

Letter to the Editor

Characterization of asthma status by parent report and medical record review

To the Editor:

Both medical records or clinical database and parents' self-report have been used for determining asthma status of children in epidemiologic research.^{1,2} However, both methods have limitations (eg, dependence on access to health care and recall bias, respectively).³⁻⁶

Given the different nature of identification of asthma between parent report and medical record review, little is known about the magnitude of these differences and their implications on the relationship between risk factors and asthma status by different ascertainment methods in epidemiologic research addressing asthma etiology. To address these questions, we conducted a cross-sectional study nested in a retrospective cohort study to characterize the discrepancy in asthma status between parent report and medical record review by using predetermined criteria for asthma in young children.

Rochester, Minn, is an excellent setting because medical care is virtually self-contained within the community, and a unified medical record system has been maintained among the 2 medical centers. In our study, a convenience sample of children younger than 4 years who visited the Mayo sick child care program and their parents who consented to participate in the study were enrolled. Parents completed a self-administered questionnaire that included asthma status of their children. The asthma status of a child by parental report was determined by a parent response of "yes" to the question, "Has your child ever had asthma in the past?" Also, other pertinent data were obtained. The study questions were adopted from the National Health Interview Survey questionnaire.⁷

Subsequently, we conducted comprehensive medical record reviews to determine their asthma status by applying predetermined criteria for asthma delineated in Table I. Juhn et al⁸ developed these criteria for asthma, which have been extensively used in previous epidemiologic studies.

To assess concordance on asthma status between parental report and medical record review, we calculated the Cohen unweighted κ index and the specific proportionate agreement for positive (ie, both parent report and medical record review indicated asthma) and negative (ie, both parent report and medical record review indicated no asthma) ratings⁹ in asthma status of the subjects between parent report and medical record review. Also, we assessed the relationship between various risk factors and asthma status by parent report and medical record review.

In our results, 115 parents and their 115 children participated in the study. Of the 115 parents, 105 (93%) were female (ie, mothers), and the mean age of the parents was 32.9 years (SD, 5.3 years), and the mean age for children was 2.0 years (SD, 1.03).

The prevalences of asthma reported by parents and medical record review were 13.0% (15/115) and 22.6% (26/115), respectively. The overall agreement on asthma

status between parent report and medical record review was 81.6%, but the unweighted κ index was 0.37 ($P < .001$). The specific proportionate agreement for positive (ie, both parent report and medical record review suggested asthma) rating in asthma status was 49%, whereas the specific proportionate agreement for negative rating (ie, both parent report and medical record review suggested no asthma) was 89%. The sensitivity, specificity, and positive and negative predictive value for parent report in predicting asthma status by medical record review were 38.5%, 94.3%, 66.7%, and 83.8%, respectively.

The parent's age (odds ratio [OR], 0.87; 95% CI, 0.78-0.98; $P = .023$), college graduates (OR, 0.02; 95% CI, 0.00-0.29; $P = .004$, compared with subjects with a high school diploma), the child's history of wheezing episodes (OR, 11.88; 95% CI, 2.54-55.70; $P = .002$), the child's history of atopy (OR, 3.63; 95% CI, 1.06-12.42; $P = .04$), breast-feeding duration (OR, 0.78; 95% CI, 0.64-0.94; $P = .009$), and family history of asthma (OR, 4.63; 95% CI, 1.49-14.36; $P = .008$) were associated with asthma status by parental report, whereas sex of the child (OR, 0.40; 95% CI, 0.16-1.01; reference is male, $P = .05$), the child's history of wheezing episodes (OR, 9.15; 95% CI, 3.13-26.76; $P = .000$), and the child's history of atopy (OR, 5.36; 95% CI, 1.81-15.89; $P = .002$) were associated with asthma diagnosis by medical record review. However, environmental tobacco smoke exposure and the number of physician visits to general outpatient clinic, urgent care, and emergency department were not significantly associated with asthma prevalence by either method for asthma ascertainment.

Our study demonstrates that parents underreport the asthma status of their children, and the agreement on asthma status between parent report and medical record review varies depending on the type of agreement (ie, positive vs negative). These results suggest that there was better agreement for negative ratings (ie, both parent report and medical record review indicated no asthma) than positive ratings (ie, both parent report and medical record review indicated asthma). These results explain why the prevalence estimate of asthma by parent report was lower than that by medical record review and are consistent with relatively high specificity and negative predictive value.

For the relationship between each ascertainment method and risk factors, the association between less controversial risk factors for asthma (eg, history of wheezing or history of atopy) and asthma status by either parental report or medical record review was quite consistent, but the relationship between controversial risk factors for asthma (eg, socioeconomic status and breast-feeding) and different methods of asthma ascertainment (parental report vs medical record review) was inconsistent. Therefore, parent report may still be suitable for monitoring the trend of asthma or the burden of other chronic diseases over time, but it may not be suitable for

TABLE I. Asthma criteria

Definite asthma if a physician had made a diagnosis of asthma and the presence of 2 of the following 3 conditions or if each of the following 3 conditions were present. *Probable* asthma if only 2 of the following 3 conditions were present or a physician had made a diagnosis of asthma with either none or only 1 of the following 3 conditions:

1. History of cough with dyspnea and/or wheezing, OR history of cough and/or dyspnea plus wheezing on examination
2. Substantial variability in symptoms from time to time or periods of weeks or more when symptoms were absent
3. Two or more of the following:
 - Sleep disturbance by nocturnal cough and wheeze
 - Nonsmoker (14 years of age or older)
 - Nasal polyps
 - Blood eosinophilia higher than 300/uL
 - Positive wheal and flare skin tests OR elevated serum IgE
 - History of hay fever or infantile eczema OR cough, dyspnea, and wheezing regularly on exposure to an antigen
 - Pulmonary function tests showing one FEV₁ or forced vital capacity of <70% predicted and another with at least 20% improvement to an FEV₁ of higher than 70% predicted OR methacholine challenge test showing $\geq 20\%$ decline in FEV₁
 - Favorable clinical response to bronchodilator

etiologic research in which a higher sensitivity to detect asthma status or a higher agreement with other measures of positive ratings is required.

There is a noteworthy point that can be drawn from our study findings. Considering a possibility to operationalize our criteria for asthma, a criteria-based asthma questionnaire needs to be considered instead of asking whether a diagnosis of asthma has been made by health care professionals or whether a child has such a diagnosis. A set of questions can be developed to determine the asthma diagnosis of a child on the basis of this clinical definition of asthma.

In conclusion, parents underreport the asthma status of their children, and this discrepancy may not only result in a variation in prevalence estimates of asthma but also affect the interpretation of the relationship between controversial risk factors and asthma in etiologic research. Therefore, it is important to apply a suitable ascertainment method of asthma depending on the purpose of study.

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