

Online Supplementary Material

Supplementary Table S1: Characteristics of studied included in the systematic review.

First Author	Country	Time Period of Study	Type of Study	Number of People Affected	Number of Deaths	Diagnosis	Treatment	Outcome
Satish et al [1]	India	March 2020 - Dec 2020	Retrospective Chart Review	25	2	KOH staining of Nasal cavity crusts, CT scan	IV amphotericin (50 mg/day). Debridement once stable	Surgical debridement in 20 people, 5 patients went against medical advice. 1 patient presented one month later with vision loss. 2 patients died on follow up.
Ravani et al [2]	India	Sept 2020- mid March 2021	Retrospective cohort study	31	3	CT imaging	IV Amphotericin B	3 patients died, 28 patients recovered and were alive on follow up
Sharma et al [3]	India	April 2021	Observational study	23	0	CT imaging	Surgical debridement	All recovered except 2 who were lost to follow up
Singh et al [4]	UK, USA, Mexico, Iran, Brazil, France, Italy, Turkey, Austria	May 2021	Systematic Review	101	31	N/A	N/A	N/A
Mehta et al [5]	India	Sept 2020	Case Report	1	1	MRI, nasal biopsy	IV meropenem (1 gm thrice daily), Vancomycin (1gm twice daily), Amphotericin B (0.5mg/kg/day), cessation of steroid therapy	Died on 6 th day of admission
Werthman-Ehrenreich et al [6]	USA	April 2021	Case Report	1	1	Face CT scan, nasal swab culture, MRI of brain	Vancomycin, Piperacillin-tazobactam, Amphotericin B	Died on day 26 of hospitalization.
Sarkar et al [7]	India	April 2021	Letter to Editor	10	4	KOH staining, nasal biopsy,	Amphotericin B, 4 patients received Remdesivir	4 patients died within 1 month of diagnosis, 5 had

								irreversible vision loss, 1 had favourable outcome
Revannavar et al [8]	India	April 2021	Case Report	1	0	Functional endoscopic sinus surgery (FESS), Nasal biopsy, culture	Amphotericin B, aspirin	Showed favourable outcome
Karimi-Galougahi et al [9]	Iran	March 2021	Case Report	1	0	Sino-nasal endoscopy	Insulin, systemic anti-fungal, surgical debridement	Exenteration of the eye, the patient survived
Mekonnen et al [10]	USA	Nov 2020	Case Report	1	1	CT angiography, nasal endoscopic biopsy, Fungal culture	IV vancomycin, cefepime, Liposomal Amphotericin B, glucose management	Died on day 31 of hospitalization
Do Monte Junior et al [11]	Brazil	Nov 2020	Case Report	1	1	Chest CT, esophago-gastro-duodenoscopy	Ceftriaxone, azithromycin, oseltamivir, hydrocortisone	Died 1 week after hospitalization
Garg et al [12]	India	Feb 2021	Case Report & Systematic Review	8 (1 index case)	7	Sputum fungal culture	Liposomal Amphotericin B (3mg/kg)	Index case discharged 54 days after hospitalization and received Amphotericin B on an outpatient basis
Alekseyev et al [13]	USA	March 2021	Case Report	1	0	CT scan and MRI	Multiple surgical debridements, IV abelcet, IV heparin	Discharged to complete course of coumadin and Abelcet
Johnson et al [14]	USA	June 2021	Case Report	1	1	Bronchioalveolar lavage (BAL), fungal culture	IV Liposomal amphotericin B, IV voriconazole, IV vancomycin, IV ceftriaxone	Discharged to long term acute care facility
Veisi et al [15]	Iran	April 2021	Case Report	2	1	Nasal endoscopic biopsy	Amphotericin B, Endoscopic debridement	1 patient died, 1 was managed successfully
Maini et al [16]	India	May 2021	Case Report	1	0	FESS, MRI	IV Fluconazole, IV Amphotericin B	Recovered with minimum deformity
Saldanha et al [17]	India	April 2021	Case Report	1	0	Nasal endoscopy, CT scan	Endoscopic surgery, Amphotericin B (25 mg/day)	Discharged with left eye vision loss
Pasero et al [18]	Italy	Dec 2020	Case Report	1	1	Bronchial aspirate culture, CT scan, sinus biopsy	Amphotericin B (5mg/kg), surgical debridement, Isavuconazole	Died on day 62 of ICU admission
Zurl et al [19]	Austria	Feb 2021	Case Report	1	1	CT scan, post-mortem lung tissue biopsy	Tocilizumab, high dose glucocorticoids	Died on day 24 of symptom onset
Hoenigl et al [20]	India, USA, Pakistan	April 2021	Systematic Review	80	39	Radiologic findings, positive culture, or PCR	Amphotericin B	39 patients died, 19 lost vision,

	France, Iran, Mexico, Russia, Bangladesh, Brazil, Chile, Czech Republic, Germany, Italy, Kuwait, Lebanon Turkey						Posaconazole, Isavuconazole in combination, as salvage or monotherapy	Surgery improved outcome
Krishna et al [21]	UK	April 2020	Case Report	1	1	CT pulmonary angiography, Tracheal aspirate culture, urine culture, Fungal biomarkers, PCR, autopsy	Steroids, continuous venovenous hemodiafiltration, therapy to meropenem and teicoplanin	Died after 20 days of ICU stay
Arana et al [22]	Spain	April & Nov 2020	Case Report	2	0	Facial CT, endoscopic evaluation,	Amphotericin B and an azole, tacrolimus, and posaconazole, surgical debridement, fasciotomy	Recovery in 5 months for patient 1, and in 3 months for patient 2
Nehara et al [23]	India	Nov – Dec 2020	Case Series	5	2	CT paranasal sinus, MRI Brain and orbit, Lactophenol cotton blue and KOH mount	liposomal amphotericin B (5mg/kg/day)	2 patients died, 2 patients had a full recovery, 1 patient lost an eye
Krishna et al [24]	India	April 2021	Case Reports	2	0	CBCT, CT scan, surgical resection	IV liposomal Amphotericin B 5 mg/kg/day, Itraconazole 200 mg, IV liposomal Amphotericin B 250 mg, Posaconazole 300 mg	Full recovery
Rao et al [25]	India	June 2021	Case Report	1	0	MRI, post-contrast scans, MR angiography, endoscopic-guided deep nasal swab	intravenous liposomal amphotericin	Partial recovery with loss of direct and consensual light reflex
Khatrri et al [26]	USA	Feb 2020	Case report and Review	1	1	CT chest	IV liposomal amphotericin B 550 mg/d and posaconazole 300 mg/d, debridement	The patient died on the 175 th day of hospital stay
Waizel-Haiat et al [27]	Mexico	Feb 2021	Case Report	1	1	contrast-enhanced CT, Rhinoscopy	Surgical management	Death due to organ failure
Kanwar et al [28]	USA	Nov 2020	Case Report	1	1	CT chest, blood, and sputum cultures	intravenous (IV) vancomycin, piperacillin-tazobactam	The patient succumbed to cardiac arrest

Sen et al [29]	India	Aug 2020 – Dec 2020	Retrospective Study	6	0	sinus biopsy, deep nasal swab, MRI, CT scan	IV liposomal amphotericin B, posaconazole and surgical debridement	Full recovery of all patients at follow-up
Meshram et al [30]	India	May 2021	Letter to the editor	2	2	MRI-PNS, bronchoalveolar lavage with biopsy	Maxillectomy, IV amphotericin B	Both patients succumbed to death
Miishra et al [31]	India	Aug 2020 – Dec 2020	Retrospective Case Review	10	5	CT PNS and MRI	Local debridement, IV amphotericin B, FESS	1 patient was lost to follow-up, 4 patients died, 4 recovered
Moorthy et al [32]	India	May 2020 – Dec 2020	Retrospective multi-centric study	17	7	CT, MRI of the face, orbits, and brain, KOH test, sinus endoscopy	surgical debridement, maxillectomy, liposomal amphotericin therapy 3–5 mg/kg	10 patients recovered, 7 patients died of which 1 was lost to follow-up
Hanley et al [33]	UK	March – April 2020	Post-mortem study	9	9	Full autopsies, percutaneous biopsy sampling	N/A	Death
Dallalzadeh et al [34]	USA	Jan 2021	Case Report	2	2	Fundoscopy exam, MRI, culture, CT scan	Intravenous amphotericin, isavuconazole, and micafungin, lateral canthotomy, and cantholysis	Died on day 4 of treatment
Placik et al [35]	USA	Aug 2020	Case Report	1	1	Intraoperative samples, CT chest	amphotericin B, surgical resection	Died on day 21
Bellanger et al [36]	France	Dec 2020	Case Report	1	1	Respiratory samples, CT	liposomal amphotericin B	Died after 40 days of admission
Sargin et al [37]	Turkey	Jan 2021	Case Report	1	1	biopsy and culture	Liposomal amphotericin B, debridement, tracheostomy, Colimicin treatment	Died on the 10 th day of hospitalization
Pakdel et al [38]	Iran	June 2021	Cross-sectional	15	7	Biopsy, MRI, CT scan	IV amphotericin B liposomal, oral Posaconazole, IV Caspofungin, sinus debridement	7 patients died, 8 recovered
Buil et al [39]	Netherlands	Dec 2020 – May 2021	Case series	4	3	CT scan, sputum cultures, lung biopsy	liposomal amphotericin B, Voriconazole, Posaconazole, Surgical debridement	3 patients died in ICU, 1 is undergoing antifungal treatment in ICU
Bayram et al [40]	Turkey	March 2020 - Dec 2020	Prospective observational	11	7	CT scan/MRI	intravenous and retrobulbar liposomal amphotericin B, radical debridement	4 patients recovered, 7 died
Rabagilati et al [41]	Chile	May–July, 2020	Retrospective cohort	2	1	CT scan, chest x-ray	Liposomal amphotericin B	1 patient died; 1 patient recovered

Bhavani et al [42]	India	March 2021	Case Report	1	N/A	CT scan/MRI, biopsy	N/A	N/A
Khan N et al [43]	USA	Nov 2021	Case Report	1	1	CT scan	voriconazole 250 mg IV, piperacillin/tazobactam 4.5 g IV	Died on day 17 of hospital admission

Supplementary Table S2: Detailed search strategy

PubMed (276)	("covid 19"[All Fields] OR "covid 19"[MeSH Terms] OR "covid 19 vaccines"[All Fields] OR "covid 19 vaccines"[MeSH Terms] OR "covid 19 serotherapy"[All Fields] OR "covid 19 serotherapy"[Supplementary Concept] OR "covid 19 nucleic acid testing"[All Fields] OR "covid 19 nucleic acid testing"[MeSH Terms] OR "covid 19 serological testing"[All Fields] OR "covid 19 serological testing"[MeSH Terms] OR "covid 19 testing"[All Fields] OR "covid 19 testing"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "ncov"[All Fields] OR "2019 ncov"[All Fields] OR (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "cov"[All Fields]) AND 2019/11/01:3000/12/31[Date - Publication]) OR ("sars cov 2"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[All Fields])) AND ("mucormycosis"[MeSH Terms] OR "mucormycosis"[All Fields] OR "mucormycoses"[All Fields] OR (("african continental ancestry group"[MeSH Terms] OR ("african"[All Fields] AND "continental"[All Fields] AND "ancestry"[All Fields] AND "group"[All Fields]) OR "african continental ancestry group"[All Fields] OR "black"[All Fields] OR "african americans"[MeSH Terms] OR ("african"[All Fields] AND "americans"[All Fields]) OR "african americans"[All Fields] OR "blacks"[All Fields] OR "blackness"[All Fields]) AND ("fungi"[MeSH Terms] OR "fungi"[All Fields] OR "fungus"[All Fields] OR "fungis"[All Fields] OR "microbiology"[MeSH Subheading] OR "microbiology"[All Fields]))))
PMC NCBI (1325)	((("COVID-19"[All Fields] OR "COVID-19"[MeSH Terms] OR "COVID-19 Vaccines"[All Fields] OR "COVID-19 Vaccines"[MeSH Terms] OR "COVID-19 serotherapy"[All Fields] OR "COVID-19 Nucleic Acid Testing"[All Fields] OR "covid-19 nucleic acid testing"[MeSH Terms] OR "COVID-19 Serological Testing"[All Fields] OR "covid-19 serological testing"[MeSH Terms] OR "COVID-19 Testing"[All Fields] OR "covid-19 testing"[MeSH Terms] OR "SARS-CoV-2"[All Fields] OR "sars-cov-2"[MeSH Terms] OR "Severe Acute Respiratory Syndrome Coronavirus 2"[All Fields] OR "NCOV"[All Fields] OR "2019 NCOV"[All Fields] OR (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "COV"[All Fields]) AND 2019/11/01[PubDate] : 3000/12/31[PubDate])) OR ("sars-cov-2"[MeSH Terms] OR "sars-cov-2"[All Fields] OR "sars cov 2"[All Fields])) AND ((("mucormycosis"[MeSH Terms] OR "mucormycosis"[All Fields]) OR (("african continental ancestry group"[MeSH Terms] OR ("african"[All Fields] AND "continental"[All Fields] AND "ancestry"[All Fields] AND "group"[All Fields]) OR "african continental ancestry group"[All Fields] OR "black"[All Fields] OR "african americans"[MeSH Terms] OR ("african"[All Fields] AND "americans"[All Fields]) OR "african americans"[All Fields]) AND

	("fungi"[MeSH Terms] OR "fungi"[All Fields] OR "fungus"[All Fields])) AND ("0001/01/01"[PubDate] : "2021/06/30"[PubDate])
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Supplementary Table S3: Total number of cases of COVID-associated mucormycosis (CAM) by countries.

Country	Number of CAM cases
India	138
Iran	18
Turkey	12
USA	10
UK	10
Netherlands	4
Chile	2
Spain	2
Austria	1
France	1
Brazil	1
Mexico	1
Italy	1

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