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Evaluation the Frequency of Hematuria and Proteinuria After Physical Activities, and its Relationship with the Underlying Factors in Selected Soldiers

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ABSTRACT

Since some military exercises can be harmful, the occurrence of proteinuria and hematuria after physical exercise and military training were studied in soldiers participating in the morning exercise. The results showed that the 0.9% of individuals (1 person) before the study, and 2.7% (3 cases) after the study had hematuria. There was a significant difference (p = 0.027) between hematuria before and after exercise. 11% of individuals (11 cases) had proteinuria before exercise and 27.3% of individuals (30 cases) after. A statistically significant difference (p = 0.00) was observed in terms of the incidence of proteinuria before and after exercise. There was a significant relationship (p = 0.3) between the underlying disease and the occurrence of proteinuria after exercise. So that 100% of individuals with Renal calculus (2 cases), burns (1 cases), cold (3 cases), and 50% of individuals with a history of fracture were developed proteinuria after exercise. But there was not statistically significant difference (p = 0.99) between the underlying disease and hematuria. The incidence of proteinuria and hematuria has many factors. One of the major reasons can be hard physical and morning exercises, therefore, it is necessary to implement some appropriate measures to reduce the physical stresses on personnels. Hard physical exercises can lead to proteinuria and hematuria and their side effects. To alleviate clinical problems from hard activities in military bases, the individuals must be managed in terms of physiological characteristics and the appropriate exercises should be given them based on the individuals' physiology.

Key word : Proteinuria, Hematuria, Physical exercises, Soldiers.

INTRODUCTION

Steady implementation of Physical activities is very important for human health. When the *body is immobile for* an extended period of time, irreversible side effects may be occured on human health. Therefore, doctors recommend continuous and balanced activities in life. Heart Failure Society of America has been added the lack of physical exercise and sport in the list of major risk factors for heart disease[1-2]. Exercise not only helps fight heart disease by improving all the risk factors, but for sedentary people adding exercise to your daily routine reduces the risk of high blood pressure, osteoporosis, breast and colon cancer, depression, anxiety and stress[3-6]. However, physical activity may also have some adverse effects that should be noted in doing exercise including the proteinuria and hematuria after exercise. Proteinuria means the presence of abnormal amounts of protein in the urine, healthy kidneys remove waste products from the body's metabolism, whereas, prevent the removal of requirements such as proteins. Proteinuria (protein in urine), indicates kidney damage, normal persons daily excrete less than 150 mg of protein and 30 milligrams of albumin in the urine. The presence of greater-than-normal amounts of protein in the urine is considered

Proteinuria that may be permanent or transient. It has usually various causes such as kidney problems or damage to the urinary tract, as well as exercise activities[7-8]. The exact cause of the disease is important. One of the other problems that can occur following prolonged exercise is hematuria, which has numerous reasons including high physical exercise. The presence of bBlood in the urine to any extent in women and in men is extremely important and sometimes indicates a dangerous disease such as bladder[9-10]. There can be two types of blood in the urine, Type 1 that can be observed in the urine by the patient, called the apparent blood, type 2 which is much more common can not be observed in urine by the patient but lab reports that there is blood in the urine, called hidden blood [11]. Hematuria may occur following a parade, or a long walk and blows to the bladder. Red blood in the urine which is not associated with blood leads to a false hematuria. Some medicines, food colors and herbs result in such a case[12]. Since the military's physical fitness is an important issue in the world that makes the military training exercise inevitable. On the other hand, some exercises can cause some side effects, therefore, in doing exercises, individuals should be managed according to the individuals' physiology and the history of disease and problems associated with the disease. The aim of this study was to evaluate the effectiveness of activities and military exercises in the incidence of hematuria and proteinuria in soldiers with regular morning activities.

METHODS

It is a descriptive observational study. The study population was the castellan soldiers in the center. Crater exclusive for the study population was participants' dissatisfaction and the presence of gross hematuria, none of the participants had gross hematuria. Method was census, meaning that all eligible patients in the project were studied at the time of project implementation.

Sample size

Considering the formula for determining the sample size in descriptive studies, the highest possible sample size, the first statistical error of 0.05, resolution (d), and 10% of the required sample size for the study, 96 people were predicted and 110 patients were finally studied.

$$N= \alpha^2 p(1-p) / d^2$$

In the study, which was conducted as a descriptive observational study, 110 were selected from Castellan Soldiers in the center.

Individuals were selected by non-randomized (Sequential) method, meaning that all eligible individuals were selected according to referring to complete the necessary sample size. The individuals were informed that the process is a research study and the satisfaction was taken. Then, the urine test was taken from all soldiers before and immediately after the morning exercise using Dipstick method, the centrifuge was done in case of positivity at 3000 rpm for 5 min and after the formation of a pink precipitate, observing 7-8 red blood cells under the microscope was considered as hematuria.

It should be noted that the military exercise in the morning was as a 8000-meter military running (pummeling the fourth shot with the right foot) for 30 minutes and 20 minutes stretching and Launchers while all the soldiers during the exercise had military boots. The temperature was 31 ^{o}C in the day of sampling. Demographic data such as age, height, weight, and information on urine tests was measured before and immediately after 50 minutes morning exercise. Then all data was entered in the prepared information sheets and the raw data obtained were analyzed and interpreted in spss software.

RESULTS

The mean age of the study population was 19.2 years, the minimum was 18 and the maximum 25. The mean height of the study population was 7/182 cm, the minimum was 176 and the maximum 190. In terms of weight, the average weight of the study population was 19/80 kg and there was an almost steady weight distribution between weight groups of 75-79 and 80-84. The average PH of urine in the study population after exercise was 38/5. The specific weight mean of the urine after exercise in the study population was 41/1021, in normal limits.

The research was aimed to study the relationship between physical exercise and hematuria. The hematuria was found in 90% of individuals before the study, and 2.7% individuals after and based on SPSS software, a significant difference (p = 0.027) was found between hematuria studied before and after the physical exercise. The study was also conducted to evaluate proteinuria. The proteinuria was found in 11% of individuals before the exercise and 27.3% after. A statistically significant difference (p = 00.0) was observed in case of the incidence of proteinuria in the study population before and after exercise (table 1).

Also in this study, the relationship between height and hematuria was investigated. Based on the statistical results, there was no significant relationship between the height of study population with the appearance of hematuria after exercise (p = 0.48p). it was also shown that there was no significant relationship between the height of study population with the appearance of proteinuria after exercise (p = 0.34).). There was also no significant relationship between the weight of study population with the appearance of hematuria after exercise (p = 0.148). There was also no significant relationship between the weight of study population with the appearance of proteinuria after exercise (p = 0.10). There was no significant relationship between the presence of an underlying disease in the study population with the appearance of hematuria after exercise (p = 0.990).

There was a significant relationship between the underlying disease and the appearance of proteinuria after exercise (p = 0.003). 100% of cases with renal calculus, burn and cold and 50% of cases with a history of fracture were developed proteinuria after exercise (Table 2).

DISCUSSION

Macroscopic and asymptomatic hematuria caused by physical exercise is important in runners.

Table. 1: The frequency distribution of Dipstick test results before and after exercise

Dipstick test before exercise individuals negative with positive Dipstick test		Dipstick test after exercise individuals with positive Dipstick test	
1	Blood	3	Blood
11	Protein	30	Protein
-	Glucose	-	Glucose
-	Ketone	1	Ketone

Table. 2: The comparison of Proteinuria after exercise based on the underlying disease in the individuals

Underlying disease	Proteinuria after exercise		Total
	Yes	No	
No	22 (22.4)	76 (77.6)	98 (100)
Colds	3 (100)	0	3 (100)
Diarrhea	1 (25)	3 (75)	4 (100)
Fracture	1 (50)	1 (50)	2 (100)
Burn	1 (100)	0	1 (100)
Renal calculus	2 (100)	0	2 (100)
Total	30 (27.3)	80 (72.7)	110 (100)

Exercise-induced hematuria is common. Bleeding in the lower urinary tract with a high count of red blood cells is relatively low in runners[13].

It is reported that exercise-induced hematuria is caused due to long distances running and abnormal urinary symptoms caused by physical exercises disappear within 48-24 hours[14-17]. Some studies have reported that Hematuria caused by running long distances is resulted from bladder truma, which is an increased intra-abdominal pressure that leads to the laxity of the bladder wall[18].

In our study, 90% of individuals before the study, and 2.7% after had hematuria and there was a significant difference (p = 0.027) between hematuria before and after exercise. The result is similar to findings from a study in 1997 by kallmeyer that was performed on the urinary changes in marathon and long distance runners and showed that hematuria occurs in runners in less than 10 kilometers distance. The incidence of hematuria was not identified in this study[19]. In another study conducted in 2007 by blacklock, it was reported that urinalysis was normal in marathon runners before exercise and 9 out of 50 athletes showed microscopic hematuria after exercise. The incidence of hematuria after exercise was 18 %, much higher than the prevalence found in our study that was 2.7%[20]. Fasset found in 1987 that hematuria usually occur after a long distance running, which likely leads to traumatic lesions of the bladder. In most cases of the study, hematuria was microscopic and caused by renal ischemia[21]. In our study there were no case of gross hematuria after exercise. In Jones GR study in 2001, the incidence of hematuria was associated with 90-21 km distance running was 20-25%[18]. However, because our study was performed after 8 km military running, the difference in incidence can be partly justified[18]. Another finding of our study was the proteinuria after exercise. 11% of patients before exercise and 27.3% of them after exercise had proteinuria, therefore, a statistically significant difference (p = 0.00) can be observed in case of the incidence of proteinuria in the study population before and after exercise. In a study in 1990 by clrico and colleagues, 10 athletes were compared with 90 normal indivituals. Albuminuria, a type of Proteinuria, was shown in all athletes after exercise that was due to the increased need for protein in athletes. While the proteinuria was directly related to the severity of exercise [22]. In a study by Kohanpour in 2002, which was aimed to investigate the effect of the intensity of aerobic activity on proteinuria in young soccer players, a sharp rise in urine albumin was shown immediately after exercise, followed by decrease in about 45 minutes later, but not to normal level (25). In a study conducted in 2006 by senturk, oxidant markers producing proteinuria after exercise was introduces, so that the use of antioxidants leads to a decrease in post-exercise proteinuria[23].

In a study over 60 children and adults by Nillo in 1981 that was conducted on the impact of exercise on proteinuria, the amount of Albuminuria was reported 2.5 fold of resting mood after exercise. So that the average excretion of urinary protein (albumin) was measured 4.4 ìg/min/ m^2 in resting mood and 7.9 ìg/min/ m^2 after exercise[24]. There was no significant relationship between the underlying causes that were considered (Height, Weight, Shoes Number, fluid intake before exercise) with hematuria or proteinuria after exercise. But There was significant relationship between the underlying disease and the occurrence of proteinuria after (p = 0.003). So that 100% of cases with Renal calculus, burns, colds, and 50% of individuals with a history of fracture were developed proteinuria after exercise. But there was not significant relationship between the underlying disease with the occurrence of hematuria (p = 0.003).

CONCLUSION

Based on the results, the physical activities and exercises performed in the morning exercise and parade lead to proteinuria and hematuria. Studies also show a greater incidence of the disease in people with underlying diseases. These results suggest that people who are trained as a soldier in the training centers should first be identified in terms of susceptibility to the appearance of blood in the urine, then based on the results, the officers should train them according to their physiological characteristics or reduce the amount and the intensity of exercise for people with a susceptibility to the disease due to an intense activity or even can exempt them from doing such kinds of activities. These ways can help to reduce the risk of disease caused by the physical activities.

REFERENCES

1. Pollock, M.L., *et al*., Resistance exercise in individuals with and without cardiovascular disease benefits, rationale, safety, and prescription an advisory from the committee on exercise, rehabilitation, and prevention, council on clinical cardiology, American Heart Association. *Circulation,***. 101**(7): p. 828-833 (2000).
2. Rimmer, J.H., S.S. Rubin, and D. Braddock, Barriers to exercise in African American women with physical disabilities. *Archives of physical medicine and rehabilitation,* **81**(2): p. 182-188 (2000).
3. Haskell, W.L., *et al*., Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, **116**(9): p. 1081 (2007).
4. Karvonen, J. and T. Vuorimaa, Heart rate and exercise intensity during sports activities. *Sports Medicine,* **5**(5): p. 303-311 (1988).
5. Pigozzi, F., *et al*., Bone mineral density and sport: effect of physical activity. *The Journal of sports medicine and physical fitness*, **49**(2): p. 177-183 (2009).
6. Long, J. and I. Sanderson, 12 The social benefits of sport. Sport in the city: The role of sport in economic and social regeneration, 2001: p. 187.
7. Zhu, X., *et al*., Risks of proteinuria and hypertension with bevacizumab, an antibody against vascular endothelial growth factor: systematic review and meta-analysis. *American Journal of Kidney Diseases,* **49**(2): p. 186-193 (2007).
8. Price, C.P., R.G. Newall, and J.C. Boyd, Use of protein: creatinine ratio measurements on random urine samples for prediction of significant proteinuria: a systematic review. *Clinical chemistry,* **51**(9): p. 1577-1586 (2005).
9. Messing, E.M., *et al*., Comparison of bladder cancer outcome in men undergoing hematuria home screening versus those with standard clinical presentations. *Urology,* **45**(3): p. 387-397 (1995).
10. Sarosdy, M.F., *et al*., Use of a multitarget fluorescence in situ hybridization assay to diagnose bladder cancer in patients with hematuria. *The Journal of urology,* **176**(1): p. 44-47 (2006).
11. Vaupel, P., F. Kallinowski, and P. Okunieff, Blood flow, oxygen and nutrient supply, and metabolic microenvironment of human tumors: a review. *Cancer research,* **49**(23): p. 6449-6465 (1989).
12. Bennett, W.M. and P. Kincaid-Smith, Macroscopic hematuria in mesangial IgA nephropathy: correlation with glomerular crescents and renal dysfunction. *Kidney Int,* **23**(2): 393-400 (1983).
13. Mercieri, A., R.J. Glassock, and A.M. Sheridan, Exercise-induced hematuria. 2011.
14. Robinson, Y., E. Cristancho, and D. Böning, Intravascular hemolysis and mean red blood cell age in athletes. *Medicine and science in sports and exercise,* **38**(3): 480-483 (2006).
15. Polito, C. and S. Andreoli, Sport hematuria in boys: a provocative test. *Pediatric Nephrology,* **20**(8): p. 1171-1173 (2005).
16. Sarhadi, M., S. Sanavi, and R. Afshar, Hematuria following Karate (Kumite) competitions in females. *Saudi Journal of Kidney Diseases and Transplantation,* **22**(6): p. 1253 (2011).
17. Siegel, A.J., *et al*., Exercise-related hematuria: findings in a group of marathon runners. *Jama*, **241**(4): p. 391-392 (1979).
18. Jones, G.R., *et al*., The incidence of hematuria in middle distance track running. *Canadian Journal of Applied Physiology,* **26**(4): p. 336-349 (2001).
19. Kallmeyer, W. and F. Schütze, Zur Konstitution von Kommunikationsschemata der Sachverhaltsdarstellung. Gesprächsanalysen, 1977. 65: p. 159-274.
20. Blacklock, R.E., R.E. Rhodes, and S.G. Brown, Relationship between regular walking, physical activity, and health-related quality of life. *Journal of physical activity & health,* **4**(2): p. 138 (2007).
21. Reid, R., D. Hosking, and E. Ramsey, Haematuria following a marathon run: source and significance. *British journal of*

urology, **59**(2): 133-136 (1987).
22. Clerico, A., *et al*., Exercise-induced proteinuria in well-trained athletes.*Clinical chemistry*. **36**(3): p. 562-564 (1990).
23. [a]entürk, Ü., *et al*., Biphasic pattern of exercise-induced proteinuria in sedentary and trained men. *Nephron Physiology*, **105**(2): p. p22-p32 (2006).
24. Huttunen, N.-P., *et al*., Exercise-induced proteinuria in children and adolescents. Scandinavian Journal of Clinical & Laboratory Investigation, 1981. 41(6): p. 583-587.