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Clinicopathological Study of Fungal Infections at a Tertiary Hospital in Mangalore

Dr Varsha jose[1*], Dr.Devi B[2]**

1. Assistant professor, Department of pathology, Malankara Orthodox Syrian Church Medical College, Kolenchery, Kerala, India. Email: varshajose@gmail.com
2. Associate professor, Department of pathology, Azeezia institute of medical science and research, Kollam, Kerala, India. Email: devibeena1987@gmail.com

Corresponding author: Dr Varsha jose, Email: varshajose@gmail.com

Abstract:

Background: Histopathological examination remains a vital diagnostic tool in mycology, particularly for rapid identification of fungal infections. This study focuses on the clinicopathological aspects of fungal infections in a tertiary care hospital, emphasizing the need for timely and accurate diagnostic techniques.

Aims and Objectives: The study aimed to determine the distribution of fungal infections based on age, sex, and organ involvement, and to assess the prevalence and characteristics of these infections within the patient population.

Methodology: Conducted over four years (2010-2013), the study analyzed 60 histopathological specimens, including clinically suspected and incidentally detected cases. Specimens were processed with standard procedures and special stains for improved identification of fungal elements. Clinical details were collected to aid in demographic and clinical analysis.

Results: Fungal infections were more prevalent in males (65%) compared to females (35%), with the 41-50 age group most commonly affected. The nasal cavity and sinuses were the primary sites of infection, followed by the hand and foot. Candida (23%) and Rhinosporidiosis (22%) were the most frequently identified pathogens. The study highlights significant gender disparities and age-related susceptibility.

Discussion: The results underscore the need for improved diagnostic methods and surveillance programs. The higher incidence of fungal infections in males and specific age groups suggests demographic factors play a crucial role. Advanced molecular diagnostics and serological assays are recommended to enhance early detection and treatment, especially in immunocompromised patients.

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Conclusion: The study emphasizes the importance of integrating advanced diagnostic techniques and establishing comprehensive surveillance programs to better manage fungal infections. Continued research and development of new antifungal agents are essential to address the growing threat of fungal diseases and improve patient outcomes.

Key words: Fungal Infections, Histopathology, Candida, Serological Assays, Epidemiology.

Introduction

Histopathological examination remains one of the major diagnostic tools in mycology. Rapid etiologic diagnosis in conditions such as rhinosporidiosis and lobomycosis is essential for effective treatment and management of fungal infections, highlighting the need for reliable diagnostic techniques in clinical settings. Although culture is considered the gold standard for etiological diagnosis, it often requires extended timeframes that may hinder timely therapeutic interventions, especially in immunocompromised patients where rapid diagnosis is crucial for improved outcomes[1]. To address these challenges, there is a growing call for the implementation of alternative diagnostic methods that can enable early identification and treatment of invasive fungal infections, particularly in vulnerable populations[1]. To address these challenges, there is a growing call for the implementation of alternative diagnostic methods that can enable early identification and treatment of invasive fungal infections, particularly in vulnerable populations, as recent advances in molecular diagnostics and serological assays show promise in enhancing diagnostic accuracy and timeliness[2].

Aims and Objectives

This study aimed to determine the clinicopathological aspects of fungal infections, including their distribution according to age, sex, and organ involvement, in a tertiary care hospital setting.

Methodology

The study was conducted over a span of 4 years from 2010 to 2013. All histopathological specimens received during the study period, including both clinically suspected cases and incidentally detected fungal infections, were included to provide a comprehensive

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understanding of the prevalence and characteristics of these infections in the patient population. Specimens were formalin-fixed, processed by standard procedures, and stained with hematoxylin and eosin, while special stains such as periodic acid-Schiff and Gomori's methenamine silver were utilized when required for improved visualization and identification of fungal elements. Clinical details, including age, sex, and predisposing conditions, were meticulously obtained from medical records to facilitate an in-depth analysis of the demographic and clinical profile of the affected patients, which is vital for recognizing patterns that may assist in early diagnosis and targeted management strategies.

Results

A total of 60 histopathological specimens with fungal infections were studied, constituting 0.31% of the total histopathological examinations performed during the study period. Out of these, 37 were male and 23 were female, indicating a higher prevalence of fungal infections among males in this patient cohort, which aligns with findings in other studies that suggest gender disparities in the incidence of certain fungal infections due to varying risk factors and immune responses between sexes[3].

Age incidence ranged from 16 to 80 years, demonstrating that fungal infections can affect a broad age spectrum, with certain age groups possibly being more susceptible due to age-related immune dysfunction or other comorbidities prevalent in those populations.

TABLE 1: Age & sex distribution of fungal infections

Age Group (Years)	Male	Female	Total
Nov-20	1	0	1
21 - 30	4	3	7
31 - 40	6	7	13
41 - 50	12	4	16
51 - 60	8	2	10
61 - 70	1	4	5
71 - 80	7	1	8
Total	**39**	**21**	**60**

The table 1 analysed the age and sex distribution of fungal infections among 60 patients. The majority of cases were observed in the 41-50 age group, accounting for 16 cases (12 males and 4 females). The next most affected age group was 31-40 years, with 13 cases (6 males and 7

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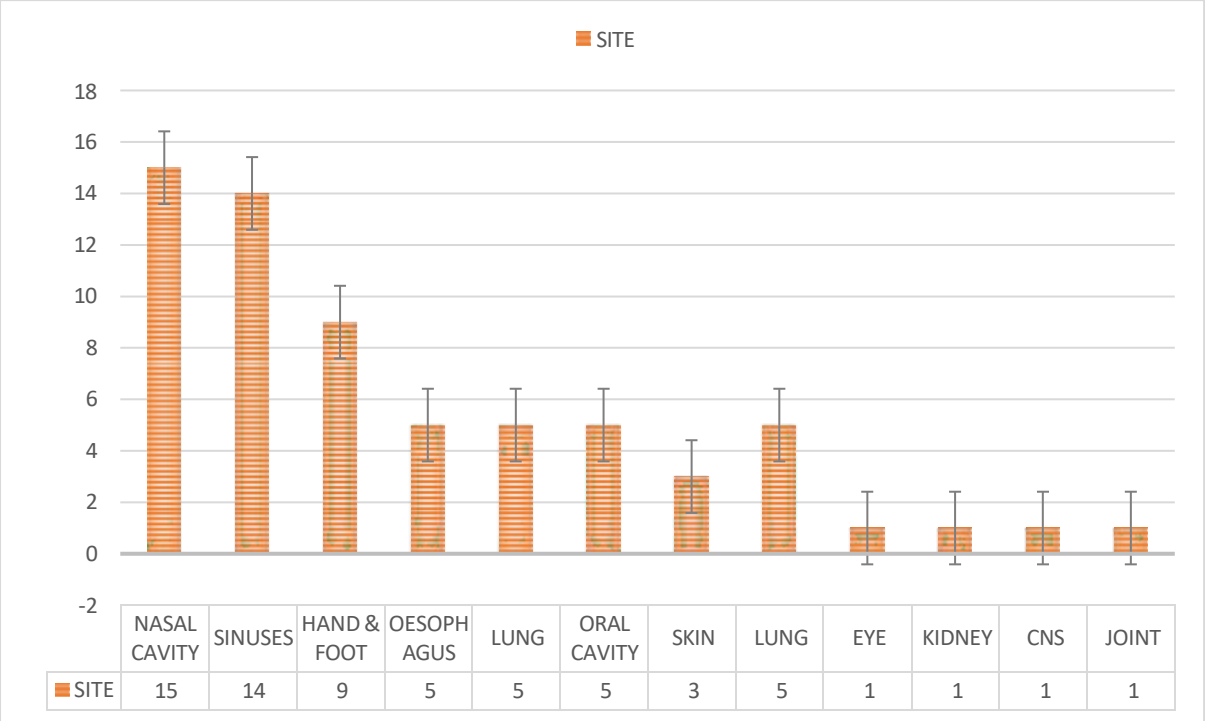
females). Fungal infections were more prevalent in males overall, with 39 cases compared to 21 in females. The distribution showed a significant male predominance across all age groups, with the highest male-to-female ratio in the 71-80 age group (7 males to 1 female). The data highlight the importance of considering age and sex in understanding the epidemiology of fungal infections.

Figure 1: DISTRIBUTION OF SITE OF LESIONS



	NASAL CAVITY	SINUSES	HAND & FOOT	OESOPH AGUS	LUNG	ORAL CAVITY	SKIN	LUNG	EYE	KIDNEY	CNS	JOINT
SITE	15	14	9	5	5	5	3	5	1	1	1	1

The bar chart Figure 1 illustrates the distribution of lesion sites among the study population. The most common sites of lesions were the nasal cavity and sinuses, with 15 and 14 cases, respectively. Lesions in the hand and foot were the next most frequent, with 9 cases. Other sites, including the oesophagus, lung, oral cavity, and skin, each had 5 cases. Less commonly affected sites were the eye, kidney, central nervous system (CNS), and joint, each with only 1 case. The data highlight the nasal cavity and sinuses as the primary locations for lesions, suggesting these areas may be particularly susceptible to fungal infections.

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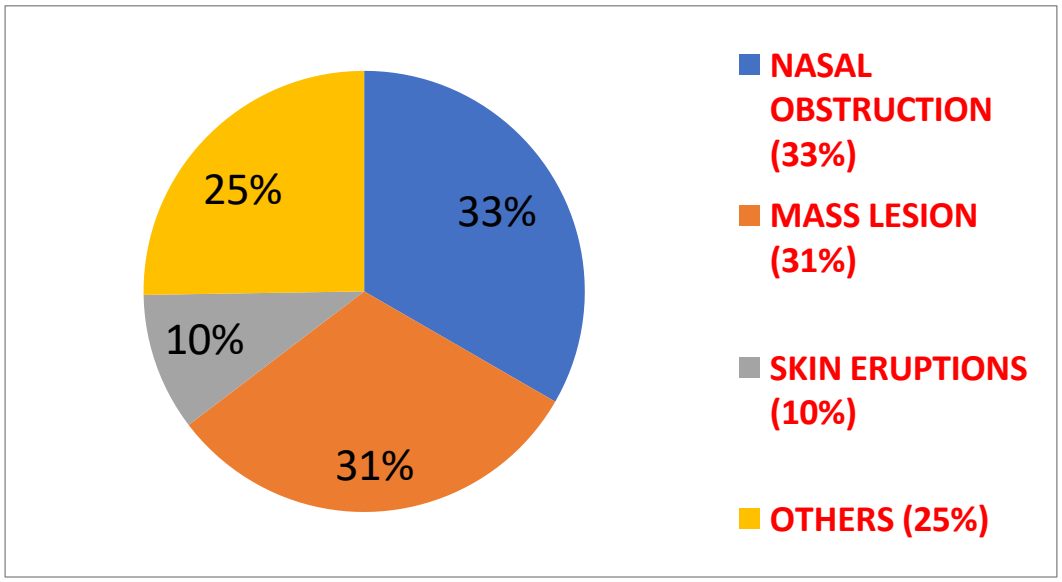
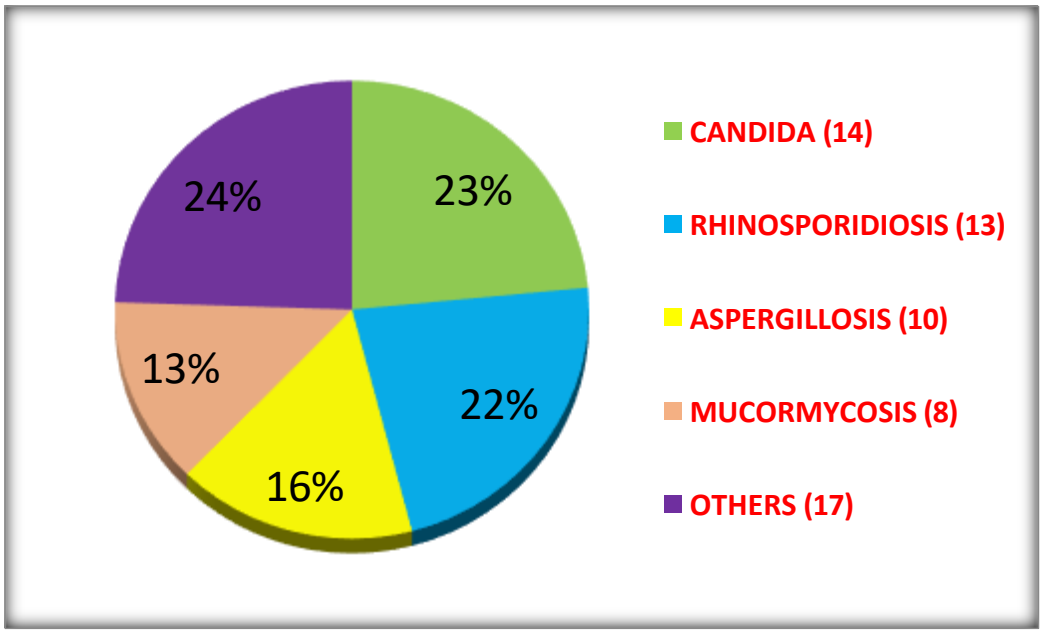
Figure 2 : PRESENTING SYMPTOMS



The pie chart Figure 2 presents the distribution of presenting symptoms among the study population. The most common symptom was nasal obstruction, accounting for 33% of cases, followed closely by mass lesions, which made up 31% of cases. Skin eruptions were observed in 10% of the cases. The remaining 25% of symptoms fell into the "Others" category, indicating a variety of less common presentations. These findings underscore the predominance of nasal obstruction and mass lesions as key symptoms in the patient population studied, with skin eruptions and other symptoms being less frequent.

Figure 3:DISTRIBUTION OF CASES



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The pie chart Figure 3 illustrates the distribution of different fungal infection cases in the study. Candida was the most common infection, comprising 23% of the cases (14 cases), followed closely by Rhinosporidiosis at 22% (13 cases). Aspergillosis accounted for 16% of the cases (10 cases), while Mucormycosis represented 13% (8 cases). The remaining 24% of cases (17 cases) fell into the "Others" category, indicating a variety of less common fungal infections. This distribution highlights the predominance of Candida and Rhinosporidiosis as significant contributors to fungal infections in the studied population.

Figure 4: MULTICENTRIC RHINOSPORIDIOSIS

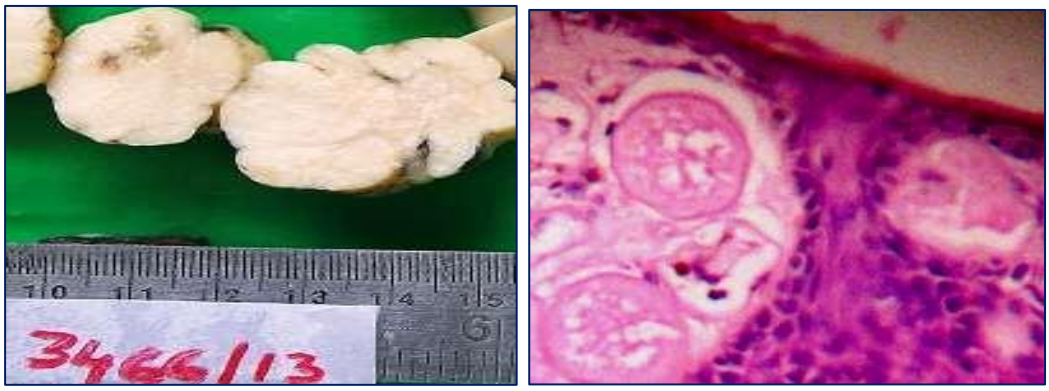

Figure 5: PHEOHYPHOMYCOSIS AS FUNGAL ARTHRITIS

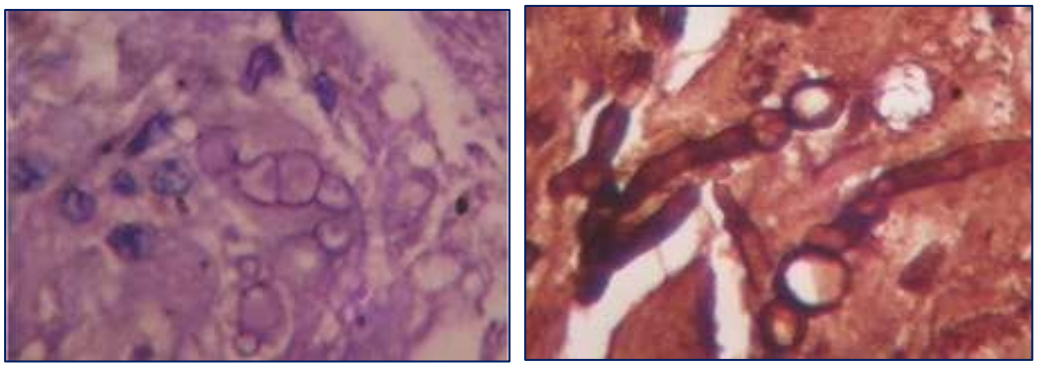

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Figure 6: ASPERGILLOSIS OF CNS

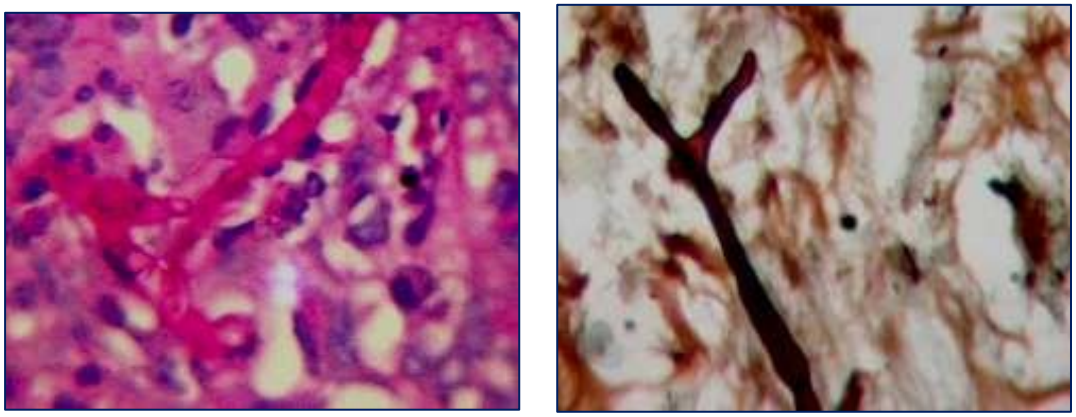

Figure 7: CRYPTOCOCCOMA

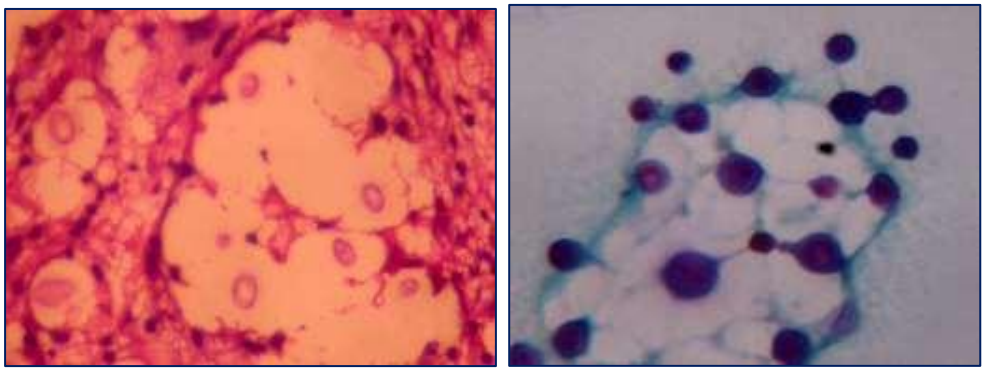

Figure 8: PAECILOMYCES LILACINUS

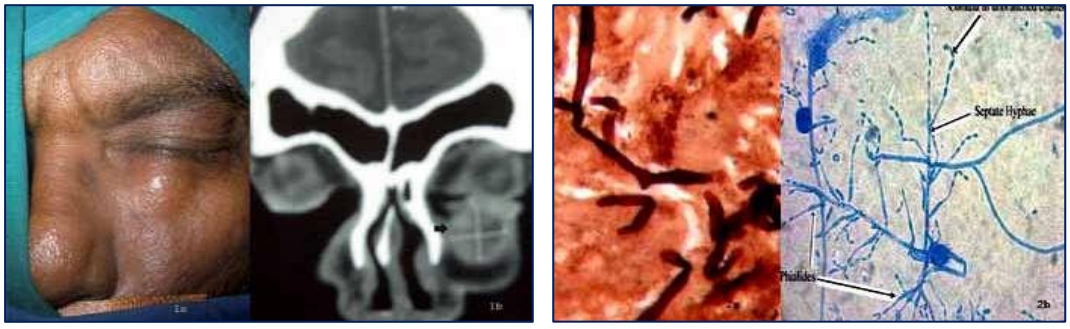

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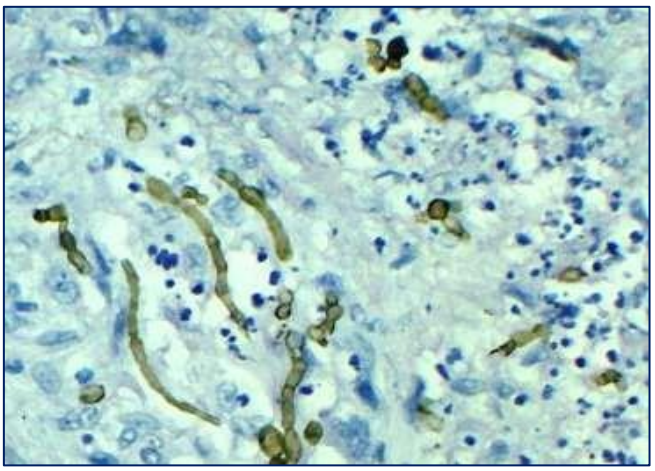
Figure 9:PHEOHYPHOMYCOSIS



The distribution of lesion sites revealed a diverse range of organ involvement, with the skin, subcutaneous tissue, and respiratory tract being the most commonly affected areas. The presenting symptoms varied widely among patients, emphasizing the need for a high index of suspicion for fungal infections in clinical practice, particularly in immunocompromised individuals who may present atypical manifestations of these diseases. The correlation between clinical diagnoses and histopathological findings underscores the complexities involved in accurately identifying fungal infections, particularly when patients exhibit symptoms that may mimic malignancies or other infectious processes, further highlighting the critical necessity for integrating advanced diagnostic modalities in routine clinical evaluations to ensure timely and appropriate therapeutic interventions[4,5,6,7].

Discussion:

TABLE 2 – Age & sex distribution of fungal infections

Age Group (Years)	Male (%) (Our Study)	Male (%) (Sidhalinga Reddy et al)	Female (%) (Our Study)	Female (%) (Sidhalinga Reddy et al)	Total (%) (Our Study)	Total (%) (Sidhalinga Reddy et al)
Nov-20	2%	17%	0%	3%	2%	20%

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21 - 30	7%	10%	5%	3%	12%	13%
31 - 40	10%	17%	12%	7%	7%	23%
41 - 50	20%	10%	7%	10%	27%	20%
51 - 60	13%	13%	3%	3%	17%	17%
61 - 70	2%	0%	7%	3%	8%	3%
71 - 80	12%	0%	2%	3%	13%	3%
Total (%)	**66%**	**67%**	**36%**	**29%**	**60%**	**30%**

The comparison between our study and Sidhalinga Reddy et al. reveals that males are more frequently affected by fungal infections in both studies, with 66% in our study and 67% in theirs. The highest prevalence in our study was in the 41-50 age group (27%), similar to their findings (20%). However, notable differences include lower infection rates in younger age groups (11-20 years) in our study (2% vs. 20%) and higher rates in the elderly (71-80 years) in our study (13% vs. 3%). These variations highlight the importance of considering local environmental and demographic factors in understanding fungal infection patterns.

The findings of this study underscore the significant burden of fungal infections in the studied population, with a notable proportion of cases being incidentally detected, rather than clinically suspected, emphasizing the need for heightened awareness and a multifaceted approach to diagnosis and management of these infections. ed approach to the diagnosis and management of these infections, recognizing the increasing global burden of invasive fungal diseases and the necessity for improved surveillance and diagnostic practices to better address this public health concern and protect at-risk populations from serious morbidity and mortality associated with these infections[4-8].

The findings of this study underscore the significant burden of fungal infections in the studied population, with a notable proportion of cases being incidentally detected, rather than clinically suspected, emphasizing the need for heightened awareness and a multifaceted approach to the diagnosis and management of these infections, recognizing the increasing global burden of invasive fungal diseases and the necessity for improved surveillance and diagnostic practices to better address this public health concern and protect at-risk populations from serious morbidity and mortality associated with these infections. This is crucial for improved outcomes. Moreover, the successful implementation of long-term, sustainable surveillance programs for fungal diseases will enable healthcare systems to monitor trends, identify emerging pathogens, and facilitate timely interventions, thereby mitigating the impact of fungal infections on public health and enhancing the overall quality of care provided to vulnerable

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patient populations. Furthermore, the establishment of more sensitive nonculture-based diagnostic techniques is essential to enhance the early detection of these infections, particularly in immunocompromised patients who are at a higher risk for invasive fungal diseases, as this could lead to improved treatment outcomes and reduced morbidity and mortality[5,6,9,10].

The successful implementation of long-term, sustainable surveillance programs for fungal diseases is crucial for healthcare systems to monitor trends, identify emerging pathogens, and facilitate timely interventions. This approach can mitigate the impact of fungal infections on public health and enhance the quality of care provided to vulnerable patient populations. Addressing the complexities surrounding fungal infections requires a multi-dimensional strategy that includes enhanced clinical awareness, improved diagnostic methodologies, and the establishment of comprehensive surveillance programs[11-12].

Investment in research and development of new antifungal agents and refined diagnostic tools is essential to combat the rising threat posed by resistant fungal strains and improve patient care outcomes. The global health community must enhance surveillance methodologies, invest in innovative diagnostic strategies, and educate clinicians on the identification and management of fungal infections, particularly in high-risk populations[13-14].

A concerted effort from the global health community is needed to enhance surveillance methodologies, invest in innovative diagnostic strategies, and educate clinicians regarding the identification and management of fungal infections, particularly in high-risk populations. The expanding population of immunocompromised patients remains vulnerable to these threats.

Conclusion:

In conclusion, the global health community must invest in research and development of new antifungal agents and diagnostic tools to combat fungal infections and improve patient care. Integrating molecular diagnostic techniques can provide rapid identification of fungal pathogens, enabling timely therapeutic interventions. Understanding the evolving epidemiology of these infections helps healthcare providers anticipate outbreaks and refine treatment protocols. Comprehensive educational initiatives and targeted training programs can improve diagnosis and treatment outcomes. Continuous research and long-term surveillance programs are crucial for understanding pathogens and developing appropriate therapeutic options.

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Continuous research is needed to better understand these pathogens and develop appropriate therapeutic options, as well as to establish long-term surveillance programs to effectively track the burden of fungal diseases in vulnerable populations. Such initiatives are essential not only to improve patient care but also to inform public health policies that can mitigate the impacts of these infections, as the burden of invasive fungal diseases continues to grow amidst changing risk factors and treatment landscapes in immunocompromised host populations.

Limitations:

As this was a single center study with a comparatively short sample size, results of this study cannot be generalized. Generalization requires the support of results from similar large studies

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Conflicts of interest: There are no conflicts of interest**.**

Ethical statement:

Institutional ethical committee accepted this study. The study was approved by the institutional human ethics committee, Malankara Orthodox Syrian Church Medical College, Kolenchery, Kerala. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

Funding: Nil.

Authors' contributions:

Dr.Devi B - conceptualization, data curation, investigation, methodology, project administration, visualization, writing—original draft, writing—review and editing; ***Dr Varsha jose*** -conceptualization, methodology, writing—original draft, writing—review and editing. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. All authors have read and agreed to the published version of the manuscript**.**

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DATA AVAILABILITY:

All datasets generated or analyzed during this study are included in the manuscript.

INFORMED CONSENT:

Written informed consent was obtained from the participants before enrolling in the study

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