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## **THE INFLUENCE OF MAGNETIC STORMS AND DISTURBANCES ON THE EXACERBATION OF CARDIOVASCULAR DISEASES**

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**Introduction.** For a long time it was believed that magnetic storms and disturbances affect human health, especially the cardiovascular system. This influence has been investigated since the beginning of 1990, and now there are many studies that confirm the effect of storms on vascular wall tone, changes in blood pressure and heart rate.

**Aim:** to assess whether magnetic storms and disturbances correlate with an increased frequency of acute cardiovascular events, namely hypertensive crises, atrial fibrillation episodes, and coronary artery disease (CAD) decompensation.

**Materials and methods.** The analysis of emergency medical calls to patients from 34 polyclinics for 3 months 2024 (September, October, November) due to exacerbation of cardiovascular diseases (hypertensive crisis, atrial fibrillation, coronary artery disease decompensation) was performed. The data on magnetic storms are taken from the official website of The Laboratory of X-Ray Astronomy of the Sun, a subdivision of the Spectroscopy department in the Lebedev Institute of the Russian Academy of Science.

**Results and their discussion.** During the three-month period (September–November 2024), 12 magnetic storms and 21 disturbances were recorded, coinciding with 562 emergency ambulance calls related to cardiovascular events.

In September, the overall average number of ambulance calls was slightly higher on geomagnetically active (GA) days (4.92 calls/day) than on normal days (ND) (4.87 calls/day), though the difference was minimal. However, condition-specific analysis revealed that hypertensive crises (GA 3.23 calls/day vs. 2.65 calls/day on ND) and atrial fibrillation (GA 1.67 calls/day vs. 1.25 calls/day on ND) were more frequent during magnetic activity, suggesting increased cardiovascular sensitivity to geomagnetic fluctuations. CAD-related calls remained unchanged (GA 1.71 calls/day vs. 1.70 calls/day on ND). Gender-specific data showed a consistent female predominance, with women comprising 79.16% of storm-day cases, 74.52% on disturbance days.

In October, ambulance calls were unexpectedly higher on normal days (8.05 calls/day) than on geomagnetically active days (6.69 calls/day). Still, hypertensive crises slightly increased during magnetic activity (GA 4.38 calls/day vs. 4.27 calls/day on ND), while atrial fibrillation (GA 1.38 calls/day vs. 1.61 calls/day on ND) and CAD calls (GA 1.61 calls/day vs. 1.69 calls/day on ND) were slightly lower. Women continued to predominate, accounting for 85.29% of storm-day cases, 67.19% on disturbance days, suggesting ongoing gender-linked cardiovascular sensitivity.

In November, overall call volumes were nearly identical (ND 7.17 calls/day vs. 7.13 calls/day on GA), but hypertensive crises remained higher during geomagnetically active days (GA 5.00 vs. 4.45 on ND), and CAD-related calls rose slightly (GA 1.17 calls/day vs. 1.00 calls/day on ND). Atrial fibrillation decreased (GA 0.83 calls/day vs. 1.42 calls/day on ND), continuing October's trend. Gender data showed that in 90% of cases on days of storms, women called an ambulance, as well as in 73.08% of cases on days of disturbances, which confirms a steady trend towards a higher sensitivity of women to geomagnetic influences.

**Conclusion.** The study suggests a modest association between geomagnetic activity and an increase in hypertensive crises, with a smaller effect on CAD decompensation. Atrial fibrillation showed no consistent pattern. Our findings support the idea that geomagnetic storms can influence cardiovascular health. Women were more affected by geomagnetic storms and disturbances than men. And during the days of storms, they need to closely monitor their condition.

Further research is needed to better understand the underlying mechanisms and develop preventive strategies for vulnerable groups during periods of high geomagnetic activity.