

Reduction of allergen by occlusive covering

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● IN THE LAST decade, there has been increasing evidence of an association between levels of house dust mite (HDM) allergen, Der p 1, and asthma severity in sensitized asthmatics (1). Current advice is to cover all bedding items with HDM-impermeable covers, given that we spend approximately one-third of our lives in the bedroom (2). These measures are known to reduce bedding Der p 1 levels (3). However, little is known of the effect of these measures on airborne allergen. Sakaguchi and colleagues have developed a highly sensitive immunoassay for the quantification of HDM allergens in air samples, and demonstrated a five-fold reduction in airborne Der p 1 when used bedding (Japanese futons) was replaced by new bedding (4). Our aim was to study the effects of occlusive covering of bedding on airborne Der p 1 levels.

Twelve adult subjects participated in the study, which was approved by the Wellington Central Ethics Committee. Before intervention, reservoir dust samples were individually obtained from mattresses, duvets and pillows as previously described (5) and air samples were collected in the bedrooms over seven consecutive nights (8 h/night at 1 l/min) with a personal air sampler (Shibata

Scientific, Tokyo). Airborne particles were collected on fiberglass filters (25 mm diameter, Millipore, USA). Mattresses, duvets and pillows were then covered with occlusive covers (Alprotec, UK) for one week. During this time, air was sampled as described above and reservoir dust samples collected directly from the bedding cover surfaces at the end of the study.

The fiberglass filters were eluted overnight and Der p 1 was measured with a highly sensitive fluorometric immunoassay (detection limit 10 pg/ml) as previously described (4). Der p 1 in reservoir dust samples was measured by double-monoclonal antibody ELISA (6). Der p 1 values were log-transformed and results expressed as geometric means with 95% confidence intervals. Statistical analysis was by paired *t*-test ($P < 0.05$ significant).

Reductions in Der p 1 levels of approximately five-fold, 16-fold and 76-fold, respectively, were found in pillows, duvets and mattresses after the one week intervention period, and airborne Der p 1 decreased by about six-fold (Table 1).

As airborne Der p 1 levels are in the picogram range, the ELISA technique (6) is not sensitive enough for aeroallergen quantification. Recently, Sakaguchi et al. developed a highly sensitive fluorometric ELISA method, able to quantify Der p 1 levels in the picogram range (7). With this method we have demonstrated an approximately six-fold reduction in airborne Der p 1 after one week of occlusive covering of the bedding. Sakaguchi and colleagues also showed about five-fold reductions in airborne Der p levels when used bedding was replaced with new bedding for five days (4). Interestingly, pre- and post-intervention HDM allergen levels were virtually identical in both studies (102 vs 102.1 pg/m³ pre-intervention; 19.9 vs 17.5 pg/m³ post-intervention).

Table 1. Geometric mean (95% confidence interval) Der p 1 levels before and after seven consecutive days of occlusive covering of bedding of 12 subjects

	Pre-intervention	Post-intervention	<i>P</i>		
Pillows (µg/pillow)	0.47	(0.20–1.10)	0.09	(0.05–0.17)	0.0021
Duvets (µg/m ²)	1.15	(0.30–4.43)	0.07	(0.03–0.16)	0.0001
Mattresses (µg/m ²)	26.0	(5.9–114.8)	0.34	(0.08–1.40)	0.0004
Air (pg/m ³)	102.1	(45.6–228.6)	17.5	(7.2–42.7)	0.0063

Further studies are required to assess the role of individual bedding items to the contribution of aeroallergens, and whether the modest reduction in airborne Der p 1 is accompanied by significant clinical improvement in house dust mite sensitized subjects.

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