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**Dr. SGS Chakravarthy**  
Associate Professor,  
Department of Medicine;  
NHRIMH, Kottayam, Kerala,  
India

**Dr. P Dastagiri**  
Research Officer/Scientist- I;  
NHRIMH, Kottayam, Kerala,  
India

**Dr. Kaushal Kumar Savera**  
Research Officer/Scientist- I;  
NHRIMH, Kottayam, Kerala,  
India

**Corresponding Author:**  
**Dr. SGS Chakravarthy**  
Associate Professor,  
Department of Medicine;  
NHRIMH, Kottayam, Kerala,  
India

## Mucormycosis and its homoeopathic management

**Dr. SGS Chakravarthy, Dr. P Dastagiri and Dr. Kaushal Kumar Savera**

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### Abstract

COVID -19 Pandemic, which initially occurred in the city of Wuhan, Hubein Province of China, is rapidly spreading worldwide and showing Immediate or Delayed Complications and is a challenge to the entire medical fraternity. To combat the complications like Cytokine storm, Intravascular Thrombotic phenomenon, Life-threatening Pneumonia, ARDS, Respiratory failure, or Cardiac arrest, Conventional Medicines such as Antibiotics, Antivirals, Steroids and Multivitamin Supplements were used out of necessity in view of saving lives which lead to many serious adverse Drug events like Severe Prostration, Immunosuppression and Opportunistic Infections. One the Recent Serious opportunistic events reported in many parts of India is Mucormycosis, popularly known as Black Fungus. Though Mucormycosis is often seen in Diabetics, Immunocompromised persons and Patients on Aggressive usage of Steroids, It is especially now projected in many COVID or Post COVID Syndrome cases, which manifest as Rhinocerebral, Pulmonary or *GastroIntestinal* forms. This Infection needs immediate medical intervention to prevent Haematogenous spread and invasion to other vital organs, which lead to Multi-organ failure. The Medicines like Amphotericin-B and Potassium Iodide is frequently used to treat Mucormycosis, and Surgical Procedures like Maxillectomy may follow in emergency cases. Since the Medication Amphotericin -B has disadvantages of causing Nephrotoxicity, though used with the utmost care, Homoeopathic Medicines can be utilised as Alternative treatment or as an adjuvant for a speedy recovery. This article discusses Mucormycosis and its management by various Homoeopathic Medicines such as Kali Group of Remedies, Silicea, Thuja, Lycopodium, Nitric acid, etc. evidenced to have antifungal effects by various laboratory experiments and provings.

**Materials and Methods:** The literature on Mucormycosis, its causation, treatment administered, and role of Homoeopathic Remedies like Kaligroup, Silicea, Thuja, Lycopodium, Nitric acid from available Materia Medica and Repertories and Radar Software.

**Conclusion:** The Second Wave of the COVID Pandemic is uncontrollable due to the Mutations of the virus, its virulency, Rapid spread, lack of Public awareness, Lack of proper treatment at the Right time due to scarcity of Hospital Beds, lack of adequate Oxygen, and superadded opportunistic Infections like Mucormycosis. Homoeopathic Medications like Kaligroup remedies, Silicea, Thuja, Arsenic album, Lycopodium, Nitric acid etc. aid in the treatment of Mucormycosis without any adverse events.

**Keywords:** Mucormycosis, causation, complications, homoeopathic remedies.

### Introduction

COVID -19 Pandemic, one of the rapidly spreading infectious diseases, has shown many medical world challenges. Its virulence on the Human body triggers a Cytokine storm leading to Intravascular Thrombotic phenomenon, ARDS, Respiratory failure, Cardiac arrest, Multi-organ failure, and even Sudden death. The COVID-19 is also associated with bacterial and fungal confections due to the associated comorbidities and immunocompromised conditions (e.g. corticosteroid therapy, ventilation, intensive care unit stay) and prone to developing severe opportunistic infections. To combat the rapid progress of illness, Antibiotics, Antivirals, Steroids and Multivitamin Supplements were used in Excess, out of necessity in view of saving lives, leading to many serious adverse Drug events. One of the recent reported Opportunistic Infection in COVID syndrome is Mucormycosis which was emerging slowly in all Hospitals across India [1].

Mycoses is a Fungal Infection contributed by various Environmental and Physiological conditions usually caused by the Inhalation of Fungal spores or localized Colonization of the skin.

**Classification:** Mycoses are classified according to the tissue levels initially colonized. The clinical nomenclatures used for the Mycoses are based on the Site of the Infection (Superficial - Tinea, Ringworm); Route of acquisition of the Pathogen (Airborne); Type of Virulence exhibited by the Fungus, i.e.

Primary pathogens (Starts in Lungs and spreads to other parts); Opportunistic Pathogens (AIDS, Immunosuppressive therapies, Cancer etc.) Ex: Candidiasis, Cryptococcosis, Aspergillosis, Zygomycosis, Phaeohyphomycosis, Hyalohyphomycosis [2].

The class Zygomycetes is divided into Mucorales and Entomophthorales. Genera from the order Mucorales (Rhizopus, Mucor, Rhizomucor, Absidia, Apophysomyces, Cunninghamella and saksenaea) cause Mucormycosis. This Mucormycosis can be Rhinoorbitocerebral, Pulmonary, cutaneous, Disseminated or *GastroIntestinal*.

This group of Molds present itself particularly in soil and decaying organic matter. It causes Infection when a person comes in contact with the fungal spores through any type of skin trauma. Pulmonary Mucormycosis is the most common type in people with Cancer, Organ transplant, or stem cell transplant. *GastroIntestinal* Mucormycosis is more common among young children-premature and low birth weight infants with a history of Antibiotics, Surgery or prolonged Medications. The cutaneous type occurs through a break in the skin like Surgery, burns etc. The Fungus causing Mucormycosis are Rhizopus Species, Mucor Species, Rhizomucor Species, Syncephalastrum, Apophysomyces, and Lichthemia Species [3].

The Rhinocerebral Mucormycosis is an Infection of the sinuses and spreads to the brain through Schneiderian Membrane and is frequently seen in people with diabetes and Immunocompromised Hosts. The usual port of entry is the nose. It proliferates and spreads to the Paranasal sinuses and then to the orbit by direct extension or Intravascular dissemination and also spreads to the cavernous sinus, leptomeninges and frontal lobe, causing extensive Ischemic necrosis, which leads to cord-like Supraorbital and supratrochlear veins swelling, which leads to increase in size and later burst forming a sinus [4].

In a single Institutional observational study on Mucormycosis, it is evidenced that Rhinoorbitocerebral (48-55%) Cutaneous (13%-15%), Pulmonary (7-17%), disseminated (5%-12%), *GastroIntestinal* (5%-13%), Isolated Renal (5%-14%) types have shown their occurrence. Likewise, in a meta-analysis of all the zygomycosis cases reported from India, Diwakar *et al.* describe an overall prevalence of ROC (58%), cutaneous (14%), pulmonary (6%), disseminated (7%), *GastroIntestinal* (7%) and isolated renal (7%). This is consistent with the global trend, wherein pulmonary and sinus infections (with/without central nervous system involvement), followed by cutaneous type, be the most prevalent. Among them, it is observed that Diabetics developed Rhino-orbitocerebral and Pulmonary Mucormycosis [5].

Usually, fungal sinusitis is often misdiagnosed disease of Paranasal Sinuses are associated with a high rate of morbidity and mortality, warrant urgent medical and surgical intervention. Therefore, it is classified by Ferguson BJ into Noninvasive Disease (Saprophytic Fungal Infection, Sinus Fungal ball, Allergic fungal Rhinosinusitis) and Invasive Disease (Acute Fulminant Invasive Fungal Sinusitis, Chronic or Indolent Invasive Fungal Sinusitis, Granulomatous Invasive Fungal Sinusitis).

**Assessment of a Mucormycosis patient for a treatment Protocol:** The patient must be assessed for H/o COVID Infection or Current COVID Infection; History of Diabetes

(Controlled/Uncontrolled), History of or Currently on Steroids, Diabetic Ketoacidosis, Persistent Neutropenia, Desferoxamine therapy (chelator), Haematological Malignancies, illicit use of Intravenous drugs, Autoimmune disorders, Prophylaxis with voriconazole or Echinocandins, and the breach of Cutaneous or mucous membrane barrier due to trauma, burns and surgical wounds and check for any Orbital Involvement or Intracranial Extension [6].

There are various causative factors for Mucormycosis that can be explained as:

**Hyperglycemia:** High Glucose impairs Chemo taxis, Fungicidal mechanisms and increases GRP78 (Endothelial Receptor) expression for the ligand (Spore-coating protein Homolog) used by the agents that cause Mucormycosis.

Hyperglycemia directly does not produce diplopia, but Invasive Mucormycosis, particularly involving the ethmoid sinus, may breach the lamina papyracea and invade the Medial Rectus Muscle Ethmoid Cavernous sinuses, encroaching on cranial nerves III, IV, V and VI. A necrotic eschar in maxillary, facial, or Sino-Orbital tissues in an immunocompromised host may also be an early sentinel marker of invasive Mucormycosis [7].

A study showed that the incidence of Mucormycosis is in constant decline as Statins frequently prescribed for Diabetic patients shows some evidence of Anti-Zygomycetes and fungicidal activity against Glomeromycota also act synergistically with other antifungal agents like voriconazole [8].

1. **Iron:** A study by Artis *et al.* have shown that Diabetic Keto Acidosis (pH<7.4) inhibits transferrin's capacity to bind iron, allowing *Rhizopus* spp. to utilise it for growth *in vitro*. The Mucorales also utilise endogenous iron through siderophores or iron permeases for enhancing their virulence. The Diabetics have also Impaired Neutrophil & Macrophage functions [9,10].

**Zinc:** The supplements in Allopathic Medications contains a rich amount of Iron, Zinc etc. were added up to almost every Prescription. The Zinc in the body Influence the mechanisms of Funga pathogenesis by direct association with virulence determinants (Metalloproteinase) and also the regulation of expression of many proteins required for Infection [11].

**Steroids:** Glucocorticoids include (Cortisol, Corticosterone, and Cortisone) at the cellular level, account for most of the physiological characteristics. Mineralocorticoids (Aldosterone) play a vital role in the maintenance of fluid and Electrolyte balance [12].

These drugs at Supraphysiological doses reduce the synthesis of Pro-inflammatory cytokines, T-cell function, and antibody Fc receptor expression (which activate anti-inflammatory and Immunosuppressive processes. Usually, to control the severe Immune-mediated damage of Lung tissue by COVID, High doses of Steroids drugs like Dexamethasone, when administered, binds to the membrane-associated GR on T cells leading to effects like T-cell impairment, Receptor signaling disturbances [13].

T Lymphocyte-Mediated Immune response, and also the Steroid interacts with the movement of Ca<sup>2+</sup> and Na<sup>+</sup> across the cell membrane, resulting in a rapid decrease in inflammation [14].

The WHO and Centers for Disease Control and Prevention

(CDC, USA) advise them against using steroids in COVID. However, the multinational Surviving Sepsis Guideline in COVID-19 recommends giving steroids in patients with severe COVID-19 on mechanical ventilation with ARDS to treat suspected adrenal insufficiency associated with sepsis with refractory shock, but against the use of corticosteroids in COVID associated Non-ARDS patients on Mechanical Ventilation. Judicious use of corticosteroids has been shown to improve parameters like reduction in duration of hospital stay, prevention of worsening of the ventilator parameters, progression to ARDS, and death, quicker normalization of Pyrexia and improvement in the status of oxygenation, reduced incidence of intubation and subsequent ventilation. Long-term glucocorticoid therapy has displayed significant improvement in indices of alveolar-capillary membrane permeability and mediators of inflammation and tissue repair [15].

While in Steroid Treatment the outcomes measured are Respiratory rate, ventilation free days, Days in ICU, Sequential Organ Failure Assessment score (SOFA) SCORE, Murray Lung Injury Score, National Early Warning Score2, No. of Patients with Treatment Failure, Rate of Remission & Progression, Blood Oxygen Saturation, Chest X-ray, Steroid adverse effect and Toxicity Monitoring. According to the study Low dose Corticosteroids do not seem to have a significant impact on the duration of SARS-COV-2 Viral shredding [16].

**Management of Mucormycosis:** The treatment of Mucormycosis consists of Amphotericin-B (AmB) is stable in 5% dextrose in water. Parenteral AmB preparations contain phosphate buffer, and also the drug is precipitated by i.v. Electrolyte solutions contain calcium (Jurgens *et al.*, 1981). The AmB induces Hypokalemia which is potentiated by corticosteroids which (Hypokalemia) in turn, potentiates digoxin toxicity, Rhabdomyolysis and also may enhance the effects of non-depolarising muscle relaxants [17].

### Homoeopathic management for mucormycosis Prophylaxis

In the Homoeopathic system, Prophylaxis is prepared from Nosodes derived from products of the disease-causing organism. When taken internally in repeated doses, these Nosodes stimulate the formation of protective antibodies by causing different cells to multiply in our system to enable it to combat the disease. Dr Chavaven of Paris proved that one dose of Diphtherinum in its 4m Potency produced a Negative schion test for 1.5 years, two doses for 2.5 years and 8m for 4.5 years. International Homoeopathic Research Council Geneva researched Influenza virus stains from Influenza lab, and potentised 30 potencies and administered. Nearly 85% of cases were successful in preventing influenza every year.

A vaccine is a morbidic stimulus that changes the resonant frequency of the defence mechanism. Vaccination is not really an example of the Homoeopathic principle, since it is an indiscriminate administration of a substance to the entire population without regard to individualisation [18].

### Homoeopathic remedies

There are many Homoeopathic Remedies for various Infectious diseases, including the recent ongoing COVID Pandemic. As there are many side effects (Mucormycosis) of steroids, Antibiotics, Multivitamins, and risk of

Nosocomial Infections in Prolonged admissions, Homeopathic Remedies can be considered Alternative or adjuvant to Conventional System.

Here in this work, Various Remedies related to Cause, clinical features of Mucormycosis from all the available literature, i.e. Materia Medica textbooks, Repertories and available software, are considered and discussed.

### Antifungal effects of Homoeopathic Medicines

A study conducted on the Antifungal effect of Homeopathy drugs of Sulphur Iodatum 1M and Petroleum 30 against the cellulolytic fungi *Garg reported Aspergillus niger*. Dua and Atri *et al.* has reported the Fungitoxic effect of the drug Lycopodium against *Alternaria solani*. *Thuja* and Natrum Muriaticum were found to be effective on *Fusarium* spp. as reported by Hussain *et al.* Khanna, and Chandra investigated the control of tomato fruit rot caused by *Fusarium roseus* with Homoeopathic drugs Kali Iodatum (149CH) and *Thuja occidentalis* (87CH) in pre and post-harvest conditions and obtained significant results. Gupta *et al.* has reported that the methanolic extract of *Thuja* has good activity against clinically isolated fungi. Jahan *et al.* described the antifungal activity of *Thuja Occidentalis* extracts against *Saccharomyces cerevisiae*, *A. parasiticus*, *Trichophyton rubrum*, *Macrophomina*, *F. solani* and *Candida albicans*. Gupta *et al.* has stated that *Thuja* 30, 200 and 10M are very effective against pathogenic isolate *Curvularia lunata*. *Thuja* 10 M and *Thuja* Q inhibitory and Fungicidal activity against *Bipolaris* isolates. No definite co-relation exists between various potencies of the same Homeopathic drug concerning their antimycotic properties [19].

Homoeopathic Remedies from various Repertories related to Mucormycosis are:

#### Boericke

Actinomycosis: Hecla, Kali.iod, Nit. ac.  
Tumours - Fungoid - Thuja  
Skin - Ulcers with Fungus growths - Mur. acid

#### BBCR

Nose Bleeding Black - Crocus, Crotalus, Kreosote, Nitric acid, Mercsol  
Fungus Haematodes - EYES -- BELL, CALC, LYC, SEP, SIL  
SKIN- ulcers - Spongy - Fungoid - margins at - CARB-AN, ARS, LACH, SIL, Merc, Sep, Phos, Staph, Thuja

#### Chaudhary

Epithelioma - Fungus - CALC, PHOS, SIL, THUJA

#### Clarke

Clinical repertory - Fungus Haematosi - LACH, PHOS  
Actinomycosis - Kali.Iod, NIT.ACID

#### Kent

EYE- Cancer - Fungus - CALC, PHOS, Lyc, sep, sil.

#### Murphy

Cancer - Fungus Growths - Spongy - Carb.an, Lach, Nit.ac, Thuja  
Ulcers -Generals - Fungal - ARS, SEP, THUJA  
Clinical - Ulcers general unhealthy bleeding Fungus - Merc, Nit.ac, SIL

Actinomycois - Mouth - Iodum

Skin - Kali Iod, Nit.acid Steroids - Abuse of - Cortisol, Merc, Sepia. Vaccinations - Preventive - Prophylactic Side effects for - Hyper, LED, Sil, Thuja (2) Clinical Chapter: Mycosis: Calc, Calc-sil, SILICEA, syc

### Phatak

Mouldy or Musty - Silicea (1) Sinuses - Affections of - Kalibich, Kali iod, Hydrastis, Merc, Phos Neglected Pneumonia - Lycopodium, Silicea, Sulphur

### Pulford Pneumonia

Neglected cases of Pneumonia: Silicea

Inflammation - Sinuses Infection after - Morgan, Syco.

### Synthesis

Mycosis Fungoides - Carbo animalis Mouth thrush Chemotherapy after - LACH

Generals - Fungoid Diseases - Kali.Iod

Eyes - Fungus - CALC, PHOS, Lyc, Sep, Sil

**Never well been since Influenza** - Carboveg, Influenzinum, Typhoidinum, Kalicarb, Lathyrus.

### Kali Group of Remedies

Allopathically the Kali Remedies have been used in Chemistry and Medicine i.e. Kali. ars (Diuretic, Complexion clearer), Kali bichromicum (Antiseptic for wounds), Bitartrate as saline purgative), The Iodide for syphilis, the Nitrate for Fevers, and the Permanganate as an oxidising agent and solvent of tumours and the effect products left in the tissues after acute inflammatory infections [20].

Normal serum potassium levels range from 3.5 to 5 mEq/L; and it is influenced by certain hormones, illnesses, and dietary deficiencies that can lead to imbalances, including acid-base disturbance, aldosterone, insulin, catecholamines, and tonicity of body fluids, as well as *GastroIntestinal* (GI) and Renal Excretion.

It is highly reactive and Hygroscopic, shows Hydrogenoid constitutional Properties. Hypokalemia is defined as a serum potassium concentration of less than 3.5 mEq/L and is one of the most commonly encountered Electrolyte abnormalities in clinical practice. Combinations of thiazide diuretics with Calcium-channel Blockers, Renin-angiotensin System Inhibitors or Beta-blockers were strongly associated with increased Hypokalemia within 90days of treatment Initiation regardless of Potassium Supplementation [21].

Hypokalemia affected by Hypoxia and Hyperventilation produces acidosis in fluid secretions leading to an acidic environment, leading to opportunistic infections.

The Potash salts affect the Bronchial tubes predominantly than the Lung parenchyma-- Therapeutics of New Remedies - EHALE.

In old Nasal Catarrhs, when the discharge becomes bloody and fetid, Iodide of Arsenic together with Douche, Glycerine and water effectively cure.

"Never use salts of potash when there is fever" - Allen.

### Potassium iodide

KI is considered the Gold standard in cases of entomophthoromycosis, which is said to enhance the Proteolytic activity of the Myeloperoxidase enzyme system of the neutrophils. However, the direct action of KI on the Fungus has been denied, and the activation of macrophages

by Iodine has now been assumed to be responsible for the healing effect.

It has been successfully used in cases of sporotrichosis, human pythiosis, *Nocardia brasiliensis*, cutaneous cryptococcosis, rhinophycomycosis, panniculitis, neutrophilic dermatoses, Wegener's granulomatosis, erythema multiforme, Behcet's syndrome, and disseminated granuloma annulare. Contraindications include known hypersensitivity to KI, hypocomplementemia vasculitis, dermatitis herpetiformis, nodular thyroid diseases (e.g., multinodular goitre), and active tuberculosis [23].

A patient diagnosed with subcutaneous mucormycosis and treated with a saturated solution of potassium iodide. Both the lesions wholly disappeared within ten weeks without any side-effect of the therapy [23].

Few cases of Nasosinusal Fungal Granuloma received Oral Steroids, Cotrimoxazole, and Oral Potassium Iodide or Intravenous Amphotericin in case of relapse. Both the cases of Fusariosis recovered completely with oral ketoconazole [24]. Potassium Iodide exerts its effects directly on *Sporothrix spp.*, yet the exact mechanism of action remains unproven. Leading theories suggest that human Polymorphonuclear cells convert potassium iodide to iodine via the action of Myeloperoxidase. Iodine inhibits fungal germination and reduces structural integrity through the intracytosolic destruction of structural components [25].

### Homoeopathic Kali IOD as a remedy

Kali Iod - 6X is given as preventive for Colds and Influenza- Hesselton.

Acrid watery coryza, Air hunger, Actinomycois - Boger.C It is used in Dry hacking cough followed by greenish expectoration. - Hempel. J.

### Nash Leaders in Respiratory Organs

- It is preferable, especially in those cases abused by Mercury. Where there are Coryza with Tenacious Greenish black discharges with foul-smelling. (NASH).
- Peculiar irritating effect on mucus membrane, Eyes, causing Catarrhal inflammation of Schneiderian membrane.
- Dr Ringer says the peculiarity of action lies on the mucus membrane of the eyes, nose. etc.
- The Iodide produces specific action on the Mucus membrane, causing detachment of lining of Epithelium and augmented flow of saliva.
- Rattling of Mucus in the chest with Edema of lungs - N.M. Chaudary
- Iodide of Potash acts in different forms of Fungoid diseases (Thrush, Ringworm)
- Expectoration like soap suds, greenish. Pneumonia when Hepatization commences. Pneumococcic Meningitis.
- Profuse flow of clear watery Coryza, Greenish black and decomposed matter, with swelling of Frontal bones.
- It is a Specific remedy for Ringworm, Thrush, Actinomycois; it removes the Mercury and leads deposits from the body; hence it acts as an antidote to Mercury and harmful effects." when Iodide of potassium reaches the tissues, it is decomposed, and free Iodine liberated. The presence of protoplasm and carbonic acid is all that is necessary to effect this change." Also, "that only a small proportion of the Iodine undergoes this decomposition, the more



significant part escaping unchanged by the urine, and, therefore, unless it has destructive work to do, is wasted [26].

- Influenza and its Resulting debility - Catarrh, Cold and Influenza; Bronchitis - after effects - Kali. IOD [27].

#### **Kali Bich**

- Kali Bich involves the sinuses and antrum rather than the septum. (NASH)
- Kali Bich is always indicated in post Influenza Weakness and action on Sinuses - BHATIA -V, Influenza, and Homoeopathic Treatment.
- Its carious effects upon the bones destroy the cartilage, Great pain and tenderness at the junction of cartilage and bones and causes loss and finally, it loses its sensibility losing smell for years. (W.H.BURT)
- Anaemia and absence of fever are characteristic. Excessive amount of Mucus turns into Fibrinous exudate, forming false Membrane; Caries of Nasal bones with significant loss of smell and Foetid discharges; Indicated in Capillary Bronchitis.
- Formation of Pseudo membranes and formation of elastic plugs in the Bronchioles; For Chronic Colds in the head, no other remedy suits as it does [28].

**Kali Carb:** Dr Bayes recommends it in Chronic Nasal catarrh, Ozena. Hahnemann says that this Antipsoric can successfully treat the Ulcerative Pulmonary Phthisis.

**Kali Mur:** The molecular motion of potassium chloride in equilibrium maintains clot formation and its lysis. The lytic activity modifies the coagulation process preventive excess or continued clotting by the normal molecular motion of this salt. At the Physiologic level, it causes Apoplexy, Thromboembolic phenomenon, swelling of lymphatic glands in infectious diseases, Pneumonia, Pleurisy, fibrinous exudations in the lungs, Pneumonia [29]. The Toxicological effects of Potassium chloride powder causes respiratory tract irritation and delayed pulmonary Edema when inhaled, and *GastroIntestinal* discomfort with nausea, vomiting and diarrhoea when ingested [30]. Homoeopathic Kalimur destroys the body wastes and must be given during the convalescence and rebuilding of the health. It retards the further secretion mechanisms of the body and builds nitrogenous protein fibre fibrin. It is the most useful when inflammation starts receding, and the membranes are thickening [31]. The fibrin is distinguished from albumen and its casein by separation. The normal amount of fibrin is not held in the proper solution without KCL. It causes fibrinous exudation (chemically related to fibrin) and dissolves greyish-white secretions of mucus membranes and plastic exudations.

**IODUM:** In a profuse dark discharge from the nose, without constitutional symptoms, occurring in a child after exposure to Contagion like diphtheria, when other indicated remedies fail, the first dilution of Kali Iod may effect a rapid cure. Iodine arouses the defensive apparatus of the system by assembling the Mononuclear Leucocytes whose Phagocytic action is marked at a given point; Iodine inhibits fungal germination and reduces structural integrity through the intracytosolic destruction of structural components [25].

#### **Lycopodium**

Usually, Lycopodium covers all the Rubrics mentioned under the rubrics related to Fungus, but as Lycopodium stands between mosses and ferns and used in olden days, inert powder dusting on excoriated surfaces. Suited to Carbonitrogenoid Constitutions [32].

BBCR - Fungus Haematodes; Neglected Pneumonia; Cancer Fungus of – RADAR [33].

**Silicea:** It is usually used after-effects or ill effects of Vaccination. Violent cough with thick yellow lumpy expectoration [29].

It is also used in Neglected cases of Pneumonia; Phatak Mouldy or Musty - Eyes Fungal affections - (Synthesis).

**Thuja:** Murphy - Ulcers - Fungus; Cancer Fungus, Vaccination Ill effects of; Epithelioma - Fungus- (BBCR); Chronic sinus Infections, Chronic Catarrh- thick yellow-green Mucus; Ulcerations within the Nostrils. Since Thuja is one of the best Antisycotic with Hydrogenoid constitutions, When Arsenic Fails to cure Asthmatic complaints, Thuja and Natrum sulph completes Case [29].

#### **Sepia**

Frequently indicated in all Fungal infections and also Mentioned under the First-grade remedies for abuse of Steroids.

The COVID-19- associated coagulopathy (CAC) are distinct from those seen with bacterial Sepsis-Induced Coagulopathy (SIC) and disseminated intravascular coagulation (DIC). The CAC usually shows increased D-dimer and Fibrinogen levels with minimal abnormalities in Prothrombin time and platelet count. The patients are monitored for D-Dimers and Coagulopathy profile, especially for assessing the complications and Prognosis. Homoeopathic remedies like Kalimur, Natrum sulph, Arsenic alb, Ammonium carb can also be considered in COVID associated Coagulopathies as an adjuvant to conventional treatment for an early recovery [34].

#### **Discussion**

COVID Pandemic, which was identified in Wuhan rapidly spread over different countries shown its virulence severity very high in the Second wave in India. It usually caused effects like Pneumonia, ARDS, and Thrombosis and Multisystemic failure leading to death. The COVID Second wave Pandemic in India has caused many casualties all over, leading to death if neglected. The SARS CoV-2 virus infection triggers acute cytokine storm, activation of intravascular clotting, further rapidly damaging Lung parenchyma leading to ARDS and Multiorgan failure. To prevent this Cytokine storm and acute Inflammatory Mediators reactions, Steroids were suggested to use judiciously with Monitoring of all the parameters such as Respiratory rate, ventilation free days, Days in ICU, Sequential Organ Failure Assessment score (SOFA) SCORE, Murray Lung Injury Score, National Early Warning Score2, No. of Patients with Treatment Failure, Rate of Remission & Progression, Blood Oxygen Saturation, Chest X-ray, Steroid adverse effect and Toxicity Monitoring.

Nevertheless, out of necessity to save the severity of Infection and Inflammatory reactions, Steroids and other Medications were used in excessive dosages beyond the

limits leading to Immunosuppression and Opportunistic Infections. One such opportunistic Infection recently observed in the COVID Pandemic Second wave is Mucormycosis. The medications utilised in treatment are more in Material quantities, and since the body cannot assimilate it correctly, the tissues are laden with abundant Minerals and Nutrients (Iron and Zinc) Medications. Most observational studies say Mucormycosis is due to the Mucorales fungi due to various factors such as Hyperglycemic states, increased free Iron in the serum, Diabetic ketoacidosis, and use of Immunosuppressive drugs, Steroids etc. Since the Pandemic, More Iron and Zinc supplements are being given, and the Infection is Opportunistic, favours the growth of organisms. The Mucormycosis itself Manifests as Rhinocerebroorbital, pulmonary, *GastroIntestinal*, where Rhinocerebral being the commonest among people with diabetes.

However, many fungal infections arise in the COVID second wave, which must be taken into serious consideration, and the causative factors must be seen. Though there is no secondary option other than steroids, Homoeopathic Remedies must be thought of to prevent all these side effects. From the above rubrics collected from various Repertories, the Kali group of drugs are to be thought of in the first instance as it has good action on the Respiratory Mucus membrane, Sinuses and Nasal septum. Most of the Allopathic treated cases of Mucormycosis had Potassium Iodide as one of the Important curative Medication. Here Homoeopathic Potassium Iodide can be thought of too, as it has syphilitic action on the Nasal septum, sinuses and cartilages, causing destructions and decomposition of the tissues. In various Repertories under the Rubric Actinomycosis, only two Remedies were mentioned - Kali-Iod and Nitric acid.

Another Remedy frequently indicated is Silicea; which can be given as suggested by various stalwarts of Homoeopathy as follows;

Pulford says- "In neglected Cases of Pneumonia",

It is quoted in other Repertories as "Silicea as a Remedy for following conditions:

Ailments after Bad effects of Vaccination", Fungus Epithelioma (Dr. Chaudary), Fungus Hamatodes (BBCR), Mycosis (Robin Murphy).

The Next Indicated remedy is Thuja as given under Rubrics, Bad effects of Vaccination, Cancerous growths (Fungus), Epithelioma Fungus. Also, Thuja in various potencies was effective against the fungal sp. Like *Fusarium* sp., *Curvularia lunata*, *alternaria solani*, and clinical isolated fungi.

Another Remedy equally indicated is Lycopodium, which can be thought of in ailments after Neglected Pneumonia, Fungotoxic effects, fungal affections of Eyes, etc.

The remedies like Sepia, Cortisol, Merc. sol can be prescribed for abuse of Steroids. The other Remedies usually can follow are Calcarea Carb, Lachesis, Nitric acid and Phosphorus, which are given under many rubrics related to Fungal affections.

More remedy should not be forgotten Iodum or Drug with a combination of Iodine like Kali-Iod, Sulph Iod, Ars-Iod, where the Iodum component helps prevent fungal affections as evidenced in the observational studies mentioned above. Though Potassium Iodide has no direct effect, Iodine activates the Macrophages and shows Anti-fungal properties.

## Conclusion

The COVID Pandemic has created much havoc in various parts of the world, giving a Challenge to the Medical fraternity. The Fatality rate of the second wave of the COVID Pandemic is uncontrollable due to Mutations of the virus, Rapid spread, lack of awareness, lack of proper treatment due to scarcity of Hospital beds, lack of adequate Oxygen to Emergency cases, and Opportunistic Infections. Mucormycosis is opportunistic Infections reported in this Pandemic, where experts attribute it as the consequence of excess usage of Steroids (to control Inflammatory Mediators), Additional Iron, Zinc Supplements, lack of Proper Glycemic control, abuse of Immunosuppressive Medications, and also in Immunocompromised Hosts. Since the Steroids and Supplements are unavoidable in COVID syndrome, Mucormycosis too is an expected outcome in most cases. Hence, Homoeopathic Remedies can be added as adjuvant therapy or alternative to Conventional treatment (Amphotericin-B) to avoid adverse drug events like Nephrotoxicity—moreover, the Homoeopathic remedies having antifungal effects like Kali. Iod, Silicea, Ars. Alb, Thuja in the priority and Kalibich, Lycopodium, Calc. carb, Phosphorus, Mercsol, and Nitric Acid in the next place can be utilised in the early recovery of the patient from Mucormycosis and also as preventive for further complications.

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