

UNSTABLE ANGINA TREATMENT IN VARIOUS PERIODS OF GEOMAGNETIC ACTIVITY

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ABSTRACT. In 145 patients with unstable angina (UA) there was analyzed an efficiency of a drug therapy at different types of heliogeophysical activity (HA) during the 23th solar cycle. 83 patients were examined at the period of a lower HA (Kp-index $16,19 \pm 0,18$), and 62 patients – at the period of a higher HA (Kp-index $17,25 \pm 0,21$, $p < 0,05$). Baseline severity of patients' condition with UA at the moment of hospitalization at the studied periods did not differ, but the effectiveness of the therapy depended on the period of HA. At the period of a higher HA antianginal effect was stronger than at the lower period of HA ($2,27 \pm 0,16$ points and $1,75 \pm 0,12$ points, $p < 0,05$), and the need in nitroglycerin on the background of a drug therapy disappeared for 5-7 days quicker than at the period of a lower HA.

Maximal hypotensive effect at a higher HA was achieved quicker – on the 3rd day of the treatment, and at a lower HA – only up to hospital discharge ($p < 0,05$). Blood viscosity did not normalize in both of the studied periods, but in small vessels there was noted a decrease of a BV ($p < 0,05$). So, at a higher HA the effectiveness of a drug therapy in patients with UA is higher than at the period of a lower HA.

Key words: heliogeophysical activity, solar cycle, unstable angina.

1. Introduction

It is known that a cardiovascular system is the main target for heliogeophysical activity influence (Breus, 2003, Samsonov et al., 2013). Tense magnification of magnetic field of the Earth caused by flashes in the Sun is one of the facts of the adaptation failure and flare-up of chronic conditions. The study aimed the research of clinical picture and a course of unstable angina, hemorheologic disorders and the effectiveness of a drug therapy at the periods of a low and a high solar activity during the 11-year solar cycle.

2. Results and discussion

In 145 patients with unstable angina (UA) there was analyzed an efficiency of a drug therapy at different types of heliogeophysical activity (HA) during the 23th solar cycle. 83 patients were examined at the period of a lower HA (Kp-index $16,19 \pm 0,18$), and 62 patients – at the period

of a higher HA (Kp-index $17,25 \pm 0,21$, $p < 0,05$). The groups were matched in age and sex characteristics.

The patients' clinical condition was estimated according to a number of pain episodes per day and a daily demand of nitroglycerine. Effectiveness of treatment was evaluated in points.

It was found out that the severity of the patients with UA at the moment of hospitalization at the studied periods of higher and lower the HA did not differ. So, the frequency of pain episodes was $8,88 \pm 0,06$ at a LHA and $8,98 \pm 1,14$ at a HHA ($p > 0,05$) (Table 1). The duration of deterioration before the moment of hospitalization also did not differ ($9,06 \pm 0,87$ days at the period of a LHA and $9,86 \pm 1,16$ days at the period of HHA, $p > 0,05$).

Table 1: Indices of a clinical condition and central hemodynamics in patients with UA at the moment of hospitalization at periods of various types of geomagnetic activity ($M \pm m$)

Indices	LHA (n = 83)	HHA (n = 62)
The number of pain episodes per day	$8,88 \pm 0,064$	$8,98 \pm 1,14$
The number of nitroglycerine pills per day	$10,74 \pm 1,08$	$8,83 \pm 1,17$
HBR (beats/min)	$75,90 \pm 0,07$ *	$76,47 \pm 0,27$
BP systolic (mm of mercury)	$147,7 \pm 2,4$ *	$156,2 \pm 3,1$
BP diastolic (mm of mercury)	$89,1 \pm 1,2$	$91,8 \pm 1,5$

Note: * – the difference between the periods of a lower and a higher HA is statistically valid, $< 0,05$.

At the same time, there are differences in parameters of hemodynamics and fats: at the period of a LHA angina develops at lower heartbeat rates (HBR) and blood pressure (BP), and at less evident fats disorders. Systolic BP and a HBR at the period of a lower HA were lower than at the period of a higher HA ($p < 0,05$) (Table 1). Diastolic BP did not statistically differ ($p > 0,05$) (Table 1).

The level of β -lipoproteins and triglycerids in patients with UA at a LHA was lower than at the period of a HHA

($p < 0,05$) (Table 2). Cholesterol parameters at various periods of HA statistically did not differ ($p > 0,05$) (Table 2).

Table 2: Parameters of lipid metabolism in patients with UA at periods of various geomagnetic activity ($M \pm m$)

Parameters	LHA (n = 83)	HHA (n = 62)
Cholesterol (mmol/L)	5,64 ± 0,12	5,93 ± 0,18
β- lipoproteins (units)	39,82 ± 0,12 *	43,46 ± 1,76
Triglycerids (mmol/L)	1,52 ± 0,07 *	1,86 ± 0,15

Note: * – the difference between the periods of a lower and a higher HA is statistically valid, $p < 0,05$.

The received data display unstable condition of patients at the period of LHA, as an exacerbation goes at lower parameters of BP, HBR and blood lipids level.

We found out that the effectiveness of a drug therapy depends on a period of HA: at a HHA antianginal effect was stronger than at a LHA (2,27 ± 0,16 points and 1,75 ± 0,12 points, $p < 0,05$).

Besides, at the period of HHA and drug therapy the number of episodes of UA decreased maximally up to hospital discharge ($p < 0,05$), and the number of nitroglycerine pills per day practically had not been changing up to the 5th day ($p < 0,05$) and hospital discharge ($p > 0,05$ with the parameter of the 5th day). It means that at a HHA the number of severe episodes decrease up to the 5th day, and there is no need in nitroglycerine, and then the number of UA episodes decreased, they disappear without any treatment.

At a HHA is accompanied as with maximal decrease of angina episodes as with a daily demand of nitroglycerine happen only up to hospital discharge, it means that severe angina episodes can be cortared only by the end of hospitalization.

Thus, at a HHA there was noted more serious antianginal effect (by the 5th day) at severe angina episodes needed nitroglycerine. At a LHA maximal decrease of angina episodes needed nitroglycerine was noted only by hospital discharge. This means that at the

period of a HHA the demand of nitroglycerine on the background of a drug therapy disappeared 5-7th days quicker than at the period of a LHA.

Moreover, at a LHA the frequency of angina episodes and nitroglycerine demand for the 5th day of treatment and at the moment of hospital discharge was lower than at the period of a HHA ($p < 0,05$).

Maximal hypotensive effect at HHA was achieved quicker (bt the 3rd day), and at LHA – only be the day of hospital discharge ($p < 0,05$).

So, antianginal effect of a drug therapy at HHA is more serious and achieved quicker than at LHA, which is accompanied by stronger hypotensive effect.

Analysis of an influence of a drug therapy on rheological blood properties displayed that there is no normalization of a blood viscosity in any of the studied periods of a drug therapy ($p < 0,05$ comparing with healthy persons). At the same time there are some positive results: a decrease of a blood viscosity in small vessels: at LHA – from 13,74 ± 0,88 to 11,45 ± 0,66 mPa·c ($p < 0,05$), at HHA – from 10,79 ± 0,74 to 9,89 ± 0,58 mPa·c ($p < 0,05$).

It is found that a drug therapy does not influence aggregation erythrocytes properties and transporting of the oxygen into tissues at LHA, as well as at HHA ($p > 0,05$).

A drug therapy does not effect on erythrocytes deformability at the period of HHA. At the period of LHA on the background of a drug therapy there is a decrease of erythrocytes deformability ability, but erythrocytes deformability stays compensated high, comparing with parameters of healthy persons (1,51 ± 0,08 and 1,14 ± 0,04, $p < 0,05$), which displays high erythrocytes deformability as adaptation response.

The results of the research show that the effectiveness of treatment of patients with unstable angina depends on parameters of geomagnetic activity. Antianginal effect and hypotensive effect of a drug therapy are more evident at the period of HHA then at the period of LHA.

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