

GEOMAGNETIC ACTIVITY AND EFFECTIVENESS OF MILLIMETER ELECTROMAGNETIC RADIATION IN UNSTABLE ANGINA TREATMENT

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ABSTRACT. There had been performed a research of an effectiveness of millimeter electromagnetic radiation (MM EMR) use in patients with an unstable angina (UA) at periods of a lower (daily value of Kp-index 16,19±0,18) and a higher (daily value of Kp-index 17,25±0,21, p<0,05) geomagnetic activity (GA). It was found that involving of the MM EMR (the wave length 7.1 mm) into the treatment of the patients with an UA, enhances an antianginal effect of a drug therapy independently on the period of GA. The MM EMR at the period of a lower geomagnetic activity (LGA) enhances the decrease of diastolic blood pressure (BP), and at the period of a higher geomagnetic activity (HGA) – the decrease of systolic BP. At a HGA there were noted: a quick and more serious antianginal effect, maximal antihypertensive effect was achieved quicker, but (as opposed to the period of a LGA) there was no a pulse slowing effect of a MM EMR. Including the MM EMR into the treatment accelerates stabilization of the patients' condition only at a LGA. Positive effect on blood rheological properties is an independent effect of MM EMR, and it is in blood viscosity reduce in microcirculatory at both of the periods of GA. Normalization of blood viscosity under the MM EMR is only at the period of a LGA. So, the effect of MM EMR on a clinical condition of the patients is more evident at the period of a HGA, blood viscosity – at the period of a LGA.

Key words: heliogeophysical activity, unstable angina, millimeter electromagnetic radiation, rheology, blood viscosity

1. Introduction

The effectiveness of millimeter electromagnetic radiation (MM EMR or extremely-high frequency therapy) in patients with an ischemic heart disease is described in many studies: there is noted its antianginal, hypotensive, antioxidant, hypocoagulative effect, positive effect on blood rheological properties, normalization of kininogenase system activity and tissue perfusion amendment (Lebedeva 1997, Parshina 2006, Vodolagin 2008). Though, there are no researches of the effectiveness of MM EMR dependent on changes in

heliogeomagnetic activity – a component of the space weather.

The research aimed studying of an effect of heliogeophysical activity on the effectiveness of a complex therapy with the use of millimeter electromagnetic radiation in patients with unstable angina during 11-year solar cycle.

2. Results and discussion

An efficiency of MM EMR was estimated in 65 patients with unstable angina, who got a complex therapy (medications + additional MM EMR therapy): at the period of a lower GA (Kp-index 16,19±0,18) – in 45 persons, at the period of a higher GA (Kp-index 17,25±0,21, p<0,05) – in 20 persons during the 23rd solar cycle. There were estimated: antianginal effect, influence on parameters of haemodynamics and blood rheology (blood viscosity (BV), aggregation index of erythrocytes and erythrocytes deformability, transporting of oxygen into tissues). The course of MM EMR (wave length 7.1 mm) included 10 sessions of intermittent radiation mode.

145 patients with UA on the background of a drug therapy were in the group of compare: 83 patients at the period of a LGA and 62 – at the period of a HGA. The groups of a drug therapy (DT) and a complex therapy (DT+MM EMR) were comparable by essential data at the proper periods of GA.

It was found that an additional use of MM EMR forces antianginal effect of a drug therapy independently on the period of GA (p<0,05). At the period of a LGA the effectiveness of a complex therapy was 2,40±0,09 points, at a drug therapy 1,75±0,12 points (p<0,05). At the period of a HGA the effectiveness of a complex therapy was also higher then the effect of a drug therapy (2,85±0,08 and 2,27±0,02 points respectively, p<0,05). But the influence on the parameters of the central haemodynamics depends on the period of a GA: at a LGA the MM EMR potentiates medicamental reduce of diastolic BP, and at a HGA – decrease of systolic BP.

Changes in GA influence on the terms of stabilization of patients' condition with UA. Stabilization of condition

at the period of a LGA at the use of MM EMR was $7,96 \pm 0,52$ days, at a drug therapy – $9,82 \pm 0,79$ days ($p < 0,05$); at the period of a HGA at a complex therapy – $7,95 \pm 0,86$ days, at a drug therapy – $8,24 \pm 0,59$ days ($p > 0,05$). So, addition of MM EMR accelerates stabilization of the patients with UA at a lower GA.

We had established that rheoprotective effect of a combined therapy with the use of MM EMR is stronger than the effect of a drug therapy at the period of a HGA, as well as a LGA.

At the period of a LGA a complex therapy (as opposed to a drug therapy) favored the decrease of a BV 100 sec^{-1} (in medium vessels) (from $11,11 \pm 0,83$ to $8,73 \pm 0,63$ mPa·c, $p < 0,05$), but this parameter was higher then in healthy persons ($7,06 \pm 0,40$ mPa·c, $p < 0,05$). And in a microcirculation area (BV20 sec^{-1}) blood viscosity at the moment of hospital discharge corresponded with parameters of healthy persons ($10,36 \pm 0,52$ and $9,62 \pm 0,46$ mPa·c, $p > 0,05$), but after a drug therapy BV20 sec^{-1} was higher comparing with the group of healthy persons ($11,45 \pm 0,66$ and $9,62 \pm 0,46$ mPa·c, $p < 0,05$).

At the period of a LGA including of MM EMR to a drug therapy did not influence the dynamics of a fibrinogen level, functional erythrocyte properties and transporting of oxygen into tissues ($p > 0,05$). By the moment of hospital discharge deformation activity of erythrocytes stayed compensatory high comparing with the group of healthy persons ($1,39 \pm 0,09$ and $1,14 \pm 0,01$ c.u., $p < 0,05$), transporting of oxygen into tissues was reduced ($7,11 \pm 0,42$ and $11,20 \pm 0,95$ c.u., $p < 0,05$).

Thus, at the period of a LGA positive effect from the use of MM EMR was in normalization of a BV in a microcirculation area and decrease of a BV in medium vessels.

At the period of a HGA including of MM EMR did not effect on a dynamics of BV parameters in big and medium vessels, as on the background of a drug therapy ($p > 0,05$). Althou, in small vessels there was a decrease of a BV (from $10,99 \pm 0,85$ to $8,89 \pm 0,43$ c.u., $p < 0,05$). Nevertheless, BV20 sec^{-1} at the moment of hospital discharge was high comparing with parameters of healthy persons ($11,45 \pm 0,66$ and $5,29 \pm 0,33$ mPa·c, $p < 0,05$).

At the period of a HGA, as well as a LGA, there were no differences in indices of aggregation and erythrocytes deformability and transporting of oxygen into tissues at the use of complex and drug therapy.

There were not found any significant differences in influence of MM EMR on blood rheological properties at the periods of LGA and HGA: the basic additional effect of MM EMR (comparing with a drug therapy at the period of LGA and HGA) is a positive effect on microcirculatory component of hemostasis system – BV in small vessels. Normalization of BV20 sec^{-1} at the use of MM EMR goes only at the period of a LGA, and at the period of a HGA there is only a statistically valid decrease of BV20 sec^{-1} .

At comparing the effects of MM EMR at various periods of GA there was found that at the period of a HGA there is more significant antianginal effect then at a LGA ($2,85 \pm 0,08$ and $2,40 \pm 0,09$ points respectively, $p < 0,05$). Hypotensive effect of MM EMR at a HGA develops 2 days quicker.

As we can see, the effect of MM EMR on clinical condition of the patients is more evident at the period of a HGA, on BV – at the period of a HGA.

The presented studyings show that the use of MM EMR in patients with UA is reasonable at any periods of geomagnetic activity.

The revealed dependence of the use of MM EMR on the state of the external magnetic field of the Earth is very significant. The retention of therapeutic effects of MM EMR at an increase of geomagnetic activity displays that the reception of MM EMR is more serious then the reception of external geomagnetic activities.

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