

Mortality in conscripted Vietnam veterans who served and did not serve in Vietnam

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Introduction

Vietnam veterans are a group of individuals with possible exposure to phenoxy herbicides and 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD). Recent reviews undertaken by the National Academy of Sciences have concluded that there are a range of adverse health effects associated with exposure to herbicides in Vietnam, such as Non-Hodgkin's Lymphoma (NHL) and Soft Tissue Sarcoma (STS).^{1,2} These reviews have noted some additional effects possibly associated with herbicide exposure (such as prostate cancer and lung cancer). Previous studies of the mortality of America and Australia Vietnam veterans showed inconsistent results, with some studies reporting increases in mortality from, say, STS,^{3,4} or NHL⁵ but with other studies showing no increase in mortality from conditions associated with herbicide exposure.^{6,7} In addition, a study of the serum level of TCDD in American Vietnam veterans showed that only a small number of Vietnam veterans have elevated levels of TCDD.⁸

This study compared the mortality experience of 18 949 men who were conscripted into the Australian Army and served in Vietnam (veterans) with the mortality 24 645 men who were conscripted at the same time but did not serve in Vietnam (non-veterans). The mortality was studied from 1982 until 1994.

The study aimed to ascertain if the mortality experience of these two cohorts differed from each other. By using two groups who were selected and trained in the same manner and differed only in the fact of service in Vietnam the study also aimed to correct for the "healthy worker effect".

Material and Methods

The two cohorts were computer matched in exactly the same manner to three electronic data bases, the National Death Index (NDI), the Australian Electoral Roll and the Medicare database. In Australia, electoral enrolment is compulsory, and nearly all of the adult population is enrolled. Medicare is a universal health insurance scheme, and nearly all of the adult population appears on the Medicare database. The NDI is a compilation of all of the registrars of death within Australia.

Using these methods the vital status of 96.2 and 96.1 per cent of the veteran and non-veterans respectively were ascertained.

It was known that this methodology resulted in under-ascertainment of individuals who have died. However, as both groups were treated in exactly the same manner, there was no reason to believe that there was differential under-ascertainment between the two groups.

Results and Discussion

The veteran group had an elevated mortality of borderline statistical significance, with a relative risk (RR) of 1.15 (95% CI 1.00, 1.33).

The study found significant elevations in lung cancer mortality, with a RR of 2.2 (1.1, 4.3). This was based on a reasonably large number of deaths, with 16 deaths in the non-veterans, and 27 deaths in the veteran group.

The study also found a relative elevation in brain malignancy mortality in the veteran group, with a RR of 5.6 (1.53, >10) and a elevation in pancreatic cancer, with a RR of 7.7 (0.93, >10). For these causes of death a deficit of deaths among the non-veterans was observed.

A cancer incidence study for generally the same cohorts as this study also found significant elevations of lung cancer, pancreatic cancer and malignancies of the brain.⁹ This study confirms the earlier finding.

Small elevations in lung cancer has been reported in a number of other studies.^{10,11}

Two cancers considered to be of *a priori* interest because of TCDD exposure were not found to be elevated, with NHL having a relative risk of 1.29 (0.48, 3.5) and STS having a relative risk of 0.65 (0.48, 4.5). However, the numbers of expected deaths from these cancers was small, so the study had limited power to make meaningful observations about these cancers.

The study had virtually no power to make meaningful observations about prostate cancer, as the cohort is too young (average age 47) to have experienced substantial prostate cancer mortality.

Deaths from cirrhosis of the liver were also elevated, with a RR of 2.7 (1.22, 6.4). This group of deaths was examined in greater detail, and it was found that alcohol abuse was the underlying cause of the cirrhosis in every case.

This study has several strengths. The two groups of veterans were exactly the same, except that one served in Vietnam, and the other only in Australia. Follow-up was good, and there was no apparent bias in determination of vital status. The length of follow-up was between 22 to 29 years.

The study also has weaknesses. It had insufficient power to detect modest differences in mortality, particularly for rarer causes of death, such as NHL and STS, and because of the relative youth of the cohort, for prostate cancer. The study also lack measures of exposure to herbicides in Vietnam, and had no power to control for factors such as cigarette smoking.

It is suggested that increased cigarette smoking in veterans may be a complete or partial explanation of these findings although it is possible that herbicides may have contributed to this elevated cancer mortality.

The study is to be repeated in the year 2001, studying mortality from 1994 to 2000.

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