

INFLUENZA EPIDEMIC AND METEOROLOGICAL FACTORS IN 47 PREFECTURES IN JAPAN

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Background and Aims: In evaluating the impact of climate change on human health, it is important to evaluate not only the heat effects, but also the cold effects. It is, however, not straight-forward to evaluate cold effects; unlike heat effect, cold effect is not a direct (non-linear) function of temperature. We thought that influenza epidemic is one of the reasons for this, because influenza epidemic occurs in winter, but is not necessarily larger during colder winter. Here, we explored the relation between influenza incidence and meteorological factors to obtain some clue to model the influenza effect in evaluating cold effects.

Methods: Meteorological factors in each of the 47 Prefectures in Japan were related to the corresponding government-provided number of patients per sentinel medical facility per week. The relation was regressed using smoothing spline. Absolute humidity was calculated using the formula, $217 * (\text{vapor pressure}) / (\text{temperature in Celsius} + 273.15)$.

Results: Among the factors, absolute humidity showed one of the most consistent relations, with only one exception, i.e., Okinawa Prefecture. Down to a certain level, no patients were observed, and beyond the level, the incidence became higher monotonously along with the absolute humidity. The "highest no patient limit" level appeared higher in Southern Prefectures. As the only exception, Okinawa Prefecture, where the climate is subtropical, showed that epidemics occurred even on days with high absolute humidity. Unlike absolute humidity, relative humidity showed inconsistent relation.

Conclusions: To relate the influenza incidence, it is better to use absolute humidity, rather than relative humidity. We speculate that the "highest no patient limit" level was higher for Southern Prefectures, because the winter is warmer for Southern Prefectures during the influenza epidemic season. This may lead to the modelling of influenza effect as one of the cold effects.