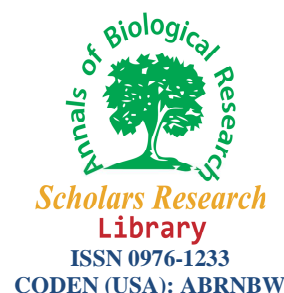




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Effect of Triathlon Competition on Urine Excretion of Heavy Molecular Weight Proteins in Southern Regions of Iran's Triathlon Athletes

Mohammad Ali Kohanpour^{1*}, Mohammad Hassan Boostani², Mona Mirsepassi¹,
Mohammad Ali Boostani², Mahdiye Nasiri Avanaki¹

¹Department of Exercise Physiology, Faculty of Physical Education and Sports Sciences, Islamic Azad University, Central Tehran Branch, Tehran, Iran

²Islamic Azad University, Arsanjan Branch – Young Researchers Club, Fars, Iran

ABSTRACT

The purpose of the present study is investigation of influence of a triathlon competition including swimming, bicycling and running on glomerular proteinuria in southern regions of Iran's triathlon athletes. Seven triathlon athletes of southern region of Iran's athletes with average age of 22 ± 2 years old, 174 ± 0.039 cm height and 62.42 ± 4.64 Kg weight, participate in a triathlon speed contest including 800 m swimming, 20 km bicycling and 5 km running. Before, immediately after and 45 minutes after the competition, urine samples were gathered. The collected samples were analyzed by using urine electrophoresis method and for each sample; the amount of total protein globulin albumin was gauged. In order to investigate changes of the variant from before to immediately then and to 45 min after the contest, statistical variance analysis approach with repeated measurements and *t* paired test with bonferroni correction were taken. All of the three under study variants had significant increases from before to immediately after the competition ($P < 0.05$), and decreased significantly to 45 min after the competition ($P < 0.05$). It seems a triathlon contest, which conducted by triathlon athletes of southern regions of Iran, was so intense that cause to a significant and considerable increase in urine excretion of heavy molecular weight proteins. Also, appears after the initial increase, the mentioned amounts came back to the basic values. There isn't any evidence that urine protein excretion could be a limiting factor in activities of southern regions of Iran's triathlon athletes. However, rather investigations are required.

Key Words: Proteinuria, Triathlon Competition, Albumin, Total Protein, Globulin, Urine Sample

INTRODUCTION

The triathlon sport is an intense physical activity consist of three successive separated activities including swimming, bicycling and running which shown each activity is able to generate large physiology changes, solely. However, overall influence of the three mentioned activities in a triathlon activity status was infrequently paid attention.

Abnormal or overflow urinary protein excretion is a renal decease called "Proteinuria" [11]. But protein excretion following a physical activity is different with its Pathologic situation. Sport proteinuria is influenced by many factors and increases with growing training intensity. Glomerular basic membrane determines glomerular capillary membrane penetrability [1]. Indeed, the spaces between fibers provide possibility for basic membrane to act as a

filter and form selective penetrability dependent glomerular molecules sizes. Naturally, membrane pores sizes avoid passing the red globules and plasma proteins through glomerular membrane to urine [1]. Though, there're two reasons for large selective ability of glomerular membrane which are pores sizes in glomerular membrane itself and electrostatic excretion of protein molecules by pores membranes.

Urinary disruptions resulting sport activities was reported in 1878 by reporting proteinuria in soldiers which had intense physical activity [16]. Change in glomerular membrane penetrability with regard to proteins [9], variations in renal hemodynamic and protein re-absorption decrease by primary tubules during training, are some of mentioned parameters that cause to increase in protein excretion. These changes are different in participated peoples of various sports and depend highly on training intensity.

Clerico *et al.*, (1965) observed larger albuminuria in company with proteinuria resulting training [4]. It's shown that the urinary ratio of albuminuria after training in gathered urine is high, which concludes the glomerular origin of proteinuria after training. Kramer *et al.*, (1988) indicated that the amount of albumin urinary excretion increases during and shortly after an intense sport on an ergometer cycle [8]. Although, it's shown proteinuria exposes after various sports, influences of triathlon sport on proteinuria hasn't investigated, yet.

Algea & Parish (1985) reported 70-80% participated athletes in various sports activities including contact sports like football, box and sports which don't need to physical contact like track and field, swimming and rowing affected to after training proteinuria [2].

The purpose of the present study was investigation of effect of a triathlon competition including swimming, bicycling and running on glomerular proteinuria in southern regions of Iran's athletes.

MATERIALS AND METHODS

Subjects

The subjects consist of 7 triathlon athletes with age of 22 ± 2 year's old, 174 ± 0.039 cm height and 62.42 ± 4.64 kg weight. By announcement athletes of Fars, hormozgan, boushehr (some of southern provinces of Iran) and expressing the purpose of the research, 7 qualified athletes and volunteer to participate the research were purposefully chosen after receiving approval and execution of medical experiments.

They're healthy athlete people which participated in triathlon sport continuously. First of all, they received complete information about method and steps of the research, then filled the approval and confirmed their health validity after medical experiments.

Competition Schedule

The competition schedule consist of a triathlon speed contest including 800 m swimming, 20 km bicycling and 5 km running.

Collecting Method and Analyzing Urine Sample

The subjects were wanted to avoid consuming foods overfilled with protein, fat and caffeine. Also, they're forbidden any physical activity 48 hours before the competition day. The athletes had drunk enough water to form water for gathering samples before and after the competition.

Before, immediately then and 45 min after the competition urine samples were gathered [13]. The samples were maintained in special capsules at 4°C and delivered to laboratory maximally 30 min in entire three times.

The gathered samples were analyzed using urine electrophoresis method and the amount of total protein, globulin and albumin were gauged for each sample. Electrophoresis method worked gel agar and urine samples were concentrated before experiment. Concentrations were done by mimicon S15 concentrators (Amico Co.).

In this method, more than 5 ml urine sample is set into the container. The existing water of the sample passes through membrane of the container, and caught by absorber. In contrast, proteins remain inside the samples including total protein, globulin, albumin and etc. Now, the concentrated urines are transplanted on the gel-agar and connected to plus and minus poles.

The existing proteins in urines move from minus pole to plus one and aggregated on the gel band like strips based on weights and the movement speed. After importing the band to processor, computer would investigate data and print results by exclusive software which was written for this experiment.

Statistical Method

In the present study, following determining parametric statistics by kolmogorov-Smirnov test to investigate variant changes from before to immediately after and to 45 min after the competition, variance analysis method with repeated measurements was utilized. In order to determine the origin of difference and decrease in error percentage, T paired test with bonferroni correction was used.

The Significance level of statistical test considered as $P \leq 0.05$. All of statistical calculations accomplished by the famous statistical software SPSS v.16, and Excel 2003 utilized to plot statistical charts.

RESULTS

Table 1 shows statistical results of the under study variants changes from before to immediately after and to 45 min after the competition.

Table 1: Variations of the study variants from before to immediately after and to 45 min after the competition

Variable	Before Competition	Immediately after Competition	45 min after Competition	P
Albumin (mg/min)	6.30±4.75	99.13±8.66	26.11±12.17	0.000 *
Total Protein (mg/min)	12.69±5.3	137.25±22.15	41.2±13.43	0.000 *
Globulin (mg/min)	4.40±2.21	38.77±9.2	20.32±5.67	0.001 *

** Significance in the level of $P \leq 0.05$ between all of three times with each other*

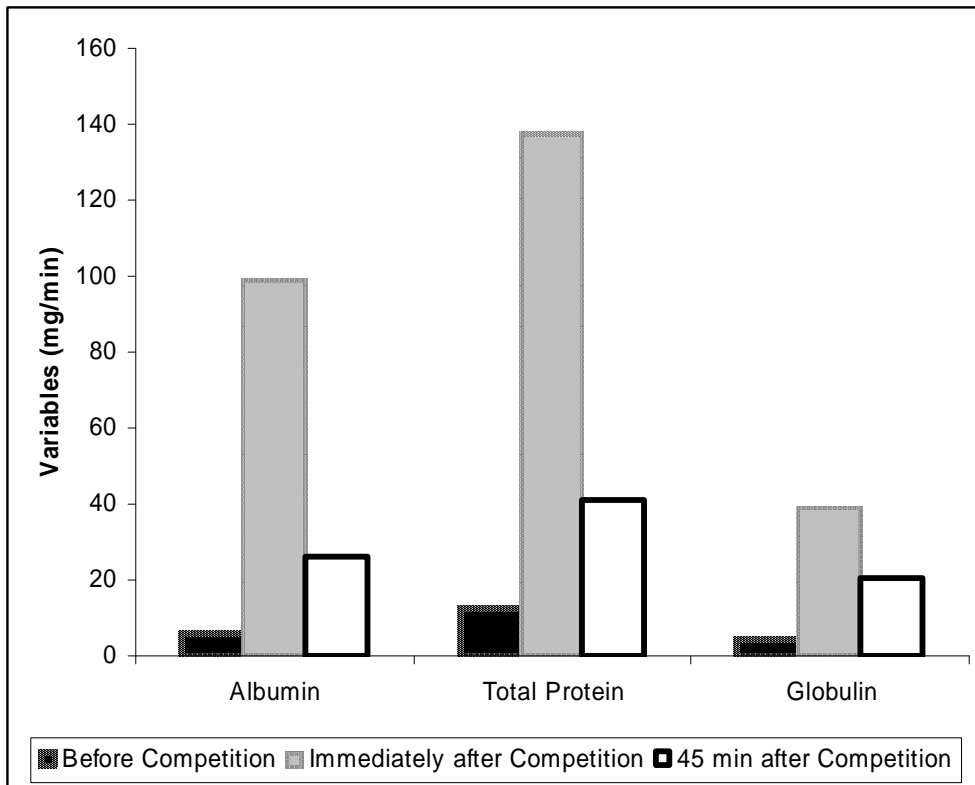


Figure 1: Variations of the study variants from before to immediately after and to 45 min after the competition

All of three urinary variants had significant increases from before to immediately after the contest. Then, they decreased significantly ($P \leq 0.05$), but they're still significantly more than the amounts of before the competition ($P \leq 0.05$).

Also, these results have shown in figure 1.

DISCUSSION

According to the study results, the amounts of urinary total protein, globulin and albumin increased significantly and considerably after the competition. Although, these amounts would lie down on the relaxation values after that, but they're still rather than the amounts of before the contest, significantly.

Previous finds indicate increase of glomerular penetrability in sport proteinuria [12]. Shamlou (1993) reported that more than 30 min physical activities cause to significant increase in the amounts of proteins excretions in both athletic and non-athletic groups [14]. In contrast, Khoshnam (1994) reported insignificant increases of the amounts of total protein urinary excretions in boxers who participated in Asian championship boxing competitions [7].

Poortmans & Vancalck (1978) reported total protein and albumin excretions increase accompany with increment of renal clearance following an intense short exercise [13]. Carroll (2000) reported that proteinuria is a common phenomenon between adults during training. The benign and harmless producing factors of proteinuria include fever, intense physical activity or sport training, losing water of body, nervous stresses and acute deceases. He declared proteinuria concerns to glomerular, Tubular and overflow partitions, which the glomerular part is more evident [3]. De Paolo et al., (2002) showed that urinary proteins excretions increase after sport activity [5]. Turgut et al., (2003) reported significant increases in urinary proteins concentrations after training [15].

But Fooladi Oskoui (2006) reported that one turn military marching in the span of 4 hrs and 2 stages with 15 min rest between the training marching steps, increases the amount of proteinuria, though this increase wasn't significant in aspect of statistical sight [6].

The differences between previous finds probably concern to different trainings intensities. It seems, a triathlon competition is adequate intense to increase proteins excretions with heavy molecular weight.

During training and physical activity, renal blood current decreases which is strictly dependent to training intensity. Following the renal blood current reduction, during the training, the amount of glomerular refinement decreases, and the refinement fraction increases. Therefore, passing of heavy molecular weight proteins through glomerular membrane would facilitate [10].

Increment of plasma renin activity which observed in intense activities, is a result of direct sympathetic stimulation of cellular complex next to glomerular, that could interfere in urinary proteins excretions after sport activities [9]. Kallikrein interference as an enzyme of kinin system which has a close relation with renin angiotensin system could increase glomerular membrane penetrability [9]. The released enzymes from kinin system in urine indicate increment of their activity during healthy people participations in such activities lead urinary proteins excretions [9]. Beside homodynamic and hormonal variations, lose of constant minus charge in capillary wall could interfere in urinary proteins excretions [9].

Zambraski et al., (1981) analyzed variation of renal sialic acids in relation with sport and pointed that sport decreases glomerular electrostatic obstruction and could excuse a part of increase in glomerular macro-molecules passage [17].

Although, urinary proteins excretions of the under study subjects in 45 min after the competition were still more significant than before the contest, but concerning with immediately after the competition, decreased significantly and indeed moved toward relaxation values. It appears, after more span of time, they'll arrive to the relaxation values, completely. So, there's nothing to be worry. Of course, in order to prove the recent issue, rather studies with repeated measurements during after sport period are required.

In study of Poortmans & Vancalck (1987) concerning urinary samples before and after activity, showed that the amount of kinds of proteins excretions return to their initial situations [13]. Also, understandings of Clerico et al.,

(1990) indicated sport proteinuria could be reversible, quickly [4]. Indeed, protein excretion in urine after sport is an instable step with a half-time of 1 hr [10]. Therefore, it's a temporary and benignant condition which couldn't limit physical activity.

In addition, recommended more studies should be done about triathlon sport. It's said, because of losing Plasma Protein in urine, athletes should rather attend to diet in the sight of ample protein foods.

Although, this issue hasn't proved, also annual medical investigations are recommended.

CONCLUSION

According to the founds of the study, it's concluded a triathlon competition consisting 800 m swimming, 20 km bicycling and 5 km running leads to significant increases in urinary heavy molecular weight proteins excretions in urinary samples of triathlon athletes of southern regions of Iran, after triathlon competition. Then, after initial increments, they would decrease following 45 min after the competition. But, they're still more than ones before the contest.

Although, previous researches reported both significant increase and nonbeing variation in urinary proteins excretions, following sport activities, it seems these differences concern to changes of sport activities intensities.

However, there isn't any research which investigates proteinuria in triathlon athletes, in previous studies. Concerning the present understandings, it appears a triathlon competition which executed by triathlon athletes of southern regions of Iran, is so intense that leads to significant and considerable increase in heavy molecular weight proteins excretions. Also, it seems after initial increases, the amounts of proteins excretions return to the basic values. Though, in order to confide in the recent issue, rather investigations with more sampling are required. It doesn't appear urinary proteins excretions limit activities of triathlon athletes of southern regions of Iran.

Anyway, more investigations of sport proteinuria following triathlon sport by measuring other proteins like light molecular weight ones and calculation of protein to urinary creatine ratio and also study with more subject are required in future.

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