Reference: The effects of radiofrequency electromagnetic fields exposure on tinnitus, migraine and non-specific symptoms in the general and working population: A systematic review and meta-analysis on human observational studies

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Abstract

Background

Applications emitting radiofrequency electromagnetic fields (RF-EMF; 100 kHz to 300 GHz) are widely used for communication (e.g. mobile phones), in medicine (diathermy) and in industry (RF heaters).

Objectives

The objective is to systematically review the effects of longer-term or repeated local and whole human body radiofrequency electromagnetic field (RF-EMF) exposure on the occurrence of symptoms. Primary hypotheses were tinnitus, migraine and headaches in relation to RF-EMF exposure of the brain, sleep disturbances and composite symptom scores in relation to whole-body RF-EMF exposure.

Methods

Eligibility criteria: We included case-control and prospective cohort studies in the general population or workers estimating local or whole-body RF-EMF exposure for at least one week.
Information sources*:* We conducted a systematic literature search in various databases including Web of Science and Medline.
Risk of bias: We used the Risk of Bias (RoB) tool developed by OHAT adapted to the topic of this review.
Synthesis of results: We synthesized studies using random effects *meta*-analysis.

Results

Included studies: We included 13 papers from eight distinct cohort and one case-control studies with a total of 486,558 participants conducted exclusively in Europe. Tinnitus is addressed in three papers, migraine in one, headaches in six, sleep disturbances in five, and composite symptom scores in five papers. Only one study addressed occupational exposure.
Synthesis of results: For all five priority hypotheses, available research suggests that RF-EMF exposure below guideline values does not cause symptoms, but the evidence is very uncertain. The very low certainty evidence is due the low number of studies, possible risk of bias in some studies, inconsistencies, indirectness, and imprecision. In terms of non-priority hypotheses numerous exposure-outcome combinations were addressed in the 13 eligible papers without indication for an association related to a specific symptom or exposure source.