Chronotherapy of Arterial Hypertension: a new approach to the old problem

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Chronomedicine and Chronotherapy

- Chronomedicine is an area of chronobiology, the purpose of which is to improve the existing and develop new methods of prevention, diagnosis and effectiveness of treatment of various diseases on the basis of the human body biorhythms data.
- The Chronotherapy main task is the development of methods to influence the disease process, taking into account the individual chronobiological characteristics of the patient.
- Chronotherapy occupies an important place in cardiology, particularly in patients with arterial hypertension. Desynchronizes of biological rhythm make a significant contribution to the development of AH complications.

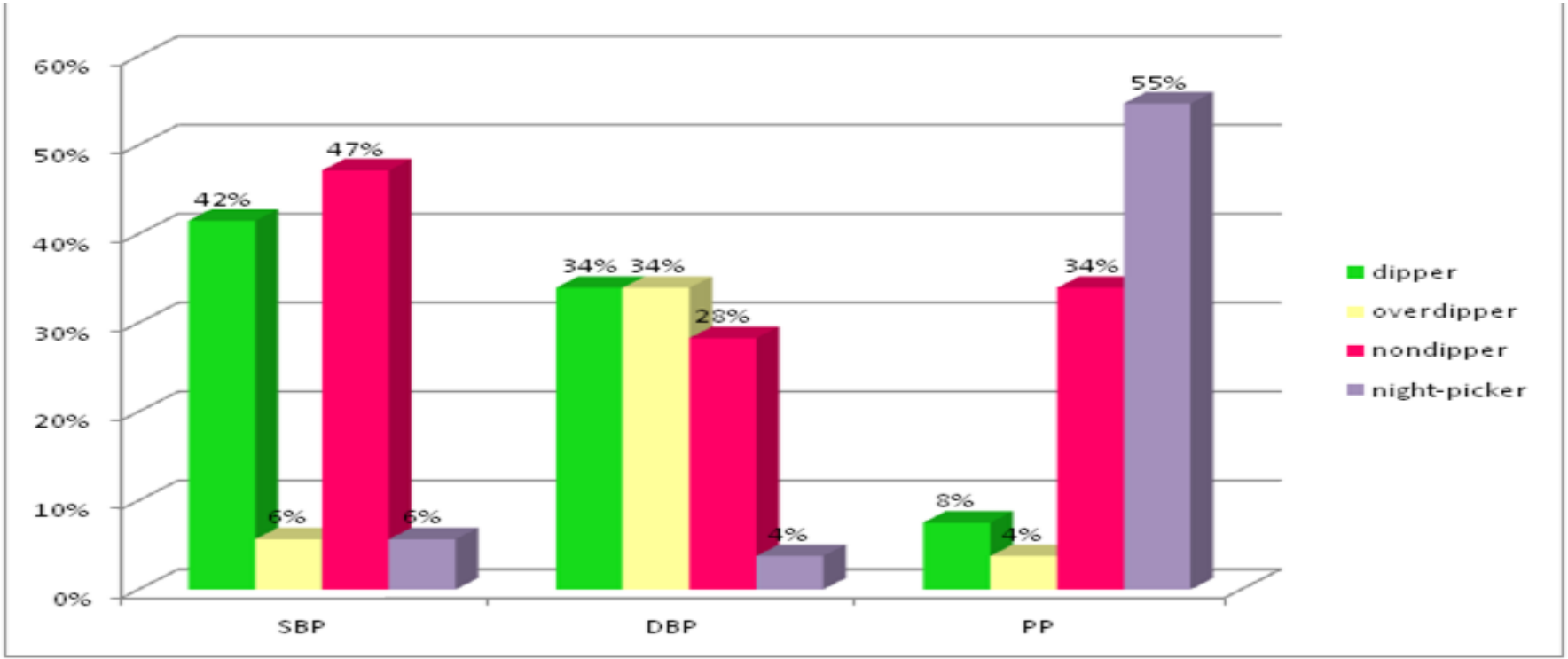
The types of daily BP pattern

A disorder of circadian rhythm of blood pressure (BP) is a a fairly common phenomenon in hypertensive patients.
At night, BP in the vast majority of people is reduced by 10-20% compared with day-time values.
The following types of daily BP pattern are distinguished:

- «dippers» - physiological decrease in BP during the night - sleep-time relative BP decline 10-20%
- «overdippers» - an excessive fall in BP at night, sleep-time relative BP decline ≥ 20%;
- «nondippers» - the lack of BP reduction at night, sleep-time relative BP decline ≤ 10%;
- «night-peakers» - night-time BP more than during daily activity, sleep-time relative BP decline < 0.

Hermida R.C. 2013 Ambulatory Blood Pressure Monitoring Recommendations for the Diagnosis of Adult Hypertension, Assessment of Cardiovascular and other Hypertension-associated Risk and Attainment of Therapeutic Goals / Ramón C. Hermida, Michael H. Smolensky, Diana E. Ayala [et al.] // Chronobiology International. – 2013. – Vol.30 (3). – P. 355-410.

Distribution of types of daily BP pattern in patients with AH



Petrenko O. V. Daily blood pressure profiles in patients with arterial hypertension: is it enough to use systolic blood pressure only / O.V. Petrenko, N. I. Yabluchansky // Journal of V. N. Karazin` KhNU, Series «Medicine». -2015. - Issue 30. – P. 21-24.

Clinical Case (I)

- Female, 59 e.o., retired accountant
- BP instability with increasing up to 150/100 mm Hg, accompanied by headache, nausea, provoked by stress, weather changes
- rare – chest pain at the background of elevated BP, not associated with physical load; sometimes – bilateral ankle edema

Anamnesis Morbi

•AH firstly was diagnosed in 2000 in National Institute of Therapy

• takes combined medisine "Tiara-Trio": Amlodipine 5 mg + Hydrochlorothiazide 12,5 mg + Valsartan 160 mg

•according to the HBPM SBP varies between 110-140, DBP – 60-105 mm Hg

Anamnesis vitae

•chronic calculouse cholecystitis, duodenal peptic ulcer, autoimmune thyroiditis.

Clinical Case (II)

Height	170 cm	**BMI**	32,9	**PS**	80	**RR**	16
Weight	95 kg	**Waist circ.**	114	**BP**	140/85	**T**	36,6

Status Praesens Objectivus

- thyroid hyperplasia
- lungs examination unremarkable
- heart borders shifted to the left, sounds are muffled, rhythm regular, no additional sounds or murmurs
- abdominal examination unremarkable
- no peripheral edema

Additional tests

- dyslipidaemia with high levels of Total cholesterol, Low-density lipoprotein cholesterol, Triglycerides
- EchoCG - hypertrophy of the left ventricle

ABPM, awake means

SBP – systolic blood pressure, DBP – diastolic blood pressure, MAP – mean arterial pressure, PAP – pulse arterial pressure

	Patient data	NR
SBP, awake mean, mmHg	131	No more then 135
DBP, awake mean, mmHg	80	No more then 85
MAP, awake mean, mmHg	95	80-95
PAP, awake mean, mmHg	50	Less then 46
SBP time index, %	33,0	Less then 15
DBP time index, %	22,5	Less then 15
SBP square index, mmHg/h	37,4	≥ 15 indicates suspected hypertension ≥ 50 indicates hypertension
DBP square index, mmHg/h	21,0	≥ 15 indicates suspected hypertension ≥ 50 indicates hypertension

Conclusion: elevated pulse pressure, SBP and DBP time index, borderline elevation of the rest of hyperbaric indices

ABPM, asleep means

SBP – systolic blood pressure, DBP – diastolic blood pressure, MAP – mean arterial pressure, PAP – pulse arterial pressure

	Patient data	NR
SBP, asleep mean, mmHg	104	No more then 120
DBP, asleep mean, mmHg	61	50-70
MAP, asleep mean, mmHg	74	80-95
PAP, asleep mean, mmHg	43	Less then 46
SBP time index, %	0.0	Less then 15
DBP time index, %	1.8	Less then 15
SBP square index, mmHg/h	0.0	≥ 15 indicates suspected hypertension ≥ 50 indicates hypertension
DBP square index, mmHg/h	0.4	≥ 15 indicates suspected hypertension ≥ 50 indicates hypertension

Conclusion: all parameters within the normal range

ABPM, daily BP profiles

	Profile type	Night-time decline, %
SBP	Overdipper	21
DBP	Overdipper	24
MAP	Overdipper	22
PAP	Dipper	14

SBP – systolic blood pressure, DBP – diastolic blood pressure, MAP – mean arterial pressure, PAP – pulse arterial pressure

ABPM conclusion

On the background of ongoing antihypertensive therapy with Amlodipine 5 mg, Hydrochlorothiazide 12,5 mg and Valsartan 160 mg in combined form “Tiara-Trio”, taken in the morning, the normal level of SBP and DBP was registered during all period of monitoring but with an excessive fall in BP at night, especially for DBP.

ABPM conclusion

On the background of ongoing antihypertensive therapy with Amlodipine 5 mg, Hydrochlorothiazide 12,5 mg and Valsartan 160 mg in combined form “Tiara-Trio”, taken in the morning, the normal level of SBP and DBP was registered during all period of monitoring but with an excessive fall in BP at night, especially for DBP. Thus antihypertensive treatment should be taken early in the morning but the dosage should be decreased to maintain physiological sleep-time relative BP decline.

Treatment

Based on the ABPM data, antihypertensive treatment should be taken early in the morning but the dosage should be decreased to maintain physiological sleep-time relative BP decline.

– maintaining a healthy lifestyle
  - increase physical activity
  - decrease sodium intake
  - lipid-lowering diet
  - avoid fried foods

– meds
  - “Tiara-Trio” – cancel
  - Hydrochlorthyaside 12,5 mg – morning
  - Valsartan 160 mg – morning
  - Atorvastatin 20mg – evening

Follow-up

- In three months, the repeated ABPM showed transformation of the overdipper daily profile into a dipper, with preservation of blood pressure levels and hyperbaric indices within the normal range.
- Chronotherapy method allowed us to reduce the medicament burden on a patient and modify such a risk factor as excessive nighttime blood pressure lowering

Conclusion

ABPM allows to perform comprehensive chronobiologic analysis of BP profile in patient real-life conditions, which in its turn allows, following the strategy of chronotherapy, to optimize the treatment in accordance with the obtained data about the daily BP fluctuations and variability.

In the treatment of patients with arterial hypertension, it is important not only to achieve the target BP levels, but also to preserve its physiologic circadian rhythm.