

Women Awareness Regarding Prevention of Mucormycosis among Their families

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Abstract

Background: Mucormycosis (previously called zygomycosis) is a serious but rare fungal infection caused by a group of molds called mucormycetes. These molds live throughout the environment. **Aim:** to assess Women awareness regarding prevention of mucormycosis among their families. **Research design:** Descriptive design was utilized to achieve the aim of the study. **Setting:** The study was conducted at health center at district fifteen Alashir of Ramadan city Alshraqia Governorate Egypt. **Sample:** simple random sample. **Sample size:** The sample size was 265 women. **Data collection tool:** the data was collected by using two tools: **First tool:** An Interviewing questionnaire for women. Consist of demographic data and women knowledge. **2nd tool** self-reported practice regarding prevention of mucormycosis among their families. **Results:** the majority 98.1% of the studied women had a poor knowledge about Mucormycosis and 1.9% of them had average knowledge. And 60.8% of the studied women had good practices and 39.2% of them had average practices. **Conclusion:** there was positive correlation between total women's knowledge and their reported practice. **Recommendation:** Specific interventions need to be designed and implemented for the women to increase their knowledge, practice and attitude about mucormycosis prevention

Key words: Awareness, Families, Mucormycosis, Prevention, Women

Introduction

Mucormycosis is considered the third most common in-vasive fungal disease after candidiasis and aspergillosis [and all such diseases are important causes of morbidity and mortality (Dubey et al.,2022)

Mucormycosis is a general term for a group of uncommon infections cause by a fungus (fungal infection). Mucormycosis is caused by a group of related molds from the order Mucorales. An "order" is a scientific term for classifying similar organisms (Dam et al., 2023). The fungi that cause mucormycosis belong to the order Mucorales: Rhizopus, Mucor, Rhizomucor, Cunninghamella, and Absidia. Broad, irregularly branched with rare septations are seen on microscopy. These fungi are ubiquitously found everywhere particularly in soil and decaying vegetations and are routinely exposed to humans without causing any infections. These

fungi are angioinvasive and cause thrombosis with the death of affected tissues (Bhandari et al., 2021).

Mucormycosis is an angioinvasive disease caused by mold fungi with high mortality rates. Mucormycosis is mainly found in immunosuppressed hosts, including those with haematological malignancies, transplant recipients, and in people with uncontrolled diabetes mellitus. Various risk factors associated with mucormycosis are undiagnosed diabetes mellitus with concomitant use of corticosteroids, COVID-19 infection, preexisting comorbidity, and the use of immunosuppressive drugs. Mucormycosis is associated with high mortality (45% to 90%) in low- and middle-income countries including India. There is a high management cost of mucormycosis and delayed diagnosis to be probable reasons for this (Gurjar et al.,2022).

Mucormycosis mainly affects people who have health problems or take medicines that lower the body's ability to fight germs and sickness. It most commonly affects the sinuses or the lungs after inhaling fungal spores from the air. It can also occur on the skin after a cut, burn, or other type of skin injury (**Centers for Disease Control and Prevention, 2021**).

Coronavirus disease 2019 (COVID-19) is an acute viral illness caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). Opportunistic infections such as mucormycosis have been reported among COVID-19 patients particularly in South Asian countries during the second wave of this pandemic. It is necessary to re-evaluate any changes in traditional risk factors associated with mucormycosis such as diabetes mellitus, organ transplant, etc in the precedent of ongoing COVID-19 pandemic (**Nagalli & Kikkeri,2021**).

Types of mucormycosis: Rhinocerebral (sinus and brain) mucormycosis is an infection in the sinuses that can spread to the brain. This is most common in people with uncontrolled diabetes and in people who have had a kidney transplant. And Pulmonary (lung) mucormycosis is the most common type of mucormycosis in people with cancer and in people who have had an organ transplant or a stem cell transplant. Gastrointestinal mucormycosis is more common among young children than adults. Premature and low-birth-weight infants less than 1 month of age are at risk if they have had antibiotics, surgery, or medications that lower the body's ability to fight germs and sickness (**Centers for Disease Control and Prevention, 2021**). Also Cutaneous (skin) mucormycosis occurs after the fungi enter the body through a break in the skin. This type of infection might occur after a burn, scrape, cut, surgery, or other types of skin trauma. This is the most common form of mucormycosis among people who do not have weakened immune systems. Finally Disseminated mucormycosis occurs when the infection spreads through the bloodstream to affect another part of the body. The infection most commonly affects the brain, but also can affect other organs such as the spleen, heart, and

skin (**World Health Organization (WHO),2023**).

The most common presentation is a sinus infection (sinusitis) that is accompanied by nasal congestion, nasal discharge and sinus pain. A fever and headache can also occur. If the infection spreads outside the sinuses, symptoms can include tissue loss (necrosis) of the roof of the mouth (palate), disintegration of thin wall of cartilage and bone (septum) that divides the nostrils (septum), swelling of the area around the nose (perinasal area) and redness (erythema) of the skin overlying the sinus and the eye socket (orbit). Sometimes, there is bluish discoloration of the skin near the sinuses or the eye socket due to a lack of oxygen (cyanosis). Sometimes, blurry vision or double vision can develop. If unrecognized and untreated, significant tissue death (necrosis) can occur and the infection can significantly damage facial structures (**Jeong et al.,2019**).

Sometimes, mucormycosis can spread to the brain. This can cause lethargy, seizures, slurred speech, partial paralysis, abnormalities of the nerves of the face and eyes (cranial neuropathies), a brain abscess, altered consciousness and coma. When the sinuses and brain is involved, this infection can be referred to as rhinocerebral mucormycosis. When the infection spreads to the eye, there can be swelling due to fluid buildup around the eyes (periorbital edema), bulging or displacement of the eye (proptosis), vision loss and potentially blindness. Some affected individuals experience paralysis or weakness of the muscles that move the eyes (ophthalmoplegia), making it difficult or painful to move the eyes (**Nagalli & Kikkeri,2021**).

Nurses have an inevitable role in caring and most importantly giving education to patients with any infectious disease. Therefore the Nurses need to understand the magnitude of the disease and give adequate teaching regarding the control and prevention of Mucormycosis to the patient. It is important to increase awareness of mucormycosis among nurses who will be an important future health care providers. It is important for nursing to stay up-to-date on current guidelines for the diagnosis and treatment of mucormycosis and

remain cognizant of emerging literature on the topic. It is important to increase awareness of mucormycosis and to stay up-to-date on current guidelines for the diagnosis and treatment of mucormycosis and remain cognizant of emerging literature on the topic (Chongloi et al., 2022).

Significant of the study:

The incidence rate of mucormycosis globally varies from 0.005 to 1.7 per million population (WHO, 2023). In a retrospective study conducted in children's cancer hospital 57357 in Egypt along a decade from 2007 to 2017, only 45 cases developed mucormycosis (Madney et al., 2019). Another study in 2010 by Zaki and Colleagues that was conducted at the same tertiary hospital where the current case series took place reported 10 cases within 12 months' duration (Roushdy & Hamid, 2021)

Mucormycosis has created an epidemic during the pandemic situation in the second wave of COVID-19 infection in India. The incidence varies from 0.005 to 1.7 per million population, and the global case fatality is as high as 46% (Sen et al., 2021). Considering the severity and mortality of this disease, it is crucial to engage the population to detect it at an early stage. Understanding KAP among patients is valuable in this regard. This could be due to the mass media coverage and also due to the initiative by the Ministry of Health and Family (Jayagayathri et al., 2022)

Emerging and reemergence of diseases such as COVID and mucormycosis can affect the population and create challenges. Lack of knowledge and awareness generally leads to unconcern attitude and improper practices. To the best of knowledge, there is no such similar study conducted related to this topic. So the current study conducted to assess women awareness regarding prevention of mucormycosis among their families.

Aim of the Study

This study aims to assess Women awareness regarding prevention of mucormycosis among their families through:

- Assessing Women knowledge regarding prevention of mucormycosis.
- Assessing Women practice regarding prevention of mucormycosis among their families.

Research questions:

1. What are women knowledge level about mucormycosis?
2. What are women practice regarding prevention of mucormycosis infection?
3. Is their relationship between Women knowledge and their practices regarding prevention of mucormycosis infection?
4. Is their relationship between socio demographic characteristics of the Women and their practices regarding prevention of mucormycosis infection?

Subjects and Methods

The study was portrayed the four main designs as follows:

I-Technical design

The technical design included research design, setting, subject and tools for data collection.

-Research design:

Descriptive design was utilized to achieve the aim of the study.

Setting: The study was conducted at health center at district fifteen Alashir of Ramadan city Alshraqlia Governorate Egypt, because of high flow rate, women low educated and low economy area.

Sample: simple random sample.

Sample size: total women flow rate 15000 annually according to sample equation the sample size was 265 with confidence level 90%

$$n = \frac{N \times p(1-p)}{[N-1 \times (d^2 + z^2)] + p(1-p)}$$

n=sample size

z: The standard score

d: The error rate

p: Property availability and neutral ratio

N=size of population

Data collection tool:

The data was collected by using two tools:

First tool: An Interviewing questionnaire for women included the following parts:

- **Part I:** Socio-demographic data of Women such as (age, level of education, residence, occupation, income, number of the family member and marital status Questions from 1 to 7

- **Part II:** Family medical history, it included 5 questions.

- **Part III:** Women knowledge about mucormycosis. It was consisted of (definition of mucormycosis, causes, sign and symptoms, complication, high risk group, methods of transmission prevention, doctor visit and source of knowledge). It included 11 questions

Scoring system:

- For the knowledge related to information correct response take score 2 , incomplete answer take score 1 , and don't know answer score 0 , for each area of knowledge the score of item were summed-up the total score were 22 which equal 100% , more than 75% was considered good , from 75 %to 50% was considered average and less than 50% was considered poor . (singh& jasvinder ,2021)

- **2nd tool** self-reported practice regarding prevention of mucormycosis among their families such as:

- Good care with wounds it included 11 items.

- House cleaner it included 14 items.

- Clean the Preserved food and vegetables included 13 items

- Close contact with a patient with a respiratory infection included 15 items³.

- Immunity booster included 16 items.

Scoring system:

-For the perform practice item related to women practices total compliance scored 1, noncompliance with instruction scored 0 for

each area of practices , the score of the item were 36 with equal 100% , more than 75% was considered good , from 75 %to 50% was considered average and less than 50% was considered poor (Dotis et al., 2020).

II- Operational design:

The operational design included preparatory phase, content validity, pilot study and field work.

a) The Preparatory Phase:

It was included reviewing of related literature and theoretical knowledge of various aspects of the study using available articles, Journals, periodicals and text books.

b) Pilot Study:

A pilot study was carried out on 10% (26 patients) of the total sample size to test applicability and clarity of tools; modification was done according to the results of pilot study.

Validity and reliability**b) Content validity:-**

It was tested by 5 experts from community health nursing, faculty of nursing Ain Shams University to review the tools for clarity, relevance, comprehensiveness, understanding and applicability.

Reliability

c) Reliability is the consistency of measurement tool. The degree to which the instrument measures the same way each time, it is used under the same condition with the same subjects and it was done by using an alpha Cronbach test. Reliability for tools was applied by the researcher for testing the internal consistency of the tools. Reliability was assessed using Cranach's alpha test. It was measured by using reliability item deprived from scale and analyzes that found in SPSS program. It was reported as 0.979 and 0.993 for tool1 and 2 respectively.

d) Field work:

This study started from beginning of 23 November 2022 , till the end of 30 March 2023

, covering three months for data collection. An official approval letter clarifying the purpose of the present study was issued from the Dean of the Faculty of Nursing at Ain Shams University to the General Director of health center at district fifteen Alashir of Ramadan city Alshraqia Governorate Egypt, and Scientific Research Ethical Committee in the Faculty of Nursing as an approval to conduct this study. The previously mentioned setting was attended by the researcher one 3 days/week (Sunday &Monday &Thursday) from 9.00 a.m. to 1p.m. The questionnaire took about 20-30 minutes to be completed.

III- Administrative Design:

An official permission was issued from the Dean of the Faculty of Nursing at Ain Shams University to General Director of health center at district fifteen Alashir of Ramadan city Alshraqia Governorate Egypt, and Scientific Research Ethical Committee in the Faculty of Nursing as an approval to conduct this study.

Ethical considerations:

Certification for conducting the research was obtained from the Scientific Research Ethics Committee of the Faculty of Nursing, Ain Shams University, before starting the study. In addition, oral informed consent was obtained from each participant prior to data collection. The researcher guarantees the complete confidentiality of information and the identity of the individuals participating in the study is not revealed. They also have the right to withdraw from the study at any time they wish.

Statistical Design:

The collection data were organized, coded, computerized, analyzed and tabulated by using electronic computer and statistical Package for Social Science (SPSS) version 22, which used frequencies and percentages for qualitative descriptive data and Chi-square test (X^2) was used relation tests, mean and standard

deviation was used for quantitative data, person correlation coefficient(r) was used for correlation analysis.

A significant level value was considered when:

- P-value $P < 0.01$ was considered as highly statistically significant
- P-value < 0.05 was considered statistically significant
- P-value > 0.05 was no statistically significant difference.

Results

Table (1) illustrate that 47.9% of the studied women had an age group from 21-30 years with mean \pm SD of 28.72 ± 5.53 , about 60.8% and 69.1% of them were married and from rural areas respectively. Regarding educational level and occupation, it is reported that 47.9% and 57.4% of the studied women had a basic education and were housewives respectively. About 42.6% had ≥ 5 members in their family and 70.6% hadn't enough income.

This figure demonstrates that 98.1% of the studied women had a poor knowledge about Mucormycosis and 1.9% of them had average knowledge.

This figure demonstrates that 60.8% of the studied women had good practices and 39.2% of them had average practices.

This table reports that there was positive correlation between total women's knowledge and their practices p-value < 0.05

Table (3) illustrates that there were no statistical relation between women's total practice and women's age, marital status, place of residence, educational level, occupation, number of family member and income p-value > 0.05 for all.

Table (1): Distribution of the studied women according to their socio-demographic characteristics (N=265).

Items	No	%
Age/years		
≤20	25	9.4
21:30	127	47.9
31:42	113	42.6
Mean and SD of women age	28.72±5.537	
Marital status		
Married	161	60.8
Widowed	41	15.5
Divorced	63	23.8
Place of residence		
Urban	82	30.9
Rural	183	69.1
Educational level		
Illiterate	23	8.7
Basic Education	127	47.9
Intermediate Education	43	16.2
Higher Education	72	27.2
Occupation		
Housewife	152	57.4
Work	113	42.6
Number of family members		
3	64	24.2
4	88	33.2
≥5	113	42.6
Income		
Enough	78	29.4
Not enough	187	70.6

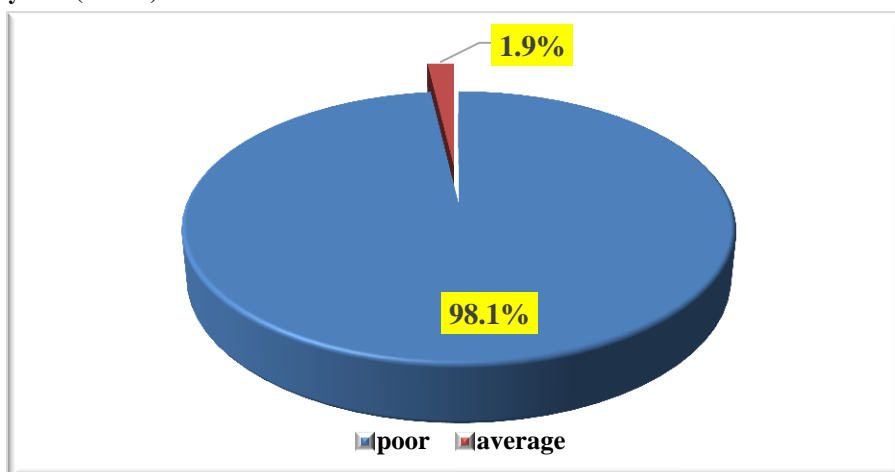
Figure 2: Distribution of the studied women according to their total knowledge about Mucormycosis (N=265)

Figure 3: Distribution of the studied women according to their total reported practice regarding prevention of Mucormycosis (N=265)

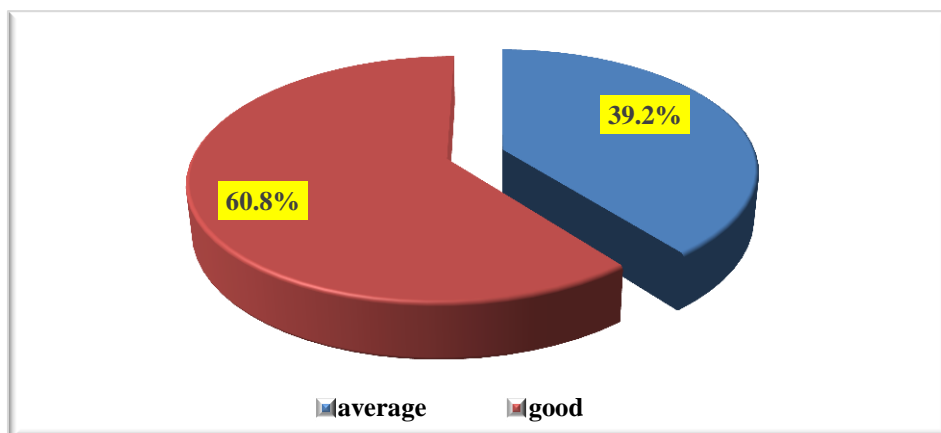


Table (2): Correlation between the studied women's total Knowledge and total practices regarding Prevention of Mucormycosis (N=265)

Items	Total reported practice	
	r	P value
Total women' Knowledge	0.253*	0.014

*. Correlation is significant at the 0.05 level (2-tailed).

Table (3): Relation between women's reported practice and their socio demographic characteristics (N=265).

Socio demographic characteristics	practice		Statistical test	
	Mean	SD	F/T	P value
Age/years				.828
≤20	76.0000	5.08265	.189	
21:30	75.4724	5.27472		
31:42	75.7965	4.67547		
Marital status				.099
Married	75.1553	5.04301	2.332	
Widowed	76.0488	5.01473		
Divorced	76.6984	4.74047		
Place of residence				.933
Urban	75.6220	4.93824	-.084	
Rural	75.6776	5.03176		
Educational level				.999
Illiterate	75.5652	5.49236	.010	
Basic Education	75.6614	5.08065		
Intermediate Education	75.7674	4.83458		
Higher Education	75.6250	4.87141		
Occupation				.811
Housewife	75.7237	5.12131	.239	
Work	75.5752	4.83810		
Number of family members				.593
3	75.2500	5.23723	.524	
4	76.0682	5.03732		
≥5	75.5752	4.83810		
Income				.778
Enough	75.6043	5.06024	-.283	
Not enough	75.7949	4.86001		

Discussion

Mucormycosis is an uncommon infection that is caused by molds from the family referred to as Mucorales. This fungus presents all over within the atmosphere, ecosystem, soil, etc. The infection happens largely by inhalation wherever it enters the sinuses and also the lungs or it will enter the body if an individual contains a burn, cut or abrasion on the skin. Most people are frequently exposed to Mucorales without developing the disease. Mucormycosis is generally spread by breathing in, eating food contaminated by, or getting spores of molds of the Mucorales type in an open wound (**Hasan et al., 2021**). So this study aims to assess women awareness regarding prevention of mucormycosis among their families

Regarding socio-demographic characteristics of the studied women, the current study result showed that less than half of the studied women had an age group from 21-30 years with mean \pm SD of 28.72 \pm 5.53, about two thirds of them were married and from rural areas respectively. Regarding educational level and occupation, about half of the studied women had a basic education and were housewives respectively. Also less than half of them had \geq 5 members in their family and less than three quarters of them hadn't enough income (**Table 1**).

This result was supported by **Jayagayathri et al.,(2022)** who applied study in India among 4573 participants entitled ".Knowledge, attitude, and practice toward mucormycosis among patients presenting to six tertiary eye care hospitals in South India" and found that less than three quarters of participants were from urban areas, while more than one tenth of them had no formal education, more than half of them had completed school education, and remaining were graduates or postgraduates. While this result was contrasted with **Massey& Lodha, (2021)** who applied study among 60 participants in India entitled "Study to Assess Level of Knowledge Regarding Mucormycosis and its Management Among Workers in Kanpur" and showed that the age group of the studied subjects between 30-40 and all of the studied

sample were females. Also **Bala et al., (2015)** who applied study among 38 participants in India entitled " A prospective study of mucormycosis in north India: experience from a tertiary care hospital" and showed that highly percentage of the studied patients was males and the mean age of all patients was 40.43 years.

From the investigator point of view this result may be due to community culture relate to age of married , and In Egypt the family income level is not enough for daily living needs this might due to high standards of living.

As regard to total knowledge about Mucormycosis, the current study result demonstrated that vast the majority of the studied women had a poor knowledge about Mucormycosis and minority of them had average knowledge (**Figure 2**). This result in the same line with **Massey& Lodha, (2021)** who reported that one tenth of the studied subjects had good knowledge, while more than two thirds of them had average knowledge about mucormycosis and its management. Also this result was supported by **Budhagaonkar & Dhanawade, (2022)** who showed that most of the studied patients had poor level of knowledge about prevention and management of mucormycosis. While minority of them had average level of knowledge and minority of the studied patients had good level of knowledge about prevention and management of mucormycosis before planned teaching. While this result was contrasted with **Saravanan et al.,(2023)** who applied A Cross-Sectional Survey among 437 respondents in India entitled "Exploring the Knowledge Regarding Mucormycosis and Its Management" and found that the overall knowledge of mucormycosis in this group was rather adequate.

Additionally **Shahin et al., (2023)** who applied study among 73 participants in Egypt to assess that Effect of nurse-led intervention on knowledge and preventive behavior of diabetic pregnant women regarding COVID-19 associated mucormycosis infection in mid-delta region of Egypt and noted that there was a remarkable high correctness of the information regarding Mucormycosis in the postintervention analysis, this probably due to

already lacked awareness and the shortage of information regarding Mucormycosis.

From the investigator point of view this result may be due to highly percentage of the studied women had basic education and were housewives.

Regarding to correlation between the studied women's total Knowledge and total practices regarding Prevention of Mucormycosis, the current study result reported that there was correlation between total women's knowledge and their practices p-value <0.05 (Table 2). This result was in agreement with Islam et al.,(2022) who found that there was statistical significant relation between knowledge and practices regarding Mucormycosis.

As regard to relation between women's reported practice and their socio demographic characteristics, the current study result illustrated that there were no statistical relation between women's total practice and women's age, marital status, place of residence, educational level, occupation, number of family member and income p-value >0.05 for all (Table 3). This result was disagreement with Kabir et al.,(2022) who explored that mucormycosis perception scores were significantly associated with their age, gender, profession, monthly income, marital status, job type.

Conclusion

In the light of the current study findings, it can be concluded that,

Vast the majority of the studied women had a poor knowledge while minority of them had average knowledge about Mucormycosis, and less than two thirds of the studied women had good practices and less than two fifths of them had average practices about prevention of Mucormycosis. Additionally there was correlation between total women's knowledge and their practices while there were no statistical relation between women's total practice and women's age, marital status, place of residence, educational level, occupation, number of family member and income

Recommendations

Based on the current study finding the following recommendations were proposed:

- ✓ This study suggests maintaining a precautionary behavior to increase safe practices toward mucormycosis.
- ✓ Specific interventions need to be designed and implemented for the women to increase their knowledge and awareness about mucormycosis prevention.
- ✓ Increased social media is required to increase awareness about mucormycosis
- ✓ Critical and timely insights from this research may also guide policymakers in improving strategic planning for mucormycosis outbreaks in developing countries.
- ✓ Replication of this study with large sample to generalize the result

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