

RESEARCH ARTICLE

Relationship between obesity and psychosocial risk factors in hypertensive patients

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Introduction: Unhealthy lifestyle habits, including sedentary behaviour and improper diet are major risk factors for obesity. Overweight is very frequent in hypertensive and type 2 diabetic patients. Psychosocial factors are associated with multiple health behaviors related to overweight/obesity. The aim of the study was to evaluate the relationship between obesity and psychosocial risk factors in hypertensive patients having different levels of education. **Material and methods:** 623 hypertensive patients, admitted to the Cardiovascular Rehabilitation Clinic in Tîrgu Mureş were evaluated by weight, height, waist circumference, laboratory analyses and psychosocial risk based on a validated questionnaire on nine topics. Non-paired Student t test was used for statistical evaluation of the obtained data. **Results:** Obesity or overweight affected 86.9% of the studied hypertensive patients. Obesity was more frequent in subjects having type 2 diabetes as comorbidity. Mean BMI was significantly higher in the lower education group ($p=0.007$) compared to those with higher level of education. Average triglyceride and uric acid levels were significantly higher in obese subjects compared to those having lower BMI ($p<0.0001$). Patients living alone had significantly lower mean BMI ($p=0.006$) and waist circumference values ($p=0.001$) compared to those living with their spouse. **Conclusions:** Weight excess is very frequent in the studied hypertensive patients, especially in those with type 2 diabetes as comorbidity and having lower educational level. Hypertriglyceridemia and hyperuricemia occurred more frequently in obese subjects compared to non-obese ones. Overweight is less frequent in patients living alone.

Keywords: hypertension, obesity, overweight, psychosocial risk factors

Received 29 July 2021 / Accepted 26 September 2021

Introduction

Overweight, obesity, hypertension and carbohydrate imbalance are major health problems in the modern society [1], obesity being a leading cause of death and disabilities worldwide, involving high medical care costs [2]. The prevalence of obesity reached pandemic levels in the last half decade, obesity being an important risk factor for the development of several diseases, such as hypertension and ischemic cardiovascular diseases, type 2 diabetes mellitus, fatty liver, osteoarthritis and certain types of cancer [3]. Sedentary lifestyle is an unhealthy habit which has a major contribution to overweight and obesity development [4,5], very frequently present in hypertensive and type 2 diabetic patients. While several articles state that unhealthy eating habits, such as a diet rich in fats and carbohydrates, low consumption of fruits and vegetables are major risk factors for obesity [6], others present controversial results [7,8], which can be due partially to the influence of genetic factors.

The prevalence of obesity and type 2 diabetes mellitus is the highest in people having low level of education and poor socioeconomic status [9]. Another study revealed that skipping breakfast and no use of dietary supplement are unhealthy habits frequent in all studied groups, regardless of the educational level, but the dietary pattern was healthier in the group of highly educated subjects [10].

Psychosocial stress and negative emotions are often associated with unhealthy eating habits and overweight [11,12].

The aim of the study was to evaluate the relationships between obesity and psychosocial risk factors in hypertensive patients having different levels of education.

Material and methods

The study group consisted of 623 hypertensive patients, admitted to the Cardiovascular Rehabilitation Clinic in Tîrgu Mureş. They were evaluated by weight, height used for body mass index calculation, waist circumference measurement, laboratory analyses (biochemical metabolic tests) and psychosocial risk based on a validated questionnaire.

Each participant enrolled in the study filled in the standardized self-administered psychosocial questionnaire developed by the European Society of Cardiology, on their mother tongue (Romanian or Hungarian). The questionnaire consisted of nineteen items in nine topics: socioeconomic status (including the education level, divided into six categories: 1st category C: 1-4 classes, 2nd C: 5-8 classes, 3rd C: Gymnasium, 4th C: Professional school, 5th C: Vocational school, 6th C: University), work and family stress, social isolation, depression, anxiety, hostility, type D personality, post-traumatic stress disorder and other mental disorders.

Measurement of serum triglyceride and uric acid level was performed on Konelab analyzer by photometric procedure.

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The study was approved by the Ethical Committees of the Mureş Emergency Clinical County Hospital and that of the University of Medicine Pharmacy Science and Technology George Emil Palade. Statistical evaluation of the data was performed by IBM-SPSS version 22 and Graph-Pad InStat version 3. Non-paired Student t test was used, with and without Welch correction.

Results

Our study analyzed the data of 623 patients, with a mean age 67.7 ± 9.9 years. 52.2% (n=325) participants were female, 36.8% of patients came from rural environment. The education level of the studied patients is illustrated on table I.

Overweight and obesity was highly prevalent in the studied hypertensive population, only 13.1% of the patients having normal weight as illustrated in table II. Mean BMI was $31.05 (\pm 6)$ kg/m², mean waist circumference was 103 ± 16 cm.

Obese patients were significantly more likely to suffer from diabetes mellitus type 2 (29.3% of patients with BMI under 30 having diabetes, versus 51.8% of patients with BMI above 30 having diabetes, chi square test $p < 0.0001$).

Patients with lower education level than 12 classes had significantly higher body mass index 31.8 kg/m² versus 30.3 kg/m² in patients with higher levels of education ($p = 0.007$). No significant difference was present between the waist circumference of the two groups, 105.7 cm in the low education group versus 102.2 cm in the high education group ($p = 0.140$).

Regarding laboratory parameters, average uric acid and triglyceride levels were significantly higher in obese individuals compared to the group of overweight and normal weight subjects ($p < 0.0001$). Separating the subjects in three groups based on their BMI values we also obtained significant differences in case of these two parameters (Table III).

Table I. Education level of the studied patients

Education level	%
1-4 classes	3%
5-8 classes	27.8%
Gymnasium	23.4%
Professional school	9.7%
Vocational school	23%
University	13.1%

Table III. Laboratory test results of obese versus non obese patients

Laboratory test	Mean BMI <25 kg/m ²	Mean BMI 25-30 kg/m ²	Mean BMI >30 kg/m ²	Significance Normoponderal compared to supraponderal	Significance Supraponderal compared to obese
Creatinine	0.92	1.00	0.94	0.13	0.04
eGFR	79.56	74.42	77.99	0.17	0.11
Urea	8.74	7.20	7.78	0.15	0.18
Total cholesterol	1.32	1.20	1.17	0.97	0.57
LDL cholesterol	2.96	2.83	2.68	0.69	0.41
HDL cholesterol				0.18	0.64
Triglyceride	1.20	1.55	1.79	0.01	0.01
VSH	15	16	16	0.65	0.89
Fibrinogen	3.9	4.1	4.1	0.61	0.99
Uric acid	276	300	326	0.07	0.005

Patients were divided into two groups according to the answers given to the questions of the European Society of Cardiology psychosocial questionnaire and mean values of body mass index and waist circumference of the two groups were compared with independent sample Student t test. The results of these comparisons are illustrated on Table IV.

Based on the results obtained we can state that subjects living alone have significantly lower mean BMI and waist circumference compared to those living with their spouse (Table IV.). Regarding other psychosocial aspects, we could not observe significant differences in these two parameters.

Discussion

Overweight and obesity are very frequent in the studied hypertensive patients. Class I obesity and overweight were the most prevalent, affecting more than half of the patients, while class II and III obesity occurred in over 20% of the subjects. These percentages are higher than those reported by the majority of the studies on hypertensive persons (over one third or about half) [13,14]. The recent Euroaspire V study found a similarly high frequency of overweight and obesity among coronary heart disease patients from Europe (82%) [15].

Obesity being more frequent in the group of hypertensive patients having type 2 diabetes mellitus as a comorbidity is in accordance with data in the literature [16,17].

Patients having lower educational level presented significantly higher mean body mass index value compared to those having higher levels of education, these results being similar to those found in the literature [9]. A trend analysis of data for 15 European countries showed an increase in the prevalence of obesity between 1990 and 2010 in both men and women with larger increases in the prevalence for those in the lower as compared to the higher educated group resulting in an increasing difference in time [18]. This

Table II. Obesity categories of participants

Obesity categories of participants	%
Normal weight	13.1%
Overweight	32.7%
Obesity class I	33.0%
Obesity class II	13.0%
Obesity class III	8.2%

Table IV. Results of the psychosocial questionnaire

Psychosocial Questionnaire question	Mean BMI if Yes	Mean BMI if No	p	Mean Waist if Yes	Mean Waist if No	p
Are you a manual worker?	32.4	30.9	0.07	101.2	99.9	0.66
Is your reward inappropriate for your effort?	32.2	31.5	0.44	98.8	102.2	0.27
Do you lack control over how to meet the demands at work?	32.2	31.0	0.17	100.2	102.9	0.51
Do you have serious problems with your spouse?	33.6	31.5	0.14	106.9	99.4	0.08
Are you living alone?	30.3	32.5	0.006	95.0	104.9	0.001
Do you lack a close confidant?	31.5	31.8	0.70	99.8	100.8	0.93
Do you feel down, depressed, and hopeless?	31.8	31.6	0.85	101.3	99.7	0.59
Have you lost interest and pleasure in life?	31.6	31.8	0.84	98.4	100.9	0.53
Do you frequently feel nervous, anxious, or on edge?	31.7	31.8	0.94	100.9	99.8	0.72
Are you frequently unable to stop or control worrying?	31.1	32.2	0.15	99.5	99.5	0.68
Do you frequently feel angry over little things?	31.8	31.5	0.74	101.9	98.0	0.24
Do you often feel annoyed about other people's habits?	31.9	31.5	0.63	103	98.5	0.14
In general, do you often feel anxious, irritable, or depressed?	31.1	31.9	0.30	99.3	100.6	0.65
Do you avoid sharing your thoughts and feelings with other people?	31.5	31.9	0.68	98.8	101.4	0.38

difference is present probably because high quality diet is more expensive compared to food poor in nutrients, but having high energetic value and affordable cost, available for people with low socioeconomic status. A German study found that patients with low level of education eat higher quantities of food rich in calories especially sugar and fat, while their consumption of fruits and vegetables is lower when compared to people with higher level of education. In the same study, analyzing the influence of physical activity, researchers came to the conclusion that adults with low socioeconomic status were more active physically and thus spent more energy, explaining their mostly unhealthy food choice leading to introduce higher amounts of calories [19].

Based on our results, living alone was found to be protective against obesity, this finding was previously described by other studies on European populations [20,21], while other surveys reported the opposite [22]. In a survey on old Japanese population researchers found that living alone affects eating habits especially in male subjects. They are very likely to skip meals and were more likely to be underweight or obese compared to those living in cohabitation, men living and eating alone having unhealthy eating habits [23]. Another study carried out in Luxemburg revealed that consumption of ready-meals is higher in men living alone, this leading to increased prevalence of abdominal obesity, ready-meals providing high energy intake and low amount of fibers [24].

A limitation of the study is that we obtained the information regarding the patients based on a questionnaire, and some answers might not be complete or appropriate.

A strength of our research is the high number of the enrolled patients, and the complexity of the evaluation (laboratory parameters, psychosocial questionnaire, demographic and anthropometric data). The results of this study have practical applicability, the patients can benefit of more appropriate advice regarding lifestyle and nutrition based on the obtained data.

Regarding laboratory test results, hypertriglyceridemia and hyperuricemia seems to be more prevalent in obese patients, the first one being diagnostic criteria for the metabolic syndrome [25].

Conclusions

Weight excess could be observed very frequently in the studied hypertensive patients, especially in those having also type 2 diabetes as a comorbidity and having lower educational level. Overweight is less frequent in subjects living alone compared to those living with their spouse. Hypertriglyceridemia and hyperuricemia occurred more frequently in obese subjects compared to non-obese ones.

Acknowledgement

Financial support was provided by SC Cattus SRL, by a private grant of the UMPHSTGEP Tîrgu Mureş, contract nr. 3963/03.06.2020.

Authors' contributions

NNE substantial contributions to conception and design, acquisition of data, analysis and interpretation of data, drafting the article and revising it critically for important intellectual content

PZ Corresponding author, substantial contributions to conception and design, acquisition of data, analysis and interpretation of data, drafting the article and revising it critically for important intellectual content

NKI substantial contributions to conception and design, acquisition of data, revising it critically for important intellectual content

PT substantial contributions to conception and design, acquisition of data, revising it critically for important intellectual content

PS substantial contributions to conception and design, acquisition of data

TMC substantial contributions to conception and design, acquisition of data, revising it critically for important intellectual content

GSM substantial contributions to conception and design, acquisition of data, analysis and interpretation of data, drafting the article and revising it critically for important intellectual content, funding, research coordinator

Conflict of interest

None to declare.

References

- Blüher M. Obesity: global epidemiology and pathogenesis. *Nat Rev Endocrinol.* 2019;15(5):288-298
- Bhupathiraju SN, Hu FB. Epidemiology of obesity and diabetes and their cardiovascular complications. *Circ Res.* 2016;118(11):1723-1735
- Hruby A, Hu FB. The epidemiology of obesity: a big picture. *Pharmacoeconomics.* 2015;33(7):673-689
- Middelbeek L, Breda J. Obesity and sedentarism: reviewing the current situation within the WHO european region. *Curr Obes Rep.* 2013;2(1):42-49
- Mocha-Bonilla Julio A, Alava DJ, Muñoz JM, Castro NJ. Obesity and sedentarism levels analysis: a case study universidad técnica de ambato-ingahurco campus. *Int J Sci Res.* 2018;74(5/1):70-83
- Barlow P, Reeves A, McKee M, Galea G, Stuckler D. Unhealthy diets, obesity and time discounting: a systematic literature review and network analysis. *Obes Rev.* 2016;17(9):810-819
- Merchant AT, Vatanparast H, Barlas S, et al. Carbohydrate intake and overweight and obesity among healthy adults. *J Am Diet Assoc.* 2009;109(7):1165-1172
- Seidell JC. Dietary fat and obesity: an epidemiologic perspective. *Am J Clin Nutr.* 1998;67(3):546S-550S
- Drewnowski A. Obesity, diets, and social inequalities. *Nutr Rev.* 2009;67(suppl_1):S36-9
- Fransen HP, Boer J, Beulens JW, et al. Associations between lifestyle factors and an unhealthy diet. *Eur J Public Health.* 2017;27(2):274-278
- Pickett S, McCoy TP. Effect of psychosocial factors on eating behaviors and BMI among African American women. *Clin Nurs Res.* 2018;27(8):917-935
- Schmitz AL, Pförtner TK. Health inequalities in old age: the relative contribution of material, behavioral and psychosocial factors in a German sample. *J Public Health.* 2018;40(3):e235-243
- Cohen JB. Hypertension in obesity and the impact of weight loss. *Curr Cardiol Rep.* 2017;19(10):1-8
- Singh S, Shankar R, Singh GP. Prevalence and associated risk factors of hypertension: a cross-sectional study in urban Varanasi. *Int J Hypertens.* 2017;2017:1-10
- Kotseva K, De Backer G, De Bacquer D, et al. Lifestyle and impact on cardiovascular risk factor control in coronary patients across 27 countries: Results from the European Society of Cardiology ESC-EORP EUROASPIRE V registry. *Eur J Prev Cardiol.* 2019;26(8):824-835
- Price AJ, Crampin AC, Amberbir A, et al. Prevalence of obesity, hypertension, and diabetes, and cascade of care in sub-Saharan Africa: a cross-sectional, population-based study in rural and urban Malawi. *Lancet Diabetes Endo.* 2018;6(3):208-222
- Seo MH, Lee WY, Kim SS, et al. 2018 Korean society for the study of obesity guideline for the management of obesity in Korea. *J Obes Metab Syndr.* 2019;28(1):40-45
- Hoffmann K, De Gelder R, Hu Y et al. Trends in educational inequalities in obesity in 15 European countries between 1990 and 2010. *Int J Behav Nutr Phys Act.* 2017;14(63):1-10
- Finger JD, Tylleskär T, Lampert T, Mensink GB. Dietary behaviour and socioeconomic position: the role of physical activity patterns. *PLoS One.* 2013;8(11):e78390
- Jeruzska-Bielak M, Kollajtis-Dolowy A, Santoro A, et al. Are nutrition-related knowledge and attitudes reflected in lifestyle and health among elderly people? A study across five European countries. *Front Physiol.* 2018;9:994
- Moon K, Krems C, Heuer T, Roth A, Hoffmann I. Predictors of BMI vary along the BMI range of German adults-Results of the German National Nutrition Survey II. *Obes Facts.* 2017;10(1):38-49
- Kolahi AA, Moghisi A, Ekhtiari YS. Socio-demographic determinants of obesity indexes in Iran: findings from a nationwide STEPS survey. *Health Promot Perspect.* 2018;8(3):187-194
- Tani Y, Kondo N, Takagi D, et al. Combined effects of eating alone and living alone on unhealthy dietary behaviors, obesity and underweight in older Japanese adults: Results of the JAGES. *Appetite.* 2015;95:1-8
- Alkerwi AA, Crichton GE, Hébert JR. Consumption of ready-made meals and increased risk of obesity: findings from the Observation of Cardiovascular Risk Factors in Luxembourg (ORISCAV-LUX) study. *Br J Nutr.* 2015;113(2):270-7
- Zafar U, Khaliq S, Ahmad HU, Manzoor S, Lone KP. Metabolic syndrome: an update on diagnostic criteria, pathogenesis, and genetic links. *Hormones.* 2018;17(3):299-313