Machine Learning of PM2.5 and PM10 Concentrations to Relate With Outpatient Visits for Upper Respiratory Tract Infections in Taiwan: A Nationwide Analysis

Dear Editor:

Thank you very much to provide the opportunity for us to revise our manuscript. We have revised our paper using point-by-point response to the reviewers' comments and highlighted in red as follow.

Responses to the Reviewer's comments

Reviewer 00503345

The authors have examined using machine learning whether particulate matter (PM)2.5 and PM10 concentrations in the air could predict the number of outpatient visits for acute upper respiratory tract infections (URI) in Taiwan. The proposed algorithm suggests that the nationwide data for PM2.5 and PM10 in the air could accurately predict the occurrence of URI, with best result for the elderly population. The test was less accurate in regard to regional data analyses. The study is original and informative. The data and the limitations of the algorithm, that takes only the concentrations of PM2.5 and PM10 into account for predicting the occurrence of URI, are well discussed.

Response:

Thank you very much for your great comment and we appreciate much to your kindness.

The authors report the concentrations of particulate matters 2.5 (PM2.5) and 10 (PM10) can predict upper respiratory infections in Taiwan. The study is interesting; however, the authors have to show direct evidence of concentrations of PM2.5 and PM10 and upper respiratory infections. The authors have to rule out coincidence of increases of PM2.5 and PM10 and upper respiratory infections in summer and spring.

Response:

Thank you very much for your great comment.

Since the study was not designed experimentally, we could not provide direct evidence for the cause-effect relationship between PM and acute URI, which may be due to coincidence. In this case, we added a statement for the limitation on the last 3 lines of page 10.

"Third, we could not provide direct evidence for the cause-effect relationship between PM and acute URI which might be due to coincidence mere based on a retrospective study design in nature."

General comments:

1. Descriptions of scientific manuscript have to be easily clearly understood by everyone. I cannot understand what the authors did by "machine learning" or "multilayer perception." I cannot understand the meaning of "URI burden."

    Response:

    Thank you very much for your comment.

    We have added the explanations following the terms of machine learning and multilayer perception to make these terms more clear for the readers.

    In addition, the term of "URI burden" has been revised to "URI volumes"

2. I think your study was a retrospective one; however, you use "predict" to show relationship between concentrations of PM2.5 and PM10 and upper respiratory infections. I think the proper verb should be "be related."

   Response:

   We have replaced the verb of "predict" by "relate with" as you suggested.

Specific comments;

3. Not all researchers are good at decoding the International Classification of Diseases. Disease names should be written, instead of code numbers.

   Response:

   We have provided the definitions of the ICD-9-CM codes for acute URI in the supplemental table 1.

4. How were upper respiratory infections diagnosed? Were they really "upper respiratory infections?" I think that "upper respiratory symptoms" seem more appropriate.

   Response:

   We made a statement for the diagnosis of URI on lines 10-11 of page 6. "Clinical physicians have to make the diagnosis of URI for patients according to the clinical symptoms, physical presentations, and objective laboratory data at outpatient department…".

Methods

5. I cannot understand the meaning of "burden of outpatient visit."

   Response:

   The description of "the burden of outpatient visits for URI" has been revised to

Discussion

6. Your epidemiological study is important because we are being exposed worsening air pollution. However, I cannot understand that increases in PM2.5 and PM10 provoke upper respiratory infections. I think that you need to show direct evidence of increases in upper airway "infections" by increases in PM2.5 and PM10.

    <u>Response:</u>

    Since the study was not designed experimentally, we could not provide direct evidence for the cause-effect relationship between PM and acute URI, which may be due to coincidence. In this case, we added a statement for the limitation on the last 3 lines of page 10.

    "Third, we could not provide direct evidence for the cause-effect relationship between PM and acute URI which might be due to coincidence merely based on a retrospective study design in nature."

Reviewer 02484487

Very informative, well written article.in my opinion there is nothing to be changed,or altered. It can be published As it is.

Response:

Thank you very much for your great comment and we appreciate much to your kindness.