Antifungal susceptibility testing of clinical *Aspergillus* isolates from Saint Petersburg, Russia

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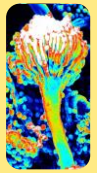

Purpose

Aspergillosis is a severe fungal disease which attacks debilitated people including patients with SARS-CoV-2 infection. Resistance of *Aspergillus fumigatus* clinical isolates to azoles has been reported in Europe and the USA. The aim of this study was to investigate *in vitro* susceptibilities to itraconazole and voriconazole of *Aspergillus* spp. clinical isolates from patients in Saint Petersburg, Russia.

Methods

A total of 107 *Aspergillus* spp. clinical isolates (including 27 from patients with SARS-CoV-2 infection) were studied: *A. fumigatus* – 54, *A. flavus* – 21, *A. niger* – 17, *A. terreus* – 9, *A. ustus* – 2, *A. calidoustus* – 2, *A. sydowii* – 1, *Neosartoria fischeri* – 1. All isolates are deposited into the Russian Collection of Pathogenic Fungi. Antifungal susceptibility testing was performed by the broth microdilution technique according to the EUCAST Definitive document E.DEF 9.3.2.

Results

Voriconazole MICs (mg/l) ranged between 0.06 and 16 against *A. fumigatus,* 0.125 and 0.25 against *A. flavus,* 0.125 and 1 against *A. niger*, 0.125 and 0.5 against *A. terreus.* MICs of this antifungal agent against *A. ustus, A.calidoustus*, *A. sydowii* and *N. fischeri* isolates were 4, 2, 0.125 and 0.25 mg/l correspondingly (Table 1). According to the EUCAST clinical breakpoints only one strain of *A. fumigatus* was resistant to voriconazole (2%). This strain was isolated from a patient with chronic pulmonary aspergillosis without SARS-CoV-2 infection.

Itraconazole MICs (mg/l) ranged between 0.015 and 8 against *A. fumigatus,* 0.03 and 0.5 against *A. flavus,* 0.06 and 2 against *A. niger,* 0.03 and 1 against *A. terreus.* MICs of this antifungal agent against *A. ustus , A. calidoustus*, *A. sydowii* and *N. fischeri* isolates were 8, 8, 0.03 and 0.06 mg/l correspondingly. According to the EUCAST clinical breakpoints only one strain of *A. fumigatus* was resistant to itraconazole (2%). This strain was also resistant to voriconazole.

Aspergillus species	Antifungal agent	MIC (mg/l)										
		0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16
A. fumigatus (54)	VOR	-	-	4	20	19	7	3	-	-	-	1
	ITR	1	3	14	15	4	10	6	-	-	1	-
A. flavus (21)	VOR	-	-	-	15	5	1	-	-	-	-	-
	ITR	-	6	8	5	-	2	-	-	-	-	-
A. niger (17)	VOR	-	-	-	2	7	5	3	-	-	-	-
	ITR	-	-	1	7	3	5	-	1	-	-	-
A. terreus (9)	VOR	-	-	-	7	1	1	-	-	-	-	-
	ITR	-	2	4	1	1	-	1	-	-	-	-
A. ustus (2)	VOR	-	-	-	-	-	-	-	-	2	-	-
	ITR	-	-	-	-	-	-	-	-	-	2	-
A. calidoustus (2)	VOR	-	-	-	-	-	-	-	2	-	-	-
	ITR	-	-	-	-	-	-	-	-	-	2	-
A. sydowii (1)	VOR	-	-	-	1	-	-	-	-	-	-	-
	ITR	-	1	-	-	-	-	-	-	-	-	-
Neosartorya fischeri (1)	VOR	-	-	-	-	1	-	-	-	-	-	-
	ITR	-	-	1	-	-	-	-	-	-	-	-

Table 1. Antifungal susceptibility of 107 *Aspergillus* spp. clinical isolates to two antifungal drugs
VOR – voriconazole, ITR - itraconazole

Conclusion

Resistance rates to voriconazole and itraconazole in clinical isolates of *Aspergillus* spp. in Saint Petersburg, Russia is low (2% in *A. fumigatus* for both antifungal agents).