

Prognostic factors for toluene diisocyanate-induced occupational asthma after removal from exposure

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Summary

Background The outcome of isocyanate-induced occupational asthma remains to be further defined. There have been few studies on the role of specific antibodies in prognosis of toluene diisocyanate (TDI) induced occupational asthma. Moreover, to the best of our knowledge, there have been no studies on the improvement pattern of airway hyperresponsiveness (AH). We analysed the prognostic factors that affected the outcome of 35 toluene diisocyanate-induced occupational asthma.

Objectives To define clinical and laboratory parameters predicting favourable prognosis for TDI-induced occupational asthma.

Methods and results After confirmation of bronchial sensitivity by TDI bronchoprovocation test (BPT), 35 patients were recommended to avoid exposure to TDI; they were also given anti-asthmatic medications including inhaled steroids and monitored for 2 years. Seventeen (49%) recovered completely with disappearance of airway hyperresponsiveness (AH) to methacholine during the follow-up period (mean duration: 12 months, range of 3–30 months). Eleven (31%) showed a significant improvement in AH for first year, which improvement stabilized in the next year with mild symptoms. Seven (20%) patients did not show any evidence of improvement in AH and had persistent symptoms. Favourable prognosis was associated with a short duration of asthmatic symptoms before diagnosis ($P < 0.05$), immediate cessation of exposure after diagnosis ($P < 0.05$), milder degree of AH at diagnosis ($P < 0.05$), and the presence of specific IgE antibodies to TDI-human serum albumin conjugate ($0.05 < P < 0.1$). No association was found with atopic and smoking status, age, exposure duration, or length of latent period ($P > 0.05$).

Conclusion These data suggest that early detection of TDI-induced asthma and immediate cessation of exposure are important factors for a favourable prognosis.

Keywords: TDI, occupational asthma, prognosis

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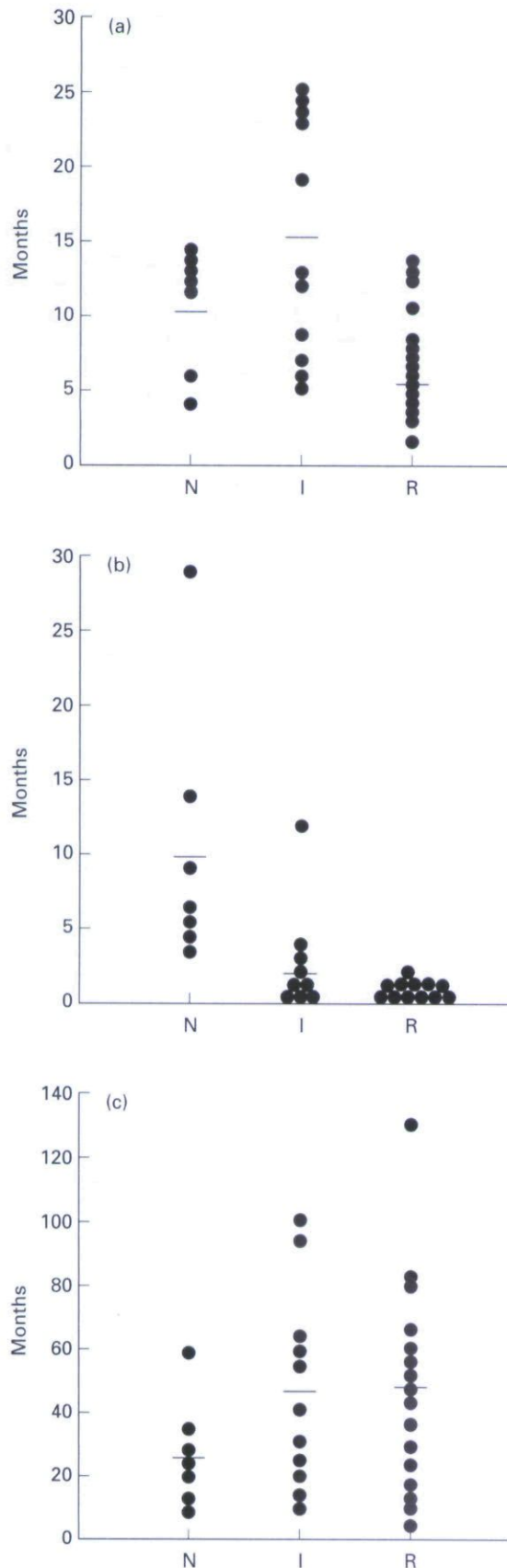
Introduction

Occupational asthma caused by isocyanate is commonly found in Korea as well as most other countries [1]. The pathogenic mechanism for TDI-induced bronchoconstriction remains to be clarified, however. Studies show that only a few subjects recover completely, with most of

them retaining their sensitivity to isocyanates and/or airway hyperresponsiveness [2–9]. As toluene diisocyanate (TDI) is the most commonly found agent in occupational asthma in our environment, we performed a follow-up study on a larger population of TDI-induced occupational asthma patients. The study included a TDI bronchoprovocation test and a regular metacholine inhalation challenges together with specific antibodies to TDI-human serum albumin (HSA) conjugate, both at diagnosis and at the follow-up visits. The data were analysed for useful prognostic factors.

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level of AH plateauing during the next year. But in a few patients of the remission group, AH improved in the third year, which suggested that the patients should be followed up for at least 3 years.

In the present study, patients who had high specific IgE antibody to TDI-HSA conjugate appeared to have more favourable prognosis although statistical significance was not noted ($0.05 < P < 0.1$); none of the not-improved group had high specific IgE antibody at diagnosis. The reason for such a high prevalence of specific IgE antibody (37.1%) in this study is not clear. Our previous study [18] showed that the latent period was significantly longer in high specific IgE responders ($P < 0.05$). There was no difference between high and low specific IgE responders in other clinical parameters at diagnosis. These results suggest that the presence of specific IgE antibody may predict a favourable prognosis.

In conclusion, the results presented in this paper strongly indicate that early detection of asthmatic workers sensitized to TDI, and immediate removal from exposure may increase the likelihood of remission of their symptoms.

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Fig. 3. Comparison of duration of respiratory symptoms before the diagnosis, the period of time between the diagnosis and cessation of exposure (duration for withdrawal), and latent period among the three groups. R, remission group; I, improved group; N, not-improved group. (a) Symptom duration $P < 0.05$; (b) duration for withdrawal $P < 0.05$; (c) Patent period $P > 0.05$.

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