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Efficiency of metoprololin the treatment of hypertensionin a coastal city climate

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Objective: evaluation of the effectiveness of metoprolol in arterial hypertension (AH) in the conditions of the coastal city of Makhachkala.
Materials and methods: There was conducted a study of the effectiveness of metoprolol at a dose of 25 mg 2 times a day in the treatment of 132 patients with grade II – III grade AH (average age 58.2 ± 4.3 years, duration of hypertension 7.8 ± 0.6 years). The study of daily blood pressure (BP) monitoring was carried out monthly during the year.
Results: In March, June, November and December the effectiveness of metoprolol was low because the time index of blood pressure exceeded 50%. In the treatment with metoprolol in June and July, there was an increase in the variability of blood pressure beyond the limits of acceptable values. Analysis of the dynamics of integral indicators of daily blood pressure monitoring showed the seasonality of the antihypertensive action of metoprolol.
Cunclusion: in the treatment of hypertensive patients with grade II – III, the dose of metoprolol should be increased in March, June, July, November and December in the conditions of the coastal city of Makhachkala.

Keywords:
arterial hypertension, beta-blocker, city, coast, metoprolol.

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In the Russian Federation, arterial hypertension (AH) affects about 40% of the adult population, and among the causes of the overall mortality of the population, circulatory system diseases account for more than half of all deaths (53.5%). Awareness of patients with hypertension about the presence of the disease is 83.9-87.1%. Antihypertensive drugs are taken by 69.5% of patients, of whom 27.3% of patients are effectively treated. Despite the large number of studies on the pharmacotherapy of hypertension, its effectiveness remains extremely low. In people with high blood pressure (BP), coronary heart diseasedevelops 3–4 times more often and cerebral strokes develop 7 times more often. The main factor in the development of these diseases is AH [2, 5, 8].

Large-scale population-based studies in the world have clearly demonstrated the importance of effective treatment of hypertension in reducing the risk of cardiovascular morbidity and mortality, and made it possible to quantify the effect on the prediction of the ratio of blood pressure to other risk factors. The correlation between average daily blood pressure and such risk factors for cardiovascular complications as mass of the left ventricular myocardium, impaired left ventricular function, microproteinuria, severity of retinopathy and cerebral complications [4, 6] has been proven.

Large-scale population-based studies in the world have clearly demonstrated the importance of effective treatment of hypertension in reducing the risk of cardiovascular morbidity and mortality, and also made it possible to quantify the effect on the prediction of the ratio of blood pressure to other risk factors. The correlation between average daily blood pressure and such risk factors for cardiovascular complications, such as the mass of the left ventricular myocardium, impaired left ventricular function, microproteinuria, the severity of retinopathy and cerebral complications, has been proven [4, 6]., fluctuations in atmospheric pressure, increased air humidity, lead to an increased risk of developing acute myocardial infarction, cerebral stroke and increased patient mortality. As evidenced by research results, increased blood pressure variability, including that associated with exposure to cold and heat, is an unfavorable prognostic factor for the course of hypertension, especially in elderly patients.The European recommendations on the diagnosis and treatment of hypertension for the first time recorded the important role of seasonal fluctuations in blood pressure, which are largely associated with changes in annual conditions. Thus, along with the recognition of significant fluctuations in the level of blood pressure over one or several days, it is indicated that this indicator may change significantly over several months and seasons of the year [9, 10].

Beta-blockers are currently regarded as one of the most effective means of treating hypertension and are recommended by WHO experts for clinical use, especially in patients with concomitant coronary heart disease. Preference is given to selective Beta-blockers, such as metoprolol succinate, bisoprolol, nebivolol. Although experts say that all the main classes of antihypertensive drugs are suitable for starting and maintaining antihypertensive therapy [3, 5, 8]. Among the factors considered as the reason explaining the insufficient efficacy of antihypertensive therapy in hypertensive patients, a special place is occupied by the lack of seasonal correction of drug therapy [9, 10].

There are few works devoted to the effect of metoprolol on indicators reflecting the risk of cardiovascular complications depending on the state of the environment and the time of year. In connection with the above, it is of scientific and practical interest to study the effectiveness of selective Beta-blockers metoprolol in a seasonal aspect.

Goal of Research: to evaluate the effectiveness of metoprolol in the treatment of hypertension in a city located on the coast of the sea**.**

Materials and Methods

The study was retrospective, historical, conducted by examining the results of daily monitoring of arterial pressure in patients with hypertension stage II, grade 2-3, who took metoprolol 25 mg 2 times a day. A total of 132 case histories were analyzed (74 men and 58 women), the average age of the patients was 58.2 ± 4.3 years, the duration of hypertension was 7.8 ± 0.6 years. The study of indicators of daily monitoring of arterial pressure was carried out in 12-14 days from the start of taking the drug. The analysis was carried out monthly from January to December in 10-12 patients. Among the indicators of daily monitoring of arterial pressure, the most significant categories of cardiovascular risk were identified: the time index of systolic arterial pressure, the time index of diastolic blood pressure — daily indices.The optimal value was taken as the time of increased blood pressure per day, not more than 37%. The optimal variability of systolic blood pressure and disastolic blood pressure was from 13 to 15 mm Hg. The degree of nocturnal decrease in systolic blood pressure, the degree of nocturnal decrease in disastolic blood pressure, the indicator was considered acceptable at values from 10 to 20%.

Statistical analysis was performed using the software package Statistica 6.0 for Windows. To identify the relationship between the indices of the 24-hour blood pressure profile and the effectiveness of the action of metoprolol and the atmospheric parameters, a correlation analysis was performed according to the Pyrsson criteria [2].

Results and its discussion

When studying the effect of metoprolol on the “pressure load” indices, the daily indices of the time of systolic blood pressure and the time index of diastolic blood pressure were obtained as shown in Figure 1.

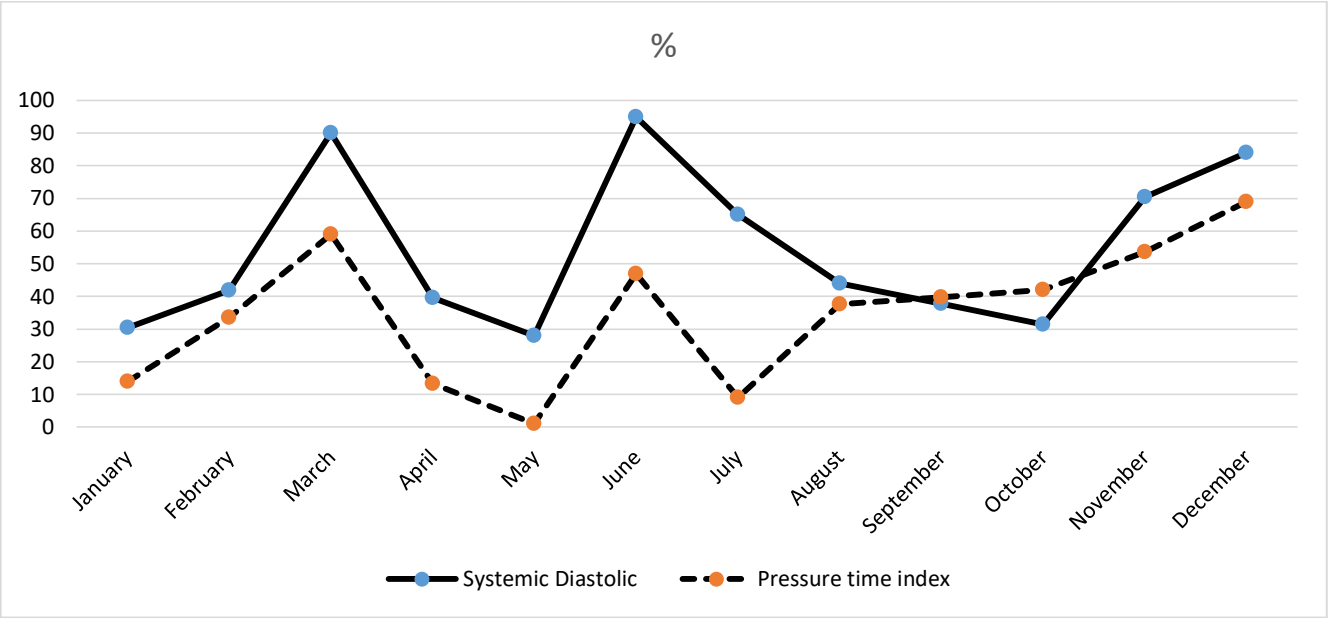

Figure 1. The change in the daily time index of systolic and diastolic blood pressure under the influence of metoprolol.

As can be seen from the figure, in January, February, April, May and July, the time index of systolic and diastolic blood pressure under the influence of metoprolol decreased quite effectively, and the indicators were close to normal (about 37%), but in March, June, November and December, the efficacy of me-toprolol was low — the daily systolic and diastolic blood pressure index was above 50%.

A number of studies have shown [6] that increased blood pressure variability closely correlates with early damage to target organs, in particular with abnormal geometry of the left ventricle, angioretinopathy, etc. The annual dynamics of the indices of variability systolic blood pressure and diastolic blood pressure pressure under the influence of metoprolol is presented in Figure 2.

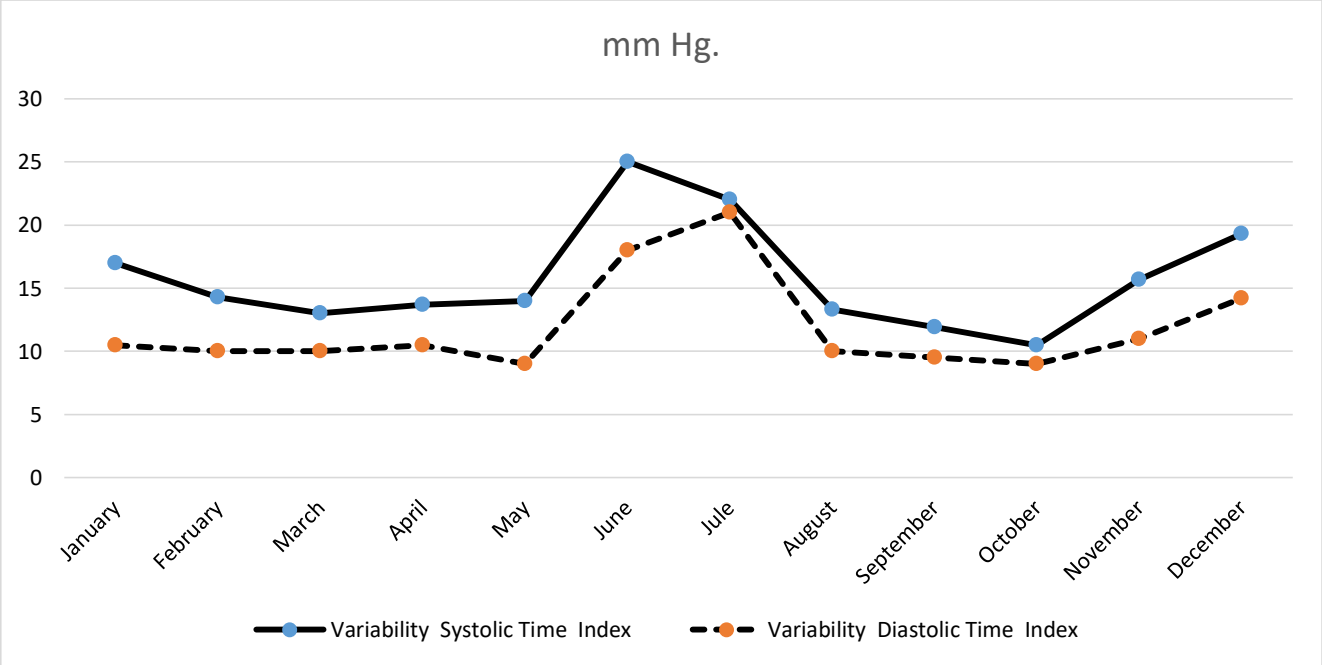

Figure 2. Changes in the daily variability of systolic and diastolic arterial pressure under the influence of metoprolol.

As can be seen from the presented figure, during the treatment with metoprolol in June and July, there was a "slip" of the variability of Systolic blood pressure and Diastolic blood pressure beyond the admissible values. The significance of the transformation of the daily profile of blood pressure during the treatment of β-blockers is still not fully understood. Figure 3 shows the changes in the degree of night-time decrease in blood pressure under the influence of method-prolol in different months of the year.

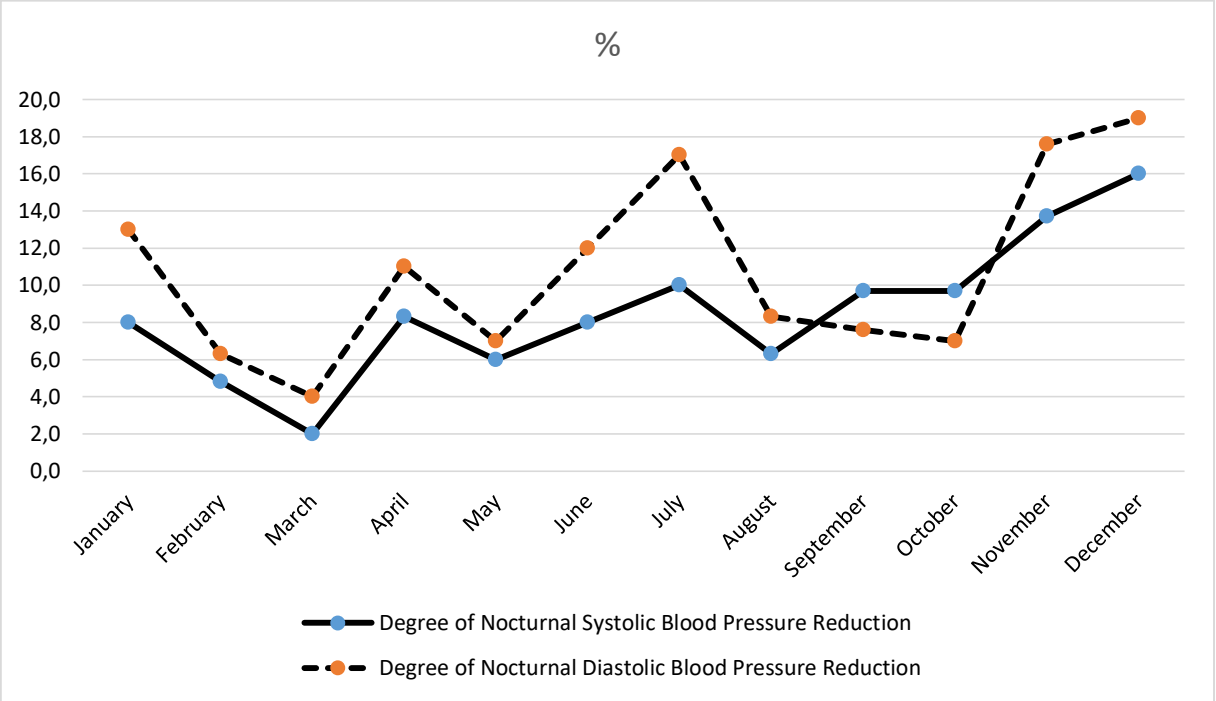

Figure 3. The change in the degree of nocturnal decrease in systolic and diasastolic blood pressure under the influence of metoprolol.

As can be seen from the presented figure, during the treatment with metoprolol in February, March, May, and August, an excessive decrease was observed in the indicators of the degree of nocturnal decrease in Systemic blood pressure and diastolic blood pressure (with normal values from 10 to 20%).

Discussion

As is known, changes in the state of the atmosphere (temperature, humidity, atmospheric pressure) lead to meteopathic reactions, which is especially pronounced in patients with hypertension, coronary heart disease and cerebrovascular disease. Me-theopathic reactions occur in 40-60% of patients with cardiovascular diseases [9-11]. One of the main components of meteopathic reactions is the activation of the sympathetic-adrenal system [1, 9-11]. β-blockers, being a powerful blocker of the sympathetic-adrenal system, helps to reduce meteotropic reactions. However, as shown by the analysis of the dynamics of the integral parameters of daily monitoring of arterial pressure, reflecting the risk of cardiovascular complications in our study, seasonal dependence of the hypotensive effect of metoprolol is observed.The above dictates the need to take into account the seasonal peculiarities in the treatment of patients with hypertension with metoprolol. Thus, in order to optimize the treatment of patients with grade II – III hypertension, to improve the index of the Systolic Blood Pressure Time Index and the Diastolic Blood Pressure Time Index, the dose of metoprolol should be increased in March, June, November and December. In order to improve the variability of systolic blood pressure and diastolic blood pressure, the dose of metoprolol should be increased in the months of June and July. At the same time, it should be borne in mind that in February, March, May and August, metoprolol may excessively reduce the rates of the nightly decrease in Systolic blood pressure and Diastolic Blood pressure.

Conclusion

Metoprolol should be prescribed to patients with hypertension of grade II-III, taking into account the effect of the drug on the indices of daily monitoring of blood pressure in different months of the year.

Funding and Conflict of InterestInformation

The authors declare the absence of overt and potential conflicts of interest related to the publication of this article.

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