



Study of the Features of the Hemodynamic Status of Patients with Type 2 Diabetes Mellitus

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ABSTRACT

We analyzed daily changes in arterial blood pressure in 50 patients of 45 –65 years old with type 2 diabetes combined with essential hypertension. Systolicdiastolic hypertension was recorded in the patients with combined pathology. In the main portion of patients blood pressure was not enough low in the night (“non-dippers”). “Night-pickers” and “hyper-dippers” were also confidently more frequent.

Keywords:

arterial blood pressure indicators, type 2 diabetes, essential hypertension

Relevance of the topic: Against the background of poor glycemic control due to the frequent clinical picture of Arterial, heart, brain or peripheral complications, diabetes is a real vascular disease[3.5.]. One in 11 middle-aged people in the world have diabetes[5.7.], patients have a high susceptibility to heart attack, paralysis, blindness, kidney failure. In about 65-80% of cases, the cause of death in diabetes is cardiovascular complications, specifically myocardial infarction (MI), stroke[4.7.]. After myocardial revascularization, heart attack often occurs in diabetic patients. The probability of 9 years of survival after plastic coronary intervention in the vessels is 68% for diabetics and 83.5% for ordinary people; MI is repeated in diabetic patients due to secondary stenosis and aggressive atheromatosis. In the cardiology department, the proportion of patients with diabetes is constantly growing and accounts for more than 33% of all patients[3.4.].

In recent years, the problem of the combination of Arterial hypertension and Diabetes Mellitus Type 2 has attracted the attention of a large number of specialists[4.6.]. The prevalence of both pathologies in the

population, the level of complications, cases of disability and death and the high cost of their treatment indicate how relevant these diseases are[6.7.]. Typically, blood pressure disorders come before, with a violation of carbohydrate metabolism in 91% of patients with Essential Arterial Hypertension[4.6.] and the fact that 50% of patients being tested already have a carbohydrate metabolism disorder at the debut of diabetes proves once again that these diseases are always side-by-side[3.5.].

Research objective: Assessment of the indicators of daily Blood Pressure Monitoring (SMAD) in patients with diabetes Type 2 and essential Arterial Hypertension.

Research materials and methods of examination: The examination received 100 (60 women and 40 men)patients with Essential Arterial Gi[pertension-hospitalized type 2 diabetes mellitus. Of these, the 1st main group consists of 50 patients of the Department of endocrinology of the TTA 3rd clinic with Diabetes Mellitus Type 2 and essential Arterial Hypertension. Their average age is 54.2 ± 1.8 ; average diabetes duration is 7.8 ± 1.2 ; AG

duration is 8.6 ± 1.4 ; average blood pressure is SAD 130 ± 10 mm.smb.column. Taste 80 ± 10 mm.smb.column. Glycemia natoshak 8.4 ± 0.6 mmol/l. These patients are constantly taking the following drugs: Sulfonylmachovine unums 10%(amaryl); Biguanides 80% (metformin); Dpp4ingibitors 30%; GLP1 agonists 15%(Victose); SGLT2 40% (Forsiga); Group 2, a control group of 50 non-diabetic patients with essential arterial hypertension. Their average age is 58.6 ± 0.4 ; average duration of Arterial hypertension is 7.6 ± 1.8 years; glycemia natoshak 5.0 ± 0.2 mmol / l; continuous receiving drug preparations of patients of the second control group: 1) antihypertensive drugs 50% (Larista); 2)

anticoagulants 80%(Thrombopol). In the main and control groups, the following tests were performed: 1) Anamnesis; 2) Blood Pressure SAD and DAD; 3) blood sugar levels. (Table 1). Patients of the main group (Diabetes Mellitus Type 2, combined with essential Arterial Hypertension) and the control group (Diabetes Mellitus Type 2 non-essential Arterial hypertension) were compared according to age, diabetes Type 2 compensation duration and stage. Also, in combination with essential AG, patients of Type 2 diabetes mellitus with the duration of Arterial hypertension and the original SAD, DAD origin Diabetes Mellitus Type 2 non-essential Arterial hypertension control group were compared with patients (Table 2).

Table 1
Features of patients selected for research (Me [25r;75r])

Specification	Diabetes Mellitus Type 2 and essential Arterial Hypertension main group	Diabetes Mellitus Type 2 non-essential Arterial Hypertension control group
Number of patients	50 ta	50 ta
Age	$54,2 \pm 1,8$	$58.6 \pm 0,4$
QD duration	$7,8 \pm 1,2$	-
AG duration	8.6 ± 1.4	7.6 ± 1.8
SAD mm.smb. column	135 ± 15	150 ± 10
DAD mm.smb. column	80 ± 10	90 ± 10
Regular intake drugs	1) Sulfonylmachovine unums 10%(amaril); 2) Biguanides 80%(metformin); 3) Dpp4ingibitors 30%(Trajenta); 4) GLP1 agonists 35%(Victose); 5) SGLT2-40%(Forsiga); 6) b_blocators 40%.	1) Antihypertensive drugs 50% (Larista); 2) anticoagulants 80%(Trombopol).
Glycemia natoshak mmol/l	$8,4 \pm 0,6$	$5,0 \pm 0,2$
HbA1c,%	8.4 ± 0.7	$5,9 \pm 0,6$

All patients conducted daily arterial pressure monitoring (SMAD) using a portable automatic monitor AD measurements were carried out in automatic mode at intervals of 15 minutes during wake-up and 30 minutes during night hours. The average arithmetic means for assessing the Daily profile of AD were calculated by the SAD and DAD values during the day and night hours, and the average pulse AD (PAD) by the average arithmetic means at the day. Blood pressure 135/85 mm.Hg column and 120/70 mm at night. Mercury was considered a pillar. To

determine the amount of "pressure load", the following were used: time Index SAD and DAD (VI SAD, VI DAD). It is characteristic that AD is more than 50% in day VI and more than 30% during the day or night [1.2].

The circadian rhythm was evaluated according to the SAD and DAD daily indexes, the night decrease in ad reflects the level of decrease in daytime blood pressure. Assessing the daily (circadian) rhythm of Arterial fluctuations is an important component of Smad-the only non-invasive method that allows you to assess the difference in blood pressure during work and

sleep. The dynamics of blood pressure during the day has some changes. The highest level of SI is observed in the morning (between 6 and 12) , with a second less pronounced evening blood pressure (about 19 O'clock). The minimum blood pressure is recorded at intervals of 0 to 4 hours, then its gradual increase is observed. From a practical point of view, the assessment of the differences between day and night is of greatest interest- the rate of night fall (SNS) or the Daily Index (SI) [1.2.].

The Daily Index is considered separate for systolic and diastolic AD.:

$$SI = 100\% \times (ADk - ADt) / ADk$$

where ADk is the average AD during wakefulness, ADt is the average AD during sleep.

In the Si analysis, it is necessary to take into account the actual waking time and take into account the patient's sleep, sleep quality, daytime sleep and changes in rest(according to the record in the monitoring diary). If during SMAD the patient woke up and got up, in addition to the study, it is necessary to measure blood pressure during the appropriate Night period. During daytime sleep periods, which are reflected in the diary, the patient analyzes and excludes them from the daily analysis to more accurately assess the level of decrease in Night Blood Pressure. According to the degree of systolic and diastolic decline, 4 types of daily curves are distinguished during the night hours[1.2.3.].

SI the value is separated as follows:

"Dippers "(SI 10-20%) - patients have enough Night blood pressure drops;

"Non-Dippers" (SI-0-10%)- patients do not have enough Night blood pressure drops;

"Night-Pickers"(SI<0%) - nocturnal hypertension in these individuals;

"Giper-Dippers" (SI>20%) - patients have an excessive decrease in blood pressure at night.

Also during the day and night hours, the volatility of SAD and DAD (own SAD and own DAD) was analyzed. Indicators of morning blood pressure dynamics: morning rise value (mmHg) and morning rise rate (mmHg)/ hour) SAD and DAD were evaluated. In data analysis, non-parametric statistics, in the form of median 25 and 75-percentiles (Me [25R;75R]), methods were used, the reliability of Intergroup differences it was evaluated according to the mann-Whitney criterion. The prior reliability of the three group differences was determined by the Kraskel-Wallis criterion. The differences were reliably considered at P<0.05 values[1.7.].

Results and discussion

When comparing the main group (Diabetes Mellitus Type 2 and essential Arterial hypertension) with the control guruh(Diabetes Mellitus Type 2 non-essential Arterial Hypertension), pathology was noted, as in patients with combined systolic-diastolic AG. It was possible to compare in groups with the levels of SAD, DAD, AG. The variability of SAD in the main group was much higher than in the control groups. In patients with diurnal joint pathology, AG had a systolic-diastolic nature, as evidenced by the following figures: SAD145[130;160] mm.Mercury.column and DAD 90 [80; 100] mm.Mercury.column. according to. And in control groups: SAD150 [140; 160] mm.Mercury.column. and DAD 90 [80; 100] mm.Mercury.column. VI SAD main group-85±10%, control group-75±10%; VI DAD main group -65±15%, control group -45±15%; own SAD main group -16±4, control group -13±5; own DAD main group -11±2, control group -12±3.

Table 2

Comparative characteristics of SMAD data during daylight hours groups studied (Me [25r;75r])

Specification	Diabetes Mellitus Type 2 and essential Arterial Hypertension main group	Diabetes Mellitus Type 2 non-essential Arterial Hypertension control group
SAD mm. Mercury.column.	145±15	150±10

DAD mm. Mercury.column	90±10	90±10
VI SAD,%	85±10	65±10
VI DAD,%	65±15	45±15
O'z SAD	16±4	13±5
O'z DAD	11±2	12±3

With the main group (Diabetes Mellitus Type 2 and essential Arterial hypertension) control group (Diabetes Mellitus Type 2 non-essential Arterial Hypertension), the results of Smad in the night hours were found to be ad systolic-diastolic in patients with concomitant pathology compared, as evidenced by the following figures: SAD135 [120;150] mm. Mercury.column. and DAD 80 [75;90]

mm. Mercury.column. according to. In control groups, however, SAD130 [120; 140] mm. Mercury.column. and DAD 75 [70; 85] mm. Mercury.column; VI SAD main group - 90±10%, control group -70±15%; VI DAD core group -75±25%, control group -45±25%; own SAD core group -13±3, control group -15±5; own DAD core group -11±2, control group -12±3

Table 3

Comparative characteristics of these SMADs during the night hours groups studied (Me [25r;75r])

Specification	Diabetes Mellitus Type 2 and essential Arterial Hypertension main group	Diabetes Mellitus Type 2 non-essential Arterial Hypertension control group
SAD mm. Mercury.column	135±15	130±10
DAD mm. Mercury.column	80±10	75±10
VI SAD,%	90±10	70±15
VI DAD,%	75±25	45±25
O'z SAD	13±3	15±5
O'z DAD	11±2	12±3

From the above, we can conclude that essential Arterial Hypertension and Diabetes Mellitus Type 2, The average indicators of ad are much higher than the indicators of the control group, both during daylight hours and during the night hours. In the main group of patients, the pressure is increased at a significantly higher Time Index, regardless of the time of day. And statistically, high variability in SAD during daylight and night hours, and DAD during daylight hours is significant (Table 4). Reliable differences between the main and Control (Diabetes Mellitus Type 2 non-Arterial hypertension) groups have not been noted (Table 1). Unsatisfactory indicators of morning AD dynamics (surpluses of SAD and DAD) may be primarily associated with possible

neurogumoral changes by activating sympathoadrenal and renin-angiotensin in early morning aldosterone systems.

According to SMAD, pulse blood pressure is statistically significant ($p < 0.05$) patients in the main group are 60 [55;65] mm. Mercury.column. compared to control group, Diabetes Mellitus Type 2 Essential Arterial Hypertension in patients 55 [50;60] mm Mercury ustuni.ga is equal to.

When analyzing the frequency of occurrence of different types of daily profile, patients with Diabetes Mellitus Type 2 and essential Arterial Hypertension have a simple two-phase blood pressure rhythm "Dippers" SAD-24.6, DAD-46.8%. The main part of these patients did not have a sufficient decrease in blood pressure at

night -"Non-Dippers" patients were equal to SAD-57.8% , DAD-48.2%, accordingly, other pathological diseases also occur more often. AD profiles:" Night-Pickers "SAD-14.5% and DAD-5.5%;" Gipper-Dipper " SAD-2.5% and DAD-10%. Unlike its main group, where" Dippers "dominated, essential AG, the non-QD control group had SAD-88.4%, DAD-74.3%;" Non Dippers "SAD-5.8%, DAD-4.2%;" Night-pickers "SAD-20.5% and DAD-13.5%;" Gipper-Dippers " SAD-25.5% and DAD-15%.

It can be seen that such a violation of the daily rhythm of blood pressure in the main group of patients is to a lesser extent due to the toxic effect of hyperglycemia, autonomic nervous system, since even in patients with normal pressure with Type 2 diabetes mellitus, the daily rhythm of AD changes (130/80 mm at the level of AD.Mercury.column). It can be assumed that a decrease in nocturnal blood pressure is caused by a change in the activity of the daily rhythm of the renin-angiotensin aldosterone system (RAAS).Thus, usually a person experiences an increase in RAAS activity during the day and a decrease in it at night . In

essential Arterial Hypertension, at midnight, RAAS activity (renin, angiotensin II) reaches its maximum values, gradually decreases in the early morning and rises again in the daytime, corresponding to the results obtained in a group of patients with Essential Arterial hypertension with Diabetes Mellitus Type 2. Essential cystolo-diastolic AD has been noted according to the daily monitoring of blood pressure in patients with Diabetes Mellitus Type 2, combined with Arterial hypertension. Major group patients have high ad averages, high time Index(VI) and AD variability, high statistical significance (p<0.05), and damage to target organs regardless of daily time is a prognostically unfavorable risk factor. When the daily blood pressure profile of patients of the type 2 diabetes and essential Arterial Hypertension group was analyzed, the main part was formed by patients who did not have a sufficient decrease in blood pressure at night - "Non-Dipper", as well as other pathological blood pressure profiles, unlike reliable comparison groups: "Night-Pickers" and "hyper-Dippers" types were also identified.

Table 4
SMAD Malu'lumot by Main and control groups (Me [25r;75r])

Specification	Diabetes Mellitus Type 2 and essential Arterial Hypertension main group	Diabetes Mellitus Type 2 non-essential Arterial Hypertension control group
Dippers	SAD-24.6±0.4% DAD-46.8±1.2%	SAD-88.4±1.6% DAD-74.3±1.2%
Non Dippers	SAD-57.8±2.2% DAD-48.2±1.8%	SAD-5.8±0.2% DAD-4.2±1.8%
Night Pikkers	SAD-14.5±0.5% DAD-5.5±0.5%	SAD-20.5±3.5% DAD-13.5±4.5%
Giper Dippers	SAD-2.5±0.5% DAD-10±1.0%	SAD-25.5±3.5% DAD-15±5.0%

Conclusion:

1.High variability in DAD(own DAD main group -11±2) in the main group during daylight hours according to the results of a transient SMAD between the main group and essential Arterial Hypertension and non-Type 2 control groups combined with essential Arterial Hypertension and diabetes mellitus type 2 is significant.

2. In the main group of patients, pressure is increased in a significantly higher Time Index,

regardless of the time of day, this indicator of VI DAD (VI DAD main group -75±25%) in the main group of patients according to the results of SMAD at night proves this.

3. When the daily blood pressure profile of patients with diabetes Type 2 and essential Arterial Hypertension group was analyzed, the main part was dominated by patients with no adequate decrease in blood pressure at night - "Non-Dipper"(SAD-57.8% DAD-48.2%), and in

the control group, on the contrary - simple two-phase blood pressure rhythm "Dippers" (SAD-88.4% DAD-74.3%). other pathological profiles of blood pressure, unlike also reliable comparison groups: "Dippers"(SAD-24.6%;DAD-46.8%),"Night-Pickers"(SAD-14.5%;DAD-5.5%), and "hyper-Dippers"(SAD-2.5%;DAD-10%) also showed higher rates than the control group.

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