

A reason why measures to avoid mite-induced asthma are more effective in children than in adults

Murray AB, Morrison BJ. A reason why measures to avoid mite-induced asthma are more effective in children than in adults.
Pediatr Allergy Immunol 1997; 8: 88–90. © Munksgaard 1997.

Mite-sensitive asthmatics seem to respond more markedly to a reduction in mite allergen in the bedding if they are children than if they are adults. In order to investigate this difference, 882 children who attended our allergy clinic were studied. The accompanying parents were asked standardized questions, and skin prick tests to *Dermatophagoides pteronyssinus* and *D. farinae* were performed on the children. The number of hours that the children spent in bed lessened progressively with increasing age, from a mean of 13.6 hrs. for 1 year olds to 9.5 hrs for 17 yr olds: the mean for the total population was 12.0 hrs. This was significantly longer than the mean for the parents, 8.4 hrs ($p=.000$). It is likely that a longer period of exposure to mite allergen in bed is an important reason why children respond more markedly to avoidance measures in the bedroom than adults do.

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Key words: mite-induced asthma; time in bed; high concentration of mite allergen in bedding

Received February 7, 1997
Accepted June 23, 1997

When mite avoidance measures are taken in the bedroom mite-sensitive asthmatics appear to improve more quickly, and to a greater degree, if they are children than if they are adults: bronchial responsiveness to histamine improves 4-fold within 2–4 months in children (1,2), but in adults there is only a 2-fold improvement after 12 months (3). We postulate that the magnitude of the response is greater in children because they spend more time in bed in contact with the high concentration of mite allergen that is found in bedding.

Methods

We studied 882 children, aged 1–17 yrs, who had been consecutively referred to one of us (ABM) in the Allergy Clinic of the Children's Hospital in Vancouver. All were included. A trained interviewer put standardized questions to the accompanying adult, who was a parent in 97% of cases. One of the questions asked was whether the child had wheezed or had asthma. Another was about the length of time spent in bed; where the child was from the Vancouver area the parent was asked at what times the child had gone to bed and had got up during the previous day and night. For children who lived some distance from Vancouver this latter question was modified: they were asked at what time the child had gone to

bed and had arisen during the child's last full day and night at home. This modification in the question was made because those who had far to travel had often spent the night in a place that was strange to them and where the child's sleep routine had changed.

The question about the length of time the children spent in bed was asked initially as part of a study protocol. Subsequently it became apparent from other studies (2–4), as well as our own (1), that children responded better than adults to mite-avoidance measures. As a result, an additional question enquiring about the length of time the parents spent in bed was added to the protocol.

A technician performed skin prick tests to appropriate allergens using a standardized method (5). Included were tests to 1% *Dermatophagoides pteronyssinus* and 1% *D. farinae* (Bencard Division of Beecham Laboratories, UK), and positive and negative control tests. If the wheal resulting from a mite test had a diameter 2 mm greater than that of the negative control the test was regarded as positive. Parents had all been contacted 2 weeks before the appointment and asked whether the child was receiving anti-histamine medication. If so they were advised to withhold the antihistamine for the appropriate length of time before the appointment. There were 44 children in whom the result of the skin test

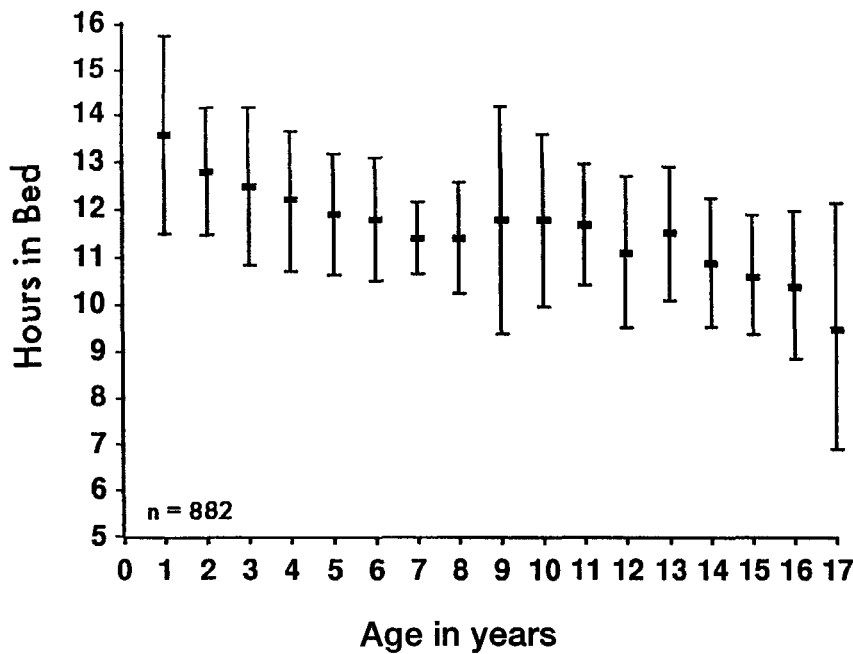


Fig. 1. The number of hours which children of various ages spent in bed.

The number of hours which children of various age groups spent in bed: means and standard deviations.

was unknown, either because they had recently been given antihistamine or because their parents did not wish them to have the skin tests.

In the children, simple linear regression of hours spent in bed on age was performed. Student's *t* tests were used to test the differences between the number of hours that the children and their parents spent in bed.

Results

The number of hours that the children spent in bed lessened progressively with increasing age, from a mean of 13.6 hrs. for 1 year olds to 9.5 hrs for 17 yr olds. A regression of hours in bed on age was significant ($p < .0000$) with an average decrease of 0.174 hours for each increasing year of age. The mean for the total population of children was 12.0 hrs (Fig. 1). In the children for whom length of time in bed for both them and their parents was known ($n=77$) the mean was 11.7 hrs for the children and 8.4 hrs for the parents ($p=.000$). For the subgroup of children who had asthma and a positive mite skin test ($n=128$) the mean was similar, 11.8 hrs.

Discussion

Recent studies support our hypothesis that a longer exposure to high mite concentrations in the bedding explains why mite-sensitive asthmatics respond bet-

ter to mite-avoidance measures in the bedroom if these patients are children than if they are adults. First, Ferguson and Broide (6) showed that the level of Der p 1 found in a patient's bronchoalveolar lavage fluid depended on the mite content of the mattress on which he or she had been sleeping. Secondly, Chan-Yeung et al. (7) found a strong relationship between seasonal variations in Der p 1 and Der f 1 levels in mattresses and the severity of asthma in mite-sensitive children but not in mite-sensitive adults. Also, in the children there was a closer association between severity of asthma and mite allergen levels in the mattress, than between severity and mite allergen levels in the carpet. These findings are consistent with the premise that the length of time spent in close contact with the bed and bedding is an important factor in determining asthma severity.

Chan-Yeung and colleagues (7) offer other explanations for the difference in response, between children and adults, to varying allergen levels in the mattress: one of these is that asthma is less reversible in adults. While there may be intrinsic differences between children and some adults, most adults would seem to respond just as well to mite-free surroundings as children do: if mite-sensitive adults not only sleep but also live in the relatively mite-free environment of a hospital, though still going out to work by day, the bronchial responsiveness in the majority improves as much and as quickly as it does in children, 4-fold within 4 months (8). The

most likely explanation for children reacting more markedly to changes in mite allergen level in their mattresses at home is that they are exposed to the allergen longer because they spend more time in bed than adults do.

Acknowledgements

We wish to thank Radana Vaughan and Carol Curtis for questioning the parents, and Huguette Brown for performing the skin prick tests. The project was supported by the BC Lung Association.

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