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# Partial mattress encasing significantly reduces house dust mite antigen on bed sheet surface: a controlled trial

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**Background:** The most effective measure in house dust mite antigen reduction is mattress encasing with an impermeable membrane. A reduction in encasing costs will help increase patients' compliance in mite antigen avoidance.

**Objective:** To investigate the effectiveness of partial mattress encasing with a nylon sheet produced in Thailand on the reduction of group I mite antigens from beddings.

**Methods:** Sixty regularly-used beds from the house officers' dormitory of the Siriraj Hospital Mahidol University, Thailand, were randomly matched into two groups according to mite antigen levels. The control group (CG) used only regular cotton bed sheets whereas the partial encasing group (PG) used mattresses partially covered with a locally produced nylon sheet underneath the regular cotton bed sheets. Dust collection from the beddings was performed at baseline, 2, 4 and 6 months after application of the nylon sheet. Mite antigen levels were detected by a two step monoclonal antibody ELISA.

**Results:** Mite antigen levels in both groups were not different at the beginning of the study. The PG had significantly lower group I antigen levels on regular bed sheet surfaces than the CG ( $P < .004$ ) at the 2, 4 and 6 month timepoints. However, antigen levels on the mattress surface of the PG was significantly higher than the CG at the end of the study ( $P < .004$ ). The barrier efficacy of the nylon sheet in preventing migration of group I mite antigens from the mattress to the surface of the regular cotton bed sheet was 94% whereas that of the regular cotton bed sheet was 66% ( $P = .007$ ).

**Conclusion:** Partial mattress encasing with a locally made nylon sheet can reduce mite antigens on the regular cotton bed sheet surfaces for up to 6 months.

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## INTRODUCTION

House dust mite is considered a major indoor antigen worldwide.<sup>1</sup> The role of house dust mite antigen in the provocation of atopic diseases such as asthma and atopic dermatitis has been well established.<sup>2,3</sup> In asthmatic patients, house dust mite antigen avoid-

ance leads to an improvement of symptom scores and peak expiratory flow rates as well as a decrease in the degree of bronchial hyperresponsiveness.<sup>4-7</sup> In atopic dermatitis, house dust mite antigen avoidance also provides significantly greater improvement in severity score and area affected in avoidance group than in controls.<sup>8</sup>

Several measures have been reported to reduce house dust mites and their antigen with variable success. These measures include bed encasing with a mite-impermeable membrane, carpet removal, acaricides, denaturants, freezing and solar exposure.<sup>9</sup> Of all these methods, bed encasing has been shown to be the most effective

method for isolating afflicted individuals from the mites and their antigens in the bedding.<sup>10</sup> Currently, there are mattress cover products made from polyurethane coated fabric or a complete impermeable membrane available worldwide. These products are recommended for complete mattress encasing.

Most mattresses in Thailand are situated on a hard wooden bed frame instead of on box springs. The mattresses are commonly covered by a special nylon sheet in a fitted sheet manner that has anecdotally been found to be clinically effective in reducing the mite antigens which induce allergic symptoms. This method of mattress encasing which we will call partial mattress encasing, together with the utilization of a locally produced nylon material, can significantly decrease the cost of mite antigen avoidance and, therefore, increase compliance among patients, especially those of low socioeconomic status.

The objective of our study is to determine the effectiveness of a locally produced nylon sheet covering mattresses in a fitted sheet manner, in the reduction of mite antigen available to patients on bedding surfaces.

## MATERIAL AND METHODS

### Subjects

Sixty mattresses from the house officers' dormitory at the Siriraj Hospital, Mahidol University, Bangkok, Thailand, were divided into 2 groups according to group I mite antigen levels. The difference of antigen levels in each matched pair did not exceed 20%. In the control group (CG), mattresses

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