

Association between attention deficit hyperactivity disorder and asthma: a systematic review and meta-analysis and a Swedish population-based study

Cortese S, Sun S, Zhang J, Sharma E, Chang Z, Kuja-Halkola R, Almqvist C, Larsson H, Faraone SV.

Lancet Psychiatry. 2018 Jul 24. pii: S2215-0366(18)30224-4.

doi: 10.1016/S2215-0366(18)30224-4.

Abstract

BACKGROUND:

Several studies have assessed the possible association between attention deficit hyperactivity disorder (ADHD) and asthma. However, existing evidence is inconclusive as to whether this association remains after controlling for possible important confounders. To fill this knowledge gap, we did a systematic review and meta-analysis, followed by a population-based study.

METHODS:

For the systematic review and meta-analysis, we searched PubMed, PsycINFO, Embase, Embase Classic, Ovid MEDLINE, and Web of Knowledge databases up to Oct 31, 2017, for observational studies allowing estimation of the association between asthma and ADHD. No restrictions to date, language, or article type were applied. Unpublished data were collected from authors of the identified studies. We extracted unadjusted and adjusted odds ratios (ORs) from the identified studies and calculated ORs when they were not reported. We assessed study quality using the Newcastle-Ottawa Scale and study heterogeneity using I² statistics. A random-effects model was used to calculate pooled ORs. The systematic review is registered with PROSPERO (CRD42017073368). To address the fact that the ORs obtained in the meta-analysis were adjusted for confounders that inevitably varied across studies, we did a population-based study of individuals in multiple national registers in Sweden. We calculated an unadjusted OR and an OR that was simultaneously adjusted for all confounders identified in a directed acyclic graph based on the studies of asthma and ADHD identified in our systematic review.

FINDINGS:

We identified 2649 potentially eligible citations, from which we obtained 49 datasets including a total of 210 363 participants with ADHD and 3 115 168 without. The pooled unadjusted OR was 1.66 (95% CI 1.22-2.26; I² =99.47) and the pooled adjusted OR was 1.53 (1.41-1.65; I² =50.76), indicating a significant association between asthma and ADHD. Possible lack of representativeness of the study population was detected with the Newcastle-Ottawa Scale in 42 of 49 datasets. In the population-based study, we included 1 575 377 individuals born between Jan 1, 1992, and Dec 31, 2006, of whom 259 253 (16.5%) had asthma and 57 957 (3.7%) had ADHD. Asthma was significantly associated with ADHD (OR 1.60, 95% CI 1.57-1.63) in the crude model adjusting for sex and year of birth, and this association remained significant after simultaneous adjustment for all covariates (1.45, 1.41-1.48).

INTERPRETATION:

The combined results of the meta-analysis and the population-based study support a significant association between asthma and ADHD, which remained even after simultaneously controlling for several possible confounders in the population-based study. Awareness of this association might help to reduce delay in the diagnosis of both ADHD and asthma.

FUNDING:

Swedish Research Council and Shire International GmbH.