The influence of children jumping on the bed on PM10/PM2.5/PM1 concentration profile

Yeh, CL1, Mena, KD2, and Chen, PS†

1Department of Public Health, Kaohsiung Medical University, Kaohsiung, 80708,Taiwan
2Department of Public Health, University of Texas Health Science Center, Houston, El Paso, 79902,USA

Keywords: schoolchildren, suspended particulate matter, PM

Presenting author email: protamine1199@yahoo.com.tw

Introduction
Recently, the harmful effects of suspended particulate matter (PM) on human’s respiratory system were observed. When children jump on the bed at home, it may resuspend PM. Therefore, the purpose of the present study was to evaluate the influence of children jumping on the bed on PM10/PM2.5/PM1 concentration profile at schoolchildren’s house.

Materials and Methods
20 schoolchildren’s houses in Kaohsiung city in Taiwan were evaluated. Firstly, PM10/PM2.5/PM1 concentration was simultaneously monitored over the first five minutes to obtain background concentration profiles. Then, a common cane was used to tap the bed for about one minute, followed by keeping motionless in 7 to 10 minutes to let PM settle down. Then, we made children’s bed by raising bed sheets for about one minute, followed by keeping motionless in 7 to 10 minutes. This evaluation was conducted by the same person for consistency of the beating strength, beating frequency, and beating location.

Results and Discussion
Our results showed that the concentration of PM10, PM2.5 and PM1 were immediately arising when tapping bed was started, and the peak was kept at least one minute. The mean background concentration of PM10, PM2.5 and PM1 was 89, 80, 80 µg/m³, respectively. When tapping bed, the mean concentration of PM10, PM2.5 and PM1 was 1561, 1457, 1456 µg/m³, respectively. When making bed, the mean concentration of PM10, PM2.5 and PM1 was 179, 156, 156 µg/m³, respectively. When tapping-bed, PM concentration was 27, 28, and 28 times higher than that of background concentration for PM10, PM2.5 and PM1, respectively. When making bed, PM concentration was 2.6, 2.5, and 2.5 times higher than that of background concentration for PM10, PM2.5 and PM1, respectively. Mite may be one of the majority components of these resuspended PM.

Conclusion
In conclusion, jumping on the bed and making bed significantly increased PM concentration. These actions may increase the risk of respiratory symptoms, especially for asthma children.

Table 1. PM concentration of background, tapping and making bed

<table>
<thead>
<tr>
<th></th>
<th>PM1</th>
<th>PM2.5</th>
<th>PM10</th>
<th>PM10/PM2.5</th>
<th>PM10/PM1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background (µg/m³)</td>
<td>80</td>
<td>80</td>
<td>89</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Tapping bed (µg/ m³)</td>
<td>1456</td>
<td>1457</td>
<td>1561</td>
<td>104</td>
<td>1</td>
</tr>
<tr>
<td>Making bed (µg/ m³)</td>
<td>156</td>
<td>156</td>
<td>179</td>
<td>22</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 1. Time serial distribution of PM10, PM2.5, PM1