Chronic lymphocytic leukaemia in Egyptian farm workers exposed to pesticides

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الابيضاض اللمفاوي المزمن في عمال المزارع المصريين الذين يتعرضون لمبيدات الآفات

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خلاصة: كان هدف هذه الدراسة تبيان العلاقة بين حدوث الابيضاض اللمفاوي المزمن في عمال المزارع وبين تعرضهم لمبيدات الآفات. فأخذت عينات دم من 932 من عمال المزارع المصريين الذكور، الذين يتعرضون لمبيدات الآفات. كما أخذت عينات دم من مجموعة شاهدة تتكون من 932 شخصاً من الذكور، من نفس العمر والحالة الاجتماعية الاقتصادية، ممن لا يعملون بالزراعة ولا يتعرضون عادةً لمبيدات الآفات. وتبيَّن أن عمال المزارع كانت لديهم تعدادات مرتفعة بدرجة ملحوظة من اللمفاويات وكريات الدم البيضاء والصفيحات. ووجدت خلايا غير ناضجة لدى 5% تقريباً من عمال المزارع الذين تزيد أعمارهم عن أربعين سنة. ووجد الابيضاض اللمفاوي المزمن لدى اثنين من عمال المزارع بينما لم يوجد لدى أي فرد من المجموعة الشاهدة، الأمر الذي يكشف عن خطر نسبي غير محدَّد، وخطر مسبب بنسبة 2.1 في الألف، وهي نسبة لا يعتد بها إحصائياً.

ABSTRACT We aimed to explore the relationship between chronic lymphocytic leukaemia and pesticide exposure among farm workers. Blood samples were obtained from 932 male Egyptian farm workers exposed to pesticides and from a control group of 932 males of similar age and socioeconomic status who were not involved in farming and did not normally deal with pesticides. The farm workers had significantly higher lymphocyte, white blood corpuscle and platelet counts. About 5% of the farm workers over 40 years had immature cells. Two of the farm workers and none of the control group had chronic lymphocytic leukaemia, giving an undefined relative risk and an attributable risk of 2.1 per 1000, which was not statistically significant.

Leucémie lymphoïde chronique chez des ouvriers agricoles égyptiens exposés aux pesticides

RESUME Notre but était d'étudier la relation entre la leucémie lymphoïde chronique et l'exposition aux pesticides chez des ouvriers agricoles. Des échantillons de sang ont été prélevés chez 932 ouvriers agricoles égyptiens exposés aux pesticides et chez un groupe témoin de 932 hommes d'âge et de condition socio-économique similaires qui n'étaient pas engagés dans des activités agricoles et normalement n'étaient pas en contact avec des pesticides. Chez les ouvriers agricoles, le nombre de lymphocytes, de globules blancs et de plaquettes était significativement plus élevé. Environ 5% des ouvriers agricoles âgés de plus de 40 ans avaient des cellules immatures. Deux des ouvriers agricoles et zéro individu du groupe témoin avaient une leucémie lymphoïde chronique: cela donne un risque relatif non défini et un risque attribuable de 2,1 pour mille, ce qui n'est pas statistiquement significatif.

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Introduction

Chronic lymphocytic leukaemia (CLL) is a neoplasm resulting from the proliferation of a single cell clone that is in an early stage of lymph differentiation and maturation. This phenomenon of arrested maturation is associated with long-lived cells, which leads to lymphocyte accumulation [*1*].

Environmental exposure is known to play a role in the development of acute leukaemias, but the link between environmental exposure and chronic leukaemias, including CLL, is less clear. Several studies have been carried out to examine the relationship between environmental exposure and CLL, but while some showed a positive correlation between CLL and electromagnetic radiation, benzene and asbestos exposure, others showed none. Most of these studies were based upon retrospective examination of epidemiological data, including death certificates and cancer registration and the contradictions may be due to differing methods for assuming the nature of environmental hazards in relation to the type of work of the patients in the cases studied [*2–8*].

Some studies have found an abnormally high incidence of CLL among farmers in the United States of America, although these findings have not been confirmed in Scandinavian studies [*3*]. Two case–control studies on CLL and non-Hodgkin lymphomas (NHLs) in farm-animal breeding workers in an agricultural area in Italy found that these workers were at a high risk for CLL and low-grade NHLs. Although one study found that this could be due to exposure to animal-transmitted diseases, specific chemicals used in breeding, or the use of agricultural chemicals [*9*], the other ascribed it specifically to insecticides, including carbamates, phosphates and DDT [*10*].

This study aimed to find any relationship between CLL and exposure to insecticides in farm workers. Because of the variable results obtained in case–control studies and the lack of registration of CLL in Egypt, this study was based on a field survey.

Subjects and methods

A population of 932 males from the governorates of Alexandria, Beheira and Marsa Matruh were selected for investigation. All worked in farming and had been exposed to pesticides, mainly cholinesterase inhibitors and, less commonly, halogenated insecticides, for 3 to 42 years. All of the participants were covered by health insurance and had been given periodic medical examinations. The mean age of the exposed population ± standard deviation was 44.56 ± 9.36 years. A further 932 males not working in farming, not dealing with pesticides and of similar socioeconomic status were selected as a control population. Their mean age was 43.20 ± 10.10 years.

A blood sample was drawn from each individual from both the exposed and control populations. Acetyl cholinesterase enzyme (AChE) activity was measured immediately after taking the blood sample using a spectrophotometer at wavelength 412 nm [*11*] and red blood corpuscles were counted microscopically. Peripheral blood for each individual was examined to determine haemoglobin (g/dL), white blood corpuscle count ($\times 10^9$/L), absolute lymphocyte count ($\times 10^9$/L) and platelet count ($\times 10^9$/L). Cases were diagnosed as CLL when sustained lymphocytosis was above 10×10^9/L in peripheral blood [*12*]. Such cases were referred for bone marrow examination.