

CHAPTER 5

Conclusion

The objectives of the present study were to develop a simple and portable exhaled breath condensate (EBC) collecting device and to investigate the association between PM₁₀ exposure and health outcomes of school children at two different study areas. Exhaled breath condensate (EBC) has been widely used to identify inflammatory and OS markers implicated in the pathogenesis of various respiratory conditions. Although the collection of EBC is non-invasive, easy to perform and able to be repeated, equipment to EBC collection is relative lack. Therefore, the purpose of the present study was to develop a simple and portable EBC collecting device and use this device to collect EBC samples from the school children who exposed to PM₁₀.

The findings of the present study indicate that the developed EBC device and methodology used to collect EBC from school children was suggested safe, rapid and simple to use and operate. The methodology for collection of EBC is simple and single operator was sufficient to undertake EBC collection from school children. Most of school children participated in the study had well adapted and tolerated the collection procedure. At beginning of the collecting EBC, some children complaint about duration of of collection time and felt boring. However, they appeared to become more accustomed to the collection procedure with successive collections. The present study shows that the procedure of EBC collection is well accepted, safe, and feasible in school-age children. The success rate was 100%. None of the subjects had to stop the procedure because of side effects. In summary, the developed EBC device described in the present study corresponds to low cost system that has disposable parts and allows the collection of simultaneous samples from subjects. Furthermore, the device provides EBC volume similar to those obtained with other EBC condenser previously described.

Findings from the present study show that elevated PM₁₀ level in Chiang Mai showed affecting the respiratory health of school children by increase in exhaled MDA concentration. MDA concentration in EBC gives good information of early biological effect of PM₁₀ exposure before clinical symptoms appear. In addition, the present study results support that ambient PM₁₀ level as part of ambient air quality must be seriously controlled in order to protect everyone in the community.

Study strengths

1. The first epidemiological study to investigate the effects of exposure to PM₁₀ on oxidative stress in school children in Chiang Mai province.
2. Participants in this study were from two different areas with a wide range of environmental exposure, which provided a good opportunity to evaluate exposure-response relationship.
3. Using biomarkers to evaluate exposure and outcome, more accurate evaluations possible than association studies using monitoring data only.

Study limitations

1. The best tool for the assessment of PM₁₀ exposure in health effects studies is personal exposure monitoring, but it is expensive, difficult to use and it does not support large numbers of participants, especially in children. The present study attempted to limit these topics by studying school children living and studying in the same area.
2. The PM₁₀ level was measured in the schools of study participants, and individual exposure could be different from the ambient particulate levels. Therefore, personal air sampler was used to measure the PM₁₀ level in their classroom instead.
3. The study did not control for any residual seasonal effects resulting from changes in the prevalence of respiratory viral infections that could have increased the levels of exhaled MDA among the school children, especially during December-January when the level of PM₁₀ are elevated.

5.4 Future use of EBC

The studies described in this thesis have shown that the collection of EBC in school children is easy to perform and well tolerated. Therefore EBC analysis becomes a useful tool for monitoring and screening of healthy individuals for possible early pulmonary disease.



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