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Suicide and exposure to phenoxy acid herbicides

A cohort mortality study was carried out on forestry workers employed six months or more in forestry work at a Canadian public utility during the period 1950–1982 (report under preparation). This occupational cohort consisted of 1 222 male workers who were exposed to phenoxy acid herbicides such as 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) through routine brush control and vegetation maintenance activities of forestry work in clearing the rights-of-way along power transmission lines and station sites. Although the investigation was prompted by concern over increased cancer risk associated with exposure to phenoxy acid herbicides, there was no evidence in this cohort of significantly increased cancer mortality. Nor were any deaths found to be due to cancers such as soft-tissue sarcomas and non-Hodgkin's lymphoma, cited by other authors (1, 2) as being related to exposure to these herbicides. The cohort is still relatively young, 96 % of the person-years experience being contributed by individuals less than 55 years of age, and it would still be possible for an excess of cancer deaths to be observed in further follow-up.

However, a statistically significant excess number of deaths due to suicide was observed (table 1). Not only for the cohort as a whole, but also for the subgroups representing short (<5 years) and medium (5–14 years) duration in the forestry trade was a significant increase in deaths due to suicide found (table 2). However, the standardized mortality ratios suggested that suicide risk decreases with years in the forestry trade.

A few published reports have cited associations between neurological toxicity and exposure to phenoxy acid herbicides. Some authors have found high scores for hypomania on the Minnesota Multiphasic Personality Inventory to be associated with chloracne caused by such herbicide exposure (5). Personality changes were observed in a small number of laboratory workers who were exposed to 2,3,7,8-tetrachlorodibenzo 1,4 dioxin, which has been reported to be a contaminant of 2,4,5-T (4). There is also one report of suicide caused by ingestion of the dimethylamine salt of 2,4-D. In this case an autopsy showed severe degenerative changes of the ganglion cells in the central nervous system (3). Although, the increased suicide risk in our study could be a result of multiple testing for various causes of death, the findings raise the question of whether the observed suicide deaths represent an extension of this previously observed central nervous system toxicity from phenoxy acid herbicides.

Table 1. Standardized mortality ratios (SMR) for specific causes of death (O = observed, E = expected, 95 % CI = 95 % confidence interval).

Cause of death	O	E	SMR	95 % CI
Circulatory	27	29.9	90	54–126
Neoplasms	18	16.4	110	61–158
Suicides	11	5.2	212	126–298
Other accidents	14	17.4	80	33–127
Other causes	10	10.8	93	33–152

Table 2. Standardized mortality ratios (SMR) for suicide by duration in the forestry trade. (O = observed, E = expected, 95 % CI = 95 % confidence interval).

Duration	O	E	SMR	95 % CI
Short (<5 years)	4	1.50	267	107–426
Medium (5–14 years)	5	1.95	256	116–396
Long (≥ 15 years)	2	1.74	115	0–263

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