



## Seasonal changes in prescribing of long-acting beta-2-agonists-containing drugs

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## KEYWORDS

Long-acting beta-2 agonists;  
Asthma;  
COPD;  
Seasonal variations;  
Secondary data analysis

## Summary

**Background:** For patients with asthma, COPD, or asthma-COPD overlap syndrome (ACOS), inter-country comparisons of seasonal changes in drug prescriptions are scarce or missing. Hence, we aimed to compare seasonal changes in prescription rates of long-acting beta-2-agonist (LABA) in four European countries.

**Methods:** A common study protocol was applied to six health care databases (Germany, Spain, the Netherlands (2), and the UK (2)) to calculate age- and sex-standardized point prevalence rates (PPRs) of LABA-containing prescriptions by the 1st of March, June, September, and December of each year during the study period 2002–2009. Seasonal variation of PPRs was quantified using seasonal indexes (SIs; based on the ratio-to-moving-average-method) and SIs averaged over the study period (aSI) stratified by sex, age, and indication (asthma, COPD, or ACOS).

**Results:** There was a moderate seasonal change in LABA-containing prescriptions which was more pronounced in asthma or COPD patients compared to ACOS patients. For asthma and ACOS patients, highest seasonal variation was found for patients living in Spain (aSI: 87.3–110.7, aSI: 93.2–103.1) whereas for COPD highest seasonal variation was revealed for the NPCR database (the Netherlands) (aSI: 92.2–105.6). Regarding age and sex, highest seasonal variation was found in Spanish boys under 10 years of age having a diagnosis of asthma.

**Conclusions:** By applying a common analysis in six databases, we could observe moderate overall seasonal changes in LABA-containing prescription rates in patients with asthma, COPD, or ACOS. © 2015 Elsevier Ltd. All rights reserved.

## Introduction

Asthma and chronic obstructive pulmonary disease (COPD) are common, high-burden diseases resulting in disability and poor health-related quality of life [1]. In the last years it has been recognized that in particular in elderly patients, symptoms of asthma and COPD may overlap (i.e. asthma-COPD overlap syndrome [ACOS] [2,3]). Compared to asthma or COPD patients, worse clinical outcomes for ACOS patients were reported [4–7] but there are also somewhat conflicting data [8]. For asthma or COPD, there is good evidence for seasonal variations of clinically relevant endpoints (e.g. exacerbations leading to hospital admissions) [9–11] whereas comprehensive data are lacking for ACOS patients. For asthma patients, the highest numbers of exacerbations are reported in spring and/or in autumn, in particular in young children, e.g., in Finland, the United States, Greece, and Israel. Pollen exposure, viral infections, climate factors, and stress (e.g., at school after the summer holidays) were reported among others as major risk factors for asthma exacerbations [10,12–17]. In COPD patients, seasonal variations with highest exacerbation rates during the winter season were found [9,11]. Viral infections may contribute to this pattern, but the results presented in the literature are conflicting [18,19].

Limited data is available regarding periodical changes in prescription rates of respiratory drugs [20]. Nevertheless,

drug-related analyses might help to identify and quantify several treatment related problems such as undertreatment or the exacerbation-related increase in drug consumption. In addition, data comparing seasonal changes in drug prescriptions in different countries is lacking. However, additional data may help to understand seasonal changes and country-specific characteristics of drug prescribing to a greater extent. Thus, we aimed to analyse seasonal variations of prescriptions of long-acting beta-2-agonists (LABA), which is a widely used drug class and recommended for the treatment of COPD, asthma, and ACOS patients according to international guidelines [2,21].

To the best of our knowledge, we assessed and compared seasonal patterns and changes of LABA-containing prescriptions for the first time with a standardized method over an eight years period using six health care databases from four different European countries. This research was performed within the framework of PROTECT (Pharmacoepidemiological Research on Outcomes of Therapeutics by a European Consortium) [22].

## Methods

### Data sources

The study was performed using the following six European health care databases: Mondriaan–Netherlands Primary

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