Common prescription drugs (not themselves antibiotics) may increase risk of developing antibiotic resistance

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New research presented at this year's European Congress of Clinical Microbiology & Infectious Diseases (ECCMID) taking place online

(9-12 July), suggests that three commonly prescribed classes of drugs that are not themselves antibiotics—proton pump inhibitors (PPIs), beta-blockers and antimetabolites—could lead to antibiotic resistant infections caused by bacteria from the Enterobacteriaceae family. These antibiotic resistant infections are in turn linked to longer hospital stays and potentially greater risk of death.

The observational study underscores the importance of commonly used non-antimicrobial drugs (NAMDs) as a risk factor for antibiotic resistance, researchers say.

Bacteria are thought to develop antibiotic resistance largely due to repeated exposure through over-prescribing, making recent antibiotic use a key risk factor for drug resistance. But in up to half of patients harbouring drug resistant bacteria when they are admitted to hospital, there is no identifiable risk factor.

Commonly used NAMDs help to treat diseases and manage symptoms of chronic conditions, but they can cause unwanted side effects. A few commonly used NAMDs have recently been found to have a significant impact on the bacterial composition of the gut microbiome. However, the role of NAMD use as a risk factor for infection with antibiotic-resistant bacteria has not been systematically studied.

To address this, researchers examined data from 1,807 adults admitted to a tertiary-level academic hospital in Tel Aviv, Israel between January 1, 2017 and April 18, 2019, with a diagnosis of upper urinary tract infection, and a positive urine or blood culture growing Enterobacteriaceae. Use of 19 non-antimicrobial drug classes prior to hospital admission was retrieved from electronic medical records.

Antimicrobial drug-resistant organisms were identified in over half of patient samples (944/1,807). And multidrug-resistant organisms

(resistant to 3 or more classes of antibiotics) were identified in around a quarter of episodes (431/1,807).

Analyses found that use of seven common drug categories was associated with increased resistance to antimicrobial drugs—SSRIs which help people manage symptoms of depression; typical antipsychotics used to treat mental health conditions such as schizophrenia; Anti 10A inhibitors for stroke prevention in patients with atrial fibrillation; PPIs which reduce the production of stomach acid; beta-blockers which help treat heart problems; and antimetabolites (chemotherapy drugs) commonly used to treat cancers and inflammatory diseases.

The researchers also found that three drug classes (PPI, beta-blockers and antimetabolites) were significantly associated with resistance to third-generation cephalosporins, trimethoprim-sulfamethoxazole, and fluoroquinolones. Antimetabolites appeared to have the strongest impact on antibiotic resistance.

"Our findings highlight the importance of non-antimicrobial drug exposure as a risk factor for antibiotic resistance, says lead author Dr. Meital Elbaz from Tel Aviv Medical Center in Israel. "We urgently need larger studies with more drug classes to confirm the discovery and to clarify the biological link between common prescription drugs and antibiotic resistance."

The authors point out several limitations of their study including that exposure to NAMD was based on medical records, and information about dosage and duration of use was lacking. In addition, for some drugs, the number of patients was too small to achieve statistical significance.

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