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Effect of Eight Weeks Intermittent Resistance Trainings on Excretions of Urinary Proteins in Rest Time and in Response to one Turn of Resistance Sport in Active Young Women

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ABSTRACT

The purpose of the present study was determination of acute and chronic effect of 8 weeks intermittent resistance trainings on amounts of Albumin, Total protein, β-2 microglobulin, creatinine, and Protein to creatinine ratio and urinary red globules of active young women. 14 student girls of Tehran city with ages of 20-25 years old were purposefully chosen and randomly divided to 2 groups of intermittent resistance training (7 persons) and control (7 persons). They attended 48 hr before and 48 hr after progressive intermittent resistance in test session, which urinary samples were taken from the training group, immediately then and 1 hr after one session intermittent resistance activity with similar intensity to before and after the trainings period, and from the control one, without doing any activity. For each sample, amounts of total protein, albumin, β-2 microglobulin, creatinine and red globules of urine and also amount of urinary protein to creatinine ratio were measured and calculated. In order to investigate variations of variables in the training group, T paired test was used, and to compare relaxation levels of variables between the training group and the control one, independent T test was utilized. The training group showed greater albuminuria, Total proteinuria, and β-2 microglobulinuria to the control one ($P<0.05$). Albuminuria and β-2 microglobulinuria increased in intermittent resistance training group and even in the control one, and total proteinuria only significantly increased in the training group ($P<0.05$). Urinary protein to creatinine ratio and hematuria in intermittent resistance training group didn't show any significant difference in comparison with the control one ($P>0.05$). Urinary protein to creatinine ratio and hematuria in intermittent resistance training group increased, significantly ($P<0.05$).According to these results, intermittent resistance trainings might cause increase in hematuria, tubular and glomerular proteinuria. However, proteinuria of the present study was lower than nephrotic domain. Hence, intermittent resistance trainings couldn't limit activity and it's different from pathologic conditions.
KEYWORDS: Resistance Trainings, Proteinuria, Hematuria, Intermittent Trainings, Protein to Creatinine Ratio.

INTRODUCTION

Attention to sport and physical activities becomes an unavoidable issue. This attention exists in the whole classes of society and with various purposes. Physical activity and sport accompany with physiologic consistencies. In the other hand, resistance trainings have been paid attention by many people, especially women in purposes of fitness, recently. Measurement of physiologic indices following various trainings schedules could aid to better understanding of acute and chronic effects of resistance trainings. There're few researches about investigation of physiologic responses and consistencies after resistance trainings, specifically about intermittent kinds. Investigation of these responses and consistencies after various resistance trainings could increase knowledge of sport coaches about physiologic consistencies following the same trainings schedule. Exercise can induce temporary proteinuria (18–100%) and hematuria (20–100%), which usually resolve within 24–48h (1).

Proteinuria is mainly influenced by exercise intensity rather than duration, while hematuria depends on both duration and intensity (2,3). Post exercise proteinuria is a well-known phenomenon in both animals and humans (4, 5, 6, 7). Large proteins, such as Globulin and Albumin cannot pass through glomerular membrane and therefore, are observed in very small amounts in urine, but in case of glomerular damages their amounts in urine increase, a

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condition called glomerular proteinuria (8). Proteins with lower molecular weights such as β-2 microglobulin, and lysosome easily pass through glomerule, but due to sufficient tubular reabsorption, these proteins are also found in very small amounts in urine (8,9). In medical conditions accompanied by tubular disorders the presence of these proteins increases, a condition called tubular proteinuria. It is observed that the proteinuria is increased following heavy physical activities (10). Renal disorders caused by sports activities first were reported in 1878, after observing the incidence of proteinuria in soldiers, who had hard physical activities (11). Post exercise proteinuria is a well-recognized phenomenon among human athletes, the severity of which has depended on the intensity of the exercise (9,12). It has been suggested that the presence of excess protein excretion in urine may be due to a disturbance in the selective permeability in the glomerulus associated or not with a saturation process in the reabsorption of the filtered protein load (9,13). These assumptions have been based on renal clearance of high and low molecular mass plasma proteins (9). In renal disease in which glomerular permeability is increased, a larger excretion of proteins with high molecular mass has been observed (9). It has been reported that when proteinuria is a consequence of tubular dysfunction, the amount of protein filtered by the glomeruli remains stable and the proteins with low molecular mass appear in larger quantity due to their incomplete tubular reabsorption (9,14). The proposed mechanism of exercise-induced proteinuria involves increased glomerular permeability and exceeding the maximum tubular reabsorption capacity (5,6). Renal blood flow and glomerular filtration rate decrease during exercise. The decrease in blood flow is more apparent, and the filtration fraction increases during exercise, which facilitates the passage of proteins into the ultra filtrate (5,6).

Also, the loss of fixed negative charge from the capillary wall of the glomerular tuft may be responsible for exercise-induced proteinuria (5,15). Still another mechanism suggested for post exercise proteinuria is the maximal tubular reabsorption capacity being exceeded during heavy exercise (5,6,16,15). Algea and Parish (1958) reported that most sportsmen attending either contact or noncontact sports activities are observed to have a variety of proteins in their urine (17). Glomerular type and both glomerular and Tubular types have been observed after moderate and heavy exercises respectively (18, 5). Poortmans and Vancalck, (1978), reported excretion of proteins after short strenuous exercise. They reported increase in total protein and Albumin content as well as renal clearance increase after exercise (19). Carroll (2000) reported that Proteinuria is a common problem among adults attending sports activities. It was also reported that fever, high intensity physical or sports activities, body water loss, mental stress, and serious diseases are benign and in dangerous factors that may cause proteinuria. According to him proteinuria may be categorized as glomerular, Tubular, and overflow, of which glomerular type is most pronounced (20). With a view to the existing research past, it's distinct that study about effect of a resistance trainings period on consistencies (relaxation levels) and response (response to one turn of acute sport) to these consistencies of proteinuria and hematuria is scant and results of this study could accommodate useful information to researchers.

The purpose of the present study was determination of acute and chronic effects of 8 weeks intermittent resistance trainings on amounts of albumin, total protein, β-2 microglobulin, creatinine, protein to creatinine ratio and urinary red globules of active young women.

MATERIALS AND METHODS

Subjects

Statistical society of this study consisted of the whole active student girls of Tehran city. Fourteen 20-25 years old girls with averages of age of 22.571±1.804 years old, height of 161.19±4.094 cm, weight of 56.904±6.533 Kg, maximal oxygen consuming of 38.428±1.567 (ml/ (Kg. body weight. min)) and Body Mass Index (BMI) of 21.789±1.999 (Kg/ height squared) declared their readiness for participation in the research, and were purposefully chosen as subjects and were randomly divided to 2 groups, including an intermittent resistance training group (7 persons) and a control one (7 persons). All of subjects have perfect physical healthiness (physician approval).

Data Collecting Method

One week before research execution, the subjects became familiar with trainings protocol and study method, in explanatory meeting. In this meeting, height, weight, Body Mass Index (BMI), maximal oxygen consuming and also maximal power (1RM) of each movement were measured, furthermore making the subject familiar with resistance movements. Then, the subject attended in test session, 48 hr before trainings beginning. And, before, immediately then, and 1 hr after an intermittent resistance exercise session, urinary samples were taken from the subjects. This session was conducted with intensity of 20% of a maximal repetition. Then, the subjects performed their trainings schedule in span of 8 weeks, progressively. The control group didn't carry out any exercise and its subjects only did their usual daily activities. After ending of 8 weeks trainings, and after 48 hours, proportional to rest interval between samples collecting first day and trainings beginning (48 hr), last session of resistance activity was

conducted exactly the same as the first day and with the same intensity of 20% of a maximal repetition. Before, immediately then and 1 hr after this session, urinary samples were taken, too.

Trainings Schedule

Resistance trainings were in a progressive manner and consisted of 8 weeks and in figure of 3 days a week (1 day on/ 1 day off). Percentages of a maximal repetition and execution speed considered as intensities and masses of trainings. Masses of trainings were kept constant and intensities of trainings increased, progressively. The progressive implemented overload was in a manner that, the subjects performed their trainings, during these 8 weeks, with intensities of 20%, 25%, 30%, 35%, 40%, 45%, 50% and 55% of a maximal repetition for first to eighth weeks, respectively. Resistance trainings were designed in a circular figure and an intermittent method. Each circle included chest press, feet press, fore-arms, fore feet, rear-arms, rear-feet and side tension (or length) which order of movements executions were in the same disposal. Duration of each station considered as 2 min and 30 sec. The training group was executing 10 sec of each station with speed of 2V and then 20 sec of it with speed of $\frac{1}{2}$V, until finishing of 2 min and 30 sec of that station. Speeds of movements were controlled by metronome. Relaxation interval between 2 successive stations was 1 min and between 2 successive circles was 2 min. 2 circles were considered in each exercise session. The resistance activities before and after the trainings period, which were counted as test and samples collecting sessions, preformed as the same way and with intensity of 20% of a maximal repetition. Each person started and finished her entire activity sessions in particular times, which were the same for her entire training sessions. The subjects of control groups didn't performed any physical and sport exercise, in this duration, and only did their daily and usual activities.

Urinary Samples Collecting and Analyzing Urine Samples

Before, immediately then and 1 hr after the first test (48 hr before trainings beginning) and the final one (48 hr after trainings ending), urine samples were collected. The control group only gave urine samples (in company with the training group) at the beginning and ending of 8 weeks period. It should be mentioned, in order to compensate lost liquids, adequate drink was considered for the subjects, after each activity session. Urine samples were preserved in frigid condition and at -20℃, until arrived to Lab and there, laboratory examinations began, immediately. It should be noticed, the subjects were requested that avoid consuming cigarette, alcohol and caffeine at the nights before samples collecting and in the stages of the research. Entire steps of sample collecting were carried out for each subject in the same conditions. Also, each person presented for sample collecting at his particular time, which was the same for before and after the trainings period. For each sample, amounts of total protein, albumin, β-2 microglobulin, creatinine and red globules of urine and also protein to creatinine ratio were gauged and calculated. Total protein was measured by Bradford method using Bradford kit with normal limitation of 0-8 (mg/dl). Albumin was gauged by Bromocresol Green Colorimetric method utilizing Quick Chem. kit with normal limitation of 30-300 (mg/24h). Beta-2 microglobulinwas measured by ELISA method utilizing Diametra kit with sensitivity of 0.1 (mg/dl) and with normal limitation of less than 0.2 (mg/dl). Creatinine was gauged by Colorimetric method using Quick Chem. with normal limitation of 800-2000 (mg/24h). Hematuria was measured by Cell Counting in Microscope method with normal limitation of 0-4 (RBC/HPF). Also, after conversion of total protein unit to (mg/24h), urinary protein to creatinine ratio calculated utilizing equation of 300×(mg/dl) and division of obtained numbers to creatinine, based on (mg/24h) unit.

Statistical Method

At first, value of each under study variable in each samples collecting time, was described using mean and standard deviation. Then, in order to determine naturalness of distribution, Smirnov-Kolmogorov test was utilized. To investigate variations of under study variants in the training group, variance analysis test with repeated measurement and Fisher's Least Significant Difference (LSD) test were utilized. Also, sphericity of data was investigated, simultaneously with performing variance analysis test, to implement Greenhouse-Giggs modification on degree of freedom, in necessary cases. Also, in order to investigate variations in control group, T paired test was used. To compare relaxation levels of variables between the training group and the control group, independent T test was used. Significance level considered as 0.05, for all of statistical tests. In order to carry out statistical calculations, the statistical software SPSS v.16 was utilized.

RESULTS

Values of albumin, total protein, β-2 microglobulin, creatinine, protein to creatinine ratio and urinary red globules have been reported in table 1. The values were represented as mean and standard deviation. In order to investigate variations of variables, concerning results to variance analysis test with repeated measurement have been presented in table 2. and, table 3 shows results of Fisher's Least Significant Difference (LSD) test following variance analysis test with repeated measurement. Table 4 has reported results of T paired test concern to changes of control group, and table 5 has reported results of independent T test concern to comparison of relaxation levels between the training group and the control one.

Albuminuria in intermittent training group and during research period, significantly increased (P=0.000). In addition, albuminuria increased significantly, in control group (P=0.004). Both before and after 8 weeks trainings, albuminuria of the training group, in rest time, was significantly more than albuminuria of the control one (P=0.023 and P=0.003, respectively). Even, albuminuria increased significantly, in control group (P=0.004).

Total proteinuria increased significantly, in intermittent resistance training group and during study period (P=0.001). But, total protein hadn't any significant variation in control group (P=0.078). After 8 weeks trainings, total proteinuria of the training group, in rest time, was significantly more than its value in the control group (P=0.03). Total proteinuria in control group hadn't any significant change (P=0.07).

Beta-2 microglobulinuria increased significantly, in intermittent resistance training group and during research period (P=0.000). In addition, β-2 microglobulinuria increased significantly, in control group (P=0.000) after 8 weeks trainings, β-2 microglobulinuria of the training group, in rest time, was significantly more than its value in the control one (p=0.001). Even, β-2 microglobulinuria increased significantly, in control group (P=0.001).

Table 1: Values of albumin, total proteinuria,-2 microglobulin, creatinine, protein to creatinine ratio and urinary red globules

Variables	Sampling Times	Training Groups	Control Groups
Albumin (mg/24h)	Pre	83.571±22.977	59.428±8.847
	Post 1	102.14±24.538	
	Post 2	122.43±41.923	
	Post 3	135.57±41.035	74.142±11.838
	Post 4	141.14±35.802	
	Post 5	170.43±38.100	
Total Protein (mg/dL)	Pre	1.342±0.382	1.234±0.316
	Post 1	1.564±0.618	
	Post 2	2.055±0.708	
	Post 3	2.207±0.728	1.454±0.382
	Post 4	2.485±0.696	
	Post 5	2.592±0.695	
β_2 microglobulin (mg/dL)	Pre	0.584±0.083	0.598±0.084
	Post 1	0.764±0.104	
	Post 2	1.008±0.304	
	Post 3	1.311±0.275	0.81±0.153
	Post 4	1.482±0.290	
	Post 5	1.657±0.290	
Creatinine (mg/24h)	Pre	904.29±51.178	889.14±47.505
	Post 1	976.14±73.987	
	Post 2	1096.1±64.527	
	Post 3	1159.1±54.364	982.14±73.249
	Post 4	1212.7±62.462	
	Post 5	1267.9±67.873	
Protein to Creatinine Ratio (mg/24h)	Pre	0.444±0.122	0.418±0.112
	Post 1	0.484±0.206	
	Post 2	0.563±0.201	
	Post 3	0.571±0.189	0.446±0.124
	Post 4	0.614±0.173	
	Post 5	0.613±0.171	
Haematuria (RBC/HPF)	Pre	0.285±0.487	0.428±0.534
	Post 1	0.428±0.786	
	Post 2	0.571±0.534	
	Post 3	0.857±0.960	0.571±0.534
	Post 4	1.285±0.755	
	Post 5	2.285±1.380	

Table 2: Statistical results of variance analysis test with repeated measurement in order to investigate changes of under study variables in the training group

Variables	F	P
Albumin	29.256	0.000 *
Total Protein	15.543	0.001 *
β_2 microglobulin	65.954	0.000 *
Creatinine	74.886	0.000 *
Protein to Creatinine Ratio	4.651	0.035 *
Haematuria	6.960	0.007 *

*The mean difference is significant at the 0.05 level

Table 3: Results of Fisher's Least Significant Difference (LSD) test following variance analysis test with repeated measurement in order to investigate variations of under study variables in the training group (only significant differences have been reported)

Albumin	Total Protein	β_2 microglobulin	Creatinine	Protein to Creatinine Ratio	Haematuria
Pre-Post1 (P=0.007)	Pre-Post2 (P=0.021)	Pre-Post1 (P=0.001)	Pre-Post1 (P=0.019)	Pre-Post4 (P=0.036)	Pre-Post4 (P=0.038)
Pre-Post2 (P=0.006)	Pre-Post3 (P=0.019)	Pre-Post2 (P=0.004)	Pre-Post2 (P=0.000)	Pre-Post5 (P=0.040)	Pre-Post5 (P=0.010)
Pre-Post3 (P=0.002)	Pre-Post4 (P=0.005)	Pre-Post3 (P=0.000)	Pre-Post3 (P=0.000)	Post1-Post4 (P=0.038)	Post1-Post5 (P=0.026)
Pre-Post4 (P=0.001)	Pre-Post5 (P=0.004)	Pre-Post4 (P=0.000)	Pre-Post4 (P=0.000)	Post3-Post4 (P=0.032)	Post2-Post4 (P=0.047)
Pre-Post5 (P=0.000)	Post1-Post2 (P=0.008)	Pre-Post5 (P=0.000)	Pre-Post5 (P=0.000)		Post2-Post5 (P=0.011)
Post1-Post2 (P=0.033)	Post1-Post3 (P=0.016)	Post1-Post2 (P=0.031)	Post1-Post2 (P=0.000)		Post3-Post5 (P=0.008)
Post1-Post3 (P=0.022)	Post1-Post4 (P=0.002)	Post1-Post3 (P=0.001)	Post1-Post3 (P=0.000)		
Post1-Post4 (P=0.009)	Post1-Post5 (P=0.003)	Post1-Post4 (P=0.000)	Post1-Post4 (P=0.000)		
Post1-Post5 (P=0.000)	Post2-Post4 (P=0.006)	Post1-Post5 (P=0.000)	Post1-Post5 (P=0.000)		
Post2-Post5 (P=0.000)	Post2-Post5 (P=0.009)	Post2-Post3 (P=0.001)	Post2-Post3 (P=0.000)		
Post3-Post5 (P=0.000)	Post3-Post4 (P=0.003)	Post2-Post4 (P=0.000)	Post2-Post4 (P=0.000)		
Post4-Post5 (P=0.000)	Post3-Post5 (P=0.007)	Post2-Post5 (P=0.000)	Post2-Post5 (P=0.000)		
		Post3-Post4 (P=0.031)	Post3-Post4 (P=0.000)		
		Post3-Post5 (P=0.000)	Post3-Post5 (P=0.001)		
		Post4-Post5 (P=0.011)	Post4-Post5 (P=0.013)		

*The mean difference is significant at the 0.05 level

Creatinineuria increased significantly, in intermittent resistance training group and during research period (P=0.000). In addition, creatinineuria increased significantly, in control group (P=0.005). After 8 weeks trainings, creatinineuria of the training group, in rest time, was significantly more than its value in the control one (P=0.000). Creatinineuria increased significantly in control group, yet (P=0.005).

Urinary protein to creatinineratio increased significantly, in intermittent resistance training group (P=0.035). But, urinary protein to creatinine ratio hadn't any significant variation, in control group (P=0.392). After 8 weeks trainings, urinary protein to creatinine ratio hadn't any significant difference between the training group, in rest time, and the control one (P=0.17). Urinary protein to creatinine ratio hadn't any significant change, in control group (P=0.39).

Urinary red globules increased significantly, in intermittent resistance training group (P=0.007). Though, urinary red globules hadn't any significant variation, in control group (P=0.356). After 8 weeks trainings, hematuria of the training group, in rest time, hadn't any significant difference with its value in the control group (P=0.040). Hematuria hadn't any significant change, in control group (P=0.5).

Table 4: Statistical results of T paired test concern to variations of the control group during 8 weeks

Variables	T	P
Albumin	4.591	0.004 *
Total Protein	2.126	0.078
β_2 microglobulin	6.679	0.001 *
Creatinine	4.304	0.005 *
Protein to Creatinine Ratio	0.921	0.392
Haematuria	1	0.356

*The mean difference is significant at the 0.05 level

Table 5: Statistical results of independent T test concern to comparison of relaxation levels of two groups

Variables	Time of Training	T	df	P
Albumin	Before Training	2.59	12	0.023 *
	After Training	3.80	12	0.003 *
Total Protein	Before Training	0.579	12	0.574
	After Training	2.42	12	0.03 *
β_2 microglobulin	Before Training	0.31	12	0.75
	After Training	4.21	12	0.001 *
Creatinine	Before Training	0.574	12	0.577
	After Training	5.13	12	0.000 *
Protein to Creatinine Ratio	Before Training	0.41	12	0.68
	After Training	1.45	12	0.17
Haematuria	Before Training	0.52	12	0.61
	After Training	0.86	12	0.40

*The mean difference is significant at the 0.05 level

DISCUSSION

According to founds of the present study, the training group showed greater albuminuria than the control one. Albuminuria in intermittent resistance training group and even in the control one, increased significantly, during research period. Also, in the present study, the training group showed greater total proteinuria than the control one. During study period, total proteinuria in intermittent resistance training group, increased significantly. Despite variations of albuminuria, total proteinuria hadn't any significant change in control group. Montelpare et al (2002) ran 14 volunteer men in a continuous and intermittent bicycling training protocol with ergometer cycle (21). They concluded that, interval trainings have greater effects in comparison with continuous one, on excretions of urinary albumin and total protein (21). Also, Montelpare et al (2002) declared, lactate concentration and blood PH depend to variations in clearance albumin and urinary total protein (21). In the study Montelpare et al. (2002), resting measures of blood pH and blood lactate were altered by the workload stress of both continuous and the intermittent work tests (21). This is consistent with the findings of Poortmans et al. (1990) that separate; exhaustive rowing and bicycle ergometer tests caused post-exercise increases in blood lactate (23). Other studies also reported post-exercise concentrations of blood pH and blood lactate different from resting levels in work tests that used various work intensities (12,24). It's not clear why albuminuria increased in the control group, and in addition of exercise, other factors probably have influenced on this matter. Perhaps, seasonal changes and degree of temperature might be some of these parameters. The present research started at the beginning of June (spring season) and continued until the ending of July (summer season). However, in order to state about this issue, further controlled investigations will be required, in future. Even, some probable parameters should be considered, which are difficult to be guessed, at present. By the way, the lack of difference in albuminuria of two groups, before the trainings period, turned to greater albuminuria of the training group in comparison with the control group, after the trainings period. This matter indicates significant effect of trainings on albuminuria. In contrast, total proteinuria hadn't any significant variation in the control group, and the training group showed greater total proteinuria in comparison with the control one. According to these results, perhaps intermittent resistance trainings might lead to increase in glomerular proteinuria. Poortmans and Labilloy (1988) reported that the post exercise proteinuria is more related to activity intensity (24). Poortmans and Vancalck (1978) showed that intense activity result in urinal excretion of albumin and total protein (19). Kramer et al. (1988) reported that albuminuria increases following heavy sports activities (25). This indicates glomerular origin of proteinuria (19). Delforge et al. (1969) also showed that the more the exercise intensity the more serious is Proteinuria. This conclusion was then confirmed by Kachadorian and Johnson (1970) and Todorovic et al (1972) (24). Some researcher has shown that following light physical activities Proteinuria is

observed to increase only in some unhealthy, for example diabetic, sedentary people and this is not the case for healthy ones (24). Vanleubo (1878), Poortmans and Vancalck(1978), Depaolo et al. (2002), and Turgut et al. (2003) showed that urinary excretion of proteins increases following physical activities (11,19,26,27), and this may be related to renal clearance increase (19).

Also, according to understandings of the present study, the training group showed greater β-2 microglobulinuria than the control one. Beta-2 microglobulinuria increased significantly, in intermittent resistance training group and even in control one, during trainings period. Likewise increment of albuminuria in the control group, the significant increase in β-2 microglobulinuria in this group, maybe affected by other factors, which are disparate from trainings. As already mentioned, variations of degree of temperature consequent on seasonal changes, could be counted as an influencing parameter. Although, it's only a weak-minded guess before performing controlled researches in this field, which hasn't any quantitative scientific value. However, prominent influence of trainings on urinary β-2microglobulin couldn't be ignored. Because, despite the lack of difference in β-2 microglobulinuria between the training group and the control one, before 8 weeks trainings, the amounts of β-2 microglobulinuria in the training group were significantly rather than their values in the control one, after 8 weeks trainings, which indicates effect of trainings on tubular proteinuria. Based on these results, maybe intermittent resistance trainings might cause increment of tubular proteinuria, although further investigation should be needed to could declare with complete confidence. Previous studies indicated that tubular proteinuria occurs with increasing physical activity intensity (19). Poortmans and Vancalck (1978), and Montelpare et al. (2002) showed that periodic physical load increases β_2-Microglobulinuria (21,19). After exercise high renal clearance of β_2-Microglobulinuria has been observed. This indicates that post exercise proteinuria has also a tubular origin (19). poortmans et al. (1988) showed β_2-Microglobuline along with increasing blood lactate (28). Perhaps several amino acids contribute to tubular reabsorption disorder (29). Under rest conditions more than 95% of filtered proteins are reabsorbed by proximal tubular cell and converted to amino acids (29). All amino acids are present in overflow Proteinuria, and tubular reabsorption is prevented as a result of absorption capacity completion (29). Suzuki and Ikawa (1991) stated that decreasing blood PH as a result of organic acids may change glomerular permeability and prevent tubular absorption (30). This may be one of the reasons of increasing proteinuria as a result of heavy physical activities, because we know that heavy physical activities make body environment more acidic. These findings have been confirmed with Turgut et al. (2003) (21). If blood PH was estimated in this study, we could discuss with more confidence, presently.

Turgut et al. (2003) reported significant post exercise proteinuria in both young men and women (27). The narrowing of renal arteries due to epinephrine and norepinephrin increase during exercise may be one of the reasons of post exercise proteinuria increase (12). As a result of renal blood flow decrease during exercise glomerular filtration rate also decreases and regarding that this decrease is smaller that renal blood flow decrease, the filtration fraction increases and as a result passing through glomerular membrane becomes easier for high molecular weight proteins (12). Increase in plasma rennin activity, that is observed during hard physical activities and is a result of glomerular sympathetic excitement may affect post exercise proteinuria (31,5). The mediation of kallikrein, an enzyme of kinin system, which is closely related to renin-angiotensin system may increase the permeability of glomerular membrane (31,5). The loss of capillary wall negative charge may also be effective (31,5). Zambraski et al. (1981) studied variations of renal ciallic acids in response to exercise, and stated that exercise decreases glomerular electrostatic resistance and may justify part of increase in passage of macromolecules (15). The role of factors like prostaglandins is also of importance, and if people take medicines that block prostaglandins production during exercise, proteinuria decreases significantly, provided that there is no renal hemodynamic change (32). Gundoz et al (2007), Senturk et al. (2007), and Kocer et al. (2008) observed increase in post exercise proteinuria (10,33,34). The findings of Poortmans and Vancalck (1978), and Clerico et al. (1390) suggest that post exercise proteinuria is very transient (35,19). Although the main factor affecting post exercise proteinuria is activity intensity (25,19), the activity duration is also effective (18,35). In order to obtain more accurate investigations, it's recommended to study levels of catecholamine's, renin, kallikrein and Prostaglandins serums, in future researches. Also, attention to examination of Renal sialic acids in company with urinary protein excretion could be remarkable and might aid to rather accurate conclusions.

In the present study, the training group presented greater creatinineuria than the control one. During the research period, creatinineuria in intermittent resistance training group increased, significantly. Also, based on founds of the present study, urinary protein to creatinine ratio in intermittent resistance training group didn't show any significant difference in comparison with control one, during the study period. During the research period, urinary protein to creatinine increased significantly, in intermittent resistance training group, and despite changes in albuminuria, β-2 microglobulinuria and creatinineuria, and similar with total proteinuria, hadn't any significant variation in control group. Diagnosis of quantity of proteinuria needs 24 hr urine collecting. But, 24 hr urine

gathering is often a difficult task and could be contain some inadvertences (36). Urinary protein to creatininehas been known as a rapid and reliable test to estimate different domains of proteinuria (37). The obtained results, which are reported as protein to creatinine ratio, could be are placement for 24 hr urine samples (38, 39). Analyzing founds of researches, showed a significant correlation between protein to creatinine ratio in random urine sample and patients' 24 hr urine samples. Neithardt et al (2002) presented a correlation coefficient between 24 hr urinary protein excretions and protein to creatinine ratio as 0.93 (40). Also, Yamasmit et al (2003) reported a correlation coefficient between these two variables as 0.92 (41). Robert et al (1997) showed a correlation coefficient between protein to creatinine ratio and amount of protein in 24 hr urine excretions as 0.94 (42). This issue indicates a powerful linkage between protein to creatinine in random urine sample and 24 hr proteinuria (42). Therefore, protein to creatinine ratio in random urine samples could be a replacement for slow and time consuming methods of urinary protein gathering. This ratio was used to measure 24 hr urinary protein excretions, in the present study, too. Values of less than 0.1, between 0.1 and 1, and more than 1 in protein to creatinine ratio, could be utilized in recognition domains of physiologic, pathologic and nephrotic proteinuria, respectively (43). It has been concluded, protein to creatinine ratio is rather reliable to assess quantity of proteinuria and it's largely more applied (43). Of course, poor correlation cases were reported, too. However, the possible reason for poor correlation in patients with renal failure could be decrease in glomerular filtration (43, 44). This correlation depends on amount of glomerular filtration, and it's independent from gender, age and weight (43, 44). Also, it's stated the ratio of less than 0.2 indicates a proteinuria with a normal range and the ratio of more than 3.5 reveals nephrotic proteinuria domain (44). So, protein to creatinine ratio is used to recognize significance of proteinuria (43). In the present research, proteinuria was less than nephrotic domain. It's concluded, although intermittent resistance trainings would cause increment of pressure on kidneys and increase in urinary protein excretions, but the afterward proteinuria probably couldn't limit activity and it's different from pathologic conditions.

Also, there wasn't any significant difference in relaxation values of hematuria between the training group and the control one, before and after 8 weeks trainings. During the study period, hematuria increased significantly, in intermittent resistance training group. Despite variations of albuminuria, β-2 microglobulinuria and creatinineuria and similar with total proteinuria and urinary protein to creatinine, hematuria hadn't any significant difference in control group. In this matter, intensity and mass of exercise are the most influencing variables, too. Exercise induced hematuria is attributed to various mechanisms including increased body temperature, hemolysis, free radicals, lactic acidosis and catecholamine release (2). Proteinuria is mainly influenced by exercise intensity rather than duration, while hematuria depends on both duration and intensity (2,3). In research of Mousavi et al (2011), participants executed an exhaustive activity to maximal capacity and urine samples were collected, immediately then and 1 hr after the activity, to assess hematuria (22). Two days later, training group began its trainings schedule for 12 weeks (3 days in week) (22). 2 days after last session, all of participants performed an exhaustive running session with maximal capacity and urine samples were gathered, again. The first turn samples revealed hematuria failure in 100% of participants, which reduced to 75% of participants, only in training group, after trainings schedule. Anyway, this reduction wasn't significant in the statistical aspect. However, founds of Mousavi et al (2011) were in conflict with the present understandings. This incongruity in understandings and few numbers of researches indicates requirement of rather studies. Further researches should be carried out to earn more reliable results and it seems a vast field of study has been provided. It's recommended, men should be chosen as subjects in future studies, and also the same research with more subjects should be performed.

CONCLUSION

It's definite, more investigations should be done to could establish an accurate conclusion and represent a clear statement in this relation. However, it appears eight weeks intermittent resistance trainings might lead to increase in proteinuria and hematuria, that probably because of pressures arising from weekly trainings. Anyway, proteinuria was lower than nephrotic domain, in the present study. So, intermittent resistance trainings might cause increment of pressure on kidneys and increase in protein excretions, though the afterward proteinuria couldn't limit activity and it's different from pathologic conditions. Nevertheless, rather researches are required.

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