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**EFFECTS OF A BADMINTON MATCH ON URINARY EXCRETION OF LIGHT
MOLECULAR WEIGHT PROTEINS (TUBULAR PROTEINURIA) IN YOUNG
WOMEN**

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ABSTRACT

The purpose of the present study was investigation of urinary excretion of light molecular weight proteins or tubular proteinuria in young women, following a badminton competition.

Ten volunteer young women with averages age of 26 ± 2.11 year old, height of 168.7 ± 4.76 cm and weight of 62.5 ± 5.88 kg, participated in a badminton match. Urinary samples were gathered, before and after each 20 min exercise, and amount of beta-2 microglobulin was gauged for each sample. In order to investigate variations of urinary beta-2 microglobulin (resulting from exercise), paired t-test was implemented.

Badminton exercise did not generate any significant change in urinary beta-2 microglobulin ($P > 0.05$).

According to the results of the study, tubular proteinuria does not have any role in proteinuria occurrence after badminton exercise. Tubular proteinuria would usually appear in intense exercises. However, there is no evidence to could state exercise proteinuria exposes person to chronic renal diseases, and there is no need to limit physical activity of such people. Nevertheless, annual medical examinations are recommended.

Keywords: Tubular Proteinuria, Beta-2 Microglobulin, Badminton, Young Women

INTRODUCTION

Proteins with molecular weights of less than 40,000 Dalton (like beta-2 microglobulin, lysozyme, etc) are easily refined from glomerule. However, they are negligibly found in urine, because of adequate tubular reabsorption. The diseases, which have further tubular lesions than glomerular ones, accompany with urinary excretion of this group of light molecular weight proteins that is called tubular proteinuria [4].

The level of albumin excretion is negligible or even zero, among these patients [4]. Because, they does not encounter glomerular disorders, and the tubular ones would cause proteinuria. Nevertheless, the glomerular disorders would also lead to another type of proteinuria, which is not the issue of the present study. Creeth et al (1963) Showed the molecular sizes of urinary proteins have smaller sizes in tubular proteinuria than glomerular proteinuria [9].

Although proteinuria is a renal disease, but exercise proteinuria, which occurs following physical activity and is rather common among intense activities, is a reversible process that does not accompany with clinical symptoms [5]. Exercise proteinuria is a transient, reversible and mild process that involves plasma proteins, does not accompany with clinical properties and is common among both human and animals [11,14]. Urinary protein

excretion increases, following high intensity exercises [11,14].

In 1878 and for the first time, urinary disorders of sport activities were reported by proteinuria of soldiers, who had intense physical activities [21]. In tubular proteinuria, which is recognized by increase in excretion of lightweight proteins of plasma, absorption of the proteins with light molecular weight was limited by renal tubules [11, 14,23]. Post-exercise proteinuria mostly relates to the intensity of exercise, rather than its span [10, 14, 15, 17, 18, 23].

Maximum protein excretion occurs during the first 20-30 min of after exercise [4], and this disorder might even last until 45 min of after the exercise, before relieving to the initial state [12]. Clerico et al (1990) stated the amount of post-exercise albumin excretion was further than normal, among trained athletes [7]. Turgut et al (2003) reported a significant increase in concentration of urinary protein, following exercise [20].

Delforg et al (1969) indicated that the increment of intensity of exercise would generate greater proteinuria, and this conclusion approved by Cachatorian and Johansson (1970) and Tudorovich et al (1972), after that [18]. Consenzi et al (1995) showed excretion of alpha-1 microglobulin

would significantly increase, after physical activity [8]. Previous results indicate increment of glomerular permeability and limitation of tubular reabsorption in exercise proteinuria [12]. In contrast, some results did not report any significant increment [2,3]. The worthwhile role of sport and physical activity in fitness maintenance and leisure is not hidden to anybody. Nowadays, very groups of the people do exercises. In this regard, badminton is one of desirable and favorable sports that could be done by many people, especially women, for the purposes of fitness. The aim of the present research was determination of urinary beta-2 microglobulin amounts, at two moments of before and 20 min after badminton exercise, among active young women.

SUBJECTS AND METHODS

Subjects

The subjects consisted of ten active young women of Tehran city with averages age of 26 ± 2.11 year old, height of 168.7 ± 4.76 cm and weight of 62.5 ± 5.88 kg, who had regular physical activity precedence, during the last two years. These women were purposefully chosen, after signing the consents and medical examinations. They were non-smokers, who did not have any precedence of chronic renal, liver or heart disease (or any other chronic disease). They did not undergo any particular

type of surgery and had not any medicine treatment. Indeed, they were healthy people, who have two weekly regular exercises, averagely.

Data Collecting Method

After selection of the subjects, the complete information about the approach and stages of the research was explained to them, at first. Thereafter, they filled the consents and their healthiness was approved, after medical examinations. They were asked to avoid consumption of rich protein, fat and caffeine foods, at the night before the samples gathering day. In addition, they were prohibited from performing any physical activity, 48 hr before the exercise beginning. They drained their bladder, in the morning of exercise day. Then, they sat and rested in an appropriate place without any physical activity and went to the gym, 2 hr before the exercise beginning. In order to urine formation for the sample collecting turns (before and 20 min after the exercise), the subject drank adequate water, in the morning of the sport day. The urine samples were taken from the subjects, before and 20 min after the exercise. The samples were preserved in specific containers and at temperature of 4°C until delivery to the lab (lasting at most 30 min from samples collecting to the delivery, in both turns). Beta-

2 microglobulin was evaluated as the index of tubular damage, for each sample. Concentration of urinary beta-2 microglobulin was gauged by Chemiluminescence method using DiaSorin (USA) kit with sensitivity level of 0.12 (mgr/l).

Sport Schedule

The sport schedule consisted of a badminton competition, for each two subjects. So, five badminton competitions were held. Players of the matches were arranged randomly. These matches were held in three games, and the one who won two games was the winner of her match, according to the Badminton World Federation (BWF)'s laws. Thus, whenever a player wins the first two games of a match, the third one will not held in that match. Each game was played to 21 points, with players scoring a point whenever they win a rally regardless of whether they served. If the score reaches 20-all, then the game continues until a

player gains a two points lead (such as 24–22), up to a maximum of 30 points (30–29 is a winning score). There was 60 sec rest time at the score 11 of each game, and 120 sec rest interval between each 2 successive games.

Statistical Approaches

The statistical test of Smirnov-Kolmogorov was implemented, to determine the utilizing of either parametric or non-parametric tests, and the naturalness of the distribution was approved, to use parametric tests. Thus, paired t-test was applied, to investigate variations of the under study variable, from before to after the exercise.

RESULTS

Table 1 shows the statistical results of urinary bata-2 microglobulin change from before to 20 min after the exercise. The observed variation of beta-2 microglobulinuria was not significant ($P=1.11$).

Table 1: Statistical results of the under study variable, from before to 20 min after the exercise

Variable	Before the Exercise	After the Exercise	t	P*
Urinary Beta-2 Microglobulin (mgr/l)	0.050±0.015	0.052±0.016	1.76	1.11

* Significant at the level of $P \leq 0.05$

DISCUSSION

The results of the present study indicated that the amount of urinary beta-2 microglobulin would not significantly change, after a badminton match. However, it increased negligibly. This state was on the contrary to results of Consenzi et al (1995) and in

agreement with those of Winterborn et al (1987). The contrary of these results might probably concern to the activity intensity issue. The badminton matches of the present research might not probably have adequate range of intensity that would lead to an observation of a significant increase in

urinary beta-2 microglobulin. Since tubular reabsorption disorder has not any part about occurrence of proteinuria in mild and even moderate intensity exercise, this situation can be matter-of-course. In a possible manner, physical activity stimulates a tubular proteinuria, thus the exercise proteinuria might also has a tubular origin, besides its glomerular one [7].

Poortmans et al (1991) reported some increases in amounts of beta-2 microglobulin, after swimming matches with different distances [13]. Previous results represent limitation of tubular reabsorption along with increment of glomerular permeability, in exercise proteinuria [13]. Agha Alinejad (1994) stated beta-2 microglobulin did not have any significant change, after a physical activity with 75 percent of maximal aerobic power in two groups of athletic and-non-athletic male students. Khoshnam (1994) reported an insignificant increase in amount of urinary beta-2 microglobulin among the boxers, who competed in Asian Boxing Championships.

In contrast, Consenzi et al (1995) showed that urinary excretion of alpha-1 microglobulin would significantly increase, after physical activity [8]. It has been indicated that a heavy intermittent load would produce an increased

urinary excretion of beta-2 microglobulin [16]. Very high amounts of beta-2 microglobulin renal clearance have been shown, after cutting exercise [16]. This issue implies that post-exercise proteinuria has a tubular origin, too [16].

Poortmans et al (1988) indicated an increase in urinary excretion of beta-2 microglobulin along with an increment of blood lactate and an increase in the renal clearance of this protein, in addition [16]. It has been shown in high intensity exercises that several amino acids prevent from tubular reabsorption of protein [19]. More than 95 percent of filtered proteins are reabsorbed by primary tubular cells and converted to amino acids, in rest moments [18]. Because of reabsorption capacity compilation in overflow proteins, these the very amino acids prevent from further tubular reabsorption [6]. Post-exercise proteinuria is not the intensification of a physiologic proteinuria. Glomerular proteinuria is the predominant type in exercises with mild to moderate intensities, and mixed glomerular-tubular proteinuria is observed in short intense exhaustive exercises. Hence, the two types of glomerular and tubular proteinuria are observed in exercises [4]. In other words, both increment of glomerular permeability and disorder of

tubular reabsorption of plasma proteins are the factors and mechanisms of proteinuria, in post-exercise proteinuria [4].

However, proteinuria increases significantly, only in intense exercises. Absorption of light molecular weight proteins might limit by renal tubules, in such exercises. Maximal tubular reabsorption might occur, during high intensity exercises. Thereafter, tubular proteinuria would appear [4]. Proteinuria would relapse at certain level of exercise. However, there is no evidence to declare proteinuria exposes the person to chronic renal diseases. Therefore, there is no need to restrict physical activity of such persons. People who have exercise proteinuria must have annual urine test and medical examinations. Whenever the amount of proteinuria remained constant and other related medical symptoms do not appear, further examinations are not required.

CONCLUSION

Badminton may not be so intense to cause disorder of tubular reabsorption, urinary excretion of light molecular weight proteins and actually tubular proteinuria. However, some variables such as blood lactate shall be investigated in future studies, to hand a superior interpretation of the results. By the

way, a concrete conclusion cannot be achieved, by only one study.

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