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ORIGINAL ARTICLE

Analysis of small areas of paediatric cancer in the municipality of Murcia (Spain)[☆]

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Abstract
Introduction: Occasionally, primary care paediatricians notice the presence of small clusters of paediatric cancer (PC), but are often frustrated by the findings after statistical analysis. The study of small areas in spatial epidemiology has led to advances in identifying clusters and the environmental risk factors involved. The purpose of this study was to describe the PC incidence and the spatial distribution at the minimum level of disaggregation possible in Murcia, presenting the first urban municipality map of PC in Spain.
Materials and methods: A population-based descriptive study was conducted on the PC cases diagnosed in children younger than 15 years, between 1998 and 2013 in the municipality of Murcia. Cases were classified by sex, age group, and tumour type. Coordinates of home addresses at the time of diagnosis were assigned to each case, and spatial and spatio-temporal analyses were carried out at the level of census tracts, using FleXScan and SatScan.
Results: A total of 155 cases of PC were diagnosed during this period. The overall incidence of PC (138×10^6 of children under the age of 15) and the incidence for individual tumour types were within the expected ranges for Europe. A spatio-temporal cluster of Hodgkin lymphoma was identified.
Conclusions: Small area analysis of PC cases may be a useful tool for the identification of PC clusters, which would allow for the generation of hypotheses regarding disease aetiology, as well as developing urban models for environmental surveillance of PC.
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Análisis en áreas pequeñas del cáncer pediátrico en el municipio de Murcia

Resumen

Introducción: Ocasionalmente, los pediatras, sobre todo los de Atención Primaria, alertan de la presencia de pequeños agrupamientos de casos de cáncer pediátrico (CP) y con frecuencia sus expectativas se ven frustradas al aplicar los métodos estadísticos. El estudio de áreas pequeñas en epidemiología espacial ha permitido realizar algunos avances en la identificación de clústeres y de los factores de riesgo medioambientales implicados. El objetivo de este trabajo es describir la incidencia del CP y la distribución espacial a nivel de sección censal, así como presentar el primer mapa urbano municipal de CP de España.

Material y métodos: Estudio descriptivo de base poblacional, por sexo, grupos de edad, sub-periodos y tipo tumoral de los casos de CP diagnosticados en menores de 15 años, entre 1998 y 2013 en el municipio de Murcia. Georreferenciación de casos en el momento del diagnóstico y análisis de clústeres espaciales y espacio-temporales a nivel de sección censal mediante los estadísticos FleXScan y SatScan.

Resultados: Un total de 155 casos fueron diagnosticados. La incidencia global (138 por millón de niños menores de 15 años) y por tipos tumorales está dentro de los márgenes de referencia del área europea. Identificación de un clúster espacio-temporal de linfomas de Hodgkin.

Conclusiones: El análisis de áreas pequeñas de los casos diagnosticados de CP es una herramienta útil para identificar clústeres de casos que permita plantear hipótesis sobre las causas que originan la enfermedad y desarrollar modelos urbanos de vigilancia ambiental del cáncer infantil.

Introduction

Sometimes paediatricians, especially those working in a primary care setting, warn of the presence of a small cluster of paediatric cancer (PC) in their health district. Most of the time, the analysis of such clusters shows that they are not statistically significant. Paediatric cancer is a multifactorial disease that results from the interaction of genetic and environmental factors during critical periods in development.[1] Some risk factors (RFs) have been identified, but the aetiology of PC remains unclear. Spatial epidemiology methods have brought on advances in cluster identification and in the development of models that attempt to associate disease clusters with relevant RFs.[2] The low incidence of PC, the high degree of uncertainty when it comes to the associated factors, and its occurrence in small clusters emphasise the need to perform spatial analysis of cancer incidence in smaller urban areas.[3] Some experiences in this field have demonstrated its potential to identify geographical areas with a higher-than-expected incidence of cancer, allowing a deeper exploration of the postulated aetiologies.[4–8] The aim of this study was to determine the incidence, generate an urban map and perform cluster analysis of PC cases in the municipality of Murcia.

Materials and methods

New cases of PC (age < 15 years) diagnosed between 1998 and 2013 in the municipality of Murcia and classified according to the International Childhood Cancer Classification (ICCC-3). The fact that the study was conducted in a single province and that there is a regional reference unit for paediatric oncology and haematology facilitated the registration of all diagnosed cases in the Medio Ambiente y Cáncer Pediátrico (Environment and Paediatric Cancer) database of the Region of Murcia (MACAPEMUR) that documents the pediatric environmental history of incident cases since 2003 and prevalent cases since 1998.[1,4,9] We also searched the SELENE database (UTE Siemens-Indra, Madrid) and the OMIap primary care database (Stacks, Consulting e Ingeniería en Software, S.L.U., Barcelona). Patients that resided outside the municipality of Murcia at the time of diagnosis or that were temporarily residing in Murcia to get a second opinion or receive treatment after diagnosis were excluded from the study. We identified a total of 155 cases diagnosed between 1998 and 2013. We communicated with these patients by phone or in face-to-face interviews. We obtained the addresses of the 154 patients that agreed to participate for three different periods (prenatal, postnatal and at the time of diagnosis). One patient refused to participate in the study.

The project was approved by the Ethics and Research Committee of the Hospital Clínico Universitario Virgen de la Arrixaca. We obtained the informed consent of all the parents and of children aged more than 12 years.

Population

The Region of Murcia (RM) is an autonomous community in the Mediterranean coast of southeast Spain. The