

Introduction

- India contributes to the highest number of mucormycosis cases across the world
- It is due to its climatic conditions and presence of large number patients with uncontrolled diabetes mellitus, the major predisposing factor for mucormycosis
- India has been hard-hit by the COVID-19 pandemic and thus was expected to have a large number of COVID Associated Mucormycosis (CAM) cases.

Diagnosis of Mucormycosis

A case of mucormycosis was defined as one consistent with

- clinical and radiological findings and corroborating visualization of broad aseptate, ribbon like fungal hyphae in the direct microscopy of tissue or sterile body fluids of a patient or
- histopathology specimen by fungal stains, or
- zygomycetes fungi isolated on culture.

Aims & Objectives

To evaluate among the CAM patients:

- the epidemiology,
- risk factors,
- cumulative mortality and
- factors affecting outcome

Material & Methods

- A retrospective, non-interventional, observational study of the CAM patients, was conducted.
- It involved three tertiary health care centres in Hyderabad, India.
- The details of the 217 confirmed CAM cases reported during April 15-June 5, 2021 were collected and the patients were followed up for 6 weeks.
- Statistical analysis was conducted using the student t test or the Wilcoxon ranksum test the analysis of variance (ANOVA), chi square & Fisher's exact test.

Results

Risk factors with respect to the COVID-19 severity in patients with mucormycosis

COVID-19 severity	High dose steroids		Diabetes		Immunomodulators**	Lymphopenia	Higher antibiotics	No risk
	N (%)	Duration [†]	Uncontrolled*	Ketoacidosis				
Mild (n=21)	17 (81%)	5 (2)	16 (76%)	3 (14%)	0	20 (95%)	14 (67%)	0
Moderate (n=83)	72 (87%)	7 (4)	63 (76%)	12 (14%)	1 (1%)	63 (76%)	49 (59%)	0
Severe (n=100)	91 (91%)	9 (3)	83 (83%)	10 (10%)	10 (10%)	76 (76%)	81 (81%)	0
Not available (n=13)	0	--	11 (85%)	2 (15%)	0	10 (77%)	0	0
Total	180 (83%)	8 (5)	173 (80%)	27 (12%)	11 (5%)	169 (78%)	111 (51%)	0

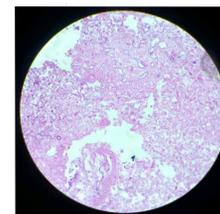


Figure 2a. Histopathology (400x) Image shows broad, aseptate, thick walled fungal hyphae in necrotic tissue.

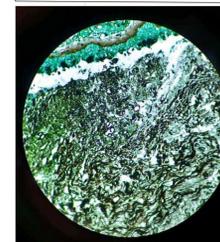


Figure 2b. GMS stain highlighting fungal hyphae in black colour

Comparison of demographics, risk factors, and outcomes of mucormycosis involving different sites

Variable	Nasal Sinus (n=95)	Orbital extension (n=84)	Pulmonary (n=25)	Other sites* (n=13)	P value
Age (37-54 years)	42 (44%)	52 (62%)	11 (44%)	4 (31%)	0.09
Age >55 years	39 (41%)	28 (33%)	12 (48%)	7 (54%)	
Gender (% men)	74 (78%)	71 (85%)	20 (80%)	12 (92%)	0.49
Time since COVID-19 recover (days)	14.9 ± 8.7	14.5 ± 8.6	18.3 ± 11.1	17.4 ± 10.7	0.39
% Severe COVID-19	44 (46%)	41 (49%)	11 (44%)	4 (31%)	0.15
% High dose steroid	76 (81%)	78 (93%)	19 (76%)	8 (62%)	0.004
% With Diabetes	72 (76%)	74 (88%)	20 (80%)	11 (85%)	0.83
% Uncontrolled diabetes	71 (75%)	63 (75%)	20 (80%)	7 (54%)	0.02
Treatment, % L-AmB + Posa	63 (66%)	52 (63%)	17 (68%)	9 (69%)	0.79
Death	8 (8%)	9 (11%)	6 (24%)	8 (62%)	<0.001
Cumulative death rate at 1month (and 95% CI)	9.9% (4.9 – 19.3%)	11.4% (6.1 – 20.8%)	22% (9.6 – 45.8%)	63.1% (37.9 – 87.5%)	0.02
Time to death (days)	26.3 ± 13.1	25.2 ± 13.8	24.6 ± 16.1	13.3 ± 8.9	0.01



Figure 1a. Black ulcerative lesion at ileocaecal junction.



Figure 1b. Left maxilla and buccal mucosa showing large ulcer with necrosis and teeth loosening.

Discussion

- Rhino-orbital mucormycosis :commonest form of CAM
- Uncontrolled diabetes mellitus, hypoxemia due to COVID-19 and inappropriate use of glucocorticoid drugs :independent risk factors for the development of CAM.
- Hypoxemia due to COVID-19 requiring mechanical ventilation, associated with a higher risk of death

Conclusion

The factors influencing mortality included site of involvement of CAM, and timing of administration of appropriate surgical and medical management

Reference

Hoeningl Martin,, et al.; ECMM Collaborators,ISHAM. (2021). The emergence CAM: Analysis of cases from 18 countries.