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Tracking Variability: Recent Anthropometric Data for Croatian Population and Comparison with Other World Populations

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A B S T R A C T

The variability that exists within the populations of individual countries and the variability that exists between the populations of different countries are both of interest in practical application. For these reasons, a comparison is made in this work between certain anthropometric variables of our sample of Croatian population and anthropometric variables that are available for other human populations in the world of the same or a similar age. The total sample was 1,372 subjects aged from 23 to 59 years old. For the purpose of comparison, data were taken from the study »International Data on Anthropometry« which provides an overview of anthropometric variables for many world populations, as well as data from Rudan's research that was carried out on Croatian population in the late seventies of the last century. Mean value, standard deviation and coefficient of variation have been calculated for every measured parameter. A comparison between the two research samples of Croatian population fairly displays up going trend, for body mass and other bodily dimensions, formed in three decades of difference. Mean value for body height in Rudan's sample is 161.0 cm, and for Bubaš's sample in this research was 170.6 cm, both values state for Croatian population but with difference of more than 30 years. Human biologists use term »secular trend« to describe alterations in the measurable characteristics of a population of humans that occur over a century. Accordingly, in adult age, the rate of gain, concerning body height, is 10 to 30 mm per decade. The changes in body proportions during recent decades are less marked than those in body size, but the relationships between stature and weight within one national group have changed significantly.

Key words: *population surveillance, anthropometry, body constitution, body dimensions*

Introduction

Besides the variability that exists within the populations of individual countries, the variability that exists between the populations of different countries is also of interest in practical application. For these reasons, a comparison is made in this work between certain anthropometric variables of our sample of Croatian population and anthropometric variables that are available for other human populations in the world of the same or a similar age as well as with former anthropometry data for sample of Croatian population of other authors.

The anthropometric variables for assessing the morphological status of the subjects encompass a model of longitudinal (body height, sitting height, leg length, thigh length, lower-leg length, arm length, upper-arm length and forearm length) and transversal dimensionality (breadth and width), body and subcutaneous fat tissue volume, and head dimensions.

Subjects and Methods

Measurement instruments and the principles of conducting anthropometry

Each individual subject completes a questionnaire with general data concerning place and date of birth, place of residence, nationality, education and occupation.

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Anthropometry is then carried out, and body variables measured in accordance with the International Biological Program (IBP), using standard anthropometric instruments produced by Siber Hegner Maschinen AG (Zurich, Switzerland) and John Bull callipers manufactured by British Instruments (London, Great Britain). When carrying out the measurements of all anthropometric points, a standard body position is adopted, i.e. a normal upright position. Subjects' arms are placed by their sides and their heads put in the Frankfurt horizontal position[1,2].

Regarding that measurements of human body characteristics form the basis of much fundamental and applied research, within the IBP a list of anthropometric points is provided which is primarily aimed at the needs of researchers without an anthropological background but who in the course of their research gather anthropometrical data. The programme provides a list of 39 linear measurements.

Measurements were conducted on the left side of the body. The forms for entering the obtained measurement values are prepared beforehand. Before starting to take measurements, the instruments are checked for accuracy and calibrated as necessary. Each measurement was carried out by a measurer together with an assistant who records the result[3].

It is important to point out that the contours of the human body are generally rounded and that only a small number of measurements can be obtained easily, being positioned on a stable and firm bone surface beneath the skin. Hence, it is not possible to achieve a precision in measurements greater than 5 mm for most anthropometric points[4]. Also, before each measurement, it is necessary to mark the anthropometric points with a demographic pencil in order to carry out the anthropometry more precisely.

Subject sample

This research covers a group of 1,372 healthy, fit-for-work subjects of which 910 (66.32%) female and 462 (33.67%) male, aged from 23 to 59 years old. The mean age of males was 41.84±10.73, and the mean age of females was 40.59±10.67. The subjects were employed in the area of the City of Zagreb and Zagreb County, and were selected randomly and divided into six age groups with a range of five years within each individual group.

List of variables

The anthropometric variables for assessing morphological status selected for the purpose of this study are: body height (HEIGHT), sitting height (SH), leg length (LL), thigh length (TL), lower-leg length (LLL), arm length (AL), upper-arm length (UAL), forearm length (FL), biacromial breadth (BB), rib-cage width (RCW), rib-cage depth (RCD), wrist width (WW), elbow width (EW), knee width (KW), rib-cage circumference (RCC), stomach circumference (SC), hip circumference (HPC), upper-arm circumference in relaxed position (UACRP), lower-arm circumference (LAC), thigh circumference (TC), lower-leg circumference (LLC), triceps skinfold (TSF), subscapular skinfold (SSSF), stomach skinfold (SSF), body mass in kilograms (WEIGHT), head length (HL), head width (HW), forehead width (FHW), face width (FW), lower jaw width (LJW), morphological face height (MFH), nose height (NH), nose width (NW), mouth width (MW), lip width (LW), ear length (EL), ear width (EW), interorbital width (IW) and head circumference (HC).

Anthropometry of the subjects

The anthropometric variables for assessing the morphological status of subjects were selected so as to encompass a model of longitudinal and transversal dimensionality, body and subcutaneous fat tissue volume, and head dimensions. The subjects' body mass was weighed in kilograms to a degree of accuracy of 0.1 kilogram. Subjects wore light sportswear without shoes.

For the purpose of comparing variability that exists between the populations of different countries an analysis is later made between certain anthropometric variables from the entire sample of our subjects with the anthropometric variables that are available for other human populations in the world of the same or a similar average age. For the purpose of this comparison, data were taken from the study »International Data on Anthropometry«[5] which provides an overview of anthropometric variables for many world populations arranged in larger groups on the basis of biological, demographic and geographic factors. Rudan's data from research that was carried out on Croatian population in the late seventies of the last century were used for comparison with our sample of Croatian population[6]. The population groups whose data are used to compare the defined variability (according to Jürgens[5]) are: NE or Northern Europe (including the former Federal Republic of Germany, Denmark, Ireland, the Netherlands, Iceland, Finland, Norway and Sweden), NA or North America (USA and Canada), CE or Central Europe (Austria, Belgium, the Czech Republic, Slovakia, the former German Democratic Republic, Luxembourg, Great Britain and Switzerland), FR or France, AU or Australia (Australia and New Zealand), EE or Eastern Europe (Poland and the countries of the former Soviet Union), SEE or South-east Europe (Italy, Hungary, Romania, Bulgaria, Greece, the countries of the former Yugoslavia, Malta and Israel) and PP or the »Pyrenean peninsula« (Portugal and Spain) are in the following text marked with »Jürgens«. The part of the Croatian population covered by this research was marked »Bubaš«, while the values determined in Rudan's research of the Croatian population are marked »Rudan«. The anthropometric data of the sizes determined were entered into a previously prepared database in accordance with the list of variables selected for the purpose of this research.

Statistics

The list of researched variables that are entered into each of the four aforementioned measurement groups is given in individual tables in the specific subchapters that follow, including the sample size, mean value, standard

deviation, and 5th and 95th percentile for each variable. Mean value, standard deviation and standard error are calculated for every measured parameter.

Results

Head dimensions

The size of the sample is the same as far as age groups are concerned, for all head dimensions. Both for males and females the coefficients of variation of measured head dimensions range from 3.58% to 9.82% with the exception of lip thickness, the coefficient of variation of which was 30.25%. Median value of head length for our sample population was 189.6 mm, with percentile values ranging from 173.3 mm to 204 mm for 5th and 95th percentile respectively. Median value of head width for our sample was 154.3 mm, ranging from 145 mm at the 5th percentile to 170 mm at the 95th percentile.

In Figures 1 and 2, the value distribution is shown for head width and head length, as an example of the distribution of head dimensions. They also display the variability among the different populations of Europe, America and Australia in relation to our sample population in terms of head width and length based on Jürgens' data for these variables. In the terms of variability, the greatest difference in head length is shown between our sample population and NE, NA and FR sample population ($p<0.05$). The values of head length of our sample resemble to the values of head length for CE and EE and SEE sample population, hence the difference was not statistically significant ($p>0.05$). For this part of research we could not obtain data from aforementioned Rudan's research.

Longitudinal body dimensions

The basic descriptive values for the body height of the male and female subjects by age group are shown in Tables 1 and 2. Body height was taken as an indicator of the entire group of longitudinal variables in the analysis of intrapopulation variability for our subjects.

The relative standard deviation from the mean value of body height ranges from 6.94 to 9.46 with coefficient of variation from 3.9% to 5.24% for men, and 5.66 to 6.36 with a coefficient of variation from 3.37% to 3.85% for women. Among the longitudinal measurements of extremities, the overall lengths of extremities show the smallest coefficients of variation (arm length 3.62%, leg length 3.53%), compared with the lengths of their individual segments (3.76% to 4.40%).

The variations in the distribution of median body height among 9 population groups are presented in Figure 3. A comparison is made between the average values for body height (t-test) between Rudan's and Bubaš's data for Croatian population and the data of Jürgens for other world populations. Significant difference in body height is observed between our sample population and NE, NA, CE, FR, EE and PP ($p<0.05$). Between popula-

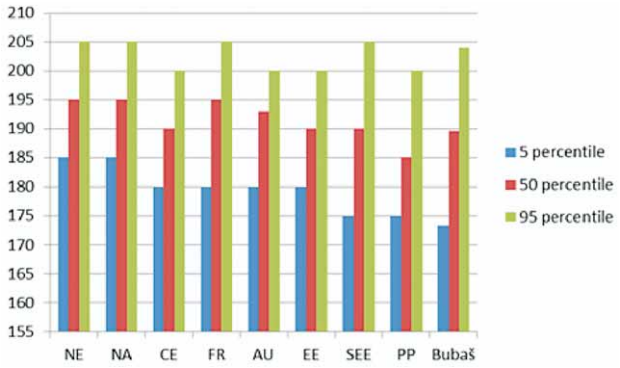

Fig. 2. Percentile distribution of head length in mm for the observed populations (NE – Northern Europe, NA – North America, CE – Central Europe, FR – France, AU – Australia, EE – Eastern Europe, SEE – South-east Europe, PP – Pyrenean peninsula, Bubaš – sample of the Croatian population covered by this research, Rudan – sample of the Croatian population covered by Rudan's research).

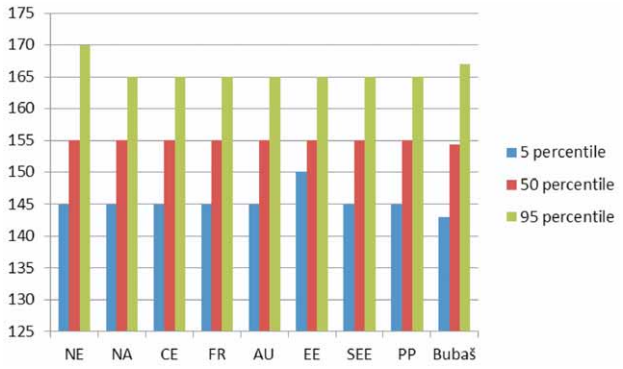

Fig. 1. Percentile distribution of head width in mm for the observed populations (NE – Northern Europe, NA – North America, CE – Central Europe, FR – France, AU – Australia, EE – Eastern Europe, SEE – South-east Europe, PP – Pyrenean peninsula, Bubaš – sample of the Croatian population covered by this research, Rudan – sample of the Croatian population covered by Rudan's research).

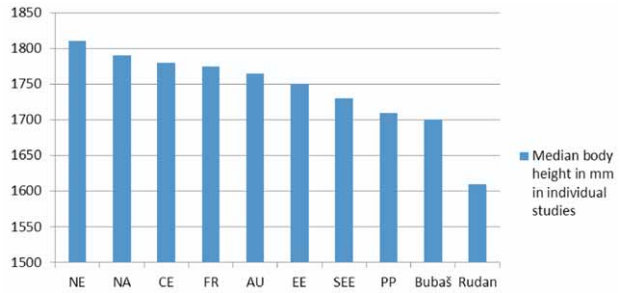

Fig. 3. Variations in the distribution of median body height (in mm) for the observed population groups (NE – Northern Europe, NA – North America, CE – Central Europe, FR – France, AU – Australia, EE – Eastern Europe, SEE – South-east Europe, PP – Pyrenean peninsula, Bubaš – sample of the Croatian population covered by this research, Rudan – sample of the Croatian population covered by Rudan's research).

TABLE 1
BODY HEIGHT IN CM FOR MEN BY AGE GROUP

Body height in cm for men					Percentiles		
Group	N	Average	SD	Coef. Var.%	5%	50%	95%
I (age 23–28)	73	180.21	9.46	5.24	165	182	193
II (age 29–34)	64	180.53	8.64	4.78	170	180.5	192.8
III (age 35–40)	67	178.95	7.61	4.25	170	180	188
IV (age 41–46)	83	179.26	7.378	4.11	170	179	190
V (age 47–53)	92	179.17	8.23	4.59	167.5	179	191.4
VI (age 53–58)	83	177.93	6.94	3.9	165.4	177	189

*N – number of subjects, SD – standard deviation, Coef. Var. – coefficient of variation

TABLE 2
BODY HEIGHT IN CM FOR WOMEN BY AGE GROUP

Body height in cm for women					Percentiles		
Group	N	Average	SD	Coef. Var.%	5%	50%	95%
I (age 23–28)	151	167.45	6.6	3.79	155.9	168	178.9
II (age 29–34)	159	167.56	5.66	3.37	156.1	168	179.0
III (age 35–40)	160	166.07	6.24	3.75	154.6	165	177.4
IV (age 41–46)	151	166.21	5.71	3.43	154.8	166	177
V (age 47–53)	136	165.25	5.72	3.46	153.9	165.1	176.5
VI (age 53–58)	153	164.82	6.35	3.85	153.5	164.9	176

*N – number of subjects, SD – standard deviation, Coef. Var. – coefficient of variation

tions of SEE, AU and our sample of Croatian population there is no statistically significant difference concerning body height.

Following, the distribution of body height and sitting body height for the observed population samples are shawn in Figures 4 and 5. The variations in distribution of body height among populations have similarities with the variations in the distribution of sitting height. The difference in sitting body height is observed between our sample population and NE, NA, CE, FR and EE populations ($p<0.05$).

Transversal body dimensions

The basic descriptive values of five researched transversal body dimensions, expressed in centimetres, are shown in Tables 3 for male and 4 for female subjects, together with standard deviation and coefficient of variation. The coefficients of variation of the transversal body

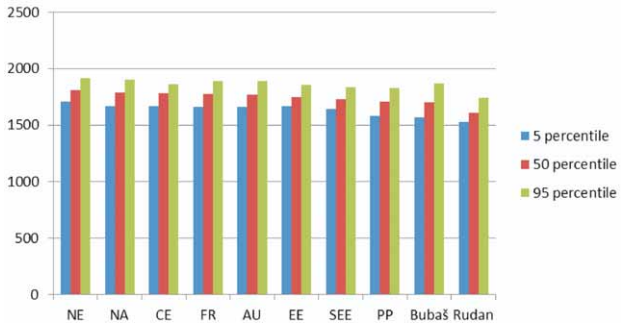

Fig. 4. Percentile distributions of body height (in mm) in the observed populations (NE – Northern Europe, NA – North America, CE – Central Europe, FR – France, AU – Australia, EE – Eastern Europe, SEE – South-east Europe, PP – Pyrenean peninsula, Bubaš – sample of the Croatian population covered by this research, Rudan – sample of the Croatian population covered by Rudan's research).

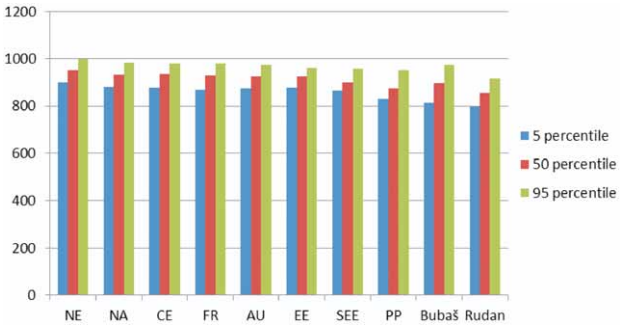

Fig. 5. Percentile distributions of sitting body height (in mm) in the observed populations (NE – Northern Europe, NA – North America, CE – Central Europe, FR – France, AU – Australia, EE – Eastern Europe, SEE- South-east Europe, PP – Pyrenean peninsula, Bubaš – sample of the Croatian population covered by this research, Rudan – sample of the Croatian population covered by Rudan's research).

TABLE 3
TRANSVERSAL BODY DIMENSIONS IN CM FOR MALES

Body dimensions in cm, males	Average	SD	Coef. Var.%	Percentiles		
				5%	50%	95%
BB	42.70	2.29	4.49	37.0	42.75	45.58
RCW	29.91	2.01	5.71	27.86	29.91	31.96
PW	30.52	2.88	8.59	28.22	31.78	33.56
EW	7.52	0.47	5.19	7.00	7.85	8.03
KW	10.61	0.66	5.35	9.88	10.61	11.34

*BB – biacromial breadth, RCW – rib cage width, PW – pelvis width, EW – elbow width, KW – knee width, SD – standard deviation, Coef. Var. – coefficient of variation

TABLE 4
TRANSVERSAL BODY DIMENSIONS IN CM FOR FEMALES

Body dimensions in cm, females	Average	SD	Coef. Var.%	Percentiles		
				5%	50%	95%
BB	39.77	1.90	4.78	35.87	38.24	42.49
RCW	28.71	1.89	6.60	26.74	28.71	30.68
PW	32.92	2.34	7.12	30.66	32.92	35.17
EW	7.42	0.46	6.24	6.912	7.42	7.93
KW	10.48	0.58	5.53	9.76	10.48	11.20

right*BB – biacromial breadth, RCW – rib cage width, PW – pelvis width, EW – elbow width, KW – knee width, SD – standard deviation, Coef. Var. – coefficient of variation

dimensions range from 4.49% to 8.59% for male and 4.78 to 7.12% for female subjects. The greatest variation of mean values is shown for pelvis width, both, males and females with coefficient of variation 8.59% and 7.12%, respectively and the lowest for biacromial breadth with coefficient of variation 4.49% and 4.78%, respectively ($p<0.05$).

In Figure 6, the percentile distributions of biacromial breadth in various populations are shown in comparison with the population sample from this research and Rudan's data for his population sample. The median values for Bubaš's sample of Croatian population (402 mm) are close to the median values for populations of NA, SEE, CE and NE (389 mm, 399 mm, 400 mm, 401 mm respectively). The difference in biacromial breadth is observed between our sample population and AU, PP, FR and EE populations and Rudan's sample of Croatian population ($p<0.05$).

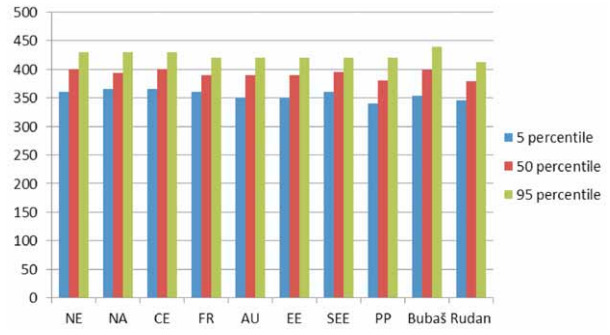

Fig. 6. Percentile distributions of biacromial breadth (in mm) in the observed populations (NE – Northern Europe, NA – North America, CE – Central Europe, FR – France, AU – Australia, EE – Eastern Europe, SEE- South-east Europe, PP – Pyrenean peninsula, Bubaš – sample of the Croatian population covered by this research, Rudan – sample of the Croatian population covered by Rudan's research).

Measurements of body volume and subcutaneous fat tissue

The basic descriptive values for 11 studied body volume measurements are shown in Table 5 for male and Table 6 for female subjects. The mean BMI for the whole group was 24.9 kg/m^2±4.9 kg/m^2. The lowest BMI values are found in the youngest age groups of women and men. Overweight and obesity were more reported in higher age groups of both, women and men, continuously increasing with age ($p<0.05$).

Discussion

The distribution of head dimension values for our sample of Croatian population is similar to that of South-east Europe population, but differs most from those for Northern Europe and North America and France, whose values tend towards higher figures. The percentile distributions of body height and sitting body height values in

TABLE 5
BODY VOLUME AND SUBCUTANEOUS FAT TISSUE IN CM AND BODY MASS IN KG FOR MALES

Body dimensions in cm, males	Average	SD	Coef. Var.%	Percentiles		
				5%	50%	95%
RCC	104.73	7.56	6.14	97.55	104.73	111.91
SC	103.07	10.25	7.96	96.00	103.06	110.13
HPC	102.83	10.38	8.48	95.78	102.83	109.88
UACRP	32.72	3.5	7.65	28.41	32.39	36.38
141511 FC	27.97	2.22	6.49	26.05	27.97	29.88
TC	54.32	4.66	7.27	50.60	54.32	58.05
LLC	38.73	3.06	6.81	36.08	38.74	41.39
TSF	8.03	4.50	47.05	4.98	9.45	13.91
SSSF	8.77	4.83	45.90	4.67	10.44	16.21
SSF	11.68	5.05	35.59	5.72	14.10	22.48
WEIGHT (Bubaš)	86.45	14.79	14.35	65.16	86.78	108.39
WEIGHT (Rudan)				56.5	71.5	95

*RCC – ribcage circumference, SC – stomach circumference, HPC – hip circumference, UACRP – upper-arm circumference in relaxed position, FC – forearm circumference, TC – thigh circumference, LLC – lower-leg circumference, TSF – triceps skinfold, SSSF – subscapular skinfold, SSF – stomach skinfold, WEIGHT (Bubaš) – body mass in kg for sample of the Croatian population covered by this research, WEIGHT (Rudan) – sample of the Croatian population covered by Rudan's research, SD – standard deviation, Coef. Var. – coefficient of variation.

the population of Croatia are most similar to the measurements for the populations of South-east Europe, and differ most from the distributions in the populations of Northern Europe (as the extreme upper values) and the Pyrenean and Rudan's data for Croatian population as the extreme lower values of the observed variables. The distribution of head width is very similar in all the observed samples, while large differences are noticeable in the distribution of head length in 5^{th} and also 50^{th} and 95^{th} percentile. Concerning transversal body dimensions, the greatest variations in terms of age group are shown by the measurements for the rib cage with and pelvis width. These are also parts of the body for which measurements cannot be taken precisely because of the accu-

TABLE 6
BODY VOLUME, SUBCUTANEOUS FAT TISSUE IN CM AND BODY MASS IN KG FOR FEMALES

Body dimensions in cm, females	Average	SD	Coef. Var.%	Percentiles		
				5%	50%	95%
RCC	100.99	8.9	8.81	94.06	100.99	107.91
SC	102.14	11.9	11.72	95.13	102.13	109.14
HPC	102.05	3.68	3.61	95.05	102.05	109.05
UACRP	33.01	3.68	11.16	30.75	33.01	35.27
FC	27.14	2.23	8.24	25.28	27.14	29.00
TC	56.37	4.83	8.56	52.50	56.36	60.23
LLC	37.95	3.15	8.30	33.34	39.11	44.88
TSF	7.86	4.50	58.51	4.32	9.03	13.74
SSSF	8.76	4.83	55.86	4.16	10.59	17.03
SSF	11.99	5.05	42.16	11.17	11.99	12.81
WEIGHT (Bubaš)	68.82	12.03	14.86	64.22	69.60	73.57
WEIGHT (Rudan)				52	62.2	83.5

*RCC – ribcage circumference, SC – stomach circumference, HPC – hip circumference, UACRP – upper-arm circumference in relaxed position, FC – forearm circumference, TC – thigh circumference, LLC – lower-leg circumference, TSF – triceps skinfold, SSSF – subscapular skinfold, SSF – stomach skinfold, WEIGHT (Bubaš) – body mass in kg for sample of the Croatian population covered by this research, WEIGHT (Rudan) – sample of the Croatian population covered by Rudan's research, SD – standard deviation, Coef. Var. – coefficient of variation.

mulated subcutaneous fat tissue covering them. It could be said that these measurements include both the transversal and volume component of anthropometry, and are therefore characterised by a greater variability. Certain, more easily accessible measurement points and their corresponding variables show much less variability (for example, biacromial breadth). Also, it is evident that the distribution of biacromial breadth for our population follows that of the populations of North, Central and South-east Europe, while the values for other populations range from lower (Pyrenean and Rudan) to somewhat higher values (North America, France and Australia). Among the lowest values for biacromial breadth are those belonging to populations from the Pyrenean group and in Rudan's data for Croatian population (380mm and 379 mm, respectively). As for measurements of body volume and subcutaneous fat tissue the smallest variability is shown by body circumferences and the largest by skinfolds. Thereof, the greatest rates of change occurred in dimensions related to soft tissues rather than skeletal dimensions. Intrapopulation variability in body volume can be shown by using body mass as an indicator. The lowest average value recorded in our sample population is in the youngest age group: 78.67 kg for male and 60.52 kg for female subjects. The highest was recorded in the oldest age group: 91.15 kg among male and 77.2 kg among female subjects. The differences between the average extremes are 16.68 kg for female and 12.48 kg for male subjects. For the purpose of making comparisons between populations concerning measurements of body volume it must be said that there is substantial lack of that kind of data in research of other authors. Data presented in the study »International Data on Anthropometry«[5] do not provide information on body mass of sample population, so the variability of that kind between populations cannot be displayed. On the other hand, Rudan[6] in his research notes body mass for his sample of male and female subjects. So, a comparison concerning body mass between his research sample of Croatian population and the one in our work was possible and it fairly displayed up going trend for body mass formed in three decades of difference between the two researches. Also, this time span between the two researches leaves a space for new questions. Human biologists use term »secular trend« to describe alterations in the measurable characteristics of a population of humans that occur over a period of time (or a century). Tanner[7,8] in his work concluded that, in adult age, the rate of gain, concerning body height, is 10 mm per decade. Cole[9] suggests that the secular trend to increasing adult height varies from 10 to 30 mm per decade. This research confirms the latter statement. Mean value for body height in Rudan's sample is 161.0 cm, and for Bubaš's sample in this research was 170.6 cm, both values state for Croatian population but with more than 30 years of distance. We found that the changes in body proportions during recent decades are less marked than those in body size. Also, subcutaneous fat thicknesses have increased, especially at the upper percentiles. These findings are in accordance with the works of other authors (Katzmarzyk[10] and Greiner[11]). Ruff states that variation in height, among human populations in the world is smaller (about 10%) than the variation in breadth, which is larger (up to 25%) and shows a clear latitudinal gradient[12]. Regarding that, we also found that the body height varies about 10% among observed population groups, but the variation in breadth was somewhat smaller (20%). The relationships between stature and weight have changed within one national group. Data allow conclusions about possible secular trends in body constitutions. Nevertheless the changes in nutrition alone could not account for the ends which exceed the original socioeconomic differentials[13,14], one should consider the possibility that relatively high values of the BMI in our sample, can be substantially explained with the evidence of unhealthy dietary habits in Croatian population[15]. Thereof, the secular trends could reflect environmental improvements, specifically changes in living conditions, leading to improvements such as decreased mortality rates and increased life expectancy.

Strength and limits and of the research

The strength of the survey lays in fairly large sample size and in fact that participants were randomly selected. Although employed in the City of Zagreb and Zagreb County, participants' places of birth were different meaning they were born and raised in different regions of Croatia and came to City of Zagreb, or somewhere in Zagreb County, for employment. Thereby our subjects are also representing different geographical regions of Croatia. The limits of this research arise from comparisons with the data from aforementioned publication of Jürgens. It provides an overview of a larger number of anthropometric variables for the entire world population, grouped in a randomly selected number of groups based on biological, demographic and geographic factors. Jürgens, in collaboration with two other authors, attempted to gather as much already-published data as possible on the sizes of anthropometric variables for the purpose of their practical application in industrial design. In order to do this, they divided the entire world population into twenty population groups. For each of these, nineteen body dimensions were chosen and shown according to the gender of the subjects, who were aged between 25 and 45 years old. Their next step was to divide these world populations into two anthropometric groups based on their body dimensions. These were »northern« (the group with the greater body height) and »southern« (the group with the shorter body height). That part of the anthropometric data that was not available to the authors was obtained by means of calculations based on the existing data gathered, although the way in which this was carried out is not set out in the study.

Conclusion

Comparison of gathered data with those from anthropological research of other authors gives fair display of variability between different human populations in the

world as well as it, most importantly, shows anthropometric changes within Croatian population. Alterations in body size and shape that happened during past thirty years within one population have shown that throughout time, Croatian women and men became taller, with larger waist lines. These alterations can be assigned to secular trend. Undoubtedly, the secular trend is due to various factors and the identification of causes is necessarily speculative but, so far, can be related to cultural changes. Therefore, we suggest that it will be more appropriate to study secular changes in culturally more defined groups. Finally, the findings in this work are useful basis for applied research in the fields of biological anthropology and ergonomics.

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PRAĆENJE VARIJABILNOSTI: NAJNOVIJI ANTROPOMETRIJSKI PODACI ZA HRVATSKU POPULACIJU U USPOREDBI S OSTALIM POPULACIJAMA SVIJETA

SAŽETAK

Varijabilnosti unutar pojedine populacije i među populacijama ljudi u svijetu podjednako su zanimljive za proučavanje ali i praktičnu primjenu prikupljenih podataka. Iz tih je razloga provedena usporedba antropometrijom prikupljenih podataka za uzorak hrvatske populacije obuhvaćen ovim istraživanjem i podataka iz literature za druge populacije ljudi u svijetu, iste ili slične dobi. Ovim istraživanjem obuhvaćeno je ukupno 1,372 ispitanika u dobi od 23 do 59 godina života. Za potrebe usporedbe korišteni su podaci iz publikacije »International Data on Anthropometry« koja daje pregled antropometrijskih varijabli za mnoge populacije svijeta te Rudanovi podaci prikupljeni na uzorku hrvatske populacije, krajem sedamdesetih godina dvadesetog stoljeća. Srednja vrijednost, standardna devijacija i koeficijent varijacije izračunati su za svaku varijablu. Usporedba podataka dvaju uzoraka hrvatske populacije jasno pokazuje rastući smjer vrijednosti tjelesnih dimenzija i, naročito, mase tijela kroz protekla tri desetljeća. Srednja vrijednost visine tijela u Rudanovom uzorku bila je 161.0 cm a kod Bubaš 170.6 cm, obje vrijednosti su izmjerene na hrvatskoj populaciji s razmakom od 30 godina. Biolozi koriste pojam »sekularni trend« kojim opisuju porast vrijednosti mjerenih karakteristika ljudi što se javljaju u većim vremenskim razmacima. Prema njima, u odrasloj dobi stopa prirasta u visini tijela iznosi od 10 do 30 mm po desetljeću što je utvrđeno i podacima ovog rada. Posljednjih desetljeća promjene međuodnosa tjelesnih dimenzija manje su zamjetne nego promjene u samoj visini tijela, dok se odnos visine i mase zamjetno mijenja unutar jedne populacijske skupine.