin, kreatinin, sodyum ve potasyum atılım düzeylerinin

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belirlenmesi idi. Toplam 40 şampiyon sporcuya gerekli açıklamalarla bir anket uygulandı. Ulusal takım seçim kampına çağırılan sporculardan çok sayıda şampiyonluğu bulunan, benzer müsabaka katılımı olan, tam sağlıklı, ilaç ve destek beslenme ögesi kullanmayan 18 denek test için seçildi. Ortalama olarak 19 yaşında, 67 kg vücut ağırlığında ve 170 cm boyunda idiler. İdrar örnekleri müsabakadan 24 saat öncesi ve sonrasında incelendi. Verilere ilişkin istatistiksel analiz SPSS yazılım programı aracılığıyla gerçekleştirildi. İdrar total protein, albümin, kreatinin, β_2 -mikroglobülin atılımları karate müsabakalarını takiben anlamlı düzeyde değişirken, sodyum ve potasyum atılımlarında anlamlı bir farklılık gözlenmedi.

Anahtar sözcükler: *Karateci, idrar total proteini, albümin, kreatinin, β_2 -mikroglobülin, sodyum, potasyum, egzersiz*

INTRODUCTION

The development of sports sciences requires an insight to the body and its functions. Sports have become important in many countries, which try to include it in their everyday routine (12). Body activities, if not executed on a scientific basis, might jeopardize the very health and safety of the community involved (9).

Studies concerning human physical exercise reveal that each activity produces its own specific biological reaction. One of these reactions concerning kidney functions is protein excretion. Changes in kidney's blood flow have great influence on glomerular membrane diffusion, and re-absorption disorders of urinary protein and albumin may occur (10).

Mechanisms involved in this process are yet unknown in healthy people and more research is needed to be done. Changes vary in people depending on the intensity of the activities. Poortmans and Labilloy studied 24 hour urinary albumin and protein excretion in fifteen male runners following 100, 400 and 3000 meter competitions and proved that heavy exercise has great influence on these protein losses (8). Furthermore, besides heavy exercise, acute kidney troubles and muscle injuries usually lead to changes in protein excretion.

Newman et al (4) based their studies on the effect of competitions on creatinine and albumin excretion in 61 football players, and the results revealed the extent of the discharge following a match.

Kidney's main role is to maintain a stable condition by keeping balance between electrolyte compounds and body fluid volumes. Kidney's function concerning sodium has manifold importance. First, kidneys are the foremost organs to balance sodium and potassium in the body. Since the amount of sodium taken by each person differs, kidneys should mainly balance sodium discharge. When exercising, potassium flows in and out of the muscle continuously (6), but the cells absorb more sodium, and loss of water causes urinary potassium to increase. Ozawa showed that urinary sodium excretion increases after judo competitions (5).

The main purpose of the present study is to evaluate the level urinary proteins, creatinine, sodium and potassium following karate competitions, in order to clarify the magnitude of such excretion in this specific combat sport.

MATERIALS AND METHODS

The total group included 40 karate athletes invited to a national team. Eighteen of them were selected for their past records of frequent championships in four World, Asian and national tournaments. They were aged between 18 to 21 years old, and had performed in a similar number of competitions.

For selecting the subjects of the study, a questionnaire was presented to athletes invited to a national team selection camp. Eighteen subjects, who had won frequent championships, were in good health, free from using drugs or ergogenic aids. Their urine samples were collected before the competitions and 24 hours following them, to measure the urinary protein variables such as total protein, albumin, β_2 -microglobulin, and others such as creatinine, sodium and potassium.

To measure urinary total protein and β_2 -microglobulin, spectrophotometers (Bausch & Lomb and Eppendorf model E-Com, Germany) were used. Albumin was measured using another device (Helena Co, France). The amount of creatinine was measured through an analyzer (Hitachi, Germany and Japan). To measure urinary sodium and potassium a flame photometer (Corning model 450, Germany) was used. Urine test strips (Analyticom) were also used in the study.

Statistical description consisted of means and standard deviation. A non-parametric t-test (SPSS) was used to compare pre- and post-competition results, with statistical significance level set at $p < 0.05$.

RESULTS

Physical variables are given in Table 1; urinary variables are given in Table 2, as mean \pm SD and min-max scores.

Table 1. Physical characteristics of the karate athletes

Variable	Mean \pm SD	Min	Max
Age, yr	18.9 \pm 0.9	17	20
Weight, kg	62.7 \pm 1.4	60	81
Height, cm	173.1 \pm 8.9	160	188

Table 2. Urinary parameters of the karate athletes

Variable	Period	Mean \pm SD	Minimum	Maximum
Protein, mg/dl	BC	23.6 \pm 12.9	9.0	57
	FC	51.4 \pm 51.6	5.0	190
Creatinine, mg/dl	BC	171.0 \pm 96.1	34	437
	FC	224.5 \pm 85.5	81	372
Albumin, mg/dl	BC	4.98 \pm 3.22	1.3	11.6
	FC	19.3 \pm 14.1	1.8	61.6
β_2 -microglobulin mg/dl	BC	0.018 \pm 0.006	0.01	0.03
	FC	0.067 \pm 0.011	0.05	0.08
Sodium, mg/dl	BC	200.3 \pm 89.3	92	340
	FC	260.9 \pm 74.4	98	360
Potassium, mg/dl	BC	68.5 \pm 32.9	22	140
	FC	67.1 \pm 34.4	25	141

BC: Before the competition; FC: Following the competition

Accordingly, there were significant increases in urinary excretion of total protein, creatinine, albumin and β_2 -microglobulin following the competition. The increase in urinary sodium levels did not prove to be significant ($p > 0.05$), whereas mean urinary potassium levels stayed more or less stable.

DISCUSSION

This research proved once again that urinary protein discharge was increased following the competitions. This is probably a result of glomerular malfunction caused by the practice of high level karate competition. The haemodynamic changes in kidney vessels during the competitions lead to filtration obstruction and increased absorption of glomerular membrane towards circulatory proteins. The amount of urinary protein and albumin discharge most probably depends on the intensity of physical activity. The present results agree with those Poortmans and colleagues (7), Montelpare (3) and Ayca (1) have obtained in various sports.

Muscular activities or any disorder causing destruction or increase of muscular metabolism produce more creatinine. Miyai and his team (2) did a research on baseball players, and found increased creatinine discharge following the competitions, in accordance with the present study. The result of Shahidi's studies (11) in athletes also shows the absence of sodium discharge after the match which is consistent with the present work. Instead, contrary to their findings, no change in potassium excretion was observed in this research, which may be a result of lower dehydration in the subjects.

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