Could lack of vitamin D and ultraviolet be linked to COVID-19 mortality in northerly latitudes?

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A new international collaborative study between Trinity and the University of Liverpool, published in the *British Medical Journal* offers

fresh insight into COVID-19's impact across countries, and the factors that influence its severity.

The research examines how and why COVID-19 affects populations in different ways, and builds on the collaboration between the two universities.

The study reports COVID-19 mortality rates per million population in 117 countries with 150 or more COVID-19 cases. Data was accumulated on each country, examining people aged 65 and over, incorporating data on population density and air pollution, while latitude was entered for each country's capital city. Researchers tested their hypothesis that there was no link between mortality and latitude below a defined threshold, and that thereafter mortality increased with latitude.

What does the research show?

- The study identifies how age adjustment played a significant factor in rising mortality rates, with an estimated increase of 13% in mortality for each 1% increase in the proportion of people aged 65 and over.
- Latitude remains significant after adjustment for age with an estimated 5% increase in death rates for each degree further north the country was located above a threshold of 28 degrees north.
- Countries with higher pollution included many with younger populations, and pollution was negatively associated with mortality but did not add significantly to a model containing latitude and age.
- Population density per country was not significantly linked with mortality.

Key Findings

- The study has found that the proportion of older people in each country greatly affected COVID-19 mortality rates, but after adjustment for this, a strong association remains across the Northern hemisphere between more northerly latitude and higher death rates from COVID-19.
- The association between COVID-19 mortality and latitude exists above 28 degrees, not far from the latitude (35 degrees) beyond which populations often have insufficient ultraviolet B exposure, to maintain normal vitamin D blood levels through winter and spring.

It is widely documented that vitamin D offers many positive benefits to overall health; including boosting the body's immune response, supporting bone and muscle health and in playing a potentially critical role in suppression of the severe pro-inflammatory response.

Evidence linking vitamin D deficiency with COVID-19 severity is circumstantial but growing. The researchers point out that if the association between vitamin D deficiency and COVID-19 severity is causative, the disease should prove seasonal, since more severely affected individuals are infectious for longer. The researchers recommend supplementation of 800-1000 International Units (20 -25 micrograms) daily to ensure normal blood values, especially for those at greater risk of deficiency, such as people with darker skin or living in institutions.

Professor Rose Anne Kenny, principal investigator of TILDA and author of the study said: "Our group is cautious about ascribing a causal association in advance of results from vitamin D supplementation studies which are on-going. However, given the high prevalence of vitamin D deficiency in many northern latitude countries, the reduction in outdoor

physical activity during COVID, and the safety of vitamin D, public health bodies in Ireland and UK are recommending that older persons, those who are mainly indoors and those from other high risk groups such as BAME, should take regular supplements."

Professor Jon Rhodes, emeritus professor of medicine, University of Liverpool and co-author of the study said: "Vitamin D is an unusual vitamin—it is a hormone and we get most of it by the action of ultraviolet light on cholesterol in the skin. Unless you live in a sunny country or eat a very large amount of oily fish you are quite likely to need supplements to maintain a normal level. It is plausible that vitamin D deficiency increases risk of severe COVID-19 illness, but all the evidence is indirect. The correlation between COVID-19 mortality and northern latitude, with consequently reduced ultraviolet exposure from sunlight, adds to this evidence."

More information: Jonathan Rhodes et al. COVID-19 mortality increases with northerly latitude after adjustment for age suggesting a link with ultraviolet and vitamin D, *BMJ Nutrition, Prevention & Health* (2020). DOI: 10.1136/bmjnph-2020-000110

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