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Studying Parameters of 24-Hour Blood Pressure Monitoring in Patients with Arterial Hypertension and Abdominal Obesity

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Abstract:
The purpose of the study: to study the daily blood pressure profile in young patients with hypertension and against the background of abdominal obesity (AO). To achieve this goal, 99 patients with stage I-II hypertension were examined, including 59 men and 40 women aged 18-44 years. It has been established that the presence of AO contributes to disruption of the daily blood pressure profile in young hypertensive patients. In patients with hypertension and AO, the disturbance in the daily rise in blood pressure is mainly due to an increase in SBP, especially in the morning.

Keywords: abdominal obesity, young age, arterial hypertension, blood pressure.

Introduction

The likelihood of developing arterial hypertension in overweight adolescents also depends on ethnicity, family history, birth weight, lifestyle, physical activity, and sleep quality. High tolerance to cardiorespiratory stress and a number of genetic polymorphisms may play a protective role against the development of hypertension. Young people with hypertension and overweight have a number of differences in the level of hormones and the activity of enzymes of the renin- angiotensin system, indicators of lipid metabolism and inflammatory activity.

There are no universal recommendations for determining the low risk of hypertension in overweight at a young age. However, European, North American and International guidelines emphasize the importance of assessing the complications and comorbidities associated with excess weight. Most guidelines recommend BP screening in all overweight and obese adolescents.

According to WHO experts, the spread of overweight and obesity among young people and adolescents has reached epidemic proportions in recent years [1, 2] . Epidemiological studies indicate that up to 32% of young people in economically developed countries are obese or overweight [1, 3, 4] . At the same time, the prevalence of obesity in the global population continues to increase. The criticality of the situation is due to the fact that along with the prevalence of obesity, the frequency of concomitant diseases, in particular cardiovascular diseases, which are currently the leading cause of mortality worldwide, is increasing [2, 4–6] .

Thus, based on the above about the close relationship between AO and arterial hypertension, the purpose of this study was to study the daily BP profile in young hypertensive patients with abdominal obesity.

Materials and research methods

To achieve this goal on the basis of RSNPMCTiMR The Ministry of Health of Uzbekistan examined 99 patients with stage I-II hypertension, including 59 men and 40 women aged 18-44 years, average age (33.4±9.3), disease duration from 5 to 15 years. Verification of the diagnosis was carried out on the basis of the WHO/MOAG classification (1999) and OSC- VI . Group 1 of patients consisted of 48 patients with hypertension I- I- II degrees and group 2 51 patients with hypertension I- I- II degrees with obstructive sleep apnea syndrome (AO).

Exclusion criteria from the study were: symptomatic hypertension, previous stroke, myocardial infarction, severe diabetes mellitus, heart failure and chronic obstructive pulmonary disease, endocrine diseases.

In addition to traditional blood pressure measurements, all patients underwent bifunctional monitoring, including 24-hour blood pressure monitoring (ABPM) using the ABRM-04 device (Medite ch , Hungary). At the same time, we were guided by the recommendations of the joint national committee for the treatment of hypertension ONC- VI and WHO/MOAG [1,6]. Monitoring was carried out for 26-27 hours. In accordance with generally accepted recommendations, the intervals between blood pressure measurements during the day were 15 minutes, at night - 30 minutes. We tried to carry out ABPM in the conditions of the patient's daily activities. To record changes in psychoemotional and physical activity during ABPM, the subjects kept a special diary. Based on the records in it, upon completion of ABPM, the time intervals of day and night were corrected in order to most accurately correspond to the period of sleep and wakefulness. After preliminary data processing, including the rejection of incorrect measurements and the results of the first hours of the study, a mathematical analysis of the entire set of successful measurements was carried out with the calculation of the following indicators:

1) average systolic blood pressure (SBP), diastolic blood pressure (DBP) and pulse blood pressure (PBP) per day, day and night in mm Hg . (calculated as the arithmetic mean of the results of all measurements for a given period of time);

2) variability of systolic blood pressure (SBP) and diastolic blood pressure (VDBP) per day, day and night in mmHg . (calculated as the standard deviation from the average blood pressure value for a given period of time);

3) c degree of night-time decrease in systolic blood pressure (SNS SBP) and diastolic blood pressure (SNS DBP) in percentage (calculated using the formula: (BP_{day} - BP_{night}) x 100/ BP_{night});

4) the magnitude and speed of the morning rise in systolic blood pressure (VUPSAD and SUPSAD) and diastolic blood pressure (VUP DBP and SUP DBP) (calculated using the formulas: morning BP - night BP , mm Hg and (morning BP - night BP) / t , mm Hg /h).

5) indicator of "pressure load" (hypertension time index - TI).

Statistical processing of the research results was carried out using the standard electronic program package " biostatic" for windows , version 4.03". The parameters were described in the form M± δ . When distributing values, group comparisons of quantitative variables were performed using Student's t test of variance (t). Statistical significance was considered proven at $p < 0.05$.

Research Results

The results of the analysis of the daily blood pressure profile revealed different patterns of its changes in patients with hypertension, depending on the presence of AO (Table No. 1). In the group of patients with hypertension + AO, blood pressure differs in many respects from the indicators recorded in group 1.

Table No. 1. ABPM indicators in patients with hypertension and AO .

Index	1 group with hypertension (n =48)	2nd group With AG+AO (n =51)
SBP , mmHg .	138.3±3.2	157.4±5.3**
SADD , mmHg .	142.1±4.5	161.4±5.1**
SBP , mmHg .	135.6±4.1	157.7± 5.0 **
DBPs , mmHg .	88.5±3.6	97.5±4.9*
DAdd , mmHg .	89.8±3.8	96.9±3.4*
DBP , mmHg .	86.7±3.9	98.8±4.3**
PAPs , mmHg .	52.8±3.9	60.6±4.0*
PADD , mmHg .	51.3±2.5	63.8±3.7**
PAPn , mmHg .	51.2±3.0	61.2±3.4***
VSAPs , mmHg .	17.4±1.8	21.2 ±1.9
VSADD , mm. Hg	17.7±1.2	22.7±1.7**
VSAPn , mmHg .	16.8±1.1	21.4±1.6**
VDADS , mmHg .	13.5±0.9	16.5±1.55*
In DBPd , mmHg .	13.7±1.1	16.9±1.24*
VDADN , mm. Hg _	13.5±0.95	17.55±1.33**
IV SADs , %	48.6 ± 3.4 _ _	59 , 4 2± 4 , 4*
IV SADD , %	52.8 ± 3.5 _	6 7.3 ± 4.1 ** _ _ _

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IV SADn ,%	4 2.8 ± 3.6 _ _ _	61.3 ± 3.8 2 *** _
IV DADs , %	41.2 ± 3.7 _ _	5 2.4 ± 3.56 * _
IV DADd , %	43.5 ± 3.5 _ _	5 6 , 74 ± 4 , 7 9 *
IV DADn , %	39.7 ± 3.4 _ _	49.2 ± 3.35 *
SNS SBP, %	13.0 ± 1.3 _ _	7.65 ± 0.75 *** _
SNS DBP, %	12.1 ± 1.1 _ _	7.9±0.87*
VUP GARDEN, mmHg .	46.4±2.8	61.8±4.2**
VUP DBP, mmHg .	38.3±3.1	53.0±4.1**
SOUP GARDEN, mm Hg / h	18.4±1.2	2 7.3 ± 2.5**
SUP DBP, mmHg / h	1 3.9 ± 1.1 _ _	1 8.9 ± 1.45 * _
Heart rate , per 1 min.	69.0±4.1	78.5±5.2
Heart rate , per 1 min.	70.5±3.7	79.4±3.1*
HRn , in 1 min.	65.6±3.3	72.5±3.8

Note: * - p<0.05; ** - p<0.01; *** - p<0.001 compared with group 1 .

The results of a comparative analysis established that patients with hypertension and manifestations of AO are characterized by more pronounced changes in the daily blood pressure profile. In particular, in patients of group 2 there is a significant increase in average SBP in all its manifestations.The difference in the average SBP_c, SBP_d and SBP_n in comparison with group 1 was 12.4% (p < 0.01); 13.2% (p<0.01) and 17.5% (p<0.01), respectively. A significant difference was also found in DBP. The average DBP_s, DBP_d and DBP_n in group 2 were higher by 10.5% (p < 0.05); 7.5% (p<0.05) and 14.4% (p<0.01), respectively, compared with group 1.

In patients of group 2 with hypertension and AO, a statistically significant increase is also observed in PBP parameters. So, in particular, PAD_c was increased by 15.7% (p< 0.05), PAD_d by 23.5% (p<0.01) and PAD_n by 20.1% (p<0.001). The presence of AO is fraught not only with an increase in the average values of SBP and DBP, but also with an increase in their variability during the day. At the same time, $VSAD_d$ was increased by 29.7% (p< 0.01), $BPAP_n$ by 33.7% (p<0.01), $BPBP_s$ by 26.9% (p<0.05), $BPBP_d$ by 19, 7% (p<0.05) and $VDBP_n$ by 30.6% (p<0.01).

It was also revealed that the manifestations of AO were accompanied by an increase in “pressure load”, the manifestation of which is an increase in IV SBP_c by 23.3% (p < 0.05), IV SBP_d by 27.7% (p<0.01), PV SBP_n by 43.9% (p<0.001), PV DBP_s by 27.3% (p<0.05), PV DBP_d by 30.3 % (p<0.05), IV DBP_n by 24.2% (p<0.05). The high value of nighttime SBP and DBP is due to a decrease in SNS SBP by 66.2% (p< 0.001) and SNS DBP by 52.5% (p<0.05).

The development of AO in patients with hypertension is dangerous in the morning, which is due to an increase in UL SBP by 33.2% (p < 0.01), UL DBP by 38.9% (p < 0.01), and SBP SBP by 49.4 % (p<0.01) and SUP DBP by 35.5% (p<0.05). The development of a magnetic storm is also accompanied by a statistically significant increase in heart rate $_d$ by 13.4%. Thus, the presence of AO contributes to a significant disruption of the daily blood pressure profile in patients with hypertension.

A pronounced morning rise in blood pressure is considered an independent cardiovascular risk factor, since in the morning the frequency of adverse cardiovascular events (myocardial infarction, cerebral stroke, cardiac arrhythmias) is significantly increased [7,8,9]. A more complete description of the state of morning blood pressure is provided by a joint study of the VUP and SUP BP, SUP, which, being an integral indicator, depends only on the magnitude and time of blood pressure growth; it is not influenced by either the circadian rhythm or the absolute values of blood pressure, which are not always maximum in the morning.

Based on this, and also on the basis of the data we obtained, it is necessary to point out that in case of AO, the threat for the development of cardiovascular complications in patients with hypertension is posed by VUP SBP and SUP SBP. Also, in the group of patients with the presence of AO, the threat of developing these complications increases due to VUP DBP and SUP DBP.

It has been established that with the progression of hypertension, a characteristic change in the daily blood pressure profile (BPAP) is the appearance of evening-night and evening variants of the circadian rhythm [10]. This provision gives grounds for the assertion that the presence of AO acts as a factor in the progression of hypertension. Evidence of this is a decrease in SNS SBP and SNS DBP in the group of patients with hypertension + AO, i.e. There is an increase in the number of patients belonging to the " non - dipper " type. The data obtained are important from a prognostic point of view, since the absence of a normal decrease in blood pressure at night or its increase (daily profile " night peaker ") is accompanied by more frequent target organ damage and a 2.5-fold increase in cardiovascular mortality [11,12].

A comparative study of SPBP in patients with hypertension makes it possible to understand the essence of exacerbation of the disease when exposed to apnea syndrome, which in many cases is fraught with the development of a hypertensive crisis with the ensuing consequences, in particular, the development of an acute catastrophe from the cardiovascular system (CVS). As can be seen from our research results, an increase in VUP SBP and SBP SBP in patients with hypertension and AO is preceded by a statistically significant increase in the average value of SBP_n and, in turn, this is preceded by $VSBP_d$, i.e. instability of SBP during the daytime turns into a persistent increase at night with a sharp increase in the morning hours. When exposed to AO, DBP is also involved in this process with a more pronounced increase in the analyzed parameters.

Thus, the results obtained complement the current understanding of metabolic disorders in young people. A metabolically unhealthy phenotype is characteristic not only of obese individuals, but also of individuals with normal body weight. In young people with normal weight, as well as in obese people, cardiometabolic changes can be detected, which allows for the timely diagnosis of these disorders and the implementation of effective strategies for the primary prevention of cardiovascular and metabolic diseases.

These data are important in developing effective measures to prevent negative CV reactions in AO. In the development of the above hemodynamic changes under the influence of abdominal obesity, the reaction from the neuro-hormonal system, in particular the sympatho-adrenal system, is obviously important . Concretization of this opinion requires comprehensive studies aimed at a joint study of the daily profile of both blood pressure and heart rhythm in young patients with abdominal obesity.

Conclusions

1. The presence of abdominal obesity among young people contributes to disruption of the daily blood pressure profile in patients with hypertension.
2. In young patients with hypertension and AO, the disturbance of SPBP is caused mainly by an increase in SBP, in particular mean SBP_n, $VSBP_d$, as well as VUP SBP and SBP SBP.
3. The identified changes in ABPM in patients with hypertension and AO are manifested by disturbances in SPBP involving all its indicators, an increase in both SBP and DBP, especially in the morning.

REFERENCES:

1. Мустафаева А.Г. Механизмы развития артериальной гипертензии у лиц молодого возраста с избыточным весом. *Проблемы Эндокринологии*. 2019;65(3):191-196. https://doi.org/10.14341/probl9651
2. Din-Dzietham R, Liu Y, Bielo M, Shamsa F. High blood pressure trends in children and adolescents in national surveys, 1963 to 2002. Circulation. 2007; 116 (13): 1488-1496. https: //doi.org/10.1161/CIRCULATIONAHA.106.683243.
3. Hannon TS, Gupta S, Li Z, et al. The effect of body mass index on blood pressure varies by race among obese children. J Pediatr Endocrinol Metab. 2015;28(5−6):533−538. https://doi.org/10.1515/jpem-2014-0225.
4. Gairolla J, Kler R, Modi M, Khurana D. Leptin and adiponectin: pathophysiological role and possible therapeutic target of inflammation in ischemic stroke. Rev Neurosci. 2017;28(3):295−306. https://doi.org/10.1515/revneuro-2016-0055.
5. Ghomari-Boukhatem H, Bouchouicha A, Mekki K, et al. Blood pressure, dyslipidemia and inflammatory factors are related to body mass index in scholar adolescents. Arch Med Sci. 2017;13(1):46−52. https://doi.org/10.5114/aoms.2017.64713.
6. Guyenet SJ, Schwartz MW. Clinical review: regulation of food intake, energy balance, and body fat mass: implications for the pathogenesis and treatment of obesity. J Clin Endocrinol Metab. 2012;97(3):745−755. https://doi.org/10.1210/jc.2011-2525.

7. Koebnick C, Black MH, Wu J, et al. High blood pressure in overweight and obese youth: implications for screening. J Clin Hypertens (Greenwich). 2013;15(11):793−805. https://doi.org/10.1111/jch.12199.
8. Koleva DI, Orbetzova MM, Nikolova JG, Deneva TI. Pathophysiological role of adiponectin, leptin and asymmetric dimethylarginine in the process of atherosclerosis. Folia Med (Plovdiv). 2016;58(4):234−240. https://doi.org/10.1515/folmed-2016-0039.
9. Korek E, Krauss H. Novel adipokines: their potential role in the pathogenesis of obesity and metabolic disorders. Postepy Hig Med Dosw (Online). 2015;69(0):799−810. https://doi.org/10.5604/17322693.1161415.
10. Lin FH, Chu NF, Hsieh AT. The trend of hypertension and its relationship to the weight status among Taiwanese young adolescents. J Hum Hypertens. 2012;26(1):48−55. https://doi.org/10.1038/jhh.
11. McNiece KL, Poffenbarger T, Turner J, et al. Prevalence of hypertension and pre-hypertension among adolescents. J Pediatr. 2007;150(6):640−4, 644.e1. https://doi.org/10.1016/j.jpeds.2007.01.052.
12. Noronha JA, Medeiros CC, Cardoso Ada S, et al. C-reactive protein and its relation to high blood pressure in overweight or obese children and adolescents [Article in English, Portuguese]. Rev Paul Pediatr. 2013;31(3):331−337. https://doi.org/10.1590/S0103-05822013000300009.
13. Obradovic M, Stanimirovic J, Panic A. Regulation of Na+/K+-ATPase by estradiol and IGF-1 in cardio-metabolic diseases. Curr Pharm Des. 2017; 23 (10): 1551−1561. https: //doi.org/10.2174/1381612823666170203113455.
14. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. JAMA. 2012;307(5):483−490. https://doi.org/10.1001/jama.2012.40.
15. Psaltopoulou T, Hatzis G, Papageorgiou N, et al. Socioeconomic status and risk factors for cardiovascular disease: impact of dietary mediators. Hellenic J Cardiol. 2017; 58(1): 32−42. https://doi.org/10.1016/j.hjc.2017.01.022.
16. World Health Organization. Interim Report of the Commission on Ending Childhood Obesity. Geneva: Switzerland; 2015 [cited 2015 April 1]. Available from: https://www.who.int/end-childhood-obesity/commission-ending-childhood-obesity-interim-report.pdf.