The Effects of one session Submaximal Aerobic activities on Albuminuria in Amateur Football players

Seyed Yaghoob Sharifi, Reza Hasani, Mohammad Hassan Boostani, Mohammad Ali Boostani

INTRODUCTION

Whereas proteinuria is an index in renal disorder and kidneys have important role in human health, Post exercise proteinuria has always been subject of attention. Physical activities and sport competitions along their beneficial effects, and because of their stressful nature, make interim homeostasis disorder, would cause bad effects if not observing the basics of exercise methods.

The proteinuria is increased following heavy physical activities and one factor for kidney disorder is proteinuria and hematuria. Physical activity makes notable changes in kidney function and amount of proteinuria, so proteinuria is a well recognized phenomenon among sportmen. Increased Proteinuria after physical activity is an interim phenomenon and has no relevance to pathological situation. Mechanisms responsible for this process in healthy people are still unknown and require more researches. Still, changes in the filtration rate of capillary wall of the glomerular tuft changes in Hemodynamics and incomplete tubular reabsorption of the protein in kidney may be responsible for exercise-induced proteinuria. These changes are different in participants of various sports and depend highly on training intensity. Soft training by healthy people causes glomerular proteinuria and specially albuminuria. It is observed that the proteinuria is increased following heavy physical activities.

Renal disorders caused by sports activities first were reported in 1878, after observing the incidence of proteinuria in soldiers, who had hard physical activities [29]. Albumin is the main protein in human plasma [26] and generally referred to any protein which is soluble in water. Albumin is a protein with molecule weight of 65000 Dalton and 6 nanometer long. Serum Albumins are needed to adjust blood amount by preserving osmosis pressure [26]. Von Leubo (1878) reported increased proteinuria in the urine of healthy people who did physical activities. He observed that from among 119 soldiers without morning albuminuria, 14 people had proteinuria after military exercises and long parades [29]. Clerico et al. (1965) observed much albuminuria with proteinuria caused by exercise [4]. It has been shown that amount of albuminuria increases after exercise which is a sign of glomerular origin of proteinuria after exercise [9,15,16,25]. Kramer et al. (1988) showed that albuminuria increased in a short period after heavy exercise on bicycle ergometer [12]. Clerico et al. (1990) showed that after exercise albuminuria was more than normal in athletes after doing exercise [3].
The purpose of the present study was to determine the effects of one session of submaximal aerobic exercise on albuminuria in young football players and discussing the mechanisms and factors.

MATERIAL AND METHODS

Subjects:

The subjects of this study consisted of 7 young male football players competing that their characteristics were: Age: 18±0.5 years, height: 174±0.039 cm, weight: 64.42±4.64 kg, maximum oxygen usage: 47.6±4.83 ml/kg/pm and BMI: 20.53±2.4 kg/height squared. These young men had playing experience in the premier league of Fars province, Iran in the past 3 years. Announcing call for youth football teams in the premier league of Fars province and elaborating the purposes of the present study, 7 players eligible to participate in the study after receiving informed consent and medical examinations and tests were selected. The subjects were non-smokers with no background of renal, heart and lever etc, disorders and had not a surgery or medical treatments in 6 months before conducting the experiments of this study. Indeed, they were healthy and athletic people who had regular practice at least 3 days a week.

Data Collecting Method:

After designation of subjects, full information on methods and stages of research was given to them. Then, they filled in a written consent form and their health conditions were confirmed by a physician. The subjects were asked to avoid taking meals full of fat, proteins and caffeine at night before sampling day and were asked to avoid physical activity 48 hr. before starting exercise. In the morning of sampling day, each subject had to empty his bladder and rest sitting without physical activity. They had to be present at the exercise location 2 hr. before doing sport, they drank enough water before and after each session to have urine for sampling. Urine samples were taken before, soon after and 45 min from the exercises [15]. The samples were stored in special containers at 4 c. and were delivered to laboratory after at most 30 min. The collected samples were analyzed by urine electrophoresis method and the amount of albumin for each sample was determined. The method was electroforsis on agar gel. Urine was concentrated before test. Concentration of urine was done by Mimicon S15 (amicon company) concentrators. 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 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.

Exercise program:

The exercise program was consisted of one session of 30 min. aerobic running on treadmill, at 85% of maximal heart rate.

Statistical Methods:

In the present study in order to make sure that the data distribution is normal and to determine the parametric or non parametric statistical test, the resulted data was first investigated using kolmogrov-smirnov test and it was determined that the data posses normal distribution and could use parametric tests. So in the present research to study albuminuria before, soon after and 45 min from the exercise the method of analysis of variance by Repeated Measuring was used and to determine the origin of difference paired-samples t-test with Bonferroni correction was also utilized.

Results:

Table 1 show statistical results related to changes in studied variable before, soon after, and 45 min from the exercise. Urinary albumin excretion increased significantly and decreased 45 min. after exercise, but still was notable compared to before that.

| Variable | BBefore exercise mg/min | Soon after exercise mg/min | 45min after exercise mg/min | The mean difference
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<tr>
<td>Albumin</td>
<td>6.245</td>
<td>77.142</td>
<td>16.228</td>
<td>* soon after and 45 min after the exercise 0.000</td>
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* The mean difference is significant at the 0.05 level
Discussion:

Based on the findings of present study, albuminuria increased significantly soon after one session of submaximal aerobic exercise, at 85% of maximal heart rate. Clerico et al. (1990) observed much albuminuria with proteinuria caused by exercise, which was in accordance with reports by others [2,3,14].

It has been shown that amount of albuminuria increases after exercise which is a sign of glomerular origin of proteinuria after exercise [9,15,16,25]. Gardner (1965) explained that there is a difference between pattern of proteinuria after sport and the syndrome of nephrotic caused by increase in albumin, since these changes are benign, temporal and reversible [8]. Viberti et al. (1978) showed that among diabetics, compared to non-athletic group’s healthy subjects, greater Post exercise albuminuria was seen [28]. Feldt et al. (1985) observed diabetics who had greater Post exercise albuminuria than diabetic’s non-athletic groups [8]. Kramer et al. (1988) explained that increased albuminuria during sport was proved in healthy subjects when doing maximal and submaximal exercises, but some researchers did not find any albuminuria during sport in healthy subjects, of course in submaximal exercises [12]. Clerico et al. (1990) found that average Post exercise albuminuria in active athletes was 18 mg p/min, which is notable and clearly exceeds normal limit (11.5 mg p/min) [3].

Kramer et al. (1988) and Clerico et al. (1990) reported that Post exercise albuminuria is more than that amount of albuminuria in urine samples of non-athletic groups [12,4]. Consenzi et al. (1995) showed that albuminuria increased meaningfully after exercise [5]. Stachenfeld (1996) also reported the same results [27]. In albuminuria, the main roles are played by loss of chosen characteristics electrostatic characteristics of glomerular membrane [6].

Sport also makes great changes in renal homodynamic. During exercise, the effective flow of renal plasma reduces and at the time of heavy activities, it sometimes reduces to 25 percent of its relaxation value. It seems that, sympathetic neuron activities and hormonal systems play roles in this trend. Following the renal blood current reduction during the training, the amount of glomerular refinement (GRE) decreases [16]. There is a close link between plasma reduction and albuminuria which. This link is said to be caused by effect of intense activities on renal responses. 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 [5,17]. Kallikrein interference as an enzyme of kinin system which has a close relation with renin angiotensin system could increase glomerular membrane penetrability [5,17]. The released enzymes from kinin system in urine indicate increment of their activity during participation of healthy people in such activities which lead to urinary proteins excretions [5,17].

Also, based on the findings of present study, albuminuria decreased significantly 45 min after exercise, but still was notable compared to albuminuria soon after exercise. This case is nothing to be worried about. It seems that if urine sample was studied 1 hr, not 45 min after the exercise, this increase was not notable and indeed, the amount of albuminuria moved toward relaxation values, as it had moved toward relaxation values 45 min. after the exercise. And it is possible that, if the intensity and duration of exercise becomes less, albuminuria 45 min after exercise can be completely gone away, but more studies have to be done.

In the studies of Poortmans & Vancalck and Kohanpour et al. the amount of albuminuria 45 min after exercise, was little than amount of albuminuria soon after exercise [10,15]. And this is in accordance with previous findings that albuminuria is an instable step with a half-time of 1 hr. and the most albuminuria occurs in 20 to 30 min. after physical activities.

Conclusion:

The results of present study showed that albuminuria increased significantly soon after submaximal aerobic exercise, at 85% of maximal heart rate, but then moved toward resting amounts. Its mechanism could be charged disorders and Hemodynamics, hormonal and enzyme changes. According to the findings of the present study and other researches, afterward albuminuria couldn’t limit activity conditions. Indeed, albuminuria after physical activity is an interim phenomenon and has no relevance to pathological albuminuria and it has no damaging effects on athletes, but occasional medical research is recommended.

REFERENCES


