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SPORT-RELATED DIFFERENCES IN THE URINARY T/Et AND A/E RATIOS AMONG POLISH ATHLETES

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INTRODUCTION

Urinary testosterone to epitestosterone ratio (T/Et) and androsterone to etiocholoanalone ratio (A/E) are the main markers commonly applied as the routine procedure for detection of exogenous androgens administration by athletes. The critical value of T/Et has been established arbitrary on the level 4.0 both for male and female athletes. The urine samples exhibiting T/Et values above the accepted level are suspected as positive ones, and are subjected further analysis to confirm doping. Considering marked within- and between-subject variability of T/Et ratios (coefficient of variation ranges from 30 to 125%) in non-using doping athletes [1] and risk of false-positive results, studies on the other factors that may influence the urinary androgenic profiles is very important [2]. It has been confirmed, at least, that urinary T/Et ratio has been found to be unaffected by diet [3] or by competition stress [4]. Contrary to that, basal level of blood endogenous testosterone is very sensitive to different psycho-physical stimulus. For example, it depends on mentioned factors and also on type of physical activity [5,6], and on daytime [7,8]. In women relative blood testosterone fluctuations are usually much more lower than in men.

Numerous anti-doping controls pointed out higher percentage of positive urine samples in strength-trained athletes, who compared with others are much more prone to use androgenic-anabolic steroids. There is no data, however, whether the T/Et value of negative urine samples depends on kind of sport.

AIM OF STUDY

The study was undertaken to verify hypothesis, whether mean negative urinary T/Et values in strength-trained male and female athletes are differ than those in other athletes, especially than endurance-trained ones.

MATERIAL AND METHOD OF THE STUDY

Urine samples were taken from polish male and female athletes of different sport on competition and out of it to analyzed to determine T/Et according to the routine anti-doping tests . Analysis were performed with using method of screening IV. Estimation of uncertainty were 12.6% as described previously [9].

The results of the steroid profile of athletes researches were compared with the age-matched control groups of males (n=30) and female (n=30).

RESULTS AND DISCUSSION

Mean values of T/Et ratios and standard deviations in the control groups were as follows: Females (n=30): $0,66 \pm 0,30$ and males $1,50 \pm 0,98$.

The results of the study on athletes are given in Tables 1 (for males) and 2 (for females)

The results revealed gender differences within the same sport event regarding T/Et ratio. Male athletes (except body-building) usually exhibited higher T/Et ratio. The same is true for control groups. Moreover, the athletes, who were at high risk of anabolic-androgenic abuse, as was described earlier [10] had also higher mean negative urinary T/Et ratios. The most spectacular association between demand on strength development and prevalence of steroidal doping occurs in competitive weightlifting. The statistics of doping cases detected during the modern Olympic Games showed this sport as the most tainted one by illicit drugs [11]. In spite of that some authors are of the opinion that number of officially revealed doping cases is underestimated in comparison to the real scope of doping phenomenon, and number of the long-life fantastic world outcomes are suspicious [12]. In this study higher T/Et ratios in volleyball players and triathlon athletes were unexpected. These endurance-trained athletes exhibited low number of steroidal doping cases and demand of muscles strength is considered as rather low. We may speculate, that higher T/Et ratios are associated with huge physical load during long-lasting competition season.

It should be underlined, that higher T/Et ratio may be resulted in the two independent urinary factors: higher T or lower Et level. Indeed, it was shown that urinary concentrations of T and Et sometime fluctuate over time independently each other. However significant positive linear correlation between urinary T and Et ($r=0.41^*$, $n=28$) in 6 athletes with elevated T/Et ratio provides evidence, that synthesis of both androgens occurring in tests is in part synchronized [13].

CONCLUSION

We conclude that excluding natural negative cases of higher T/Et ratio the others may be resulted in sub-threshold doses of doping agents, or when so-called “delayed doping controls” were performed after doping detection period. In both situations urinary T/Et ratio does not meet doping criteria despite real doping taking.

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Tab1. Means and SD values of T/Et in the male athletes.

Athletes	n	Mean	Minimal value	SD
Power lifting	224	2,09	0,10	1,25
bodybuilding	39	2,09	0,39	1,16
weightlifting	837	1,93	0,10	1,33
ice hockey	163	1,89	0,10	1,12
volleyball	148	1,87	0,07	1,33
canoeing	458	1,85	0,04	1,18
basketball	171	1,85	0,10	1,16
triathlon	64	1,85	0,10	0,99
rugby	86	1,82	0,10	1,27
skiing	114	1,76	0,06	1,29
cycling	540	1,73	0,03	1,05
rowing	287	1,73	0,10	1,15
pentathlon	94	1,72	0,10	1,04
track and field	912	1,71	0,01	1,15
boxing	243	1,70	0,08	1,15
judo	232	1,70	0,10	1,11
swimming	302	1,70	0,07	1,03
archery	51	1,68	0,30	0,94
sports acrobatics	51	1,66	0,10	1,11
wrestling	792	1,65	0,10	1,08
field hockey	61	1,61	0,10	0,96
football	304	1,60	0,04	1,06
fencing	112	1,59	0,10	1,07
handball	128	1,57	0,04	0,93
speed skating	91	1,53	0,10	0,95
karate	47	1,51	0,20	0,86
shooting	56	1,47	0,10	0,83
biathlon	39	1,33	0,20	0,92
kick boxing	65	1,28	0,10	0,77

Tab2. Means and SD values of T/Et in the female athletes.

Athletes	n	Mean	Minimal value	SD
bodybuilding	27	2,41	0,30	1,75
gymnastics	47	1,71	0,10	1,00
Power lifting	66	1,57	0,10	1,13
basketball	133	1,36	0,10	0,90
figure skating	38	1,30	0,40	0,54
handball	118	1,29	0,06	0,86
swimming	211	1,26	0,10	1,01
skiing	98	1,24	0,10	0,69
speed skating	51	1,23	0,10	0,68
judo	158	1,22	0,02	0,81
rowing	120	1,21	0,04	0,81
track and field	579	1,20	0,01	0,85
canoeing	193	1,13	0,04	0,77
biathlon	38	1,10	0,10	0,74
sports acrobatics	38	1,09	0,03	0,84
archery	67	1,08	0,02	0,82
volleyball	117	1,06	0,02	0,76
cycling	43	0,96	0,10	0,54
fencing	59	0,95	0,10	0,66
weightlifting	51	0,88	0,10	0,79