

Case-control study of non-Hodgkin's lymphoma and exposure to pesticides

Lennart Hardell* and Mikael Eriksson**

*Department of Oncology, Örebro Medical Center, SE-701 85 Örebro, Sweden

**Department of Oncology, University Hospital, SE-221 85 Lund, Sweden

Introduction

The incidence of non-Hodgkin's lymphoma (NHL) has increased in most western countries during the last decades (1). Immunodefective conditions are established risk factors. In 1981 we reported an increased risk for NHL following exposure to certain pesticides (2) as further displayed in a later report (3). The study was initiated by a clinical observation (4). The present study was designed to further elucidate the importance of phenoxyacetic acids and other pesticides in the etiology of NHL.

Materials and Methods

A population-based case-control study in Northern and middle Sweden encompassing 442 cases and twice as many controls was performed. Data assessment, ascertained by questionnaires and supplemented by telephone interviews, was blinded as to case or control status. Uni- and multivariate analyses were done with SAS statistical data program. All confidence intervals (CI) were rounded outwards.

Results and Discussion

Increased risk for NHL was found for subjects exposed to herbicides (odds ratio (OR) 1.6, CI 95% 1.0-2.5). Among herbicides the phenoxyacetic acids dominated, and when subclassified one of these, 4-chloro-2-methyl phenoxyacetic acid (MCPA), turned out to be significantly associated with NHL (OR 2.7, CI 95% 1.0-6.9). Also exposure to glyphosate as well as other herbicides increased the risk for NHL, Table 1. A time-dependence of the risk for exposure in relation to diagnosis was found. For several categories of herbicides it was noted that only exposure during the latest decades before diagnosis of NHL was associated with an increased risk of NHL. Fungicides also increased the risk for NHL when combined (OR 3.7, CI 95% 1.1-13), but this group consisted of several different agents with few subjects exposed to each type of fungicide. Exposure to impregnating agents or organic solvents did not significantly increase the risk for NHL. In the interpretation of the results it should be noted that both 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) and chlorophenols were banned in Sweden in 1977.

Furthermore, organic solvents have been used with better hygienic conditions during later years and also the solvents have changed over the years (5).

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References

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Table 1. Number of exposed cases and controls, odds ratio (OR) and 95% confidence interval (CI) for exposure to pesticides.

Agent	Number of exposed cases/controls	OR	CI
Herbicides	61/81	1.6	1.0-2.5
-phenoxyacetic acids	51/71	1.5	0.9-2.4
--MCPA	12/11	2.7	1.0-7.0
--2,4-D+2,4,5-T	43/62	1.3	0.7-2.3
-glyphosate	4/3	2.3	0.4-13
-other	12/7	3.4	1.1-9.9
Insecticides	90/139	1.2	0.8-1.7
--DDT	66/107	1.1	0.7-1.7
--mercurial seed dressing	17/25	1.6	0.7-3.4
--pyrethrins	10/21	1.3	0.5-3.4
Fungicides	10/8	3.7	1.1-13
Impregnating agents	86/131	1.2	0.8-1.7
-chlorophenols	57/92	1.1	0.7-1.8
--pentachlorophenol	55/87	1.2	0.7-1.8
-arsenic	7/8	1.2	0.3-4.5
-creosote	15/26	1.2	0.5-2.8
-other	38/41	1.7	0.9-3.2