STUDY OF THE DAILY RHYTHM OF ARTERIAL BLOOD PRESSURE IN PATIENTS WITH ARTERIAL HYPERTENSION AND OBESITY

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ABSTRACT

Daily changes in arterial blood pressure rhythm have been studied in patients with arterial hypertension with concomitant obesity and non-obese patients. The study included 54 patients. Daily changes in blood pressure rhythm were studied by conducting daily blood pressure monitoring using the ABPM 50 (China 2017) apparatus. According to the results obtained, the daily change in blood pressure is higher in patients with obesity than in non-obese patients. According to the daily blood pressure monitoring, non-dipper and night-peaker cases, that is, the insufficient decrease or increase in blood pressure at night can be observed in patients with arterial hypertension and obesity.

Purpose of the research: To determine the specific features of the daily rhythm of arterial hypertension in both obese and normal weighed patients with arterial hypertension.

Key words: arterial hypertension, abdominal obesity, body mass index, daily blood pressure monitoring.

I. INTRODUCTION

Arterial hypertension (AH) is one of the most common diseases in the world. In recent years, the highly frequent association of arterial hypertension with obesity has attracted scientists’ attention. Early disability, a high probability of cardiovascular complications, and untimely death due to arterial hypertension associated with obesity are considered to be the focus of modern medicine. Obesity and related diseases are becoming increasingly important in many developing countries [1]. Worldwide, 1.2 billion people are overweight and at least 3,000 million are obese. The World Health Organization (WHO) predicts that by 2025, the number of obese people will exceed 4,000 million. The obesity epidemic has become one of the major challenges for the health system. The incidence of obesity has doubled in the last 30 years. In 2008, 1 billion people worldwide were diagnosed with overweight and more than 500 million people were diagnosed with obesity [7]. One-fourth of the population in the United Kingdom and one-third in the United States are obese [8,9]. The best way to assess abdominal obesity is to use imaging techniques. Determining waist circumference (WC) is one of the best anthropometric alternatives for assessing abdominal obesity. Detection of waist circumference is one of the main methods of diagnosing metabolic syndromes in obese and overweight patients and is of great importance in the diagnosis of general and abdominal obesity. Abdominal overweight is associated with WC 94–101 cm for males and 80–87 cm for females. Abdominal obesity is defined as measuring more than 102 cm (for men) or 88 cm (for women) [4].

II. MATERIAL AND METHODS

The examination was conducted in the 1st cardiology and general therapy departments of the Tashkent Medical Academy. Fifty-four patients (25 women and 29 men) with arterial hypertension were examined, with a mean age of 62.7 ± 10.3.
Verification of the diagnosis of arterial hypertension and stratification of patients by risk group were determined according to WHO criteria (1999). The diagnosis of arterial hypertension was made considering the anamnesis of the disease, systolic and diastolic blood pressure readings, risk factors for AH, "target" organ damage and the presence of concomitant cardiovascular diseases. Level I of arterial hypertension was set at rest when systolic blood pressure is 140-159 mm Hg, diastolic blood pressure is 90-99 mm Hg; AH II - when systolic blood pressure was 160–179 mm Hg at rest, diastolic blood pressure was 100–109 mm Hg, AH III - when systolic blood pressure was 180 mm Hg, and diastolic blood pressure was above 110 mm Hg. The stratification of patients by risk group was based on the followings: low risk (risk I) - AH I level and in the absence of other risk factors; moderate risk (risk II) - at the level of AH I and 1-2 risk factors, or at the level of AH II and no risk factors; high risk (risk III) - at the level of AH I or AH II and in the presence of risk factors or with damage to the target organs; if the risk is very high (risk IV) - AH I or AH II level is set when accompanied by other concomitant clinical pathologies, AH III level and when risk factors are present or when target organs are damaged. According to the stratification of the risk of cardiovascular complications, a moderate risk was identified in 10 patients (35%), a high risk in 36 patients (45%) and a very high risk in 8 patients (20%). Patients were divided into 2 groups: patients with arterial hypertension and abdominal obesity (38 patients) and patients with arterial hypertension and normal body weight (16 patients). Daily blood pressure monitoring in all patients was performed on an ABPM 50 (China 2017) device; The following indicators of daily blood pressure monitoring were identified: 1) average time indicators: average daily BP, average daytime BP, average night BP; 2) arterial blood pressure variability: daytime blood pressure variability index, nocturnal blood pressure variability index. 3) Daily rhythm indicators of arterial blood pressure: daily index of systolic pressure, daily index of diastolic pressure, rate of rise in morning blood pressure.

Body mass index (BMI) was identified in all patients. To determine obesity, patients underwent anthropometric examination to measure their height (cm), body weight (kg), waist-hip ratio, and waist circumference. Hip ratio was measured in the buttocks area and waist circumference in the umbilical area. Body mass index (BMI) was calculated by dividing patients’ weight in kilograms by their height in metres squared (m2) (Kettle index). According to the International Obesity Task Force (IOTF WHO), overweight (pre-obesity) BMI is 25.0-29.9 kg / m2; I degree obesity BMI - 30.0-34.9 kg / m2; Grade II obesity BMI - 35.0-39.9kg / m2; Grade III obesity was calculated at a BMI of 40.0 kg / m2. The number of patients with a normal BMI was 10 (18.5%). According to the BMI of patients with arterial hypertension and obesity, 16 patients were found to be overweight, 17 patients had grade I obesity, and 11 patients had grade II obesity. In overweight patients, the BMI was 25 ± 2.1, in grade I obesity 33 ± 1.6, and in grade II obesity 36.7 ± 1.2. Overweight and obesity were reported in 53.8% of women and 8.9% of men. Waist circumference (WC) was measured using a non-stretching centimeter tape. Abdominal obesity was noted when WC ≥ 102 cm for men and WC ≥ 88 cm for women.

All patients underwent biochemical blood tests (lipid profile, blood sugar and creatinine). Quality of life was determined in all patients using the SF 36 questionnaire.

III. RESULTS

According to waist circumference, the prevalence of obesity was 33.8% (men = 8.9%; women = 53.8%) and it has been found to increase with age. The prevalence of hypodynamics, especially among women, has been shown to be one of the main factors leading to obesity. The study of daily blood pressure monitoring did not reveal a reliable difference between the indicators in patients with AH and overweight. The mean daily systolic blood pressure in obese patients was also found to be higher than the daily index in patients with AH who were not obese. A normal decrease in nocturnal ABP was observed in 69% of patients with AH with normal body weight. High variability of ABP was found in 4 (40%) patients of normal body weight with AH, in 8 (50%) overweight patients, and in 19 (67%) obese patients.

Table 1: Results of daily blood pressure monitoring

<table>
<thead>
<tr>
<th>Variation</th>
<th>Patients of normal body weight</th>
<th>Overweight patients</th>
<th>Patients with obesity of I-II degree</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>average daily BP</td>
<td>129/84</td>
<td>122/81</td>
<td>133/84</td>
<td>0,2</td>
</tr>
<tr>
<td>average daytime BP</td>
<td>132/89</td>
<td>129/87</td>
<td>151/90</td>
<td>0,2</td>
</tr>
<tr>
<td>average night</td>
<td>126/78</td>
<td>111/72</td>
<td>144/85</td>
<td>0,055</td>
</tr>
</tbody>
</table>

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BP

daytime blood pressure variability index
21/25 20,5/23,5 25/24 0,3

nocturnal blood pressure variability index
22/15,5 25/13,5 28/17 0,0007

nocturnal BP dipping
12/15 8,5/10 7/8 0,04/0,5

rate of rise in morning blood pressure
15/23 17/11,5 18/12,7 0,4/0,1

daily index of systolic pressure (%)
9,2% 3,7% 3,4% 0,3

daily index of diastolic pressure (%)
10,6% 4,6 % 5,1% 0,3

IV. DISCUSSION

Obesity is on the rise as a risk factor in the development of cardiovascular disease. In recent years the incidence of obesity among the world’s population has also been on the rise. According to the WHO, 30% of the world’s population (of which 16.8% are women and 14.9% are men) are overweight. According to the study, changes in daily blood pressure readings are more common in obese patients. The results of our study are consistent with the results of daily monitoring of blood pressure in patients with hypertension, the impact of various factors on the course of hypertension, cited in medical sources. Obesity is one of the main risk factors negatively affecting the course of arterial hypertension. According to many studies in recent years, the data obtained using daily monitoring of blood pressure are correlated with “target organ” damage compared to traditional blood pressure measurements [10-11]. The widespread use of daily monitoring of blood pressure in practice has greatly helped to gain more information about the daily profile of AH: changes in blood pressure during the day, changes during sleep and wakefulness. Insufficient or very low blood pressure at night in patients with high blood pressure variability is considered a high risk group in the development of cardiovascular disease, especially in patients with AH accompanied by obesity. The study found high variability in systolic and diastolic blood pressure (p <0.001) at night in patients with AH and overweight and obesity. High variability was found in 40% of patients with AH with normal body weight. High variability of ABP was found in 50% of overweight patients and 67% of obese patients. A normal decrease in nocturnal ABP was observed in 69% of patients with AH with normal body weight. It should be noted that studies have shown that BP variability has been included in a new risk factor in patients with AH, indicating stiffness of the large arteries and a double role in leading to complications [11]. Our study noted a high variability of systolic and diastolic blood pressure in patients with AH and overweight and abdominal obesity compared to patients with normal body weight. Such changes can lead to more rapid cardiovascular complications. In obese patients, high systolic blood pressure was detected not only during the day but also at night, and a low daily index of systolic and diastolic pressures was observed, which was recorded in the form of non-dipper and night-peaker. Determining waist circumference, BMI in patients is a great help in diagnosing obesity and eliminating the complications that result from obesity. Abdominal obesity is more common in women with hypertension than in men. Patients who realize that they have a high waist circumference can make useful decisions for themselves, exercise, adjust their diets to normalize, and as a result, reduce the impact of obesity on AH course, AH levels. The study found that daily systolic and diastolic blood pressure readings were correlated in patients with AH and abdominal obesity, and that AH was involved in risk factors.

V. CONCLUSION

According to the results of daily blood pressure monitoring in patients with arterial hypertension and obesity, the daily changes in blood pressure rhythm, non-dipper and night-peaker cases are more common than in patients without obesity.
CONFLICT OF INTERESTS AND CONTRIBUTION OF AUTHORS
The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article and report on the contribution of each author.

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