

Original article

Are dietary reports in a case-control study on thyroid cancer biased by risk perception of Chernobyl fallout?

Les déclarations de comportement alimentaire des sujets d'une étude cas-témoins sur le cancer de la thyroïde sont-elles biaisées par leur perception des risques liés aux retombées de l'accident de Tchernobyl ?

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Abstract

Background. – In retrospective case-control studies performed following nuclear tests or nuclear accidents, individual thyroid radiation dose reconstructions are based on fallout and meteorological data from the residential area, demographic characteristics, and lifestyle as well as dietary information. Collecting the latter is a controversial step, as dietary declarations may be affected by the subjects' beliefs about their risk behavior. This report analyses the potential for such bias in a case-control study performed in eastern France.

Methods. – The study included 765 cases of differentiated thyroid carcinoma matched with 831 controls. Risk perceptions and beliefs of cases and controls were compared using Chi² tests and differences in dietary reports were analyzed using a two-way ANOVA.

Results. – In general, atmospheric pollution and living near a nuclear power plant were the two major risks that may influence thyroid cancer occurrence cited by cases and controls. When focusing in particular on the consequences of the Chernobyl accident, cases were more likely to think that the consequences were responsible for thyroid cancer occurrence than controls. Vegetable consumption during the two months after the Chernobyl accident was correlated with the status of subjects, but not to their beliefs. Conversely, consumption of fresh dairy products was not correlated with the status or beliefs of subjects.

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Conclusion. – We found no evidence of systematic bias in dietary reports according to the status or beliefs held by subjects about the link between thyroid cancer occurrence and Chernobyl fallout. As such, these dietary reports may be used in further studies involving individual dosimetric reconstructions.

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Keywords: Radiation risk perception; Thyroid cancer; Dosimetric reconstruction; Case-control study

Résumé

Position du problème. – Dans les études cas-témoins rétrospectives menées à la suite d'essais ou d'accidents nucléaires, les reconstructions individuelles de doses de rayonnements ionisants reçues à la thyroïde sont basées sur les retombées et les données météorologiques dans la zone d'habitation, les caractéristiques démographiques, le mode de vie et le comportement alimentaire. L'utilisation de ce dernier est controversée, car les déclarations alimentaires peuvent être affectées par les croyances des sujets concernant leurs comportements à risque. Nous rapportons ici une analyse de ce biais potentiel dans une étude cas-témoins réalisée dans l'est de la France.

Méthodes. – L'étude comporte 765 cas de cancer différencié de la thyroïde appariés avec 831 témoins. Les perceptions des risques ainsi que les croyances des cas et des témoins ont été comparées en utilisant des tests du Chi² et les consommations de légumes et de produits laitiers ont été analysées à l'aide d'une analyse de variance à deux facteurs.

Résultats. – D'une manière générale, la pollution atmosphérique et habiter à proximité d'une centrale nucléaire ont été les deux risques majeurs cités par les cas et les témoins pouvant influencer l'occurrence du cancer de la thyroïde. Lorsqu'on s'est intéressé aux croyances liées aux conséquences de l'accident de Tchernobyl, les cas ont été plus nombreux que les témoins à penser que les cancers de la thyroïde dans leur région étaient dus à ces conséquences. Enfin, les déclarations des consommations de légumes frais pendant les deux mois qui ont suivi l'accident étaient corrélées au statut des sujets mais pas à leurs croyances. En revanche, les déclarations de consommation de produits laitiers n'étaient pas corrélées aux croyances ou au statut des sujets.

Conclusion. – Nous n'avons pas été en mesure d'identifier de biais systématiques dans les déclarations alimentaires en fonction du statut des sujets ou de leurs croyances concernant le lien entre l'occurrence des cancers de la thyroïde et les retombées de Tchernobyl. Par conséquent, ces déclarations alimentaires pourraient être utilisées dans des études reconstruisant les dosimétries individuelles.

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Mots clés : Perception des risques ; Cancer de la thyroïde ; Reconstructions dosimétriques ; Étude cas-témoins

1. Introduction

Thyroid cancer, the most common malignancy of the endocrine system, accounts for less than 2% of all cancers diagnosed worldwide [1]. However, in recent decades, its incidence has grown rapidly in many countries, including many in Europe [2,3]. This trend over time is mostly due to an increase in the incidence of differentiated thyroid carcinoma (DTC), which can be attributed, in part, to improvements in monitoring thyroid nodules [4–6], but also to a likely increase in environmental or lifestyle factors [5].

The Chernobyl nuclear power plant accident occurred in Ukraine on 26 April 1986. In France, the radioactive fallout and thyroid radiation doses were much lower compared with highly contaminated areas, such as Ukraine, Belarus, and Russia. A number of risk projections, using a risk coefficient estimated for moderate and high doses, suggested that a small excess in thyroid cancer might occur in eastern France due to this low-level fallout [7]. Moreover, large-scale studies examining radiation doses from CT scans have reported that for breast and brain cancers, risk coefficients for a low dose may be higher than for a high dose [8,9]. However, no such studies have been performed on thyroid cancer risk.

No post-accident large-scale cohort has been set up in France to investigate the potential impact of radioactive fallout on DTC incidence. To this end, we performed a case-control

study on DTC incidence in young people living in eastern France in the period following the Chernobyl accident.

Exposure to ionising radiation during childhood or adolescence is known to increase the risk of thyroid cancer [10,11]. However, measuring the radiation dose received by the thyroid for cases and controls presents a number of challenges: individual thyroid radiation dose reconstruction has to be based not only on radioactive fallout, meteorological data in the residential area, and demographic characteristics, but also on a number of lifestyle and diet parameters [12].

The main source of potential contamination after the Chernobyl accident was contaminated food intake (70%), especially from fresh milk or dairy products, as well as from leafy vegetables. The two other alleged sources were due to external exposure (20%) and radioactive dust inhalation (less than 10%) [12].

Accordingly, before a radiation dose assessment is performed, further investigation is required into the possibility of systematically biased answers provided by cases and controls to dietary questionnaires in relation to beliefs or perceptions about radiation risks and cancer occurrence.

This last part is the most difficult and controversial step, particularly when performed 30 years after the accident in western countries, where diet is varied and difficult to trace. These difficulties are increased by popular beliefs about diet or lifestyle. These prejudices may also affect reports relating to

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