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Sunlight and Influenza Mortality in Scotland: Insights From the 1918 Influenza Pandemic and Later Flu Outbreaks

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We previously demonstrated that higher ambient ultraviolet (UV)-A exposure is associated with lower COVID-19 mortality in the USA, England and Italy. UV photomobilises nitric oxide (NO), which inhibits viral replication and modulates the immune response. Low sunlight, especially during Scottish winters, may not activate sufficient circulating NO to protect infected individuals near end-of-life. This study examines associations between daily sunlight exposure and excess mortality during the 1918 influenza pandemic in Scotland, using data from the Scottish Historical Population Platform, linked with environmental data. We also compare two modern pandemics: the Asian Flu (1957–1958) and Hong Kong Flu (1968–1970). A modified time-stratified case-crossover design with a 3-day window was used, treating daily death counts as-if randomly assigned to daily weather conditions, while accounting for time trends. We employed conditional quasi-Poisson regression models for linear associations and Generalised Additive Models for non-linear associations, adjusting for temperature. Two waves of high excess mortality were observed: September–December 1918 (9,992 excess deaths) and January–April 1919 (7,889 excess deaths). A one standard deviation increase in 2-day average solar radiation was associated with lower excess mortality (1918: RR = 0.93, 95% CI: 0.87-0.99; 1919: RR = 0.96, 95% CI: 0.91–1.00; waves pooled: RR = 0.95, 95% CI: 0.91–0.98). Results for the Asian and Hong Kong Flu are forthcoming. Safe, low UV doses may reduce infectious disease mortality particularly in winter in low-sunlight regions. Beyond a certain threshold, additional sunlight may offer little benefit. UV-B was too low for vitamin D synthesis during the Scottish waves, suggesting a UVA-NO pathway.

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