

CORRESPONDENCE

Toxic Effects from Ivermectin Use Associated with Prevention and Treatment of Covid-19

TO THE EDITOR: Ivermectin is approved by the Food and Drug Administration as an oral treatment for intestinal strongyloidiasis and onchocerciasis and as a topical treatment for pediculosis and rosacea. It is also used as a treatment for parasites in pets and livestock. Ivermectin may decrease severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) replication in vitro,^{1,2} but randomized, controlled trials have shown no clinical benefit in the prevention or treatment of coronavirus disease 2019 (Covid-19).³ Veterinary use of ivermectin has increased, and the number of prescriptions for use by humans in the United States is 24 times as high as the number before the pandemic. Moreover, the number of such prescriptions in August 2021 was 4 times as high as the number in July 2021.^{3,4}

The Oregon Poison Center is a telephone consultative center staffed by specialty-trained nurses, pharmacists, and physicians who provide treatment advice for the public and comprehensive treatment consultation for health care workers caring for patients in Oregon, Alaska, and Guam. The center has recently received an increasing number of calls regarding ivermectin exposure related to Covid-19. The rate of calls regarding ivermectin had been 0.25 calls per month in 2020 and had increased to 0.86 calls per month from January through July 2021; in August 2021, the center received 21 calls. Monthly total call volumes for all poison exposures were stable throughout 2020 and 2021.

Of the 21 persons who called in August, 11 were men, and most were older than 60 years of age (median age, 64; range, 20 to 81). Approximately half (11 persons) were reported to have used ivermectin to prevent Covid-19, and the remaining persons had been using the drug to treat Covid-19 symptoms. Three persons had received prescriptions from physicians or veterinarians, and 17 had purchased veterinary formulations; the source of ivermectin for the remaining person was not confirmed. Symptoms had devel-

oped in most persons within 2 hours after a large, single, first-time dose. In 6 persons, symptoms had developed gradually after several days to weeks of repeated doses taken every other day or twice weekly. One person had also been taking vitamin D to treat or prevent Covid-19. Reported doses ingested by the persons who had been using veterinary products ranged from 6.8 mg to 125 mg of 1.87% paste and 20 to 50 mg of the 1% solution. The dose of the human-use tablets was 21 mg per dose twice weekly for prevention.

Six of the 21 persons were hospitalized for toxic effects from ivermectin use; all 6 reported preventive use, including the 3 who had obtained the drug by prescription. Four received care in an intensive care unit, and none died. Symptoms were gastrointestinal distress in 4 persons, confusion in 3, ataxia and weakness in 2, hypotension in 2, and seizures in 1. Of the persons who were not admitted to a hospital, most had gastrointestinal distress, dizziness, confusion, vision symptoms, or rash.

These cases illustrate the potential toxic effects of ivermectin, including severe episodes of confusion, ataxia, seizures, and hypotension, and the increasing frequency of inappropriate use. There is insufficient evidence to support the use of ivermectin to treat or prevent Covid-19,³ and improper use, as well as the possible occurrence of medication interactions,⁵ may result in serious side effects requiring hospitalization.

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Disclosure forms provided by the authors are available with the full text of this letter at NEJM.org.

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1. Caly L, Druce JD, Catton MG, Jans DA, Wagstaff KM. The FDA-approved drug ivermectin inhibits the replication of SARS-CoV-2 in vitro. *Antiviral Res* 2020;178:104787.

2. Lehrer S, Rheinstein PH. Ivermectin docks to the SARS-

CoV-2 spike receptor-binding domain attached to ACE2. *In Vivo* 2020;34:3023-6.

3. Centers for Disease Control and Prevention. Rapid increase in ivermectin prescriptions and reports of severe illness associated with use of products containing ivermectin to prevent or treat COVID-19. CDC Health Alert Network no. CDCHAN-00449. August 26, 2021 (<https://emergency.cdc.gov/han/2021/han00449.asp>).

4. Lind JN, Lovegrove MC, Geller AI, Uyeki TM, Datta SD, Budnitz DS. Increase in outpatient ivermectin dispensing in the US during the COVID-19 pandemic: a cross-sectional analysis. *J Gen Intern Med* 2021;36:2909-11.

5. Edwards G. Ivermectin: does P-glycoprotein play a role in neurotoxicity? *Filaria J* 2003;2:Suppl 1:S8.

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