

Plain language summary: did the COVID-19 pandemic change the resistance to current antifungal medicines?

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Summary

What is this summary about?

Previous research shows that patients with COVID-19 have a high chance of getting fungal infections. Medicines called antifungals are used to treat fungal infections. However, some fungi are resistant, which means the fungi are not killed by the antifungals and they keep growing, which can make the patients sicker and even die. This is a summary of a study that looked at whether different types of fungi and their resistance to antifungals changed from before COVID-19 to during the pandemic.

What were the results?

We found that some fungi were more common before while others were more common during the pandemic. We also observed that resistance to antifungals did not change much either between fungi collected before and during the COVID-19 pandemic.

What do the results of the study mean?

Knowing which fungal species are resistant to each antifungal can help doctors choose the best treatment. The results from this study may help scientists understand the effect of the COVID-19 pandemic on antifungal resistance.

How to say (double click sound icon to play sound)...

- **Antifungal:** an-tee-FUN-gal
- ***Aspergillus fumigatus:*** a-sperr-JILL-uss few-mee-GAH-tuss
- ***C. glabrata:*** see-gla-BRAH-tah
- ***C. krusei:*** see-crew-SEE-eye
- ***C. lusitaniae:*** see-lew-see-TAN-ee-ay
- ***C. parapsilosis:*** see-pah-RAP-see-low-sis
- ***Candida:*** can-DEE-duh
- ***Echinocandin:*** eck-INE-oh-kan-din
- **Triazole:** try-ah-zole

Where can I find the original article on which this summary is based?

You can read the original article 'Impact of COVID-19 on the antifungal susceptibility profiles of isolates collected in a global surveillance program that monitors invasive fungal infections' for free at: <https://academic.oup.com/mmy/article/60/5/myac028/6576774?login=true>

What is the purpose of this plain language summary?

The purpose of this plain language summary is to help you to understand the findings from recent research. The results of this study may differ from those of other studies. Health professionals should make treatment decisions based on all available evidence, not on the results of a single study.

Who is this plain language summary for?

This plain language summary is for healthcare professionals who treat patients with fungal infections. It is also for patients and their caregivers, but treatment decisions should always be made with the advice of a healthcare professional.

Who sponsored the study?

This study was supported by Pfizer Inc, New York, NY, USA.

Sponsor: A sponsor is a company or organization that oversees and pays for a clinical research study. The sponsor also collects and analyzes the information that was generated during the study.

What you need to know about fungal infections and COVID-19

COVID-19 is a disease caused by a virus that can be very contagious. Most patients with COVID-19 have cold- or flu-like symptoms, but some can get very sick and even die. Patients with COVID-19 have a weakened immune system and so have a higher chance of getting infections caused by fungi.



These fungal infections can lead to worse outcomes in patients with COVID-19, including death. Fungal infections that spread to other parts of the body are called invasive fungal infections, and are caused by yeasts and molds.

Examples of these infections are:

- Aspergillosis, which is caused by *Aspergillus*, a type of mold
- Candidiasis, caused by *Candida*, a type of yeast
- Mucormycosis, caused by the *Mucorales* group, a type of mold

Each type of fungus has many different species.

- For example, *C. glabrata* is a species of *Candida*

Some of these fungi have made treating COVID-19 difficult.

- However, it is not clear which species have been the cause

Medicines called antifungals treat invasive fungal infections.

- Examples of antifungals are echinocandins, azoles and amphotericin B

Fungi can become resistant to antifungals designed to kill them. If resistance occurs, antifungals can't kill all the fungi, and the fungi keep growing.

This study looked at if the resistance to antifungals changed during the pandemic and, if so, how it changed.

How was the study carried out?

This study looked at fungal samples collected as part of the SENTRY Antimicrobial Surveillance Program before COVID-19 (2018–2019) and during the COVID-19 pandemic (2020).

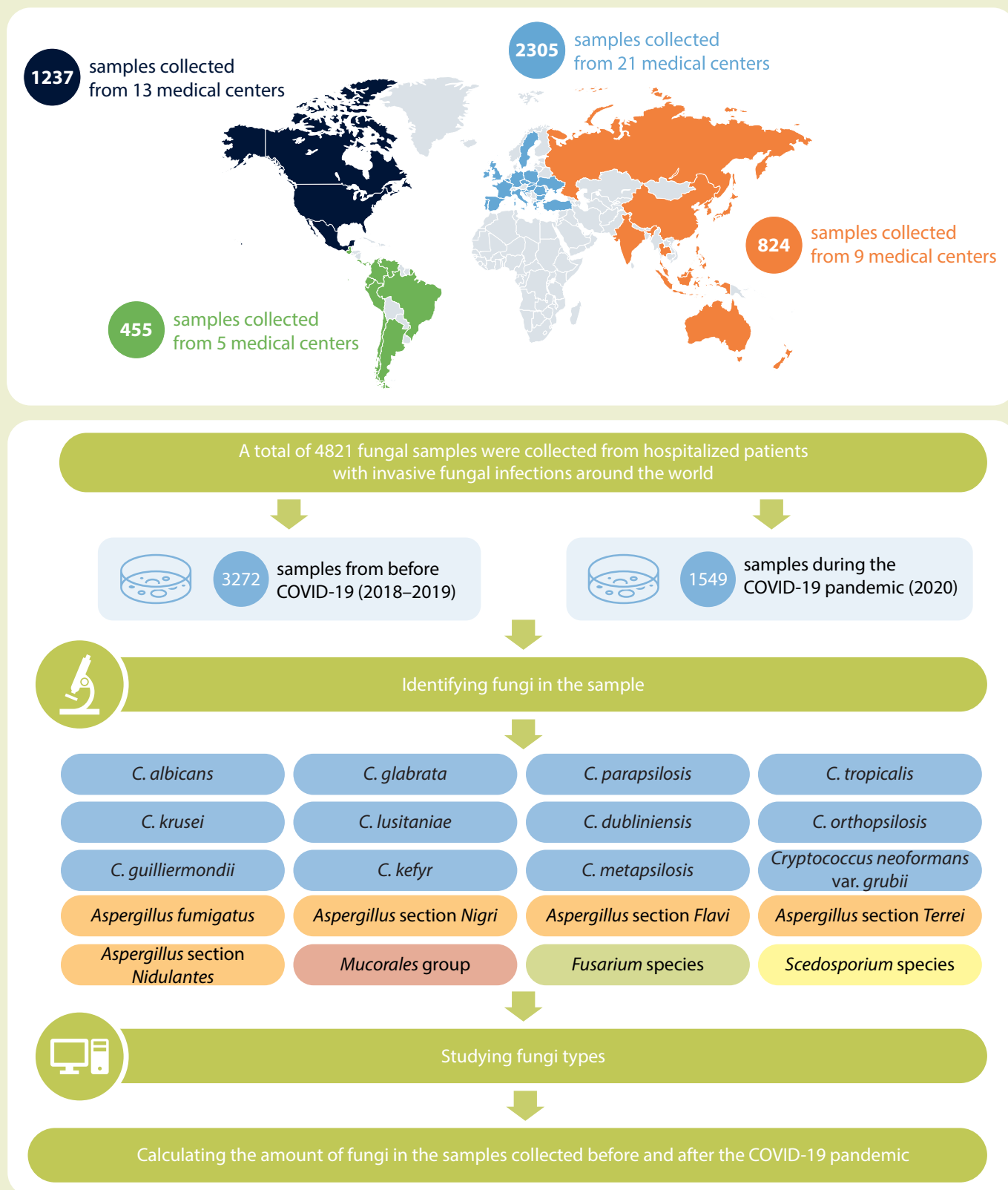
- SENTRY is an antifungal monitoring program that continuously investigates fungal samples collected from patients in hospitals around the world to understand resistance to antifungals
- All the patients had invasive fungal infections, but not all of them had COVID-19
- We did not collect any information about the patients
- A limited number of samples were collected. We don't know if these were from a whole year or part of each year

In this study:

- We looked at the number of different types of fungi present before and during the COVID-19 pandemic
- We looked at whether fungi were or were not resistant to antifungals before and during the COVID-19 pandemic



What happened in the study?



How we studied if resistance to antifungals changed



We tested nine antifungals on 20 different types of fungi in samples collected before and during the COVID-19 pandemic

If the antifungal worked, it would kill the fungus



If the antifungal did not work, it would not kill the fungus



Fungus did not grow, which means it was **not resistant** to the antifungal



Fungus grew, which means it was **resistant** to the antifungal

Note that fungal samples were collected from patients and studied in a laboratory. We did not give antifungals to patients.

Antifungals tested

Azoles

- Fluconazole
- Itraconazole
- Isavuconazole
- Posaconazole
- Voriconazole

Amphotericin B

Echinocandins

- Anidulafungin
- Caspofungin
- Micafungin

What does the study show?

The number of different types of fungi did not change much from before to during the COVID-19 pandemic. The most common fungi before and during the COVID-19 pandemic were *Candida*, a type of yeast, followed by *Aspergillus*, a type of mold.

- The fungal species that increased or decreased the most from before to during the COVID-19 pandemic were *C. glabrata*, *C. krusei*, *C. parapsilosis* and *C. lusitaniae*, which are types of *Candida*, and *A. fumigatus*, which is a type of *Aspergillus*

The percentages of fungal species before and during the COVID-19 pandemic

	Before COVID-19	During the COVID-19 pandemic
<i>Candida</i> species	78.4%	83.4%
– <i>C. glabrata</i>	18.0%	19.2%
– <i>C. krusei</i>	2.6%	3.6%
– <i>C. parapsilosis</i>	14.7%	12.8%
– <i>C. lusitaniae</i>	2.6%	1.4%
<i>Aspergillus</i> species	14.5%	11.0%
– <i>A. fumigatus</i>	63.7%	66.7%

The percentages in the table above indicate the amount of each type of fungi found in the samples out of the total amount of fungi in the samples collected before and during the COVID-19 pandemic.

We did not find any major differences in antifungal resistance between fungal samples collected before and during the COVID-19 pandemic.

The percentages of resistance to antifungals before and during the COVID-19 pandemic

Antifungals	Fungal species	Before COVID-19	During the COVID-19 pandemic
Fluconazole	<i>C. glabrata</i>	5.8%	2.0%
	<i>C. parapsilosis</i>	9.8%	13.9%
	<i>C. tropicalis</i>	0.7%	3.5%
Voriconazole	<i>C. parapsilosis</i>	0.8%	4.2%
	<i>C. tropicalis</i>	0.0%	2.1%
	<i>A. fumigatus</i>	3.6%	2.6%

The percentages in the table above indicate the amount of fungi resistant to antifungals out of the total fungi present in samples collected before and during the COVID-19 pandemic.

Two *Candida* species showed increased resistance to fluconazole and voriconazole during the COVID-19 pandemic. This is important for doctors to know when choosing which medicine to use.

Resistance to the other antifungals tested did not change between the two time periods.

- These included the azoles (isavuconazole, posaconazole and itraconazole), amphotericin B and the echinocandins (anidulafungin, caspofungin and micafungin)

What do the results of the study mean?

We know based on other research that patients with COVID-19 can get invasive fungal infections and become very sick and even die. It is important to know which fungal species are resistant to antifungals to improve treatment decisions.

We observed that some types of fungi were more common before COVID-19 and some others during the COVID-19 pandemic, but there were no important differences.

We also found that antifungal resistance did not change much from samples collected before COVID-19 compared with those collected during the COVID-19 pandemic.

- A few changes were found in the resistance to antifungals, which could impact treatment choices

The results from this study should be taken in context:

- We took samples from hospitalized patients during the COVID-19 pandemic, but that does not mean they had COVID-19. We do not know if the invasive fungal infections led to death
- A limited number of samples was collected, and we do not know if these were representative of the whole year, or just a part of the year
- One study is not enough to guide treatment decisions, especially because the COVID-19 pandemic continued beyond this study, and results can change with time. It is important to look at all the science supporting a treatment

Where can readers find more information on this study?

Pfaller MA, Carvalhaes CG, DeVries S, Rhomberg PR, Castanheira M. Impact of COVID-19 on the antifungal susceptibility profiles of isolates collected in a global surveillance program that monitors invasive fungal infections. *Med. Mycol.* 60(5), myac028.doi:10.1093/mmy/myac028 (2022).

You can read more about fungal diseases and COVID-19 here:

- <https://www.cdc.gov/fungal/covid-fungal.html>

and about antimicrobial-resistant fungi here:

- <https://www.cdc.gov/fungal/antifungal-resistance.html>

You can learn more about the SENTRY Antimicrobial Surveillance Program here:

- <https://www.jmilabs.com/sentry-surveillance-program/>

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Competing interests

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