Allergol Immunopathol (Madr). 2015;43(4):383–391

Allergologia et immunopathologia

Sociedad Española de Inmunología Clínica, Alergología y Asma Pediátrica

www.elsevier.es/ai

ORIGINAL ARTICLE

Anti-asthmatic prescription variability in children according to age

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Received 26 January 2014; accepted 25 May 2014
Available online 23 October 2014

KEYWORDS
Pharmacoepidemiology;
Drug utilisation studies;
Childhood asthma;
Anti-asthmatic agents;
Prescribed daily dose;
Defined daily dose

Abstract
Introduction: There is little research in the Spanish paediatric population about the consumption of anti-asthmatic agents. The aim of this study was to describe the current pattern of anti-asthmatic drug prescription in the paediatric population from a region of Spain, using the prescribed daily dose as a unit of measurement.
Methods: We analysed the requirements of R03 therapeutic subgroup (anti-asthmatic agents) in children less than 14 years of age in the Public Health System of Castilla y León from 2005 to 2010. Consumption data are presented in prescribed daily doses per thousand inhabitants per day (PDHD) and compared with defined daily doses per thousand inhabitants per day (DHD).
Results: 394 876 prescriptions of anti-asthmatics were given to a population of 1 580 229 persons/year. Bronchodilators, leukotriene receptor antagonists, single inhaled corticosteroids (ICS) and long-acting β2-adrenergics associated with inhaled corticosteroids were the most commonly prescribed drugs: 7.5, 5.2, 4.9 and 2.2 PDHD, respectively. The maximum prescription of bronchodilators (15.9 PDHD/9.8 DHD) occurred in children under 12 months, with montelukast (8.9 PDHD/3.6 DHD) and single inhaled corticosteroids (7.9 PDHD/2.9 DHD) at one year of age.
Conclusions: Between 2005 and 2010, children under four years received a high prescription of anti-asthmatic drugs. The use of maintenance therapy was poorly aligned with the recommendations of asthma guidelines. The PDHD was more accurate for measuring consumption than DHD, especially in younger children.

Introduction

Asthma is the most prevalent chronic paediatric disease with effective treatment. Its prevalence in Spain is around 10%.[1] There is little research in the Spanish paediatric

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http://dx.doi.org/10.1016/j.aller.2014.05.010
0301-0546/

population about the consumption of anti-asthmatic agents which reveals the current pattern of use.

Worldwide information about the prescription of anti-asthmatic drugs in children shows a high variability between and within each country, with this variability not being related to incidence and the conditions of the disease,[2] as it is generally younger children who have a higher consumption of drugs.[3–6]

The results of studies on anti-asthmatic prescriptions in children are generally expressed in number and/or percentage of prescription for every drug[3,5,6] or in number and/or percentage of children who have received any drug at a certain age.[6–9] The WHO recommends the use of defined daily dose (DDD) for evaluating the consumption of drugs in adults. However, it is generally accepted that these units should not be applied in childhood because they are not specifically calculated for children for most approved drugs and it is not appropriate to use adult doses of consumption in paediatric studies because the results would be underestimated. Therefore, the WHO recommends paediatric studies to use prescribed daily dose (PDD) of active ingredients and compare them with the DDD for adults,[10] and it was decided to follow such recommendations in this study. However, very few studies are expressed as DDD[11,12] or PDD,[13–17] and a limited number of active ingredients are analysed in these cases.

The aims of our study were to determine the prescription pattern of anti-asthmatic drugs (RO3 subgroup) in children less than 14 years old in the Public Health System of Castilla y Leon, during 2005–2010, and to assess the possible differences when using PDD or DDD as units of drug consumption.

Methods and population

Population and setting

Castilla y Leon is a large region in the centre of Spain (94 225 km^2). It has 2 550 000 inhabitants, of whom 12% are children under the age of 14. The prevalence of asthma in the paediatric population in 2010 was 7.4% (from doctor diagnoses), with grass pollen being the allergen most frequently implicated in allergic asthma.

The prescription data were obtained from the Pharmacy Information System of the Public Health Service of Castilla y Leon (SACYL), which covers 96% of the population. Data came from the total computerised official prescriptions written between January 1, 2005 and December 31, 2010 and dispensed in pharmacies. At the time of the study, only prescriptions from primary care were computerised (80% computerised and 20% issued manually). Prescriptions from primary care represented 94% of the total official requirements of Public Health System of this period, as hospital prescriptions only accounted for 6% of the total. Data correspond to the RO3 therapeutic subgroup (drugs for respiratory obstructive diseases) of the Anatomical Therapeutic Chemical Classification of WHO [ATC classification[18]]. The active ingredient and the age of the children were analysed for all prescriptions. Only electronic prescriptions were able to identify the patient's age. The patient identification data, the prescribing physician or the trademark used was not collected, in order to maintain the anonymity of those aspects.

The included population was children under 14 years old who had an individual health card (TSI) of Castilla y Leon between the years 2005 and 2010. The TSI identifies people who may personally receive national health care and official prescriptions. The paediatric population data for each age (0–13 years) were obtained from the Technical Department of the SACYL.

Units of measurement

The main analysis unit was the prescribed daily dose (PDD), which is the usual recommended average daily dose of a given drug for its main indication. As there are no defined PDD for anti-asthmatic drugs in paediatric cases, they were elaborated taking into account the age or body weight dose recommended in the data sheet of each drug and the main guidelines for asthma in childhood. PDD was determined for 26 active ingredients with 59 different concentrations and pharmaceutical forms (inhaler, syrup, tablets, etc.). In cases where the PDD was calculated per kg body weight per day, tables were used representing the weight of the current Spanish child population.[19] In other drugs, PDD was estimated by age sections. On the other hand, regarding inhaled corticosteroids, single or in combination, the PDD was calculated for each concentration of inhaler device and each age and it was concluded that the PDD was one inhalation every 12 h, with the exception of formats of 50 mcg of budesonide, beclomethasone and fluticasone, in which two inhalations every 12 h was considered (usually the recommended dose). Online supplementary material for the calculation of the PDD is provided: Appendix I.

Results are shown in prescribed daily dose per thousand inhabitants per day (PDHD). The PDHD represents the average prescribed daily dose every day to 1000 people exposed. The PDHD was calculated for each active ingredient, raw and age-adjusted, by the direct adjust method [standard population[20]], using all children from Castilla y Leon with a TSI card and aged 0–13 years as the reference population.

The results in defined daily doses per 1000 inhabitants per day (DHD) have also been added to allow comparison of both units for all ages and to future comparisons with other studies. We have used the DDD values proposed by the WHO for each active ingredient.[18]

SPSSv15 and Excel sheets were used for statistical analyses.

Results

During the six-year study, 394 876 prescriptions of anti-asthmatic drugs were issued to an at risk population of 1 580 229 person/year. Among them, 82% were prescribed by paediatricians. Bronchodilators (BD) were the most consumed drug (7.5 PDHD), mainly in inhaled form (5 PDHD). With respect to maintenance therapy, leukotriene receptor antagonists (LTRA) were the most prescribed subgroup (5.2 PDHD), followed by single inhaled corticosteroids (ICS: 4.7 PDHD), with inhaled corticosteroids associated with long-acting beta-agonists being the least common (LABA-ICS: 2.2 PDHD) (see Tables 1–3).

Anti-asthmatic prescriptions were twice as frequent from October to June compared to July to September, for both