

Impact of Stress on Children's Asthma Attacks

Sandberg S, Paton JY, Ahola S, et al. *The role of acute and chronic stress in asthma attacks in children. Lancet* 2000;356:982-7.

Study Overview

Objective. To determine whether acute stressful events increase the risk of asthma attacks in children and whether chronic stress exacerbates the effects of acute stress.

Design. Prospective cohort study. Teams of assessors measuring outcomes and exposures were blinded to each other's findings.

Setting and participants. Children aged 6 to 13 years with moderate to severe asthma (British Thoracic Society classification score of 3, 4, or 5) who attended the Royal Hospital for Sick Children in Glasgow, Scotland. Probability sampling was used to obtain a sample that was representative of the overall age-, gender-, and social class-mix of the clinic. 113 children were approached, and 94 children (83%) enrolled. All children had asthma symptoms for at least 3 years and an asthma diagnosis for at least 1 year. Children received standard care, overseen by Dr. Paton; all patients took prophylactic inhaled steroids and intermittent or scheduled bronchodilators.

Main exposures. Parent and child interviews using the Psychosocial Assessment of Childhood Experiences (PACE) [1] provided data used to classify children by level of chronic stress and to identify severe, acute stressors. Evaluations were made at baseline (measuring the previous year), and at 9 and 18 months (measuring the interval since the previous assessment). Children experiencing 4 or more events with severe long-term negative psychosocial consequences were classified as the high-chronic stress group. Life events and chronic stress related to the child's asthma were excluded in these measurements.

Main outcome measures. Children and their parents recorded twice-daily peak-flow readings and kept weekly symptom diaries. An acute asthma attack was defined as a peak-flow drop below 70% of the best value. Periods with missing asthma data were excluded from analysis. The authors also analyzed potential confounders, such as patient age, gender, and social class; parental smoking status; number of asthma attacks in the 6 months prior to any data collection period; and season during which asthma attacks occurred.

Main results. Children were observed for a mean of 620 days (range, 314 to 7575 \pm 73.8 days). A little more than half of the patients did not miss any data entries, while those that did missed a total of 8.9% of entries. Patients experienced 423 asthma attacks (mean, 4.7 per child; range, 0 to 21) based on peak flow data; 80% of these events were confirmed with clinical data. Twenty children were classified as living with high chronic stress, with a mean of 5.25 long-term adversities compared with 1.06 among the remaining children. During the study, 234 severe acute events were recorded (means, 2.75 and 2.56 [not significant] among high- and low-chronic stress children). 24 children had no severe acute stressors.

Among children with low chronic stress, acute events increased their risk of suffering an exacerbation as follows: odds ratio (OR) at 0 to 2 weeks following the event, 0.73 (95% confidence interval [CI], 0.39 to 1.40); at 2 to 4 weeks, 1.71 (95% CI, 1.04 to 2.82); and at 4 to 6 weeks, 2.17 (95% CI, 1.32 to 3.57). Corresponding risks among high-chronic stress patients were OR, 2.98 (95% CI, 1.20 to 7.38); 0.78 (95% CI, 0.22 to 2.80); and 0.50 (95% CI, 0.13 to 7.91). No relationship between asthma attacks and age or social class was evident. Expected relationships were significant in parental smoking (high risk with a smoking parent), season (higher risk in the autumn and winter), asthma severity, and number of attacks in the 6 months prior to evaluation. Adjusting for these variables did not significantly alter the association between acute stress and asthma attacks. No direct relationship was found between chronic high levels of stress and asthma attacks.

Conclusion

Children with high baseline stress have a nearly threefold increased risk of developing an asthma attack during the 2 weeks following an acute stressful event. Children with lower levels of chronic stress have a delayed and lower (yet still significant) risk.

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"Outcomes Research in Review" is edited by Adam Jonas, MD, MPH, Medical Director for Health Services, Washington State Department of Corrections, Olympia, WA, and Benoit Tonneau, MD, Assistant Professor of Medicine, Department of Medicine, Albany Medical College, Albany, NY. Dr. Jonas prepared reviews 1-3; Dr. Tonneau prepared reviews 4-6.

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Commentary

This study follows a significant body of literature on the relationships between stress and health conditions, including asthma. Most notably, Sandberg et al [1] cite studies that link stressful events to the development of upper respiratory infections. While this was a well-designed study, the low number of study participants and limited setting reduce the generalizability of the findings. Data collection and follow-up were good, and the authors included analyses demonstrating no differences between the group with perfect data collection and the group with missing data. The study's design and execution support its internal validity, although bias is difficult to rule out when stress is measured. One would expect a relationship between stressful events, coping ability, and health status that could partially confound the data. For example, recall bias may have played a role in results if patients with asthma attacks (or their parents) were more likely to recall stressful events or to grade their severity higher than were subjects who remained healthy. Ability to cope both with asthma and other stressful events may be causally linked to the occurrence of attacks as well as to the reporting of other adverse life events. Nonetheless, these results are intriguing and intuitively make sense.

Applications for Clinical Practice

Making use of these data in clinical practice may be very challenging. One potential intervention may be to include results of this study in asthma education programs teaching parents and children to maintain a heightened vigilance around the time of stressful events. Physicians may also choose to use a lower threshold to initiate short-term treatment. Other intriguing interventions may include stress management. A 1991 study published in *JAMA* reported that asthma patients who wrote about stressful events improved their health status [2]. Whether such activities, specifically programmed around serious events, may prevent acute attacks is not known.

References

1. Sandberg S, Rutter M, Giles S, et al. Assessment of psychosocial experiences in childhood: methodological issues and some illustrative findings. *J Child Psychol Psychiatry* 1993;34:879-97.
2. Smyth JM, Stone AA, Hurewitz A, Kaell A. Effects of writing about stressful experiences on symptom reduction in patients with asthma or rheumatoid arthritis: a randomized trial. *JAMA* 1999;281:1304-9.

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