
LETTER to the EDITOR

Hypothesis of Consumption of Gasoline as a Risk Factor of Breast Cancer Incidence in Korea in an Ecological Study

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Dear Editor

I read the article by Park et al. (2014) which was published in your journal with great interest. The article suggested a hypothesis of the number of vehicles or consumption of gasoline as a risk factor of breast cancer incidence in Korea using an ecological study. After reading carefully the article, I would like to point several issues which should be considered.

First, interpreting results obtained from an ecological study should be caution because of notoriously ecological fallacy, which was declared as the methodological limitation by the authors. Thus the epidemiological causation ask to distinguish the concept of correlation and association. While the authors suggested the hypothesis based on the positive 'relations', it need to make the concept clear.

Second, the authors stressed that the numbers of motor vehicles or the amount of gasoline were just proxy markers of the air pollution caused by traffic emission, which meant environmental pollutions resulted from industrialization. However, there would be so many surrogates of industrialization, such as degree of sewage disposal (contaminated water), penetration rate of cellular phone (electromagnetic field), and so on. Thus using the number of motor vehicles or the amount of gasoline as a proxy markers of environmental pollution should be limited in suggesting one of risk factors in breast cancer.

Third, the authors treated the time trend of incidence rate of breast cancer as the outcome. This depends on changing level of compliance on mass screening program, increasing sensitivity of screening modalities, improving accuracy of cancer registry information, as well as the change of targeting exposures. It is sorry that the authors did not take them into careful consideration.

Forth, the geographic information of Korea Central Cancer Registry supplying the nationwide and regional cancer incidence data in Korean is indicated just as the address at the first registry, not birth place or the place of longest dwelling. Thus the suggesting mechanism of hypothesized air pollution at birth would not be appropriate in the article.

Last, the trends in breast cancer incidences by age groups in Korean women between 2002 and 2010 showed that the age group of the highest incidence rate have kept as 45-49 years old for 8 years (Bae, NCC). This fact makes us doubt the hypothesis.

References

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In Response

We thank Dr. Bae for his interest in our paper and insightful comments. The ecological study method, which was adapted in this study, is used to investigate the relationship between population-level exposure to risk factors and disease. Especially measurements at individual level are not available, ecological study is useful to generate and verify the hypothesis, therefore often used in environmental epidemiology (Morgenstern and Thomas, 1993). We used the number of motor vehicles and the amount of gasoline as the proxy markers of the air pollution caused by traffic emission due to industrialization in spite of many surrogates because compared with other indicators that we could obtain, they showed stronger association with both breast cancer incidence and mortality and the obtained periods were enough to long to adjust time lag (Table 1 in the original paper).

The information regarding degree of sewage disposal and penetration rate of cellular phone that he mentioned as surrogates of industrialization have not been obtained for enough time. We considered only two indicators and did not consider other factors such as diet or screening rate and other ecological studies conducted in both Korea and Western countries have focused on the certain factors (Cho et al., 2010; Chen and Bina, 2012). As the authors' knowledge, there are few or no ecological studies considering many factors associated with a disease with interest. However, the authors have understood this is one

of main limitations of our study and we mentioned it as limitation in our original papers.

The other studies investigating the geographical variations in cancer incidence also used registry data such as SEER data (Chen et al., 2007; Chen and Bina, 2012) which do not consider dwelling period or point of dwelling time of each individual. It is caused by inherent limitation of ecological study that cannot consider the exposure at the individual level. However, the authors have understood this as a one of the limitations and mentioned it as such in our original paper.

The term 'relation' or 'relationship' includes both correlational relationship and causal relationship. The ecological study could show only the correlation between exposures and outcomes but we tried to consider the order of the correlation by including lag time. Therefore we applied the term 'relation' or 'relationship' to show the correlation as your suggestion and our effort that considered lag time.

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