ORIGINALNI ZNANSTVENI RAD

Hrvat. Športskomed. Vjesn. 2016; 31:64-69

SEX AND AGE-RELATED DIFFERENCES IN ATHLETES' HEALTH STATUS IN INDIVIDUAL AND TEAM SPORTS

SPOLNE I DOBNE RAZLIKE U ZDRAVSTVENOM STATUSU SPORTAŠA U POJEDINAČNIM I MOMČADSKIM SPORTOVIMA

Joško Sindik[1], Jelena Šarac[1], Tonći Grgurinović[2], Darko Tomić[2], Drago Paušek[3], Saša Missoni[1]

[1]Institute for Anthropological Research, Zagreb, Croatia
[2]Polyclinic for Occupational Health and Sport, Zagreb, Croatia
[3]Croatian Society for Patient Safety
Contact: josko.sindik@inantro.hr

SUMMARY

Main goal of this study was to determine the differences between the athletes who are actively engaged in team vs. individual sports, stratified by age groups and sex, in BMI (Body Mass Index) and other chosen biochemical health indicators. Second goal is directed on forecasting the criterium BMI, on the base of predictors (i.e. chosen morphological and biochemical health indicators, except body height and body mass), for the athletes from team and individual sports, separately for males and females and separately for different age groups.

The data were collected during routine medical examinations performed by physicians from the Polyclinic for Occupational Health and Sport in Zagreb. The database comprised medical data obtained in 2011 and 2012 from 8482 athletes in the City of Zagreb. Collected data included height, body mass , BMI, blood pressure (diastolic and systolic), heart rate, hemoglobin, hematocrit, leukocytes, thrombocytes, and sedimentation rate.

Inspecting the results, it could be concluded that more statistically significant differences in the variables in research, related to the sport type (team/individual), have been detected in male athletes (as compared with female ones). These differences are more emphasized in team than in the individual sports. More statistically significant predictors are found in males (than in females) and more in team sports.

The results could be mainly discussed in terms of the differences among requests in different sports, different levels of professional sport training in certain sports, as well as in terms of sex differences in growth.

Key words: age groups, athletes, routine medical examinations, sex

SAŽETAK

Glavni cilj istraživanja bio je utvrditi razlike između sportaša koji aktivno sudjeluju u momčadskim i pojedinačnim sportovima, stratificiran po dobnim skupinama i spolu, za BMI (indeks tjelesne mase) i druge izabrane biokemijske pokazatelje zdravlja. Drugi cilj je usmjeren na predviđanje kriterija BMI, na temelju prediktora (tj. izabranih morfoloških i biokemijskih pokazatelja zdravlja, osim visine i težine tijela), za sportaše iz momčadskih i pojeidnačnih sportova, odvojeno za muškarce i žene, posebno za različite dobne grupe.

Podaci su prikupljeni tijekom rutinskih medicinskih pregleda koje obavljaju liječnici iz Poliklinike za medicinu rada i sporta u Zagrebu. Baza podataka obuhvaća zdravstvene podatke dobivene u 2011. i 2012. godini od 8482 sportaša u Gradu Zagrebu. Prikupljeni podaci uključuju visinu, masu, BMI, krvni tlak (dijastolički i sistolički), puls, hemoglobin, hematokrit, leukocite, trombocite i sedimentaciju.

Provjerom rezultata, može se zaključiti da je više statistički značajnih razlika u varijablama istraživanja, koje se odnose na vrstu sporta (momčadski/ pojedinačni), otkriveno kod sportaša (u usporedbi sa sportašicama). Razlike naglašenije u momčadskim nego u pojedinačnim sportovima. Više statistički značajnih prediktora pronađeno je kod sportaša nego kod sportašica, i češće u momčadskim sportovima.

Rezultati se uglavnom mogu raspravljati u terminima razlika u zahtjevima u različitim sportovima, različitih razina profesionalnosti sportskog treninga u pojedinim sportovima, kao i u pogledu spolnih razlika u rastu.

Ključne riječi: dobne skupine, sportaši, spol, rutinski liječnički pregledi

INTRODUCTION

Numerous studies have been indicated that athletes with the best performance in certain sports have distinctive anthropological (morphological, functional and psychological) characteristics that differ according to the demands of the type of sports and the competitive level. Many factors, along with basic physical fitness, are contributing to athletic performance, but one could have a major effect on the athletic performance, whether the sport is individual or team-based. Constant monitoring of these factors, as well as their health status, provides valuable data for sports coaches with valuable data for the moderation of adequate training program for the certain sport, adjusted to athletes' age group and the level of sport excellence.

The greatest differences among the athletes in team and individual sports could be found in psychological characteristics. Global considering the differences in morphological, health, motor or functional characteristics between the large groups of the athletes engaged in team or individual sports couldn't be unambiguous. Namely, the requests of sports are different (independent on the fact whether certain sport is team or individual). Probably the biggest difference between team and individual sports is in motivation. In individual sports, the athlete is responsible for the training and strategy needed to ensure his/ her own success, whereas in a group sports, team members must work together toward the victory (13). The concepts of intrinsic and extrinsic motivation refer that the intrinsic motivation is the drive to do something for its own sake (4), while extrinsic motivation refers that an individual do something because of consequences, like a reward or punishment (16). Self-Determination Theory is stating that three psychological needs (of competence, relatedness and autonomy) are satisfied by the intrinsic motivation (5, 14). The results from study conducted by Gillet and Rosner (6) revealed that athletes involved in individual sports experienced greater feelings of autonomy (they can more often make decisions by themselves), than their team-sports athletes. The athletes in team sports have more challenges, needing more coordination between team members, while the leadership plays a critical role (13). The empathic accuracy of the coaches of individual sports is higher than coach's understanding of the athletes in team sports (10). Overall, the research revealed (mainly) significant differences between athletes in individual and team sports in terms of motivation, coaching, and training (12, 13).

This study examined how activity type influenced heart rates and time spent in target heart rate zones of high school students participating in physical education classes (9). Significantly higher average heart rates existed for fitness, compared to team or individual activities. Boys showed higher heart rates during team activities, while female students had higher rates during individual activities. Therefore, in could be said that male and female adolescents respond differently to activity types. The highest mean heart rates were observed during fitness activities (9).

Bendiksen et al. (3) investigated the heart rate (HR) response to various types of physical education (PE) activities for 8- to 9-year-olds (five school classes) and the fitness effects of a short-term PE training programme (three of the five classes) with high compared to low-to-moderate aerobic intensity. Sport activities used as the variables were: small-sided indoor soccer (SO), basketball (BB), unihockey (UH), circuit training (CT), walking (W) and Nintendo Wii Boxing (NWB) and Nintendo Wii Tennis (NWT). The results revealed that ball games elicited high aerobic loading for young schoolchildren and a short-term, low-volume ball game PE-intervention improved physical fitness. On the other hand, traditional PE sessions had no effects on intermittent exercise performance (3).

Armstrong et al. (2) studied aerobic fitness and its relationship with sport participation, exercise training and habitual physical activity (HPA) during youth. Systematic reviews of time trends in aerobic fitness/performance, and exercise training and peak oxygen uptake (peak VO(2)) revealed several multiple confirmed findings. Peak VO(2) increases with age and maturation, while boys' peak VO(2) is generally higher than peak VO(2) in girls (2). Despite data show a decrease in performance test estimates of aerobic fitness, the evidence about low levels of peak VO(2) in young people (or declining of peak VO(2) over time) is ambiguous. The VO(2) kinetics response to heavy intensity exercise is faster in boys. There is a negative correlation between lactate threshold as a percentage of peak VO(2) and age, but differences related to maturation or sex are not so clear. Finally, it is not doubtful that young people can increase their peak VO(2) through exercise training, but a meaningful relationship between aerobic fitness and HPA has not been demonstrated.

Sports scientists and human biologists in general have studied the relationship between physical characteristics and performance in sports extensively, while morphological characteristics and functional abilities are proven important elements in overall anthropological status of an athlete. However, there is still a limited amount of data on differences in these factors between individual and team sports, especially in relation to sex and age.

The main goal of this research is to determine the differences between the athletes who are actively engaged in team vs. individual sports, stratified by age groups and sex, in BMI and other chosen morphological and biochemical health indicators. The second goal was focused on forecasting BMI, on the base of predictors (i.e. chosen morphological and biochemical health indicators, except body height and body mass), for the athletes from team and individual sports, separately for males and females and separately for different age groups.

SAMPLE AND METHODS

The data from 1798 female and 5981 male athletes (in total 7779), engaged in 72 different sports, were collected routine medical examinations at the Polyclinic

for Occupational Health and Sport in Zagreb (Croatia), during 2011 and 2012. In age range 7-13, (N=1743), 1275 male athletes engaged in team (T) and 466 in individual (I) sports[1], while in female athletes (N=423); T=206; I=217. In age range 13-15, male athletes (N=871; T=703; I=168) and females (N=193; T=128; I=65). In age range 15-17, male athletes (N=640; T=522; I=118) and females (N=146; T=104; I=42). In age range 17-30, male athletes (N=791; T=618; I=173) and females (N=179; T=126; I=53). Collected data included height, body mass, BMI, blood pressure (diastolic and systolic), heart rate, hemoglobin, hematocrit, leukocytes, thrombocytes, and sedimentation rate. T-test was used for testing the differences in dependent variables, between individual and group sports. Linear multiple regression analysis (complete) was used to forecast the criterion BMI on the base of predictors (chosen anthropometrical and biochemical variables). All data analyses are performed using statistical program SPSS 20.0.

RESULTS AND DISCUSSION

A number of statistically significant differences in chosen morphological and biochemical variables have been revealed in both male and female athletes (stratified by age groups) between individual and team sports (Table 1).

Table 1. Differences in chosen health indicators between male and female athletes engaged in individual and team sports, according to their age group

Tablica 1. Razlike u odabranim zdravstvenim pokazateljima između sportaša i sportašica u pojedinačnim i momčadskim sportovima, prema dobnoj skupini

TEAM SPORTS								
AGE GROUP	**7-13**		**13-15**		**15-17**		**17-30**	
SEX	**males**	**females**	**males**	**females**	**males**	**females**	**males**	**females**
height (cm)	153.20±9.77	**156.17±9.41**	168.54±9.86	**165.49±6.65**	177.10±8.22	**169.72±7.96**	**180.38±8.76**	**170.54±7.02**
body mass (kg)	**44.84±11.04**	**48.44±11.62**	57.85±12.58	**56.20±8.93**	68.14±12.21	**62.87±8.51**	**77.75±12.36**	**64.46±10.89**
heart rate (beats/ min)	**72.59±12.45**	**77.79±13.44**	69.16±12.38	71.55±10.49	65.32±11.80	67.16±9.55	**59.73±10.93**	61.30±10.53
blood pressure diastolic (mm Hg)	**100.64±10.44**	**102.58±10.59**	108.41±11.45	106.24±9.59	114.03±11.67	105.80±13.79	119.67±11.66	110.31±9.98
blood pressure systolic (mm Hg)	63.32±8.09	**65.34±7.75**	65.38±8.62	66.13±7.64	68.12±7.54	66.43±6.22	71.83±8.01	**70.48±7.95**
hemoglobin (g/L)	132.69±6.92	132.48±6.74	138.25±8.85	131.03±7.50	143.94±9.18	128.89±8.30	**146.61±8.99**	128.23±8.18
hematocrit (proportion)	0.40±0.02	0.40±0.02	0.42±0.03	0.40±0.02	0.44±0.03	0.40±0.02	**0.44±0.03**	0.40±0.02
leukocytes (µL)	6.46±7.38	7.44±10.58	6.23±5.80	6.15±1.27	6.55±7.01	6.21±1.26	7.14±9.97	7.02±9.62
thrombocytes (µL)	272.15±57.63	264.99±57.37	248.39±51.46	249.48±56.30	229.70±47.12	235.16±46.73	217.81±45.13	**234.52±45.98**
sedimentation rate (mm/h)	7.16±4.06	7.43±4.42	5.70±3.75	8.00±4.77	4.45±3.04	7.18±4.26	4.08±2.52	7.40±4.41
BMI (kg/m^2)	**44.84±11.04**	**48.44±11.62**	57.84±12.58	**56.20±8.93**	68.14±12.21	**62.87±8.51**	77.99±11.66	**64.92±9.59**
INDIVIDUAL SPORTS								
AGE GROUP	**7-13**		**13-15**		**15-17**		**17-30**	
SEX	**males**	**females**	**males**	**females**	**males**	**females**	**males**	**females**
height (cm)	153.82±9.36	**152.16±9.23**	168.67±9.11	**163.22±6.53**	177.04±6.74	**164.62±5.53**	**178.48±8.88**	**166.88±6.49**
body mass (kg)	**46.36±11.64**	**44.02±11.03**	57.64±11.54	**53.61±8.45**	68.79±10.80	**56.67±6.59**	**75.59±11.33**	**60.43±9.14**
heart rate (beats/ min)	**75.15±12.72**	**74.26±11.68**	68.63±12.29	71.34±13.65	64.87±11.83	66.10±11.76	**63.61±11.31**	60.04±11.06
blood pressure diastolic (mm Hg)	**102.45±10.14**	**99.64±10.47**	108.34±11.05	104.66±11.09	115.22±10.38	107.02±10.77	120.24±10.76	108.40±11.22
blood pressure systolic (mm Hg)	63.96±8.82	**62.68±8.60**	66.27±7.52	65.83±7.32	67.53±7.26	66.86±7.70	75.22±52.49	**67.60±8.95**
hemoglobin (g/L)	133.00±7.32	131.68±7.02	139.40±8.52	132.20±6.29	145.31±9.61	129.76±6.93	**148.25±10.04**	129.70±8.30
hematocrit(proportion)	0.40±0.02	0.40±0.02	0.42±0.02	0.40±0.02	0.44±0.03	0.40±0.02	**0.45±0.02**	0.40±0.02
leukocytes (µL)	6.18±1.50	6.20±1.38	6.01±1.39	6.07±1.42	6.16±1.39	6.32±1.45	6.36±1.42	5.99±1.44
thrombocytes (µL)	274.78±57.46	274.71±58.90	247.78±50.82	247.15±52.03	228.56±46.11	238.74±48.49	217.06±44.33	**251.34±51.50**
sedimentation rate (mm/h)	7.29±4.29	7.42±5.09	5.61±3.33	6.71±3.66	4.10±2.56	6.57±3.90	4.42±3.72	7.21±3.51
BMI (kg/m^2)	**46.36±11.64**	**44.21±10.71**	57.63±11.54	**53.61±8.45**	68.79±10.80	**56.67±6.59**	75.59±11.33	**60.43±9.14**

[1] Sports and number of athletes (N): acrobatic rock and roll (178), aerobic fitness (2), American bowling (10), American football (81), archery (36), athletics (241), badminton (47), baseball (67), basketball (712), biathlon (13), bocce (31), body building (10), bowling (172), boxing (69), car racing (50), climbing (15), crossbow (8), dancing (119), diving (22), fencing (63), field hockey (98), fishing (14), futsal (56), golf (3), gymnastics (56), handball (603), hiking (1), horse riding (17), ice hockey (140), ice skating (63), jet ski (9), ju-jitsu (31), judo (125), karate (153), karting (1), kayaking (11), kendo (6), kickboxing (18), motorcycling (4), mountain rescue (1), nanbudo (33), orienteering (31), race cycling (52), rowing (249), rugby (86), sailing (12), savate (14), shooting (27), skiing (33), snowboard (13), soccer (2907), softball (103), squash (9), swimming (256), synchronised swimming (52), table tennis (31), taekwondo (177), tennis (114), Thai boxing (22), triathlon (47), twirling (1), ultimate fight (2), underwater diving (28), volleyball (453), water skiing (3), waterpolo (170), weightlifting (1), wrestling (119).

Male athletes engaged in team sports aged 17-30 years are both taller and heavier (with higher BMI) than those engaged in individual sports in the same age group and the same trend has been observed in female athletes aged 7-13 years. Female athletes aged 17-30, engaged in team sports are also heavier (with higher BMI) than those in individual sports. Regarding the minimal heart rate (pulse), higher means have been observed in male athletes in age groups 7-13 and 17-30 in team sports (as compared with individual sports), while the only significant difference for blood pressure data has been detected in female athletes (age group 7-13), with higher means obtained for those engaged in team sports. Higher means for hemoglobin and hematocrit have been observed in individual sports, but only in males aged 17-30 and 15-17, respectively. Regarding leukocytes and thrombocytes level, higher means are revealed in female athletes engaged in individual sports, in the age groups 15-17 and 17-30, respectively. Most significant differences between individual and team sports have been detected in BMI in female athletes in all age groups, with higher means observed in team sports.

The BMI was then also used as a dependent variable (criterion) in the linear multiple regression analysis, together with other variables used in this research, except body mass and height (Table 2 and Table 3).

Multiple regression coefficients were statistically significant for males engaged both in individual and team sports, in all observed age groups of athletes. In females, multiple regression coefficients were not statistically significant in age group 15-17, both in individual and team sports, as well as for age group 7-13 (only in team sports). The other coefficients in females (in other age groups) were statistically significant. The variances explained varied in range from 0.10 to 0.36. The highest number of statistically significant predictors for BMI has been revealed in males in age group 7-13, engaged in team sports, as well as in the age group 7-13 in females, for those engaged in individual sports.

The explanations of the results obtained could be given in terms of differences among requests in different sports in which the athletes are engaged. On the other hand, in different sports in Croatia, different levels of 'professionalism' of the sport training vary, depending on type of sport, age range and sex. Moreover, sex differences could be also reflected in growth standards (what can be reflected in different health indicators). Additionally, greater general importance of physical activity and sport could be stronger for males (in all age groups), which can have as influence in their health status.

Demands of certain sports depend about the competitive level in some sport (1), particular play styles (15), but in

Table 2. Multiple regression analyses for male and female athletes in team sports, according to their age group

Tablica 2. Višestruke regresijske analize (prognoziranje BMI pomoću odabranih zdravstvenih pokazatelja kao prediktora) za sportaše i sportašice u momčadskim sportovima, prema dobnoj skupini

TEAM SPORTS												
AGE GROUP	**7-13**						**13-15**					
SEX	**males**			**females**			**males**			**females**		
	BETA	**t**	**p(t)**	**BETA**	**t**	**p(t)**	**BETA**	**t**	**p(t)**	**BETA**	**t**	**p(t)**
heart rate (beats/ min)	0.068	1.900	0.058	0.141	0.763	0.450	0.004	0.107	0.914	**-0.235**	**-1.992**	**0.051**
blood pressure diastolic (mm Hg)	**0.416**	**9.694**	**0.000**	0.348	1.554	0.129	**0.281**	**6.342**	**0.000**	**0.418**	**2.732**	**0.008**
blood pressure systolic (mm Hg)	-0.019	-0.451	0.652	0.133	0.584	0.563	**0.157**	**3.603**	**0.000**	0.135	0.925	0.359
hemoglobin (g/L)	**-0.168**	**-2.198**	**0.028**	-0.062	-0.140	0.890	-0.132	-1.245	0.214	-0.306	-0.920	0.362
hematocrit (proportion)	**0.32**	**4.148**	**0.000**	-0.103	-0.229	0.820	**0.428**	**4.000**	**0.000**	0.272	0.815	0.419
leukocytes (µL)	-0.027	-0.778	0.437	-0.080	-0.410	0.684	**0.084**	**2.135**	**0.033**	0.085	0.680	0.500
thrombocytes (µL)	**-0.118**	**-3.441**	**0.001**	-0.036	-0.231	0.819	-0.020	-0.509	0.611	-0.051	-0.390	0.698
sedimentation rate (mm/h)	**0.119**	**3.279**	**0.001**	-0.236	-1.373	0.178	0.043	0.991	0.322	0.142	1.170	0.247
Criterion: BMI (kg/m^2)	**R=0.504 R^2=0.254 F=28.253**			R=0.487 R^2=0.237 F=1.399			**R=0.558 R^2=0.312 F=25.981**			**R=0.557 R^2=0.310 F=3.033**		

TEAM SPORTS												
AGE GROUP	**15-17**						**17-30**					
SEX	**males**			**females**			**males**			**females**		
	BETA	**t**	**p(t)**	**BETA**	**t**	**p(t)**	**BETA**	**t**	**p(t)**	**BETA**	**t**	**p(t)**
heart rate (beats/ min)	**-0.112**	**-2.161**	**0.031**	-0.153	-1.309	0.195	**-0.082**	**-2.003**	**0.046**	0.077	0.731	0.466
blood pressure diastolic (mm Hg)	**0.277**	**4.655**	**0.000**	0.164	1.321	0.191	**0.233**	**4.902**	**0.000**	-0.065	-0.473	0.637
blood pressure systolic (mm Hg)	0.073	1.220	0.223	-0.039	-0.313	0.756	0.074	1.522	0.129	0.216	1.519	0.132
hemoglobin (g/L)	0.073	0.526	0.600	-0.446	-1.252	0.215	0.185	1.600	0.110	**-0.523**	**-2.126**	**0.036**
hematocrit (proportion)	0.078	0.569	0.570	0.340	0.933	0.354	-0.043	-0.373	0.709	**0.582**	**2.382**	**0.019**
leukocytes (µL)	0.064	1.258	0.209	-0.015	-0.120	0.905	-0.050	-1.254	0.210	0.011	0.118	0.906
thrombocytes (µL)	**-0.241**	**-4.589**	**0.000**	0.044	0.353	0.725	0.007	0.181	0.857	-0.121	-1.247	0.216
sedimentation rate (mm/h)	0.001	0.017	0.987	0.125	0.927	0.357	0.032	0.740	0.460	**0.339**	**3.385**	**0.001**
Criterion: BMI (kg/m^2)	**R=0.486 R^2=0.236 F=12.134**			R=0.352 R^2=0.124 F=1.202			**R=0.333 R^2=0.111 F=8.695**			**R=0.445 R^2=0.198 F=2.868**		

Table 3. Multiple regression analyses for male and female athletes in individual sports, according to their age group
Tablica 3. Višestruke regresijske analize (prognoziranje BMI pomoću odabranih zdravstvenih pokazatelja kao prediktora) za sportaše i sportašice u pojedinačnim sportovima, prema dobnoj skupini

INDIVIDUAL SPORTS												
AGE GROUP	**7-13**						**13-15**					
SEX	**males**			**females**			**males**			**females**		
	BETA	**t**	**p(t)**	**BETA**	**t**	**p(t)**	**BETA**	**t**	**p(t)**	**BETA**	**t**	**p(t)**
heart rate (beats/ min)	0.003	0.039	0.969	0.020	0.277	0.782	-0.078	-1.119	0.265	-0.107	-1.147	0.255
blood pressure diastolic (mm Hg)	**0.494**	**6.959**	**0.000**	**0.549**	**6.543**	**0.000**	**0.216**	**2.514**	**0.013**	**0.584**	**4.952**	**0.000**
blood pressure systolic (mm Hg)	-0.079	-1.180	0.240	-0.044	-0.534	0.594	0.062	0.742	0.459	-0.074	-0.606	0.546
hemoglobin (g/L)	-0.072	-0.529	0.597	**-0.461**	**-2.753**	**0.007**	-0.033	-0.163	0.871	-0.076	-0.374	0.709
hematocrit (proportion)	0.243	1.774	0.078	**0.485**	**2.885**	0.004	**0.420**	**2.099**	**0.037**	-0.067	-0.336	0.738
leukocytes (μL)	-0.026	-0.390	0.697	0.057	0.839	0.403	-0.101	-1.432	0.154	0.044	0.429	0.669
thrombocytes (μL)	-0.049	-0.728	0.467	**-0.150**	**-2.161**	**0.032**	-0.122	-1.670	0.097	0.030	0.327	0.744
sedimentation rate (mm/h)	**0.164**	**2.444**	**0.015**	0.104	1.498	0.136	0.091	1.187	0.237	0.180	1.819	0.073
Criterion: BMI (kg/m^2)	**R=0.547 R^2=0.299 F=10.277**			**R=0.572 R^2=0.328 F=9.624**			**R=0.540 R^2=0.292 F=8.191**			**R=0.598 R^2=0.358 F=5.713**		

INDIVIDUAL SPORTS												
AGE GROUP	**15-17**						**17-30**					
SEX	**males**			**females**			**males**			**females**		
	BETA	**t**	**p(t)**	**BETA**	**t**	**p(t)**	**BETA**	**t**	**p(t)**	**BETA**	**t**	**p(t)**
heart rate (beats/ min)	0.028	0.299	0.766	0.095	0.573	0.570	0.004	0.067	0.947	-0.117	-1.006	0.319
blood pressure diastolic (mm Hg)	**0.435**	**4.259**	**0.000**	0.124	0.684	0.498	**0.433**	**6.781**	**0.000**	0.281	1.931	0.058
blood pressure systolic (mm Hg)	-0.051	-0.450	0.653	0.266	1.563	0.125	-0.073	-1.138	0.257	0.268	1.890	0.064
hemoglobin (g/L)	0.240	1.040	0.301	0.235	0.583	0.563	-0.215	-1.137	0.257	0.006	0.022	0.982
hematocrit (proportion)	-0.069	-0.306	0.760	-0.206	-0.506	0.615	0.346	1.817	0.071	0.031	0.112	0.911
leukocytes (μL)	0.141	1.589	0.115	0.154	1.027	0.310	-0.082	-1.293	0.198	**0.446**	**3.499**	**0.001**
thrombocytes (μL)	-0.069	-0.761	0.448	-0.076	-0.481	0.633	-0.029	-0.433	0.666	-0.168	-1.411	0.164
sedimentation rate (mm/h)	0.020	0.186	0.853	-0.071	-0.440	0.662	0.002	0.022	0.982	0.094	0.788	0.434
Criterion: BMI (kg/m2)	**R=0.512 R^2=0.263 F=4.538**			R=0.439 R^2=0.193 F=1.255			**R=0.506 R^2=0.256 F=8.305**			**R=0.599 R^2=0.359 F=4.125**		

general about overall components of the specification equation in certain sport. Therefore, regardless of sport type, individual athletes are usually determined on the basis of their anthropometric, functional and psychological characteristics. The most beneficial advantage of this research is studying all athletes which were included in routine medical examinations in particular polyclinic, in two consecutive years (2011 and 2012). On the other hand, the first shortcoming is the possibility of the generalization of the findings in this study, which is not good (reason is various number of the athletes in certain team or individual sports, with various competitive levels). The subsamples of athletes in certain sports are quite small-sized (when stratified by sex and age groups). Morevoer, the data about competitive levels, playing styles, specific psychological profiles or other relevant variables, were not collected. The main shortcoming of this study is the feature of routine medical examinations, which are very often fast and superficial, without collecting all data for all variables in research. Namely, the data about hemoglobin, thrombocytes and sedimentation rate are particularly incomplete. In future studies, collecting more data in general, and the data about competitive levels, specific psychological profiles and other relevant characteristics, as well as obtaining more precise data, are the imperatives for the researchers. Practical implications lead to identifying the individuals who are disturbing from 'ideal' profiles in morphological variables, as well as in desirable functional health status, for both sports. Moreover, results could help in identifying the widespread problem of overtraining, defined as an increase in amount or intensity of physical activity combined with inadequate recovery, is a problem (7). In spite of the fact that some level of overtraining is a prerequisite for top performances, pushing the athletes too hard can lead to chronic fatigue and underperformance, leading to a state of physical "staleness" (11). Higher levels of staleness are found among participants in individual sports (8), explained by a greater autonomy level in individual athletes, which sometimes result in overambitious goals. Therefore, these results could be a pilot indicator for this problem.

CONCLUSIONS

When analyzing the differences, it could be concluded that more statistically significant differences in the variables in research, related to the sport type (team/individual), have been detected in male athletes (as compared with female ones). These differences are more emphasized in team than in the individual sports. Multiple regression coefficients were statistically significant for males engaged both in individual and team sports, in all observed age groups of athletes. In females, multiple regression coefficients were

not statistically significant in age group 15-17 (both in individual and team sports), for age group 7-13 (only in team sports), while the other coefficients were statistically significant. More statistically significant predictors are found in males (than in females) and more in team sports. The results could be mainly discussed in terms of the differences among requests in different sports, different levels of professional sport training in certain sports and in terms of sex differences in growth. The main shortcomings are the quality of collected data, misbalanced (incomplete) data in different variables. At the end, these results show that, in spite of their robustness, health indicators collected during routine medical examinations could be a useful proxy for detecting sex and age-related differences in athletes' health status, even according to sport type.

Acknowledgements

This study was supported by the Polyclinic for Occupational Health and Sport, Zagreb, Croatia, project: "Health status and life quality of athletes", project leader: Joško Sindik, PhD.

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