

COVID-19 aggravates antibiotic misuse in India

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The COVID-19 catastrophe in India has resulted in more than 30 million people infected with the virus and nearly 400,000 deaths, though experts are concerned that the figures most likely are much higher. Meanwhile, another public health crisis has emerged along with COVID-19: the widespread misuse of antibiotics.

During India's first surge of COVID-19, antibiotic sales soared, suggesting the drugs were used to treat mild and moderate cases of COVID-19, according to research led by Washington University School of Medicine in St. Louis. Such use is considered inappropriate because antibiotics are only effective against bacterial infections, not [viral infections](#) such as COVID-19, and overuse increases the risk for drug-resistant infections.

"Antibiotic resistance is one of the greatest threats to global public health," said the study's senior author, infectious diseases specialist Sumanth Gandra, MD, an associate professor of medicine and an associate hospital epidemiologist at Barnes-Jewish Hospital. "Overuse of antibiotics lessens their ability to effectively treat minor injuries and common infections such as pneumonia, which means that these conditions can become serious and deadly. Bacteria that have become resistant to antibiotics don't have boundaries. They can spread to any person in any country."

The study, conducted in collaboration with McGill University in Canada, is published July 1 in *PLOS Medicine*. Giorgia Sulis, MD, Ph.D., a postdoctoral researcher at McGill, is the first author.

Antibiotics are life-saving medications. However, unchecked, germs learn to defy the antibiotics designed to kill them while also multiplying in force. Along with more illnesses and deaths, [antibiotic resistance](#) leads to increased hospital stays and medical costs.

In high-income countries such as the United States, United Kingdom and Canada, overall [antibiotic use](#) plunged in 2020, even during COVID-19 peaks. "This is because physicians in high-income countries generally did not prescribe antibiotics for mild and moderate COVID-19 cases," Gandra explained. "The uptick in India indicates that COVID-19 guidelines were not followed."

Also worrisome are prior data analyses concluding that COVID-19 cases and deaths in India surpass the official estimates. "In reality, the problem is likely much worse," said Gandra, who also serves on a World Health Organization (WHO) committee focused on reducing antibiotic prescriptions in low- and middle-income countries.

With nearly 1.4 billion people, India is the world's second most populous country. "India is essential to study because it is the largest consumer of antibiotics in the world, and it's basically a poster child for antibiotic misuse in low- and middle-income countries with similar health-care practices," Gandra explained. "In general, these countries excessively prescribe antibiotics in primary care settings. Therefore, we suspect the pandemic has also spurred inappropriate antibiotic use in many low- and middle-income countries."

Antibiotic use increased despite guidelines from the Indian Health Ministry and WHO urging against antibiotics for mild and moderate forms of COVID-19, which account for more than 90% of the cases. "Antibiotics should only be given to patients who develop secondary bacterial illnesses," Gandra said. "This was not the case, indicating the need for policy changes in India, especially in light of the current crisis and the possibility of a devastating third wave."

In India, an unregulated private sector accounts for 75% of health care and 90% of antibiotic sales, Gandra said. "This allows for antibiotic overprescription," he said. "Low- and middle-income countries tend to skip diagnostic testing for respiratory illnesses because most patients cannot afford it, so they receive antibiotics under the assumption that their illness is bacterial. In the U.S., however, patients with a cold or a cough usually undergo testing for bacterial infections such as strep throat and only receive antibiotics if the tests are positive."

To assess the pandemic's impact on antibiotic use, researchers analyzed

monthly sales of all antibiotics in India's private health sector from January 2018 through December 2020. The data came from an Indian branch of IQVIA, a U.S.-based health information technology company.

Specifically, researchers examined the total sales volume of all antibiotics as well as the individual sales volume for azithromycin. The latter was studied because some countries experienced a spike in azithromycin sales early in the pandemic after observational studies suggested the antibiotic could help treat COVID-19 (subsequent studies disputed the claim).

The researchers determined that a total of 16.29 billion doses of antibiotics were sold in India in 2020, which is slightly less than the amounts sold in 2018 and in 2019. However, when researchers focused on adult doses, usage increased from 72.6% in 2018 and 72.5% in 2019 to 76.8% in 2020.

Additionally, sales of azithromycin for adults in India increased from 4% in 2018 and 4.5% in 2019 to 5.9% in 2020. The study also showed notable increases in the sales of doxycycline and faropenem, two antibiotics commonly used to treat respiratory infections.

The researchers used previously published studies to compare India's antibiotic use with use of such drugs in the U.S. and other high-income countries. In those countries, the researchers found that adult antibiotic use decreased drastically during the pandemic compared with such use in 2018 and 2019.

"It's critical to acknowledge that antibiotic use in high-income countries plummeted in 2020," Gandra said. "People isolated, schools and offices closed, and fewer people got the flu and, overall, stayed healthier compared with the pre-pandemic years. This reduced the overall need for antibiotics, as did canceling dental procedures and outpatient

surgeries.

"India also had restrictions and experienced dramatic decreases in malaria, dengue, chikungunya and other infections typically treated with antibiotics," he said. "Antibiotic use should have gone down, but it didn't. Not only that but antibiotic use increased along with the rise of COVID cases."

After statistically adjusting for seasonality and mandatory lockdown periods, researchers estimated that COVID-19 likely contributed to 216.4 million excess doses of antibiotics for adults and 38 million excess doses of azithromycin for adults from June 2020 through September 2020, a four-month period of peak COVID-19 activity in India. "Our results indicate that almost everybody who was diagnosed with COVID-19 received an antibiotic in India," Gandra said.

Azithromycin is a vital drug for treating typhoid fever, non-typhoidal Salmonella and traveler's diarrhea. "Unnecessary use will lead to resistance among the bacteria that cause these illnesses," Gandra said. "These infections are highly prevalent in India and other low- and [middle-income countries](#) ... and azithromycin is the only effective oral treatment option available for typhoid fever in Pakistan."

Researchers also studied hydroxychloroquine, an anti-malarial drug touted as a potential treatment for COVID-19 earlier in the pandemic. In India, sales of the drug decreased after the government issued an emergency order imposing stronger restrictions on the sale of hydroxychloroquine. Gandra said the Indian government should strongly consider mandating similar restrictions for azithromycin and other antibiotics.

"The most recent wave in India is at least four times the first wave, and preliminary research shows a similar reliance on using [antibiotics](#) to treat

mild and moderate COVID-19 cases," he said. "The medium- and long-term consequences on bacterial resistance patterns are highly concerning, highlighting the need for urgent antibiotic stewardship measures, including mass vaccination."

Provided by Washington University in St. Louis

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