

筋運動 所引起的 蛋白尿及血尿



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Introduction

In 1827, Richard Bright⁽¹⁾ first noted the relationship between proteinuria and disease of kidney. Despite the continuous interest of innumerable investigators in this subject since that time, many key questions remain unsettled. Just as the absence of proteinuria does not rule out renal disease, so its presence does not inevitably imply an organic renal lesion. It is common, in fact, for intermittent and relatively mild proteinuria to be found in occasional urine specimens of healthy individuals under certain conditions. In order to have a general idea of the clinical significance of proteinuria, we have attempted to observe the effect of quiet sitting and muscular exercise on protein excretion of the kidney.

Method

Materials: Apparently healthy male students of Taipei Medical College, aged from 18 to 25; Chien kuo senior middle school, aged from 15 to 19; Lao-Sonn elementary school aged 12 and some non-student adults aged from 20 to 35 were employed for the studies.

Urine collection: Urine was collected immediately before and after exercise or practice. Urinary proteins were determined quantitatively by the sulfosalicylic acid method

and by the heat and acetic acid test and quantitatively by the Kingsbury-Clark method.⁽²⁾ For the examination of urinary sediment, about 12 ml of Urine was centrifuged for 5 minutes at 1500 r.p.m. Values recorded represent the average number of erythrocytes seen per high power field (8×40) after examination of at least 10 fields.

Results

The results obtained from the different groups of participants were summarized in Table 1. (1) Sit crosslegged (quiet sitting)

Five experienced participants aged from 18 to 35 were employed. Proteinuria and hematuria were not observed in all of them after a quiet sitting with crosslegged position for 60 minutes.

(2) Gymnastics.

Three students, all 20 years old, practiced heavy gymnastics for 30 minutes. All of them did not develop proteinuria and hematuria.

(3) Hiking

Thirty-six 12 years old pupils of a elementary school and five 24 years old college students hiked for 100 minutes. In only 2 pupils, a weak proteinuria 4 mg per 100 ml was observed. No hematuria was demonstrated.

Table 1 The occurrence of proteinuria and hematuria induced by physical exercise

Type of Exercise	Age (yr)	Duration (min)	No. of participants	Before practice No. of No. of prote Hematuria	After practice No. of No. of prote Hematuria	Quantity of proteinuria mg/dl
Sit crosslegged	18-35	60	5	—	—	3 11 21 31 41 51 61 71 81 91 101 151 201 251 301 351 401 451
						10 20 30 40 50 60 70 80 90 100 150 200 250 300 350 400 450 500
Heavy gymnastics	20	30	3	—	—	
Hiking	127	100	36	—	2	4.9 — 0 2
Hiking	24	100	5	—	—	0 — 0
Judo	18-25	80	25	—	22	88.0 2 8.0 13.3 2 2 1
Judo	26-30	80	12	—	10	83.3 1 8.3 2 6 3
Football	15-20	70-105	27	—	24	88.8 5 18.6 10 6 2 2 1 2 1 1 1 1
Football	21-25	70-105	23	—	19	83.6 3 13.0 8 2 1 1 2
Basketball	18-22	50	41	—	37	90.2 9 22.0 17 4 4 2 1 1 1 1 3 2 1

(4) Judo

For the observation of the frequency of proteinuria in different age groups, The participants were divided into two groups, one group consisted of 25, aged 18 to 25, and

another group consisted of 12, aged 26 to 30. Twenty two of the younger group (88.0%) and ten of the older group (83.3%) had proteinuria immediately after practice of Judo for 80 minutes. The concentration of protein

was ranging from 3 mg to 57 mg per 100 ml in the younger group, and 5 mg to 25 mg per 100 ml in the older group. The proteinuria showed the tendency to decrease with increasing age. Hematuria was observed in 3 of all the participators (Fig 1)

(5)Football

The players were divided into 2 groups, one group consisted of 27, aged 15 to 20 and another group consisted of 23, aged 20 to 25. In 24 of the younger group (88.8%) and 19 of the older group (83.6%)proteinuria occurred immediately after playing for 70 to 105 minutes. The concentration of proteinuria was ranging from 3 mg to 420 mg per 100ml in the younger group and 3 mg to 60mg per 100 ml in the older group(Fig 2)The proteinuria also showed the tendency to decrease with increasing age. Hematuria was demonstrated in 8 of all the participators.

(6)Basketball

This group consisted of 41 students aged 8 to 22 In 37 students proteinuria ranging 5 mg to 350 mg per 100 ml was observed immediately after the 50 minutes play (Fig 3) Hematuria was observed in 9 of all the players.

Discussion

The present observations indicated that qualitatively determined proteinuria was induced by severe muscular exertion in 86 to

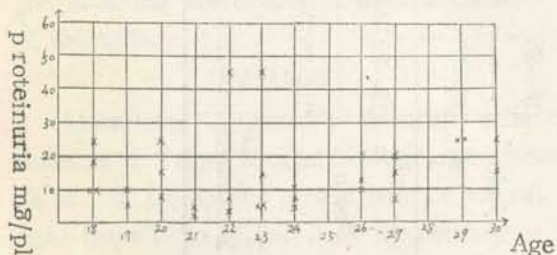


Fig 1 Age distribution of the intensity of proteinuria induced by Jueo.

90 per cent of apparently healthy young men aged 15 to 30 microscopic hematuria was also observed in 8 to 22 per cent of these subjects. These are in agreement with the results

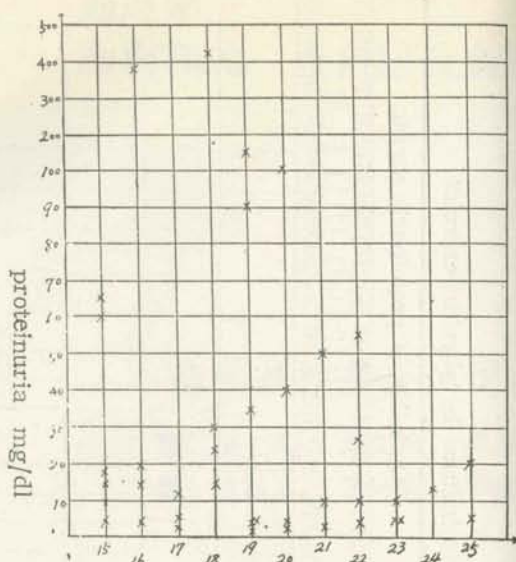


Fig 2 Age distribution of the intensity of proteinuria induced by football.

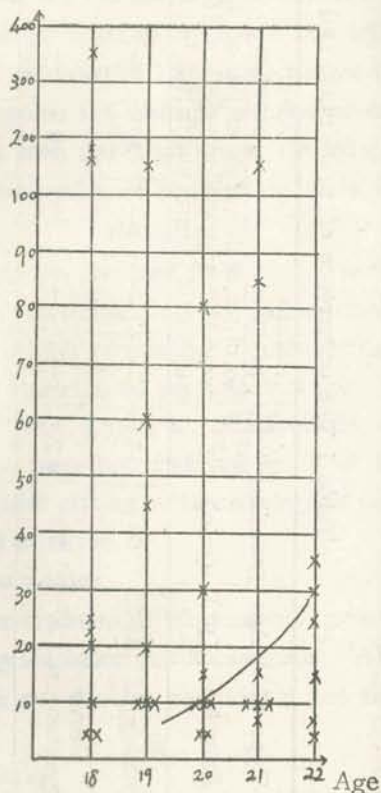


Fig 3 Age distribution of the intensity of proteinuria induced by basketball.

obtained by Alyea and Parish(3), Gardner(4) and Kleiman (5) who demonstrated that proteinuria, cylindruria and hematuria were frequently induced by athletic exertion. The

present observations indicated that the concentration of proteinuria tends to decrease with increasing age. Recently there has been much interest in the effect of athletic exertion on the excretion of protein and formed elements in the urine.

On the other hand, proteinuria did not occur in a group of 5 men after practicing-quiet sitting for 60 minutes. It is known that an exaggerated lordotic position will induce proteinuria in a substantial percentage of healthy young subjects. de Wardener described that proteinuria could be produced in 75 per cent of youths if they were placed in extreme lordosis, with increasing age the proportion gradually dwindled and, of men over 50, only 10 per cent would have proteinuria in this position. In this study the participants were all experienced in cross-legged sitting and the posture might be not lordotic, and perhaps the absence of proteinuria might be explained on this basis. Because it is known that proteinuria tends to decrease with training(7) It is obvious that if proteinuria occurs in the majority of apparently healthy young people with the assumption of an exaggerated lordotic position (7) and after violent exercise(3) this phenomenon cannot be considered indicative of renal disease. It is commonly believed that this type of proteinuria has a generally benign prognosis, provided that there are no other evidences of renal disease(7).

The explanation of the effect of posture and exercises on protein excretion is still some what uncertain. The role of renal venous congestion, vasoconstriction, renal ischemia have been emphasized by some studies(8)(9), but it seems likely that reduction in plasma flow and filtration rate are also important. Gardner(4) emphasized the red blood cells as a result of trauma. Boone(10) and Alyea(3) suggested that perhaps the red blood cells were not after all to trauma as supposed, but to the response of the kidneys to the severe exercise itself.

The present studies demonstrated that

the frequency of occurrence of hematuria was relatively low in the percentage of football and basketball players compared with those in other reports(3)(10) which indicated approximately 50 per cent.

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