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Some Anthropometric Characteristics, Reactions on Physical Stress, and Blood Pressure in Males Aged 18 in »Primorsko-Goranska« County, Croatia

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A B S T R A C T

The paper presents the distribution and average values of some anthropometric characteristics in 1,210 males aged 18 in »Primorsko-Goranska« County, as well as some manifestations of physical fitness parameters and some correlations between these two groups of characteristics. The prevalence of hypertensive and limit values for systolic blood pressure (SBP) was 8.6% and for diastolic blood pressure (DBP) 2.1%. Body weight and body mass index were in a significantly positive correlation with SBP and DBP. Body mass index showed a significantly positive correlation with heart rate after step -test. Therefore, it can be concluded that overweight reduces tolerance on workload.

Introduction

Body height, body weight and some parameters that are used to determine body composition and nourishment (relative weight and body mass index) are standard morphological parameters for the estimation and prognosis of work ability[1,2]. They very often show correlations with workload tolerance, with estimated or measured maximally achieved load during physical stress tests and with cardiovascular functions. Body mass index and body weight are usually in correlation with blood pressure values in studied populations[2–8], even in children aged 7 or 10 years[9] or in schoolchildren[10]. Overweight is one of the most prominent risk factors

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for arterial hypertension. The prevalence of arterial hypertension in adult population varies from 8% to 23% depending on average age of studied groups, on ethnic, geographic, race and numerous other characteristics[3,7,11–18]. It is a severe medical and socio-economic problem because it often causes temporary work disability or invalidity.

Regarding the prognosis of working or living ability, it's especially important to determine these relations in young people preparing to enter a profession. It means at the end of their formal education and training. Most persons are 18 years old at that moment.

The aim of this study was to present the distribution of principal anthropometric characteristics in a representative sample of male population aged 18 in »Primorsko-Goranska« County and to establish correlations between these characteristics and the values of systolic or diastolic blood pressure, the results of physical stress test expressed by heart rate after stress, and achieved work intensity, in order to assess physical fitness of this population. It was the result of the presence of physical activities in the life of the young men preparing to enter the working population. Physical activity and adequate nutritional habits are two of basic preventive measures in health maintenance and promotion. The purpose of the study was to utilize the results in planning the prevention of cardiovascular risk factors and primary prevention of work ability of our population, particularly in the work ability prognosis. Thus, the risk degree for the development of different diseases later in life, especially arterial hypertension and other cardiovascular diseases, could be estimated.

Materials and Methods

During the first semester of 1998, 1,210 or 85.6% of 1,414 males in »Primorsko-Goranska« County aged 18 were examined for the purpose of this study. All subjects with some acute or chronic disease or impairment and injury (158 out of 1,414), were excluded from examination. There were also excluded 31 subjects with incomplete data while 14 subjects refused examination. The list of males aged 18 was obtained from residential data in the local police administration.

Only male subjects were chosen because cardiovascular diseases are more prevalent in males than in females. Also, males are more frequently employed in workplaces demanding physical work. So, it is especially important for them to have their physical fitness assessed in professional orientation and before the employment. The sample was representative for Croatia because it included people of all races (predominantly Dinaric and Alpine) and nationalities present in Croatia. We selected the area of this county because we were interested in the characteristics of population in our domicile region.

The studied area geographically includes the mountain region of Gorski Kotar with mountain climate and the region of Northern Croatian coast i.e Kvarner Bay and Kvarner islands with Mediterranean climate. Gorski Kotar is a poorly developed region economically. Physical activities are a part of the life there. Northern Croatian coast was a very developed industrial region ten years ago, before the war in former Yugoslavia. However, during the last ten years, industrial production and employment fell significantly, mostly as a consequence of the war.

In the whole studied region, nutritional habits include increasingly the use of concentrated carbohydrates and the consumption of fast food. But, Mediterranean diet is still dominant in nutrition. In the majority of young persons usual recreational and sport activities are rarely present.

This population, aged 18, is potentially a working population. So, it is important to investigate the influence of studied characteristics on physical fitness and to estimate the working capacity of this population as a whole. Blood pressure values and body mass index were included in the analysis as relevant risk factors for atherosclerosis and consequently coronary and cerebrovascular diseases. These diseases are at the first place in Croatia by their mortality and they are frequently the cause of working disability.

In all the subjects we measured body weight (BW), body height (BH) and blood pressures (BP). BW was measured by using decimal medical scale and BH by anthropometer fixed on scale. BP was taken by sphygmomanometer after 5 minute rest in sitting position, on the naked left upper arm, before stress test[1,19]. All examinations were carried out by the same physician.

Body mass index (BMI) was calculated according to Quetelet and relative body weight (RBW) in percentage from BH and BW. RBW was determined in relation to ideal body weight that we calculated by Lorenz's equation for men:

$$\text{IBW} \quad (\text{H} \quad 100) \quad \frac{(\text{H} \quad 150)}{4} \qquad (1)$$

The examinees were distributed by BMI into different categories of the nourishment degree according to recommendations by Croatian Academy of Medical Sciences[20]. We measured resting heart rate (HR_0) and heart rate immediately after modified step-test (HR_1). Heart rate was measured in a sitting subject during 1 minute by heart auscultation. The examinees performed modified step-test on a bench 30.5 cm high with 24 climbing cycles in a minute during three minutes. Work intensity during step-test (I) was calculated by equation[21]:

$$I \quad \frac{h \quad n \quad 1.5 \quad BW}{6} \qquad (\text{W}) \qquad (2)$$

h = 0.305 m; n = number of cycles in a minute = 24; BW = body weight.

We calculated achieved oxygen input (VO_2) from I, by equation:

$$VO_2 \quad \frac{I \quad 0.24 \quad 60}{1000 \quad 5} \qquad (L\,/\,\text{min}) \qquad (3)$$

0.24 = converting factor from J to cal; 60 = average I in 1 minute of test; 1000 = converting factor from cal to kcal; 5 = caloric equivalent in kcal of oxygen input of 1 L.

Equation according to Döbeln[21] was used to calculate the estimated maximal oxygen input (VO_{2MAX}) from I. We also determined the ratio $VO_2 : VO_{2MAX}$ as an indicator of work efficiency.

Statistical analyses involved the calculation of standard variability measures (arithmetic mean, standard deviation, median, and span) for all measured and calculated parameters. Pearson's product -moment correlation coefficients of BH, BW, BMI or RBW with HR_0, HR_1, I, VO_2, VO_{2MAX}, VO_2/VO_{2MAX}, SBP or DBP were determined. Pearson's product-moment correlation coefficients of I or VO_{2MAX} with HR_1, SBP or DBP were also determined. Standard multiple regression analysis, with included interception, was done for the relation between BH and BW as independent variables and SBP, VO_{2MAX} or VO_2/VO_{2MAX} as dependent variables, too.

Results

Descriptive statistics of measured and calculated parameters is presented in Table 1. It is evident from Table 2 that 43.2% of examinees could not be placed in the category of normally nourished. However, there were more moderately lean, lean and undernourished persons than moderately fat, fat and obese persons (25.0% : 18.2%).

TABLE 1
DESCRIPTIVE STATISTICS OF MEASUREDAND CALCULATED VARIABLES IN EXAMINED SAMPLE (N = 1210)

Variable	Mean	SD	Median	Span
Height (cm)	178.7	6.7	179	149.0–205.0
Weight (kp)	71.4	11.5	70	39.5–125.0
Relative weight (%)	99.9	14.2	97.9	68.7–182.9
BMI (kp/m^2)	22.35	3.17	21.90	15.43–41.10
SBP (mmHg)	126.6	12.4	125	95–210
DBP (mmHg)	76.8	7.5	80	45–105
HR_0 (b/min)	78.5	11.2	78	42–126
HR_1 (b/min)	107.3	17.1	106	64–167
I (W)	130.8	21.1	128.1	72.3–228.8
VO_2 (l/min)	0.38	0.06	0.37	0.21–0.66
VO_{2MAX} (l/min)	2.14	0.51	2.05	1.24–6.68
VO_2/VO_{2MAX}	18.2	4.0	18.2	5.2–32.4

BMI = body mass index; SBP = systolic blood pressure; DBP = diastolic blood pressure; HR_0 = resting heart rate; HR_1 = heart rate after step-test; I = achieved work intensity during step-test; VO_2 = average achieved oxygen uptake; VO_{2MAX} = maximal estimated oxygen uptake; VO_2/VO_{2MAX} = estimated work efficiency.

TABLE 2
DISTRIBUTION OF EXAMINEES BY RELATIVE WEIGHT

Examinees category	Relative weight (%)	N	%
Undernourished	<70	1	0.1
Lean	70–79	46	3.8
Moderately lean	80–89	255	21.1
Normally nourished	90–110	688	56.8
Moderately fat	111–120	132	10.9
Fat	121–130	41	3.4
Obese	>130	47	3.9
Total		1210	100.0

TABLE 3
DISTRIBUTION OF EXAMINEES BY BODY MASS INDEX

Examinees category	Body mass index (kg/m^2)	N	%
Undernourished (lean)	<18.50	90	7.4
Normally nourished	18.50–24.99	911	75.3
Obesity – 1st degree	25.00–29.99	175	14.5
– 2nd degree	30.00–39.99	33	2.7
– 3rd degree	>39.99	1	0.1
Total		1210	100.0

The distribution of examinees according to the BMI values is presented in Table 3. A relatively large proportion of corpulent and fat persons (17.3%) is obvious here. Calculated 85% percentile limit for BMI was 25.00, what is the lower limit for the category of fat persons according the WHO categorization.

Table 4 shows the distribution of examinees according to the values of SBP and DBP. Table 5 presents Pearson's correlation coefficients of some anthropometric variables with systolic or diastolic blood pressure and with some indicators of reaction on physical stress in our examinees.

In Table 6, Pearson's correlation coefficients of achieved work intensity (I), average achieved oxygen input during step-test (VO_2), predicted maximal oxygen input (VO_{2MAX}) or estimated work efficiency (VO_2/VO_{2MAX}) with achieved maximal heart rate during step-test (r_{HR1}), systolic or diastolic blood pressures are presented.

Especially interesting significant negative correlations between HR_1 and VO_{2max} ($VO_{2MAX} = 6.05–0.036 \quad HR_1$) as well as between I or VO_2 and HR_1 ($HR_1 = 91.708 + 0.119 \quad I$; $HR_1 = 91.708 + 41.461 \quad VO_2$) were found. In that way we can predict aerobic capacity and consequently maximal working capacity by maximal heart rate achieved during step-test. Heart rate at different levels of workload, namely at different intensities of work, can also be predicted. Thus, it is possible to estimate one's working capacity reserve, too.

TABLE 4
DISTRIBUTION OF EXAMINEES ACCORDING TO VALUES OF SYSTOLIC AND DIASTOLIC BLOOD PRESSURES

Blood pressure value	Systolic blood pressure (SBP)		Diastolic blood pressure (DBP)	
	N	%	N	%
Normal[1]	1108	91.6	1186	98.0
Borderline[2]	87	7.2	14	1.2
Elevated[3]	15	1.2	10	0.8
Total	1210	100.0	1210	100.0

[1] Normal BP = SBP < 141 mmHg and DBP < 91 mmHg;
[2] Borderline BP = SBP from 141 mmHg to 160 mmHg and DBP from 91 mmHg to 95 mmHg;
[3] Elevated BP = SBP > 160 mmHg and DBP > 95 mmHg.

TABLE 5
PEARSON'S CORRELATION COEFFICIENTS OF SOME ANTHROPOMETRIC VARIABLES WITH BLOOD PRESSURE AND SOME INDICATORS OF REACTION ON PHYSICAL STRESS (N = 1210)

	r_{SBP}	r_{DBP}	r_{HR0}	r_{HR1}	r_{VO2MAX}	r_I	r_{VO2}	$r_{VO2/VO2MAX}$
Height	0.10*	0.03	0.01	0.06*	0.11*	0.47*	0.47*	0.22*
Weight	0.28*	0.08*	0.04	0.15*	0.20*	–	–	0.50*
Relative weight	0.27*	0.08*	0.04	0.14*	0.17*	0.90*	0.90*	0.46*
BMI	0.27*	0.08*	0.04	0.14*	0.17*	0.89*	0.89*	0.46*

* p 0.05;
SBP = systolic blood pressure; DBP = diastolic blood pressure; HR_0 = resting heart rate; HR_1 = heart rate after step-test; VO_{2MAX} = maximal estimated oxygen uptake; I = achieved work intensity during step-test; VO_2 = average achieved oxygen uptake; VO_2/VO_{2MAX} = estimated work efficiency.

TABLE 6
PEARSON'S CORRELATION COEFFICIENTS OF SOME INDICATORS OF REACTION ON PHYSICAL STRESS WITH ACHIEVED MAXIMAL HEART RATE (HR_1), SYSTOLIC (SBP) AND DIASTOLIC (DBP) BLOOD PRESSURE DURING STEP-TEST (N = 1210)

	r_{HR1}	r_{SBP}	r_{DBP}
I	0.15*	0.28*	0.08*
VO_2	0.15*	0.28*	0.08*
VO_{2MAX}	–0.83*	–0.02	–0.03
VO_2/VO_{2MAX}	0.92*	0.23*	0.10*

* p 0.05;
I = achieved work intensity during step-test; VO_2 = average achieved oxygen uptake; VO_{2MAX} = maximal estimated oxygen uptake; VO_2/VO_{2MAX} = estimated work efficiency; HR_1 = heart rate after step-test; SBP = systolic blood pressure; DBP = diastolic blood pressure.

TABLE 7
MULTIPLE REGRESSION OF SYSTOLIC (SBP) AND DIASTOLIC (DBP) BLOOD PRESSURE, MAXIMAL ESTIMATED OXYGEN UPTAKE (VO_{2MAX}), AND ESTIMATED WORK EFFICIENCY (VO_2/VO_{2MAX}) ON BODY HEIGHT AND BODY WEIGHT (N = 1210)

Dependent variables	Independent variables						
	Height & weight			Height		Weight	
	r_m	s.e.	s.e.e.	r_p	s.e.	r_p	s.e.
DBP	0.08***	11.34	15.15	–0.01	0.03	0.09**	0.03
SBP	0.28***	8.95	11.96	–0.04	0.03	0.30***	0.03
VO_{2MAX}	0.20***	0.38	0.50	0.02	0.03	0.19***	0.03
VO_2/VO_{2MAX}	0.50***	2.57	3.43	–0.02	0.03	0.51***	0.03

** p 0.01; *** p 0.001;
r_m = multiple correlation coefficients; s.e. = standard error of r_m; s.e.e. = standard error of estimate for r_m; r_p = partial correlation coefficients.

As there was a significant correlation between BH and SBP or DBP as well as between BH and VO_{2MAX}, we wanted to know if that could be assigned to body height or some other co-factor in this variable. For that purpose we calculated multiple and partial regression coefficients of SBP or DBP, VO_{2MAX} or VO_2/VO_{2MAX} with body height and body weight in our examinees. Thus, the hypothesis proved to be correct. Partial regression coefficients between BH and SBP, DBP or VO_{2MAX} were not significant, as seen from Table 7. Partial regression coefficients between BW and SBP, DBP or VO_{2MAX} were statistically significant; meaning that BW was proved as the previously mentioned co-factor.

Discussion

The prevalence of obesity (17.3% or 18.2%) in our examinees aged 18 years was certainly lower than the prevalence usually found in adult population (from 27% and 65.2% depending on age and country) [12,15,22–25]. The prevalence of overweight in the adult population of some countries was quite low compared with developed countries (only 4%)[26]. In one of the studies the prevalence of overweight in males 20 years old was even lower than in our population of similar age[27]. That was certainly less than in some studies that include children from elementary schools[28]. Average values of relative body weight, body mass index, systolic (SBP) and diastolic blood pressure (DBP) were in normal limits for this age. They alone did not tell much about the risk of arterial hypertension development. Average values of achieved work intensity corresponded to the values that achieve persons completely fit to resist all workload levels. Average values of estimated maximal oxygen input were above the average for physically active males of that age[1].

At this age, borderline values of blood pressure for adults must also be considered as a risk, though the proportion of hypertensive persons at this age was low (1.2% for SBP and 0.8% for DBP). From that point of view, the proportion of persons with elevated blood pressure was considerably higher especially regarding SBP (8.4% for SBP and 2.0% for DBP). Some studies find the prevalences of borderline arterial hypertension in adult populations similar to the prevalence in our study (8.3%)[8]. Of course, we must be careful when interpreting blood pressure values measured only once. It especially refers to SBP which is subject to frequent variations. This can explain a significantly larger proportion of persons with borderline elevated SBP than persons with borderline elevated DBP.

We confirmed the results of other authors in the sense of pronounced blood pressure dependence on body mass index as well as dependence on the level of nourishment[2–10,25–27,29–34]. As the other authors, we found more prevalent arterial hypertension in fat persons[24,35]. The results from one of the studies in adults indicated that the obese group had SBP measurements that were on average 9.0 mm Hg higher than those in the normal group[36]. Some authors detected a significant association between BMI and SBP[37]. This confirms the importance of that risk factor for the development of arterial hypertension[38]. Some authors consider correlation between body mass index and SBP or DBP the best predictor for acquiring coronary disease in the working population[17]. The authors who study children's populations emphasize obesity and elevated blood pressure in childhood as very important risk factors for developing cardiovascular diseases and coronary arteries' calcifications in adult age[39,40]. Body mass index in some studies is more connected with elevated blood pressure in younger persons, aged 6 to 14 than in older persons, 15 to 34 years old[41].

The correlation between the indicators of nourishment and heart rate after step-test that we found is also visible in the correlation of body weight and body mass index with variations of heart rate in other studied populations[42].

Univariate and multivariate analyses in one study showed a significant relationship of exercise performance indicators with blood pressure[43]. We found the same for SBP. Other authors found out that heart rate showed a strong positive correlation with body-mass index. The association between body-mass index and heart rate diminished after further adjustments for systolic blood pressure, suggesting that the primary effect of body weight is on blood pressure rather than on heart rate[44]. We found out that both heart rate and SBP showed a statistically significant positive correlation with body-mass index. The same refers to the correlation of body weight and body mass index with the product of mean arterial pressure and heart rate in children[45].

Some authors found out that obesity accentuated exercise intolerance and low aerobic capacity[46]. Our results indirectly indicate that. In other words, we found a significant positive correlation between body mass index and exercise performance indicators as some other authors did[47]. But, we found negative correlation between heart rate after step-test and predicted maximal oxygen input. It means that working capacity was lower in the subjects with higher heart rate achieved during stress test. So, we must point out the importance of regression equation between heart rate after step-test and predicted maximal oxygen input (mentioned in the results) by which we can evaluate working capacity of anyone from this population. In one study the correlation between BMI and VO_2 was not found[48].

Regression equation between achieved work intensity during step-test and heart rate after step-test that we got in our study must be mentioned, as well. By this equation heart frequencies that this population or anyone from this population could achieve at different workloads can be predicted.

Conclusions

From this study we can conclude that prevalence and prevention of obesity should be tackled already at school age. Namely, a great number of persons were obese already at the age of 18. Later as adults, it is not easy for them to lose weight if it was gained so early in life. Then, obesity becomes a serious risk for arterial hypertension and other cardiovascular diseases. We found in this study that body weight and body mass index correlated significantly with SBP and DBP values even at the age of 18. It must be especially mentioned that body mass index showed a significantly positive correlation with heart rate after step-test, meaning that overweight reduces tolerance on workload because it leads to a heart rate increase after physical stress.

R E F E R E N C E S

1. ŠARIĆ, M., Z. RIBIĆ, Z. ČENGIĆ-BURANJI, Z. SERTIĆ: Radna sposobnost. (IMI, Zagreb, 1984). — 2. TALBOTT, E., J. HELMKAMP, K. MATTHEWS, L. KULLER, E. COTTING-TON, G. REDMOND, Am. J. Epidemiol., 121 (1985) 501. — 3. BARIĆ, LJ., In: MIMICA, M. (Ed.): Arterijska hipertenzija. (Školska knjiga, Zagreb, 1984). — 4. CHOUDHURY, S. R., A. OKAYAMA, Y. KITA, H. UESHIMA, M. YAMAKA-WA, I. NIKI, S. SASAKI, J. Hypertens., 13 (1995) 587. — 5. FOGARI, R., G. MARASI, A. ZOPPI, G. D. MALAMANI, A. VANASIA, G. VILLA, Eur. J. Epidemiol., 11 (1995) 591. — 6. LINDQUIST, T. L., L. J. BEILIN, M. KNUIMAN, Clin. Exp. Pharmacol. Physiol., 22 (1995) 580. — 7. MARINKOVIĆ, M. In: HADŽIĆ, N., M. RADONIĆ, B. VRHOVAC, B. VUCELIĆ (Eds.): Arterijska hipertenzija. (Školska knjiga — JUMENA, Zagreb, 1989). — 8. RAMIREZ, M. O., C. T. PINO, L. V. FURIASSE, A. J. LEE, F. G. FOWKES, J. Hum. Hypertens., 9 (1995) 891. — 9. SUH, I. L., L. S. WEBBER, J. A. CUTLER, G. S. BERENSON, YONSEI. Med. J., 36 (1995) 402. — 10. FORRESTER, T. E., R. J. WILKS, F. I. BENNETT, D. SIMEON, C. OSMOND, M. ALLEN, A. P. CHUNG, P. SCOTT, B. M. J., 312 (1996) 156. — 11. CIGOLINI, M., G. TARGHER, J. C. SEIDELL, M. TONOLI, R. SCHIAVON, G. AGOSTINO, G. SANDRE, J. Hypertens., 13 (1995) 659. — 12. GUPTA, R., H. PRAKASH, S. MAJUMDAR, S. SHARMA, V. P. GUPTA, Indian Heart J., 47 (1995) 331. — 13. KULČAR, Z., Nar. Zdr. List, 305–306 (1985) 8. — 14. MACMAHON, S., R. NORTON, R. JACKSON, M. J. MACKIE, A. CHENG, S. VAN DER HOORN, A. MILNE, A. MCCULLOCH, N. Z. Med. J., 108 (1995) 499. — 15. MARTINEZ -GONZALEZ, M. A., A. BUENO-CAVANILLAS, M. A. FERNAN-DEZ-GARCIA, M. GARCIA-MARTIN, M. DELGADO-RODRIGUEZ, R. GALVEZ-VARGAS, Med. Clin. Barc., 105 (1995) 321. — 16. MENNEN, L. I., J. C. WITTEMAN, J. M. GELEIJNSE, R. P. STOLK, M. C. VISSER, D. E. GROBBEE, Ned. Tijdschr. Geneeskd., 139 (1995) 1983. — 17. OSHAUG, A., K. H. BUGGE, C. H. BJONNES, M. RYG, Int. Arch. Occup. Environ. Health, 67 (1995) 359. — 18. ANONYMOUS: Podaci o zdravstvenom stanju stanovništva i radu zdravstvene djelatnosti na području općine Rijeka za 1989. i 1990. godinu. (Zavod za zaštitu zdravlja Rijeka, Rijeka, 1990). — 19. DURAKOVIĆ, Z., Z. GRGIĆ, S. HEIMER, H. MAVER, P. RUDAN, N. SMOLEJ (Eds.): Fiziološke metode III. (RSIZ za zapošljavanje Hrvatske i Sekcija za biološku antropologiju Zbora liječnika Hrvatske, Zagreb, 1984). — 20. ANTONIĆ -DEGAČ, K., A. KAIĆ-RAK, V. HRABAK-ŽERJAVIĆ, D. RAK, Praćenje stanja uhranjenosti i prehrane u cilju unapređenja zdravlja pučanstva. In: Prehrana i unapređenje zdravlja u Republici Hrvatskoj. (Hrvatski farmer d.d., Akademija medicinskih znanosti Hrvatske, Zagreb, 1999). — 21. HEIMER, S., B. MATKOVIĆ, R.

MEDVED, V. MEDVED, E. ŽUŠKIN: Praktikum kineziološke fiziologije. (Fakultet za fizičku kulturu Sveučilišta u Zagrebu, Zagreb, 1985). — 22. BEEGOM, R., R. BEEGOM, M. A. NIAZ, R. B. SINGH, Int. J. Cardiol., 51 (1995) 183. — 23. EL MUGAMER, I. T., A. S. ALI ZAYAT, M. M. HOSSAIN, R. N. PUGH, J. Trop. Med. Hyg., 98 (1995) 407. — 24. STAM-MORAGA M. C., J. KOLANOWSKI, M. DRAMAIX, S. DE HENAUW, D. DE BACQUER, G. DE BACKER, M. D. KORNITZER, Int. J. Obes. Relat. Metab. Disord., 22 (1998) 988. — 25. OSTBYE T., J. POMERLEAU, M. SPEECHLEY, L. L. PEDERSON, K. N. SPEECHLEY, C. M. A. J., 152 (1995) 1811. — 26. WANG Y., B. POPKIN, F. ZHAI, Eur. J. Clin. Nutr., 52 (1998) 908. — 27. STARK O., E. ATKINS, O. H. WOLFF, J. W. DOUGLAS, Br. Med. J., 283 (1981) 13. — 28. MENGHETTI, E., G. DI FEO, G. MUCEDOLA, M. MONTALEONE, P. MARULLI, A. LIBERTI, R. CELLITTI, A. SPAGNOLO, R. PASCONE, Minerva Pediatr., 47 (1995) 303. — 29. AMAD, S., T. ROSENTHAL, E. GROSSMAN, J. Hum. Hypertens., 3 Suppl. (1996) 31. — 30. NOVOTNY, R., J. DAVIS, P. ROSS, R. WASNICH, Ethn. Health, 3 (1998) 167. — 31. KONTOŠIĆ, I., M. VUKELIĆ, M. STIPANOVIĆ, Medicina, 28 (1992) 25. — 32. KONTOŠIĆ, I., M. VUKELIĆ, D. MATOVINOVIĆ, Liječ. Vjesn., 113 (1991) 314. — 33. PALATINI, P., A. C. PESSINA, G. R. GRANIERO, C. CANALI, P. MORMINO, F. DORIGATTI, V. ACCURSO, M. MICHIELETTO, E. FERRARESE, O. VRIZ, G. Ital. Cardiol., 25 (1995) 977. — 34. RYWIK S. L., C. E. DAVIS, A. PAJAK, G. BRODA, A. R. FOLSOM, E. KAWALEC, O. D. WILLIAMS, Ann. Epidemiol., 8 (1998) 3. — 35. LAVIE, C. J., R. V. MILANI, Chest, 109 (1996) 52. — 36. BOS A J., L. J. BRANT, C. H. MORRELL, J. L. FLEG, Coll. Antropol., 22 (1998) 333. — 37. PICCIRILLO G., F. VETTA, E. VIOLA, E. SANTAGADA, S. RONZONI, M. CACCIAFESTA, V. MARIGLIANO, Int. J. Obes. Relat. Metab. Disord., 22 (1998) 741. — 38. JOUSILAHTI, P., J. TUOMILEHTO, E. VARTIAINEN, T. VALLE, A. NISSINEN, J. Hum. Hypertens., 9 (1995) 847. — 39. MAHONEY, L. T., T. L. BURNS, W. STANFORD, B. H. THOMPSON, J. D. WITT, C. A. ROST, R. M. LAUER, J. Am. Coll. Cardiol., 27 (1996) 277. — 40. STEWART, K. J., C. S. BROWN, C. M. HICKEY, L. D. MCFARLAND, J. J. WEINHOFER, S. H. GOTTLIEB, J. Cardpulm. Rehabil., 15 (1995) 122. — 41. CHEN, Y., D. C. RENNIE, B. A. REEDER, Int. J. Obes. Relat. Metab. Disord., 19 (1995) 825. — 42. FREEMAN, R., S. T. WEISS, M. ROBERTS, S. M. ZBIKOWSKI, D. SPARROW, Clin. Auton. Res., 5 (1995) 261. — 43. SECCARECCIA, F., A. MENOTTI, P. F. FAZZINI, P. L. PRATI, D. ANTONIUCCI, F. MENGHINI, Acta Cardiol., 52 (1997) 49. — 44. WANNAMETHEE G., A. G. SHAPER, J. Cardiovasc. Risk., 1 (1994) 223. — 45. HO, T. F., W. C. YIP, Acta. Paediatr. Jpn., 37 (1995) 599. — 46. WATANABE K., F. NAKADOMO, K. MAEDA, Ann. Physiol. Anthropol., 13 (1994) 167. — 47. GULMANS, V. A., K. DE MEER, R. A. BINKHORST, P.J. HELDERS, W. H. SARIS, Eur. Respir. J., 10 (1997) 94. — 48. BERRY, M. J., J. A. STORSTEEN, C. M. WOODARD, Med. Sci. Sports Exerc., 25 (1993) 1031.

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NEKE ANTROPOMETRIJSKE KARAKTERISTIKE, REAKCIJE NA FIZIOLOŠKI STRES TE VRIJEDNOSTI KRVNOG TLAKA U MUŠKARACA DOBI 18 GODINA U PRIMORSKO GORANSKOJ ŽUPANIJI, HRVATSKA

SAŽETAK

Autori su u radu prikazali razdiobu i prosječne vrijednosti nekih antropometrijskih značajki u 1210 mladića u dobi od 18 godina u Županiji primorsko-goranskoj. Prikazali su i neke pokazatelje tjelesne sposobnosti, kao i korelacije između ovih dviju skupina značajki. Prevalencija hipertenzivnih i graničnih vrijednosti sistoličkog krvnog tlaka (ST) iznosila je 8,6%, a dijastoličkog krvnog tlaka (DT) 2,1%. Tjelesna težina i indeks tjelesne mase značajno su pozitivno korelirali sa ST i DT. Indeks tjelesne mase značajno je pozitivno korelirao sa srčanom frekvencijom nakon step-testa što znači da tjelesna težina smanjuje toleranciju opterećenja.