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BODY HEIGHT AND WEIGHT IN ADULT POPULATION IN SREM, BANAT AND BAČKA (VOJVODINA)

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ABSTRACT

The anthropological study of body height, weight and BMI in 919 adult males and 870 females was conducted in rural regions of Vojvodina Province, located in the north of the Republic of Serbia. All three regions of Vojvodina were included: Bačka in the northwest, Banat in the east and Srem in the southwest. The average age of male and female subjects was 37.54± 10.26 and 37.89± 10.28, respectively. All the subjects were of Serbian nationality with ancestors born in Vojvodina. The findings of this study suggest small differences in body constitution in adult population of Serbian nationality throughout Vojvodina. The highest body height and weight exist among the population of Bačka but these are lower in Srem. The average BMI does not differ significantly. BMI categorization indicated that the greatest number of males was overweight with the exception of Banat where there is a higher percentage of males with normal weight (41.34%). The higher percentage of obesity exist in Srem (23.34%) and is somewhat lower in Banat and Bačka (about 19.7%). The majority of females have normal weight in all 3 regions. There is a lower percentage of obese females in Srem (13.38%) but a higher percentage in Banat (16.32%) and Bačka (18.8%).

Keywords: body height, weight, BMI, Vojvodina

INTRODUCTION

Body height and weight are the best indicators of body size and constitution, and physical status of individual human beings and also populations. Research in anthropological characteristics of adults (Gavrilović, 1963; Božić, 1976) have already been carried out in Vojvodina. According to the World Health Organization (WHO 2000), Body Mass Index (BMI), i.e. the ratio of body weight and square of height (kg/m2) is useful in assessing nutritional status and living conditions. The BMI can also be the indicator of obesity related health risks. Individuals with the BMI above upper limit are obese, and therefore can have serious health problems, which may affect the quality of life and even result in premature death. The BMI is influenced by the age, gender (Kuczmarski et al., 1997; Rolland-Cachera et al., 1991; Nysom et al., 2001; Danubio et al., 2005; Andreenko, 2005; Tóth and Buda, 2007), socioeconomic conditions (Langenberg et al., 2003; Ishizaki et al., 2004; Heineck, 2006) and ethnicity (Lovejoy et al., 2001). Many studies conducted worldwide (Sheety and James, 1994; MONICA, 2005,) and in Serbia (Pavlica, 1996; Pavlica et al., 2004, 2005) have confirmed the usefulness of the BMI in evaluating nutritional status of adults.

The latest results show that overweight and obesity are the major public health problems in developed countries (Baskin et al., 2005; Bélanger-Ducharme and Tremblay, 2005; Rennie and Jebb, 2005; Milewicz et al., 2005; Nitzan Kaluski and Berry, 2005; Al-

Kandari, 2006; Carmo et al., 2006). In the past few years there has been a marked increase in the prevalence of overweight and obesity in many countries in the world (Yumuk, 2005; Schokker et al., 2007).

According to the studies conducted by Serbian Institute of Health Protection (2005), more than a half of the adult Serbian population (54%) is above normal weight limit, i.e. 36.7% are overweight while 17.3% are obese. The highest prevalence (overweight and obesity) is found in Vojvodina (58.5%).The average BMI in adult population of Serbia equals 26±4.74 kg/m2. The findings of the research conducted in Vojvodina within MONICA project (2005) showed 20% obesity prevalence.

The present study is the part of the research in adult population of Vojvodina that has been carried out since 1996. Its aim is to determine body height, weight and BMI in adult population of three regions inVojvodina.

MATERIALS AND METHODS

The anthropological study has been conducted in rural parts of Vojvodina Province, in the northern part of the Republic of Serbia. The region is divided by the Danube and Tisa rivers into Bačka in the northwest, Banat in the east and Srem in the southwest. This study discusses the data related to the population of Serbian nationality older than 20 years of age with their ancestors born in Vojvodina. The research was conducted in Srem during 1996, and included 745 subjects (433 males and 312 females). In other two regions, Banat and Bačka, it was conducted in the period 2000 – 2006. In total, 611 subjects were from Banat region (276males and 335 females), while 433 were coming from Bačka (210 males and 223 females). The average age of male and female subjects was 37.54± 10.26 and 37.89± 10.28, respectively.

The study conducted was in compliance with international protocols (Weiner and Lourie, 1969) and the WHO (2000) using the standard anthropological instrument by Martin. The data bases for both sexes were created in Excel. The differences in means were tested by t-test.

The BMI was calculated for each of the subjects using their height and weight measures. Using the criteria of the WHO (2000), the subjects were then classified into categories: the BMI < 18.5 (underweight), the BMI between 18.5 and 24.9 (normal weight), the BMI between 25 and 30 (overweight), and BMI > 30 (obesity).

RESULTS

Table 1 shows the results of the analysis of body height, weight and BMI in both males and females in all three regions of Vojvodina

It is noticeable that the sample of both sexes from Srem is somewhat younger whereas the samples from Bačka and Banat have similar decimal age.

The Serbs of both sexes from Bačka are considerably taller ($p<0.01$) compared with the other two regional populations. There are no significant differences in body height in the population of Srem and Banat. Similar distribution is noted in body weight.

Table 1. Mean (SD) of body height, weight and BMI in three regions of Vojvodina

Region	Age		Body height		Body weight		BMI	
	X	SD	X	SD	X	SD	X	SD
Males								
Srem	35.53	7.99	173.28	6.91	80.80	14.37	26.90	4.43
Banat	38.90	11.75	174.22	7.88	80.74	14.73	26.56	4.22
Bačka	39.71	11.42	175.95	6.74	83.00	12.94	26.82	3.96
Females								
Srem	33.64	7.98	160.89	5.96	65.97	12.20	25.49	4.59
Banat	40.14	10.39	161.10	6.49	66.54	11.89	25.67	4.51
Bačka	40.32	11.04	163.79	6.16	68.16	12.69	25.45	4.81

The population of Bačka has the highest values for this as well as for the former physical characteristic. There are, however, significant differences in body weight between the populations of both sexes from Srem and Bačka ($p<0.05$). There are no marked differences in the BMI in the three regions.

Figure 1 shows BMI categories in both males and females. It indicates that the highest percentage of males is overweight with the exception of Banat where there is a higher percentage of males with normal weight (41.34%). The higher percentage of obesity (the BMI>30 kg/m²) exist in Srem (23.34%). However, this percentage is somewhat lower in Banat and Bačka (about 19.7%). An insignificant number of males falls into the undernourished category (0.32%).

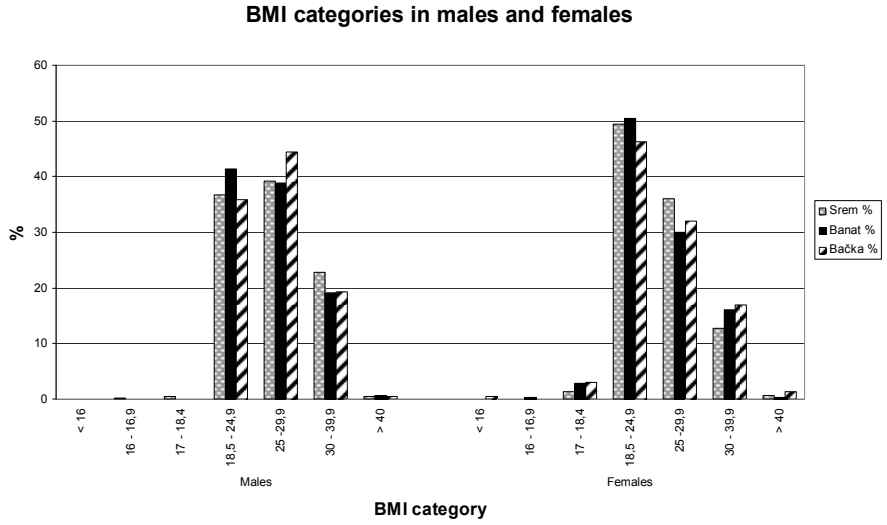
The majority of females have normal weight in all 3 regions. The percentage of overweight females is above 30% in all regions. There is a lower percentage of obese females in Srem (13.38%) but a higher percentage in Banat (16.32%) and Bačka (18.18%). The percentage of undernourished females is very low (2.58%) although somewhat higher than in males.

DISCUSSION

The findings of the study show that the population of all 3 regions of Vojvodina are characterized by great body height. When compared with previous studies of Vojvodina population (males 170.95±7.41; females 157.62±6.72) (Božić, 1976), the obtained values are significantly higher. Body height values are also higher when compared to the research conducted by Gavrilović (1963) in Bačka. In it he concluded that the native inhabitants of Vojvodina were about average height (169.17cm). This indicates that the acceleration has been present in this area. The rural population of Vojvodina has approximate body height with the population of the city of Novi Sad (males 175cm and females 162cm) the results of a project focusing on cardiovascular diseases) (MONICA, 2005). The lowest body height in both sexes is characteristic of Srem while the tallest

subjects are in Bačka. This was observed as far back as the 18th century while foreign physicians worked on plague prevention in Srem (Popović, 1990). Both males and females from Srem were described as tall healthy and physically strong but still shorter than people in Bačka.

Figure 1 BMI categories in males and females in Srem, Banat and Bačka



The population of Bačka has the highest body weight values similar to height values. Similar values are observed in both Banat and Srem.

The populations of different regions of Vojvodina have similar BMI values. Similar BMI averages for identical age are reported to be found in England, Scotland and Whales (Langenberg et al., 2003). The American population measured in the period 1988-1994 (Kuczmarski et al.,1997) shows somewhat higher averages for ages 30-59 (males 27.1kg/m^2 , females 27.0kg/m^2). The same refers to American white females of the average age 47.7 (Lovejoy et al., 2001) and Hungarian females (Tóth and Buda, 2007) of the average age 45.44±4.45 which are characterized by somewhat higher BMI (26.32kg/m^2). The population of Vojvodina shows higher BMI values in relation to the Italian imigrants of the same age to the USA (Danubio et al., 2005). The same goes for East and West Germany (Heineck, 2006), France (Rolland-Cachera et al., 1991), developing countries (Sheety and James, 1994), Denmark (Nysom et al., 2001) and Japan (Ishizaki et al., 2004).

BMI categorization indicates that the greatest number of males is overweight, followed by those of normal weight and those classified as obese. Only in Banat there is

a higher percentage of males with normal weight. The majority of females had normal weight and above 30% of females were overweight. There is a lower percentage of obese females in Srem (13.38%) but a higher percentage in Banat (16.32%) and Bačka (18.8%). Similar distribution has already been recorded in Vojvodina region (Pavlica, 1996; Pavlica et al., 2004, 2005), as well as in Bulgaria, regarding male subjects (Andreenko, 2005). The prevalence of obesity in males and females is together 18.58%, which is in accordance with data gathered in similar studies in Serbia (Serbian Institute of Health Protection, 2005) and in Vojvodina (MONICA, 2005). The population of Vojvodina has the similar prevalence of obesity as populations of some other parts of Europe (Yumuk, 2005; Nitzan Kaluski and Berry, 2005; Milewicz et al. 2005) while in America (Baskin et al., 2005), Great Britain (Rennie and Jebb, 2005) and Kuwait (Al-Kandari, 2006) this prevalence is higher. The population of Vojvodina has higher obesity prevalence than the Canadians (Bélanger-Ducharme and Tremblay, 2005), the Germans (Heineck, 2006), the Dutch (Schokker et al., 2007) and the Portuguese (do Carmo et al., 2006).

The findings of this study indicate that there are small differences in body constitution among adults of Serbian nationality from various regions of Vojvodina. There are somewhat higher values for body height and weight in the population of Bačka while lower values are observed in the population of Srem. Mean BMIs do not differ greatly in Vojvodina.

The greatest percentage of males is overweight. On the other hand, women mostly have normal weight. The prevalence of overweight and obesity is 61.76% in males and 48.43% in females. The data pointed to the necessity of a permanent nutritional condition assessment in order to reduce the number of categories with potential health risk.

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ABSTRAKT

Antropološko istraživanje visine, mase tela i BMI izvršeno je na 919 odraslih muškaraca i 870 žena u ruralnim oblastima Vojvodine koja se nalazi u severnom delu Republike Srbije. Istraživanje je izvršeno u sva tri regiona Vojvodine, Bačkoj na

severozapadu, Banatu na istoku i Sremu na jugozapadu. Prosečna starost muškaraca je 37.54± 10.26 a žena 37.89± 10.28. Svi ispitanici su srpske nacionalnosti čiji su praroditelji rođeni u Vojvodini. Utvrđene su male razlike u telesnoj građi odraslih Srba. Najveća visina i masa tela utvrđena je kod stanovništva Bačke, a najmanja kod stanovništva Srema. Srednje vrednosti BMI se značajno ne razlikuju. Najveći broj muškaraca je prekomerne težine, osim Banata, gde je najveći procenat muškaraca sa normalnom težinom (41.34%). Veći procenat gojaznih utvrđen je u Sremu (23.34%), a nešto je niži u Banatu i Bačkoj (oko 19.7%). Najveći broj žena u sva tri regiona ima normalnu težinu. Manji procenat gojaznih utvrđen je u Sremu (13.38%), a veći u Banatu (16.32%) i Bačkoj (18.8%).

Ključne reči: visina tela, masa, BMI, Vojvodina