INPLASY

Is obesity or overweight the promotor of allergic diseases? A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2025120089

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 December 2025 and was last updated on 25 December 2025.

INTRODUCTION

Review question / Objective Is obesity or overweight the promotor of allergic diseases?

Condition being studied Previous studies exploring the association between obesity/ overweight and allergic diseases have produced inconsistent and inconclusive outcomes. Besides, the included studies in previous meta-analyses were analyzed combining cross-sectional, cohort, and case-control studies, which would fail to account for the differential evidential effects. Also, another major drawback of some studies was that they have not choose normal-weight group as the reference and failed to stratify obesity from overweight. Finally, the confounders were not always adjusted in the forementioned studies, which might bias the summary effect size. With the rapidly accumulating evidence in this field, a more updated systematic review and meta-analysis is required to expand our knowledge and develop evidence-based care.

METHODS

Participant or population Individuals of all ages (or separately for children/adolescents and adults, if data permits), who were free of any allergic diseases at baseline.

Intervention Overweight or obesity, as defined by the original studies. We prioritized definitions based on internationally recognized criteria, including:
(a) For children and adolescents: Body mass index (BMI) categorized according to the World Health Organization (WHO) growth reference (overweight: >+1 SD; obesity: >+2 SD), Centers for Disease

Control and Prevention (CDC) growth charts (overweight: 85th to <95th percentile; obesity: ≥95th percentile), or the International Obesity Task Force (IOTF) age- and sex-specific cut-offs.
(b) For adults: BMI cut-offs as defined by the WHO (overweight: 25.0–29.9 kg/m²; obesity: ≥30.0 kg/m²).
Studies utilizing comparable BMI-based criteria were included in the primary meta-analysis.

Comparator Individuals with normal body weight, as defined by the original studies. This was preferentially defined using the same internationally recognized criteria as the exposure group:
(a) For children and adolescents: A BMI Z-score between -2 and +1 standard deviations (SD) according to the WHO growth reference, a BMI between the 5th and <85th percentile according to the CDC growth charts, or within the normal range based on IOTF age- and sex-specific cut-offs.
(b) For adults: A BMI within the range of 18.5–24.9 kg/m² as defined by the WHO.
The control group for case-control studies consisted of individuals without the allergic disease outcome(s) under investigation.

Study designs to be included Cohort studies, case-control studies, and cross-sectional studies.

Eligibility criteria Literature was eligible if it met the following criteria: (1) examined the association between obesity/overweight and allergic diseases; (2) clearly stated the definition and measurement of obesity or overweight (based on the World Health Organization (WHO)/Centers for Disease Control and Prevention (CDC)/the International Obesity Task Force (IOTF) criteria). Specifically, overweight and obesity were defined as follows: (a) as Z score for the body mass index (BMI) for age with the cut-off points of >1 to ≤2 standard deviations (SD) for overweight and values >2 SD for obesity;(b) as the international age and sex specific cut-offs of BMI (85th-95th percentile for overweight and ≥95th for obesity);and (c) as BMI cut-off of overweight (25.0-29.9 kg/m2) and obesity (≥30.0 kg/m2); (3) reported relative risks (RRs) or hazards ratios (HRs) or odds ratios (OR) along with their 95% confidence intervals (CI) for allergic diseases, or provided sufficient data to calculate these indices; (4) adjusted confounders.

Information sources We search scientific literature on the databases including Web of Science, Cochrane, Embase, and Pubmed. Manual scanning of the reference lists and the citing articles (via Google Scholar search engine) are also performed to ensure that all relevant publications are included.

Main outcome(s) The primary outcomes are the incidence of specific allergic diseases. We prioritize the following four clinical entities due to their high prevalence and public health significance: (1) asthma, (2) allergic rhinitis, (3) atopic dermatitis, and (4) food allergy.

Quality assessment / Risk of bias analysis To assess the quality of eligible articles, the method of the Newcastle-Ottawa Scale (NOS) is applied for cohort studies and case-control studies. For cross-sectional studies, the Agency for Healthcare Research and Quality criteria is used for quality assessment.

Strategy of data synthesis The pooled OR/RR/HR and associated 95% CIs are calculated from studies reporting these results, and forest plots are generated to visualize the outcome. Due to the inconsistent nature of the included studies, the I-squared (I2) is used to indicate heterogeneity across studies. For studies with a low heterogeneity (I2 < 50%), a fixed effects model is used. Otherwise, a randomized effects model is applied (I2 ≥ 50%).

Subgroup analysis Subgroup analyses are performed based on the characteristics of sex, age range, regions, allergic diseases types, and weight classes.

Sensitivity analysis A leave-one-out sensitivity analysis is conducted by excluding one study at a time to determine whether the results of this meta-analysis were robust.

Country(ies) involved China.

Keywords Obesity; overweight; allergic diseases; meta-analysis.

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