Review

Risk of leukaemia among pesticide manufacturing workers: A review and meta-analysis of cohort studies

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Abstract

Purpose
The purpose of this paper is to review available cohort studies and to estimate quantitatively the association between occupational exposure in plants manufacturing pesticides and leukaemia.

Methods
Following a systematic literature search, relative risks were extracted from 14 studies published between 1984 and 2004. Fixed effect analyses were carried out as heterogeneity between studies was not detected. Meta-analyses were performed on the whole set of data and separate analyses were conducted for specific chemical classes of pesticides as well as type of leukaemia.

Results
The meta-rate ratio estimate for all studies was 1.43 (95% confidence interval [CI] 1.05–1.94). After stratification by chemical class, consistent increases in the risk of leukaemia were found in all groups but statistical significance was found only for phenoxy herbicides unlikely to have been contaminated with dioxins and furans. This last finding appears equivocal in view of the existing literature. The separate analysis conducted on leukaemias from the myeloid lineage showed the highest relative risk (6.99; 95% CI 1.96–24.90). There was no obvious indication of publication bias.

Conclusion
The overall meta-analysis among pesticide manufacturing workers provides quantitative evidence to consider occupational exposure to pesticides as a possible risk factor for leukaemia but available data are too scarce for causality
ascertainment. Epidemiological evidence did not allow identifying a specific pesticide or chemical class that would be responsible for the increased risk. Exposure to pesticides may be a significant risk factor for specifically developing myeloid leukaemia and there is a need for additional large well-conducted studies with clear definition of exposure and of leukaemia type(s).

**Keywords:** Meta-analysis; Systematic review; Leukaemia; Pesticides; Occupation; Risk; Workers; Manufacturing workers

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