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DAILY BLOOD PRESSURE PROFILES IN PATIENTS WITH ARTERIAL HYPERTENSION: IS IT ENOUGH TO USE SYSTOLIC BLOOD PRESSURE ONLY

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The systolic blood pressure (SBP), diastolic blood pressure (DBP) and pulse pressure (PP) daily profiles incidence was studied in 53 patients with arterial hypertension. A significant difference in the frequency of occurrence of different types of SBP, DBP and PP daily profile was revealed. In the structure of SBP daily profile «nondipper» and «dipper» types were dominated, DBP - «dipper» and «overdipper» types, PP - «night-picker» type. The conclusion about the need to evaluate not only the SBP circadian pattern, but DBP and PP also to improve the quality of arterial hypertension diagnosis, prognosis and treatment was made.

KEY WORDS: ambulatory blood pressure monitoring, systolic blood pressure, diastolic blood pressure, pulse pressure, daily blood pressure

ТИПИ ДОБОВИХ ПРОФІЛЕЙ АРТЕРІАЛЬНОГО ТИСКУ У ПАЦІЄНТІВ З ГІПЕРТОНІЧНОЮ ХВОРОБОЮ: ЧИ ДОСТАТНЬО ОБМЕЖУВАТИСЯ ЛИШЕ СИСТОЛІЧНИМ АРТЕРІАЛЬНИМ ТИСКОМ

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Вивчено частотні характеристики добових профілів систолічного артеріального тиску (САТ), діастолічного (ДАТ) та пульсового артеріального тиску (ПТ) у 53 пацієнтів з гіпертонічною хворобою (ГХ). Виявлено істотну різницю щодо частоти виявлення типів добового профілю САТ, ДАТ і ПТ. У структурі добового профілю САТ переважали типи «nondipper» і «dipper», ДАТ - «dipper» і «overdipper», ПТ - «night-picker». Зроблено висновок про необхідність оцінки не тільки добового профілю САТ, але й ДАТ та ПТ для підвищення якості діагностики, прогнозування і лікування ГХ.

КЛЮЧОВІ СЛОВА: добове моніторування артеріального тиску, систолічний артеріальний тиск, діастолічний артеріальний тиск, пульсовий тиск, добовий профіль артеріального тиску

ТИПЫ СУТОЧНЫХ ПРОФИЛЕЙ АРТЕРИАЛЬНОГО ДАВЛЕНИЯ У ПАЦИЕНТОВ С ГИПЕРТОНИЧЕСКОЙ БОЛЕЗНЬЮ: ДОСТАТОЧНО ЛИ ОГРАНИЧИВАТЬСЯ СИСТОЛИЧЕСКИМ АРТЕРИАЛЬНЫМ ДАВЛЕНИЕМ

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Изучены частотные характеристики суточных профилей систолического артериального давления (САД), диастолического (ДАД) и пульсового (ПД) артериального давления у 53 пациентов с гипертонической болезнью (ГБ). Выведено существенное различие частот встречаемости типов суточного профиля САД, ДАД и ПД. В структуре суточного профиля САД преобладали типы «nondipper» и «dipper», ДАД - «dipper» и «overdipper», ПД - «night-picker». Сделан вывод о необходимости оценки не только суточного профиля САД, но и ДАД и ПД для повышения качества диагностики, прогнозирования и лечения ГБ.

КЛЮЧЕВЫЕ СЛОВА: суточное мониторирование артериального давления, систолическое артериальное давление, диастолическое артериальное давление, пульсовое давление, суточный профиль артериального давления

INTRODUCTION

The assessment of the daily blood pressure (BP) periodicity is an important factor in patients with arterial hypertension (AH) [1, 2]. To characterize it, in most cases, the sleep-time relative systolic blood pressure (SBP) decline is used [3]. Taking into account the different regulatory mechanisms of systolic and diastolic blood pressure (DBP), a variety of target organ damage in their combinations, as well as in relation to cardiovascular risk, there is a hypothesis that the clinical, diagnostic and prognostic value of abnormal BP pattern in patients with AH can have not only SBP, but DBP and pulse pressure (PP) also. Complex researches of circadian SBP, DBP and PP patterns clinical significance in patients with AH in the literature are absent.

OBJECTIVE

The aim of the study is to compare the frequencies of circadian SBP, DBP and PP profiles in patients with AH to develop and introduction into practice the proposals to improve the quality of AH diagnosis, prognosis and treatment.

MATERIALS AND METHODS

On the clinical base of the Kharkov city outpatient clinic № 24 53 patients with essential hypertension were examined. The study involved 22 men (42 %) and 31 women (58 %). Average age is 58 ± 10 years. The average duration of AH is 8 ± 6 years. Newly diagnosed AH – 6 patients (11 %). AH of stage I was diagnosed in 12 patients (23 %), stage II – 30 (57 %), stage III – 11 (20 %). AH of 1 grade was determined in 23 patients (43 %), grade 2 – 26 (49 %), grade 3 – 4 (8 %). Heart failure (HF) was diagnosed in the 40 cases (75 %): HF stage I – 31 (58 %), HF stage IIA – in 8 (15 %), HF stage IIB – 1 (2 %), I functional class (FC) of HF was determined in 16 patients (30 %), II FC – 22 (41 %), III FC – 2 (4 %); coronary heart disease (CHD) – 42 cases (79 %): stable angina (I-III FC) – 8 (15 %), postinfarction cardiosclerosis (PICS) – 3 (6 %), focal atherosclerotic cardiosclerosis (ACS) – 33 (62 %).

The diagnosis of AH was made according to the recommendations of the Ukraine Association of Cardiologists of (2007), the European Society of Hypertension and the European Society of Cardiology (2013), the

Committee of Experts of the World Health Organization (WHO) and the International Society of Hypertension (1999), summarized and expounded in Unified clinical protocol of primary, emergency and secondary (specialized) medical care «Arterial Hypertension» (2012) [4].

The diagnosis of CHD and its functional class, as well as the diagnosis of HF and its stage and functional class was made according to the recommendations of Ukrainian Heart Association on classification, diagnosis and treatment of cardiovascular disease (2007) [5].

Exclusion criteria were secondary hypertension, hemodynamically significant valvular heart disease, cardiomyopathies of any origin, heart failure stage III, IV FC, any acute condition (infection, trauma, surgery) within the previous 3 months., chronic decompensated or acute illness, cancer, as well as any circumstances that can hinder the ambulatory blood pressure monitoring (ABPM) implementation.

To determine the daily BP profile the ABPM was performed with an automatic oscillometric device «Kardiosens» (HAI Medica, Ukraine). ABPM was performed in a patient's normal working day; the cuff was placed at the non-dominant hand. According to the international recommendations of 2013 BP recordings were obtained automatically every 15 minutes throughout a day and every 30 minutes at night [3]. Patients should keep their habitual routine and present a report with the activities done; SBP, DBP, and PP readings were averaged for the day and the night spans according to the patients' reported time of waking up and going to bed.

All ABPM data were validated in accordance with international Ambulatory Blood Pressure Monitoring Recommendations [3], meaning exclusion the following measurements: SBP > 250 or < 70 mm Hg; DBP > 150 or < 40 mm Hg; PP > 150 or < 20 mm Hg; HR > 200 or < 20 min.

In addition, ABPM data series were considered invalid for analysis if: ≥ 30 % of the scheduled measurements were absent, BP measurement data were lacking for > 2 consecutive hourly intervals, an irregular rest-activity schedule during consecutive 24-h periods of monitoring was maintained, the nighttime sleep span was < 6 h or > 12 h [3].

Daily profiles of SBP, DBP and PP were classified using sleep-time relative BP decline,

which is defined as the percent decrease in mean BP during nighttime sleep relative to the mean BP during daytime activity, and calculated as $(100 \times [\text{awake BP mean} - \text{asleep BP mean}] / \text{awake BP mean})$ [3].

Depending on this percent ratio, the next 24-hours patterns for SBP, DBP and PP were specified: «Dipper» - physiological decrease in BP at night, sleep-time relative BP decline 10-20 %; «Overdipper» - an excessive fall in BP at night, sleep-time relative BP decline > 20 %; «Nondipper» - the lack of BP reduction at night, sleep-time relative BP decline <10 %; «Night-peaker» - night-time BP higher than the daily one, sleep-time relative BP decline < 0 [3].

The frequency ratios of different circadian BP profiles of SBP, DBP and PP were determined and compared with each other.

Calculation of ABPM indices was performed using a computer system «Kardiosens». Statistical analysis was performed on a personal computer using the program «Microsoft Office Excel 2010» with an estimation of SBP, DBP and PP daily profile types incidence in percentage.

RESULTS AND DISCUSSION

Fig. shows the frequency ratio of SBP, DBP and PP daily profiles in the studied group of patients.

In the structure of SBP daily profile the «dipper» (42 %) and «nondipper» (47 %) types were dominant. Their frequencies of occurrence were close to each other and more than 6 times higher than the «overdipper» (6 %) and «night-picker» (6 %) incidence.

In the structure of DBP daily profile the «dipper» (34 %), «overdipper» (34 %) and «nondipper» (28 %) types were prevalent, while the «night-picker» type was extremely rare (4 %).

Due to divergent frequency ratios of diurnal profiles of SBP and DBP, in the structure of PP daily profile the incidence of «night-picker» (55 %) and «nondipper» (34 %) types was absolutely dominated, and the «dipper» (8 %) and «overdipper» (4 %) types frequency of occurrence was rare.

The obtained results have showed the different distribution of SBP, DBP and PP circadian pattern incidence in patients with AH, which is explained by the peculiarities of SBP and DBP regulation mechanisms.

Taking into account that the AH prognosis and outcomes determined by abnormal daily profile formation not only SBP [6, 7], but DBP also [8-10], as well as high frequency of occurrence «night-picker» and «nondipper» types of PP 24-hours pattern in patients with AH, revealed in our study, in clinical practice it seems appropriate to monitor the diurnal profiles of all this ABPM indices.

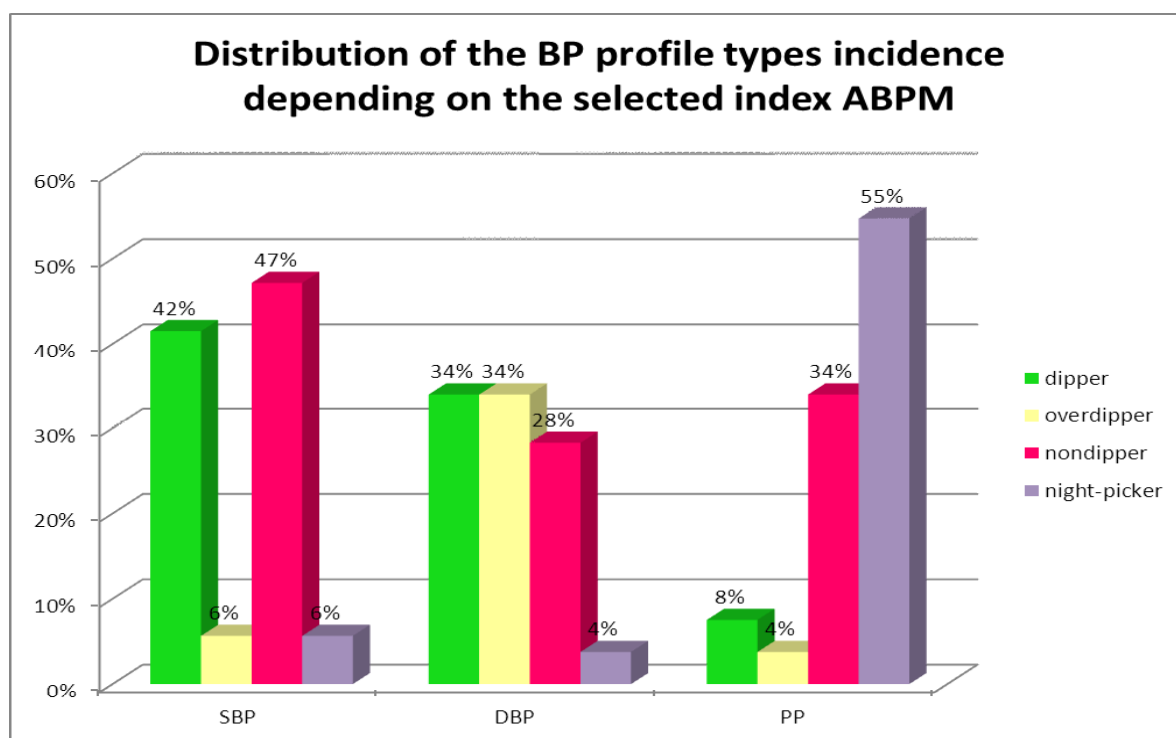


Fig. Distribution of the BP profile types incidence, depending on the selected index ABPM

CONCLUSIONS

Frequencies of occurrence distribution of SBP, DBP and PP daily profile types in patients with AH are significantly different. In the SAD daily profile structure types «nondipper» and «dipper» are dominate, DBP

daily profile structure - «dipper» and «overdipper» and PP daily profile structure - «night-picker».

Different incidence ratio of SBP, DBP and PP daily profiles in patients with AH requires that in its diagnosis and prognosis the changes in each of them should be take into account.

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