

DIET, LIFESTYLE AND OBESITY IN BULGARIAN SAMPLE

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ABSTRACT

Introduction: Over the last decades obesity became a serious problem all over the world both in developed and in developing countries. Obesity is a multifactorial origin disease resulting from the interaction between social, behavioral, psychological, as well as genetic, cellular, molecular and metabolic factors. Nowadays obesity is related to increased prevalence of cardiovascular diseases, type 2 diabetes mellitus, colon cancer and even mortality.

Aim: The present study aims to investigate the contribution of nutritional habits, physical activity and certain socio-demographic factors to the manifestation of obesity in Bulgarian sample.

Study subjects and methods: The study involved 182 adults of Bulgarian origin. Anthropometric characterisation included height, weight, waist and hip circumferences, body mass index (BMI) and waist/hip ratio. Obesity-associated clinical indices were determined: levels of plasma glucose, triglycerides, total cholesterol, high-density lipoprotein cholesterol (HDL-C), and blood pressure (systolic/diastolic). Respondents filled in questionnaires including their diet habits, physical activity, educational and social status.

Results: Statistically significant difference in all clinical parameters between the two groups - normal weight and obese subjects was established. In agreement with previously known data it was found that regular consumption of fresh fruits and vegetables was related to lower BMI, while juices rich in sugar had a negative impact. In contrast to most published research reports, the consumption of salty foods was not prevalent in overweight people but rather in those with normal weight. Similar monitoring result has been reported only about Greece, close in culture, diet and physical activity to the population of Bulgaria. In accordance to other studies, the level of physical activity had significantly positive impact on BMI. A positive correlation between BMI and age, hypertension, and marital status, and a negative correlation between BMI and employment was found.

Conclusions: Some features specific to the Balkan area were established for the Bulgarian sample. Data obtained in this study may serve in creating adequate recommendations for a healthy lifestyle to optimize national strategies for obesity prevention.

Introduction:

Over the last decades obesity became a serious problem all over the world both in developed and in developing countries [5]. Obesity is a multifactorial origin disease resulting from the interaction between social, behavioral, psychological, as well as genetic, cellular, molecular and metabolic factors [6, 11, 16]. It is described as an abnormal accumulation of adipose tissue (body fat). The World Health Organization (WHO) defines as overweight people with body mass index (BMI)>25 and obese – with BMI>30. Obesity is an established risk factor for the development of metabolic syndrome. Nowadays obesity is related to increased prevalence of cardiovascular diseases, type 2 diabetes mellitus and colon cancer [1, 4]. Even more, obesity is related to poor quality of life and increased mortality [3, 15]. The question which of the factors - lifestyle and physical activity, nutrition or socio-demographic indicators is crucial for the manifestation of obesity and related diseases is not being answered definitely yet [2, 12]. Furthermore, these factors

have different impact in different countries, influenced both by genetic characteristics of the population, culture and environment.

Aim: The present study aims to investigate the relationship between lifestyle (dietary activity, physical activity), socio-demographic factors (age, gender, education, working activity) and the manifestation of obesity in a Bulgarian sample.

Study subjects and methods:

Study subjects

The study included 182 adults of Bulgarian origin. The volunteers male:female ratio of the subjects involved in the study was 64:118. The study subjects participated on voluntary basis and each one signed a consent form of enrollment. The study protocol was approved by the Ethics Commission of Medical University – Varna. A case-control association study among subjects with adult obesity according to WHO (BMI>30) and non-obese subjects (BMI<30) was performed. Patients with secondary obesity and obesity-related hereditary disorders were not included and neither were patients with medication-induced obesity.

Evaluation of diet habits and life style

Respondents filled in specially designed questionnaires consisting of 46 self-reporting questions to assess their dietary pattern, physical activity, marital status, education and employment.

Biochemical analysis and anthropometric measurements

Anthropometric characterisation included height, weight, waist and hips circumferences measurements, performed according standardized protocols and validated scales. BMI and waist/hip ratio (WHR) were calculated. The anthropometric measurements were made using Obesity-associated indices, which included level of plasma glucose, triglycerides, total cholesterol, high-density lipoprotein cholesterol and blood pressure (systolic/diastolic) were measured. All study subjects were examined between 8:00 and 10:00 a.m. after an overnight fast. The biochemical analyses were performed at the same day using commercially available enzymatic colorimetric assay kits (Human, Wiesbaden, Germany).

Statistics

Statistical analysis were performed by SPSS (v. 17.0) statistical software. Pearson Chi-Square test, Student t-test and Pearson correlation analyses were applied. P<0.05 value was considered statistically significant.

Results and Discussion

Significantly different anthropometric indices (p<0.001), such as waist and hip circumferences, WHR were measured for the group of volunteers with BMI<30, as compared to the obese group with BMI>30. All laboratory parameters were significantly different in the two groups as well (Table 1).

Table 1. Biochemical and anthropometric parameters.

	Subjects with BMI<30	Subjects with BMI>30
Glucose [mmol/l]	4.51±0.63	5.67±2.00 ***
Triglycerides [mmol/l]	1.13±1.33	1.79±0.99***
Total cholesterol [mmol/l]	4.79±1.15	5.21±1.18 *
HDL-C [mmol/l]	1.40±0.39	1.23±0.32**
Systolic blood pressure [mm Hg]	111.28±13.55	131.56±18.87***
Diastolic blood pressure [mm Hg]	77.53±10.69	90.07±14.19***
Hip [cm]	99.70±7.53	120.00±9.86***
Waist [cm]	78.26±12.36	110.00±12.58***
WHR	0.78±0.09	0.92±0.10***

Results are presented as mean±SD; * p<0.05, **p<0.01, ***p<0.001

In agreement with previous studies [13, 8] educational level of subjects was related to BMI and the number of people with BMI<30 was higher in the group of graduates as compared to those with basic and secondary education ($\chi^2=15.47$, $p<0.001$). Higher educational attainment might be related to stronger expectations for good physical appearance and, therefore, to a greater motivation to master weight. The well-educated people might also have a better understanding for increased general-health guidelines and be thus willing to adopt these in their everyday life [9]. Another study suggested that part of the social gradient in obesity was due to a higher frequency of weight monitoring and weight control, and to a higher level of physical activity in the higher social classes [18]. We found that 87.50% of the group of the students were with BMI<30 and BMI increased proportionally with the increasing of the age ($r=0.342$, $p<0.001$) similar to data from other studies [10, 14].

Previous investigations revealed that employment is another socioeconomic factor which influenced obesity [2]. All volunteers from the current study who had indicated that they were unemployed had BMI>30 ($\chi^2=14.07$, $p<0.01$). The available data do not allow identifying whether obesity is a primary factor leading to a decrease in socioeconomic status, as negative stereotypes about obese individuals may result in restricted opportunities for social advancement in education, employment, or relationships [7].

Table 2. Socioeconomic status of participants.

	Subjects with BMI<30 N=112	Subjects with BMI>30 N=70
Average age [years]	39.28 ± 13.27	43.16 ± 12.44
Educational Background		
Basic or high school	14.29%*	18.13%
College or University	35.71%	18.13%
Students	11.54%	1.65%
Marital Status		
Single/widowed/divorced	25.83%	10.99%
Married/living with partner	35.72%	26.92%
Occupation		
Employed	45.60%	28.57%
Unemployed	0.00%	2.75%
Retiree	1.10%	2.20%
Other (including students)	15.38%	4.40%

*Data are presented as percentage from the total sample of 182 participants in the study

Assessment of diet habits found that non-obese individuals were consuming more frequently fresh fruits and vegetables, as compared to the overweight participants (Table 3), and a significant difference was estimated about consumption of sugar enriched juices and saturated oil, $\chi^2=8.65$, $p<0.01$ and $\chi^2=4.43$, $p<0.05$, respectively. In contrast to most published research reports, the consumption of salty foods was not prevalent in overweight people but rather in those with normal weight. Similar monitoring result is being reported only for Greece, close in culture, diet and physical activity to the population of Bulgaria [14].

Table 3. Food consumption.

Frequent consumption (more than once/week)	Subjects with BMI<30	Subjects with BMI>30
Fresh fruits	82.1%*	75.7%
Fresh vegetables	85.7%	82.9%
Saturated oil	90.0%	78.7%
Salty foods	39.2%	11.5%

*Data are presented as a percentage from each group

In agreement with previous studies [12, 17] physical activity played a crucial role for the maintaining of normal BMI and the retaining of obesity development ($\chi^2=20.94$, $p<0.001$) (Figure1).

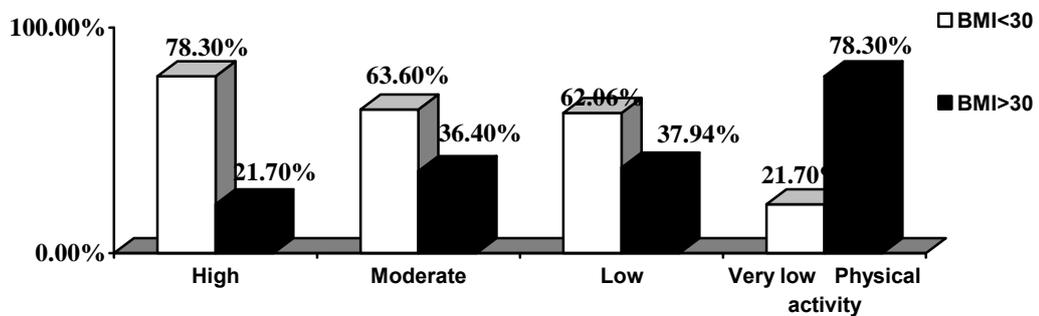


Figure 1. Influence of physical activity on BMI.

The type of physical activity also had an important role, hence 78.95% of people who were engaged in active exercises such as fitness or aerobics training were with BMI<30 ($\chi^2=6.71$, $p<0.01$). Even not intensive physical exercises, e.g. walking over than 4 hours/week had positive effect, hence 68.30% of people engaged with them had BMI<30 ($\chi^2=13.55$, $p<0.001$).

Conclusion

Various factors such as dietary habits and demographic characteristics including employment, educational degree, or marital status are associated with BMI and affect weight gain. However, physical activity appears to be the most important feature of lifestyle in Bulgaria as related to obesity development, similar to other European countries.

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