THE FREQUENCY OF USE OF COMBINATIONS OF ANTIHYPERTENSIVE DRUGS IN PATIENTS WITH DIFFICULT-TO-CONTROL HYPERTENSION ON THE BACKGROUND OF BIOFEEDBACK AND PACED BREATHING AND HEART RATE VARIABILITY

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The frequency of administration of combinations of antihypertensive drugs and its changes at different stages of observation was studied in 60 patients with difficult-to-control arterial hypertension (DTCAH) (32 men and 28 women) aged 59.0 ± 9.4. All patients were randomly divided into two subgroups: biofeedback (BFB) in the loop of paced breathing (PB) and heart rate variability (HRV) (33 patients) – basic subgroup, subgroup of comparisons (27 patients). Determined that patients with DTCAH in the subgroup of patients with the BFB in the loop of PB there has been a reduction of four-component antihypertensive therapy to three-component and in the subgroup of comparisons the frequency of the appointment of a four-component therapy was increased. At the same time, it was found that the addition of drug therapy with regular BFB sessions in the loop of PB contributed to the potentiation of the antihypertensive effect in patients with DTCAH. It is concluded that the BFB in the loop of PB and HRV can be used as a technology to improve the efficiency of control of blood pressure in patients with DTCAH.

KEY WORDS: difficult-to-control arterial hypertension, heart rate variability, biofeedback, paced breathing
Изучена частота назначения комбинаций антигипертензивных препаратов и ее изменения на различных этапах наблюдения у 60 пациентов с трудноконтролируемой артериальной гипертензией (ТАГ) (32 мужчины и 28 женщин) в возрасте 59,0 ± 9,4. Все пациенты случайным образом были разделены на две подгруппы: с биологической обратной связью (БОС) в контуре метрономизированного дыхания (МД) и вариабельности сердечного ритма (ВСР) (33 пациента) – основная подгруппа, подгруппа сравнения (27 пациентов). Установлено, что у пациентов с ТАГ в подгруппе пациентов с БОС в контуре МД отмечается сокращение четырехкомпонентной антигипертензивной терапии до трехкомпонентной, а в подгруппе сравнения возрастает частота назначения четырехкомпонентной терапии. При этом установлено, что дополнение медикаментозной терапии регулярными сеансами БОС в контуре МД способствует потенцированию антигипертензивного эффекта у пациентов с ТАГ. Делается вывод, что БОС в контуре МД под контролем параметров ВСР может быть использована как технология повышения эффективности контроля АД при ТАГ.

КЛЮЧЕВЫЕ СЛОВА: трудноконтролируемая артериальная гипертензия, вариабельность сердечного ритма, биологическая обратная связь, метрономизированное дыхание

INTRODUCTION

Currently, treatment of difficult-to-control arterial hypertension (DTCAH) is an important problem due to the widespread prevalence of patients with DTCAH (30.4–31.8 % of the total population of patients with hypertension) [1], rapid progression of target organ damage and a high risk of cardiovascular events [2].

DTCAH is characterized by the inability to achieve target blood pressure values, despite the appointment of three or more antihypertensive drugs, including diuretics [3]. Due to the absence of randomized clinical trials, the selection of therapy for persons with TAG occurs empirically, taking into account national recommendations for the treatment of hypertension [4]. The best treatment strategy in this case is to select a combination of antihypertensive drugs, which will affect the various links of pathogenesis and physiological mechanisms of hypertension, as well as take into account the comorbidity of a particular patient.

OBJECTIVE

The aim of the work is to study the change in the frequency of prescribing combinations of antihypertensive drugs used in patients with DTCAH on the background of biofeedback (BFB) in loop of heart rate variability (HRV) and paced breathing (PB).
hypertension, the presence of target organ damage and concomitant pathology in patients with DTCAH one of the following combinations of antihypertensive drugs was prescribed: Inhibitor of angiotensin converting enzyme (ACE)/blockers of the renin-angiotensin-aldosterone system (RAAS) + calcium channel blocker (CCB) + diuretic; ACE inhibitor/blocker of the RAAS + CCB + diuretic + antagonist of mineralocorticoids; Beta-blocker + ACE inhibitor/blocker of the RAAS + CCB + diuretic; ACE inhibitor/blocker of the RAAS + CCB + diuretics + hypotensive drugs of the central action.

BFB was carried out on the computer diagnostic complex CardioLab 2009 («HAI-Medica», Ukraine) with the module «Biofeedback», including software-related visual-sonic metronome breathing and dynamic algorithm for determining the current values of HRV parameters, changing under the influence of PB. The breathing rate was set by the «Biofeedback» software module.

Statistical processing was carried out using Microsoft Excel. Qualitative variables described by relative values were used for statistical evaluation of the results: % and their deviation – σ. The accuracy of differences between groups is determined by the parametric Student’s T-test. The expected result was determined by the level of reliability p < 0.05.

RESULTS AND DISCUSSION

In table 1 the frequency of prescribing combinations of antihypertensive drugs used in patients with DTCAH in the subgroup of patients with BFB in the loop of PB and the subgroup of comparison at the observation stages – 3, 6 months and a year is presented.

Table 1

<table>
<thead>
<tr>
<th>Combinations of antihypertensive drug</th>
<th>Subgroups of patients</th>
<th>Stages of therapy</th>
<th>Patients with BFB in the loop of PB</th>
<th>Comparison subgroup (BFB without PB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before treatment</td>
<td>3 month</td>
<td>6 month</td>
<td>1 year</td>
</tr>
<tr>
<td>ACE inhibitor/blocker of the RAAS + CCB + diuretic (% ± σ)</td>
<td>39,5 ± 4*</td>
<td>44,3 ± 5</td>
<td>46,3 ± 4</td>
<td>45,5 ± 3</td>
</tr>
<tr>
<td>ACE inhibitor/blocker of the RAAS + CCB + diuretic + antagonist of mineralocorticoids (% ± σ)</td>
<td>33,3 ± 3*</td>
<td>33,3 ± 3</td>
<td>34,3 ± 4</td>
<td>36 ± 4</td>
</tr>
<tr>
<td>Beta-blocker + ACE inhibitor/blocker of the RAAS + CCB + diuretic (% ± σ)</td>
<td>24,2 ± 3*</td>
<td>20,6 ± 3</td>
<td>19,4 ± 2</td>
<td>18,5 ± 2</td>
</tr>
<tr>
<td>ACE inhibitor/blocker of the RAAS + CCB + diuretics + hypotensive drugs of the central action (% ± σ)</td>
<td>3 ± 2*</td>
<td>1,8 ± 2</td>
<td>0 ± 0</td>
<td>0 ± 0</td>
</tr>
</tbody>
</table>

Both groups of patients before the beginning of the sèances were dominated by the administration of a combination ACE inhibitor/blocker of the RAAS + CCB + diuretic. In the subgroup of patients with BFB in the loop of PB combinations of ACE inhibitor/blocker of the RAAS + CCB + diuretic + antagonist of mineralocorticoids, beta-blocker + ACE inhibitor/blocker of the RAAS + CCB + diuretic, ACE inhibitor/blocker of the RAAS + CCB + diuretic + hypotensive drugs of the central action were less frequently prescribed. The ratio of prescription of these combinations of drugs in the subgroup with
BFB in the loop of PB was 13:11:8:1, at the stage of 3 month observation – 24,6:18,5:11:4:1, at the stage of 6 month observation – 3:5:7:1:8:1 and at the stage of annual observation this ratio was 2,5:1,9:1:0. This indicates that the dominance of the assignment of combination ACE inhibitor/blocker of the RAAS + CCB + diuretic was preserved, and also it was noted the declining trend in antihypertensive therapy from four-component to three-component. Frequency of assignment combination which includes beta-blocker + ACE inhibitor/blocker of the RAAS + CCB + diuretic decreased in 1,3 times. Combination of ACE inhibitor/blocker of the RAAS + CCB + diuretic + hypotensive drugs of the central action at the annual stage of treatment wasn't use.

In the subgroup of comparison, the initial ratio of combinations of antihypertensive drugs changed from 21,2:10,5:17,3:1 to 5:8:4:8:1 at the three – month stage, 7:4,6:2,2:1-at the semi-annual stage and by the end of the year of observation it was 1,7:4,6:1,8:1. At the annual stage of therapy, the predominant combination was a combination of ACE inhibitor/RAAS blocker + BCC + diuretic + mineralocorticoid antagonist, the frequency of administration increased by 2,4 times. There was also an increase of administration of combination ACE inhibitor/blocker of the RAAS + CCB + diuretics + anti-hypertensive drugs of central action (in 5,4 times). On the contrary, the frequency of administration of combination ACE inhibitor/RAAS blocker + BKK + diuretic decreased by 2,2 times, which demonstrates the predominance of four-component antihypertensive therapy at the annual stage in patients with DTCAH without PB.

The obtained results, according to which the addition of drug therapy with BFB in the loop of PB allows achieving better blood pressure control in patients with DTCAH, are in accordance with the data in patients with controlled AH [5–7]. However, publications on the effectiveness of BFB in the loop of PB in patients with DTCAH, are absent in the literature.

Our observations confirm the need for combined antihypertensive therapy in patients with DTCAH. The addition of drug therapy by regular BFB sessions in the loop of PB has an additional effect on the neurohumoral regulation, which contributes to the potentiation of the antihypertensive effect.

The results show that the addition of antihypertensive therapy by BFB in the loop of HRV and PB reduces the number of prescribed drugs.

**CONCLUSIONS**

1. The addition of drug therapy with regular BFB sessions in the loop of PB contributes to the potentiation of the antihypertensive effect in patients with DTCAH.
2. There is reduction of four-component antihypertensive therapy to three-component in the subgroup of patients with BFB in the loop of PB. On the contrary in the comparison subgroup the frequency of administration of four-component therapy increases.
3. BFB in the loop of HRV and PB control can be used as a technology to improve the effectiveness of control blood pressure in patients with DTCAH.

**PROSPECTS FOR FURTHER RESEARCHES**

In the future, it seems appropriate to study the dynamics of parameters of BFB and blood pressure in patients with the DTCAH at various stages of treatment.

**REFERENCES**


