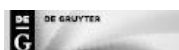


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[Review](#) [Rev Environ Health](#). 2023 May 18. doi: 10.1515/reveh-2022-0191.

Online ahead of print.

Effects of man-made electromagnetic fields on heart rate variability parameters of general public: a systematic review and meta-analysis of experimental studies

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PMID: 37195230 DOI: [10.1515/reveh-2022-0191](#)

Abstract

Objectives: The effects of man-made electromagnetic fields (EMFs) on the cardiovascular system have been investigated in many studies. In this regard, the cardiac autonomic nervous system (ANS) activity due to EMFs exposure, assessed by heart rate variability (HRV), was targeted in some studies. The studies investigating the relationship between EMFs and HRV have yielded conflicting results. We performed a systematic review and meta-analysis to assess the data's consistency and identify the association between EMFs and HRV measures.

Content: Published literature from four electronic databases, including Web of Science, PubMed, Scopus, Embase, and Cochrane, were retrieved and screened. Initially, 1601 articles were retrieved. After the screening, 15 original studies were eligible to be included in the meta-analysis. The studies evaluated the association between EMFs and SDNN (standard deviation of NN intervals), SDANN (Standard deviation of the average NN intervals for each 5 min segment of a 24 h HRV recording), and PNN50 (percentage of successive RR intervals that differ by more than 50 ms).

Summary: There was a decrease in SDNN (ES=-0.227 [-0.389, -0.065], p=0.006), SDANN (ES=-0.526 [-1.001, -0.05], p=0.03) and PNN50 (ES=-0.287 [-0.549, -0.024]). However, there was no significant difference in LF (ES=0.061 [-0.267, 0.39], p=0.714) and HF (ES=-0.134 [-0.581, 0.312], p=0.556). In addition, a significant difference was not observed in LF/HF (ES=0.079 [-0.191, 0.348], p=0.566).

Outlook: Our meta-analysis suggests that exposure to the environmental artificial EMFs could significantly correlate with SDNN, SDANN, and PNN50 indices. Therefore, lifestyle modification is essential in using the devices that emit EMs, such as cell phones, to decrease some signs and symptoms due to EMFs' effect on HRV.

Keywords: electromagnetic fields; heart rate variability; meta-analysis.

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