

## Risk of cancer due to electromagnetic field exposure: a review

### ABSTRACT

**Background:** Electromagnetic field (EMF) spectrum ranges from extremely low frequency electromagnetic field (ELF-EMF) to ultra-high frequency EMF. Increasing use of wireless telecommunication may pose a risk of cancer development due to prolonged EMF exposure. Due to inconclusive evidence from literature, a scoping systematic review was done to determine evidences to support EMF as a determinant of cancer, as well as the type of EMF is implicated in cancer and the type of cancer involved in association with EMF.

**Materials and Methods:** Full-text articles on Cohort studies and/or randomized controlled trials published from 1st January 2010 to 8th June 2016 were searched using Proquest and other sources. People of all age group and EMF were the type of participant and exposure used for the search strategy, respectively. Data collection was done by 1 reviewer and checked by 2 reviewers for discrepancies. All the papers were critically appraised using the STROBE statement. Qualitative synthesis was done by descriptive comparison, risk of bias comparison and effect of exposure comparison.

**Result:** 5 out of 29 articles met the eligibility criteria and were selected. Three articles showed low risk of bias due to low confounding bias. Another two articles had unclear risk of bias due to either information bias or using secondary data of uncertain quality. There were 2 high quality, 1 moderate quality and 2 low quality evidences using GRADE. Children under the age of 16 years with medium to ultra-high EMF exposure levels had approximately 0.7 times the rate of all cancer incidence compared to those with low exposure levels. Incidence rate of follicular lymphoma in males who were exposed to ELF-EMF was 300% higher at any given time point studied than the rate in those who were unexposed.

**Conclusion:** Exposure to medium to ultra-high EMF wavelength lowers the rate of progression of cancer development, due to shorter duration of exposure. Cancer development is only shown to be related to EMF exposure from ELF-EMF but not for shorter-wavelength EMFs, and this is due to longer exposure duration. Due to small number of studies obtained from this scoping systematic review, results from this review should be interpreted with caution.

**Keyword:** Electromagnetic field; Cancer; Cohort studies; Medium to ultra-high EMF; ELF-EMF