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Proceeding Paper

IDENTIFICATION OF *Aspergillus sp* FUNGI ON PRAYER MATS IN THE TARBIYYAHTISH SHIHHAH MOSQUE OF POLTEKKES KEMENKES BENGKULU

Nurul Rahma Dianti[1], Sahidan[1*], Tedy Febriyanto[1], Gani Asa Dudin[1], Eliana[2]

[1]Department of Medical Laboratory Technology, Poltekkes Kemenkes Bengkulu, Bengkulu, Indonesia

[2]Department of Midwifery, Poltekkes Kemenkes Bengkulu, Bengkulu, Indonesia

*sahidan@poltekkesbengkulu.ac.id

Abstract

Fungi are one of the eukaryotic microorganisms that can be found in various places, both outdoors such as on soil, plants and indoors and on the human body. Mold can grow on prayer mats because they generally have open ventilation and are frequently accessed so that various materials from outside can enter the mosque and become pollutants because prayer mats that are on the floor make it easier for fungal spore particles to stick to the surface of the prayer mat. Contact between humans and prayer mats infected with pathogenic fungi can increase the risk of fungal infections (mycosis). This study aims to identify the fungi on prayer mats in the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu, needs to be carried out to see whether there are Aspergillus Sp fungi. The research sample was taken as many as 30 samples using a sampling technique using simple random sampling. Based on the results of research on samples of mosque prayer mats, it is known that of the 30 samples examined, 5 samples (16.6%) of mosque prayer rugs were found to be infected with Aspergillus Sp fungus and (83.4%) were not infected with Aspergillus Sp fungus with the result being the Aspergillus Sp species. positive, namely that there were 2 colonies of Aspergillus Fumigatus, 2 colonies of Aspergillus Niger, and 1 colony of Aspergillus Flavus. Some of the mosque prayer mats examined were infected with the fungus Aspergillus sp. Prayer mats and the surrounding environment need to be addressed with the factors that cause the growth of Aspergillus sp fungus by regularly maintaining the cleanliness of the mosque, especially personal and environmental cleanliness.

Keywords: Aspergillus sp, Prayer Mats, Mosque, Fungi

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INTRODUCTION

Fungi are one of the eukaryotic microorganisms (having a cell nucleus) have spores as a means of distribution, do not have chlorophyll, somatic or thallus structures in the form of single cells (unicellular) and generally in the form of branched threads (multicellular) or filaments. Fungi can be

found in various places, both outdoors such as in soil, plants and indoors and the human body. There are around 5.1 million species of fungi in the world, but only around 300 species can cause disease in humans. (Mulyana, 2019).

Factors that influence fungal growth include humid conditions and environmental temperatures that support the growth of fungi, resulting in several species of fungi being able to enter and grow in dust containing a mixture of organic and inorganic materials. Fungi can grow in rooms that are usually openly ventilated and often accessed from the outside, so that various materials can enter the room from outside, one of which is a mosque (Faturrachman, 2019).

Bengkulu Province borders directly on the Indian Ocean with a relatively narrow land area. This condition makes the Bengkulu region an area with high rainfall intensity. This can be one of the factors causing fungal contamination on prayer rugs which is determined by the air quality in the mosque room, both physically, biologically and chemically. (Arif Ismul, 2018).

In mosques, dust particles flying in the air can stick to the surface of objects in the room, with the force of gravity making prayer rugs on the floor can be contaminated because it makes it easier for fungal spores to stick to the surface of the prayer rug. The community can be an intermediary for the spread of fungi from outside if personal hygiene conditions before entering the mosque are neglected. Contact between prayer rugs contaminated with pathogenic fungi and humans can increase the risk of fungal infections (mycosis) and cause disease, especially in people with weak immune function (compromised immunity). Other diseases caused by fungal infections can be skin mycosis, subcutaneous mycosis, systemic mycosis, and superficial mycosis which often infect internal organs such as the lungs, rectum, urethra, and other organs and can be life-threatening (Yanti, 2019). Pathogenic fungi can be opportunistic and primary fungi. Diagnosed fungal infections are most often caused by pathogenic fungi from the genera Aspergillus and Candida (Mulyana, 2019).

The World Health Organization (WHO) in 2019 stated that pneumonia deaths reached 2.5 million people due to household air pollution. Based on age groups, the increase in prevalence occurs at the age of 20-54 years and will continue to increase at a later age. According to the Global Action Fund for Fungal Infections (GAFFI), an estimated 15 million people are affected by aspergillosis which causes more than 1 million deaths per year. Aspergillosis is a disease caused by the Aspergillus fungus. Aspergillosis is the most common opportunistic infection in the lungs (Melo et al., 2020).

The results of the study conducted by Faturrachman and Yanti Mulyana on The Detection of Pathogenic Fungi on Prayer Rugs of The Mosques at Jatinangor Campus of Universitas Padjadjaran (2019) showed that in 28 dust samples on prayer rugs in 28 mosques and prayer rooms at Universitas Padjadjaran Jatinangor Campus there were microbiological, all samples showed fungal growth with a total of 8

identified fungal species (Faturrachman, 2019). Poltekkes Kemenkes Bengkulu is one of the higher education institutions for professional health workers under the auspices of the Ministry of Health of the Republic of Indonesia which is located in Bengkulu Province. Poltekkes Kemenkes Bengkulu has 6 departments and 14 study programs. The number of teaching and education staff is 194 people, and other employees are 18 people. And based on data from the Higher Education Database (PDDikti) in 2022, the number of students is 3556 people (PDDikti, 2022). Poltekkes Kemenkes Bengkulu facilitates various academic activities including a place of worship for Muslims by providing a mosque on the Poltekkes Kemenkes Bengkulu campus. The Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu was inaugurated in 2018. Based on the number of employees and students who are active in it, there are around 200 people every day who worship at the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu.

After the researchers conducted an initial survey at the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu, data was obtained that there were 18 prayer mats in 7 rows. The prayer mats were cleaned with a vacuum cleaner once every two weeks without using disinfectant and washed once every 2 years. Judging from the potential for dust exposure on mosque prayer mats and the high risk of fungal infections in humans, it should be able to increase.

METHODS

This research was conducted using a descriptive design. Descriptive research is research that is intended to investigate and describe circumstances, conditions or other events (Arikunto, 2019). The design of this research is a study to determine whether or not the Aspergillus sp fungus is present on prayer mats at the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu.

RESULTS AND DISCUSSION

Table 1: Frequency Distribution of Aspergillus sp Fungus on Prayer Rugs at the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu

No.	Checkup result	Number of Prayer Rug Samples	Percentage (%)
1	Positive	5	16,6
2	Negative	25	83,4
	Total number	30	100

Based on table 1, it shows that a small portion of the prayer rugs at the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu, 16.6% were positive for *Aspergillus Sp* fungus and 83.4% did not have *Aspergillus sp* fungus.

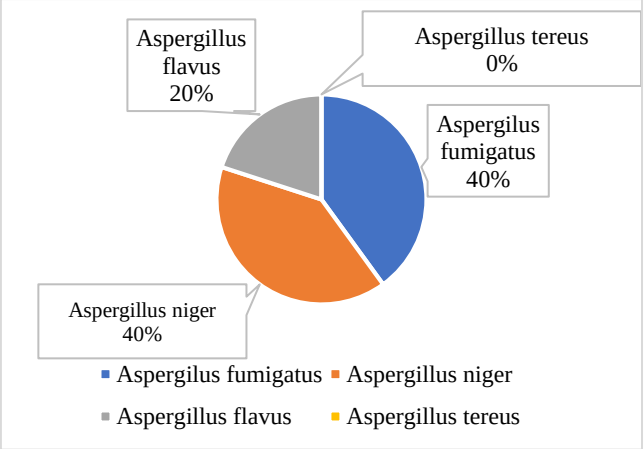

Figure 1: Percentage Diagram of Prayer Rugs Covered with Each Species of Aspergillus Sp. Fungus

Table 2: Percentage of Prayer Mats Growing Each Mushroom Species

No.	Mushroom Species	Types of Mushrooms That Grow	Percentage (%)
1	*Aspergilus fumigatus*	2	40
2	*Aspergillus niger*	2	40
3	*Aspergillus flavus*	1	20
4	*Aspergillus tereus*	0	0
	Total number	5	100

Table 2 shows the results that the contaminant fungal species that grew on prayer mats at the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu were Aspergillus fumigatus (40%), Aspergillus Niger (40%), Aspergillus flavus (20%), and Aspergillus Tereus (0%) was not found.

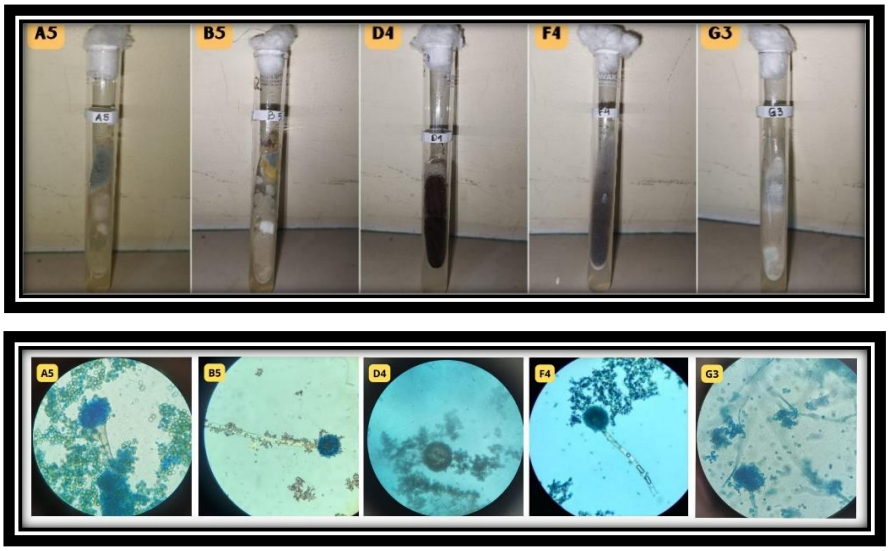

Figure 2: Results of Macroscopic and Microscopic Examination Positive for Aspergillus Sp. Fungus

The results of the examination of *Aspergillus sp* fungi on prayer mats at the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu, found 5 samples positive for *Aspergillus sp* fungi and 25 samples did not find *Aspergillus sp* fungi. In this study, the growth of *Aspergillus sp* fungi that grew was 2 colonies of Aspergillus fumigatus fungi, 2 colonies of Aspergillus niger fungi, and 1 colony of Aspergillus flavus fungi. Based on the number of positive samples, it shows that a small part (16.6%) of the prayer mats that exist and are used at the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu. The results of macroscopic observations of *Aspergillus sp* fungi colonies are brownish yellow to grayish, green and black, while microscopically they have round conidiophores and conidia. After a microscopic examination, it was discovered that the fungus growing on the prayer mat of the Tarbiyyahtish Shihhah Mosque of Poltekkes Kemenkes Bengkulu was a type of *Aspergillus sp* fungus (Aspergilus fumigatus, Aspergillus niger, Aspergillus T flavus).

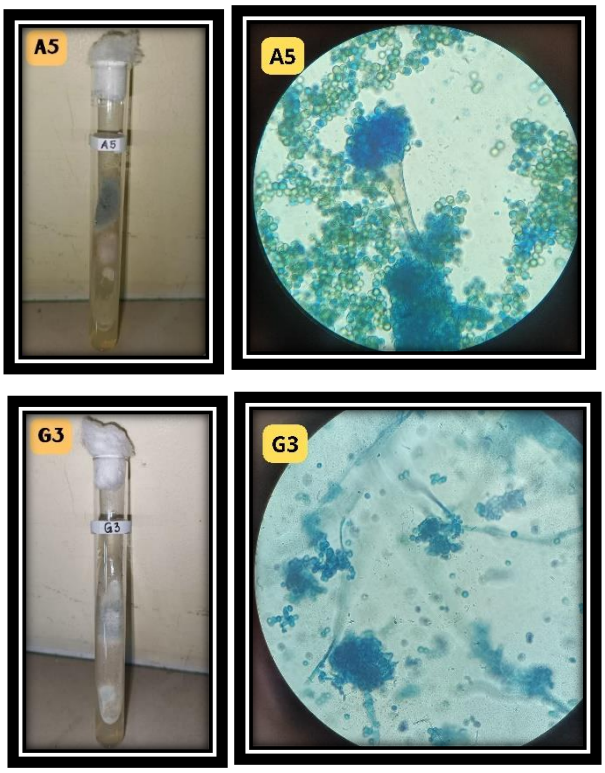

Figure 3: Macroscopic and Microscopic of Aspergillus Fumigatus Fungus

Aspergillus fumigatus found in samples A5 and G3 observed macroscopically had characteristics of having dark green colonies, like clustered sand. Microscopic observations showed smooth-walled conidia with an elongated shape and non-septate conidiophores. Aspergillus fumigatus is a type of fungus that often contaminates food, which can cause Aspergillosis. Aspergillosis is a disease caused by the Aspergillus species. Aspergillosis can develop in humans with low immunity. This Aspergillosis infection attacks the lungs so that it can cause coughing, fever, chest pain and difficulty breathing (Pujiati, 2018).

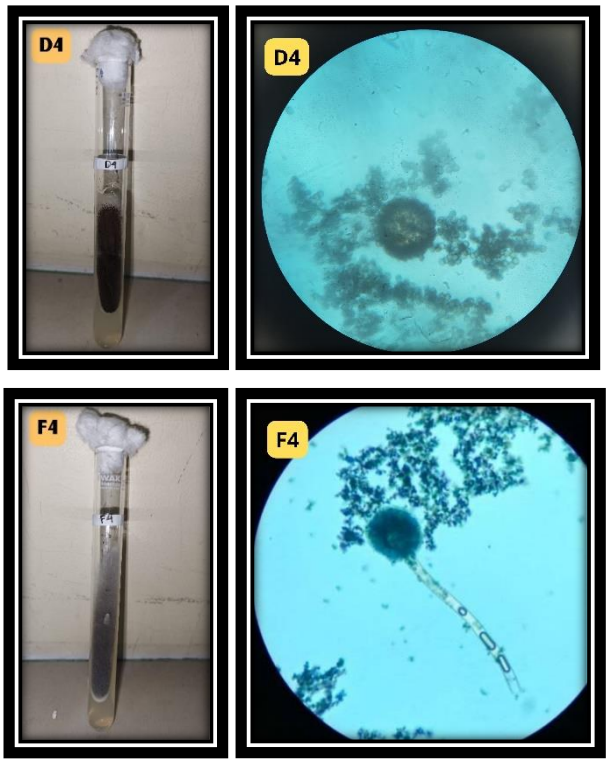

Figure 4: Macroscopic and Microscopic Aspergillus Niger Fungus

Aspergillus niger was found in samples D4 and F4 with macroscopic examination results characterized by filamentous colonies and black spores. Aspergillus niger on microscopic examination showed mycelium with round spores, non-septate hyphae and had conidiophores, there were long conidiospores, and black and round conidial heads. Aspergillus niger is one of the fungi that can cause allergic reactions. When inhaled by humans, Aspergillus niger can cause allergic reactions in humans and cause hypersensitivity such as asthma (Pujiati, 2018).

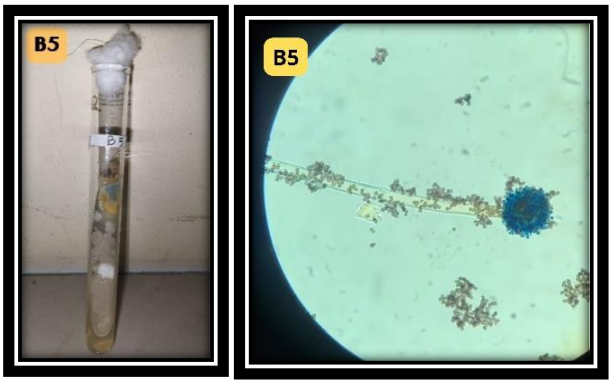

Figure 5: Macroscopic and Microscopic Aspergillus Flavus Fungus

Aspergillus flavus was found growing in sample B5 which was examined macroscopically with the characteristics of yellowish-white colonies, microscopic observations had septate conidiophores, septate hyphae.

Aspergillus flavus is one of the fungi that can cause infections and symptoms of Aspergillosis including fever, chills, headache, cough and weight loss and reduced vision (Kumala, 2018).

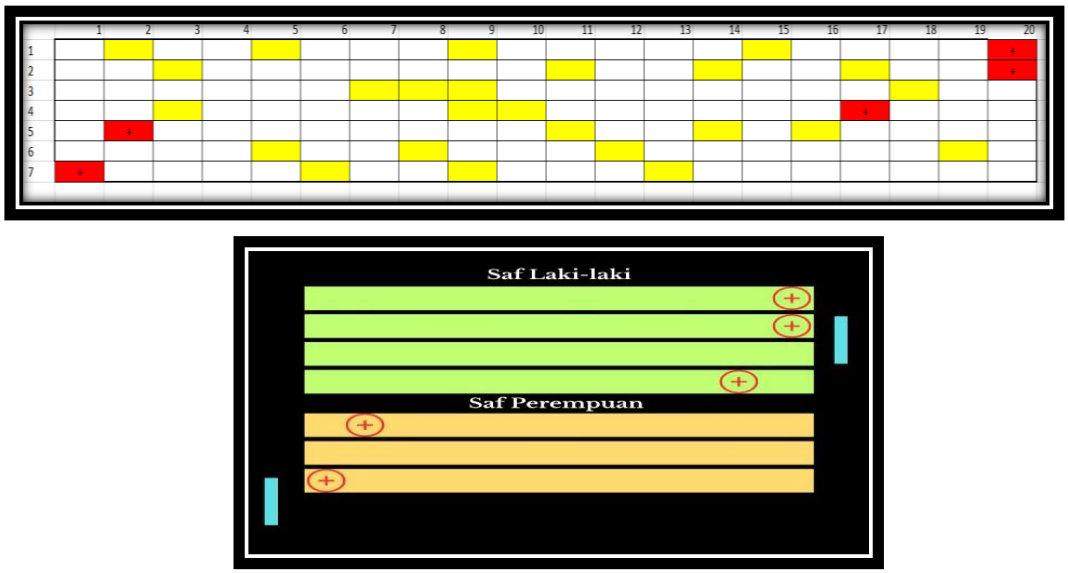

Figure 6: Parts of the prayer mat that are positive for Aspergillus sp Fungus

From the study, 30 samples were taken from a population of 140 prayer mats in the Tarbiyyatish Shihhah mosque of Poltekkes Kemenkes Bengkulu. The prayer mats studied were overgrown with *Aspergillus sp* fungus in the parts close to the entrance and toilets and ablution areas that allow for humid conditions. The open mosque room can also pose a risk of dust entering the mosque room.

Cleanliness of prayer rugs is very important for health, one of the problems is contamination of microorganisms. The causes of contamination of prayer rugs are caused by several factors, namely humidity, temperature, water potential, pH and environmental activities. Pollution of prayer rugs basically occurs due to humid conditions. Therefore, the process of hygiene of the feet of mosque visitors must be considered and the addition of footwear is highly recommended. *Aspergillus sp* fungi are found in nature as saprophytes, growing in tropical areas with high humidity. Although there are more than 100 species, the types that can cause disease in humans are Aspergillus niger, Aspergillus flavus, and Asperigilus fumigatus, all of which are transmitted by inhalation transmission. Aspergillus niger is able to produce mycotoxins, because it has genes that can produce them. The original habitat of *Aspergillus sp* in the soil, favorable conditions include high water content (at least 7%) and high temperatures. Aspergillus flavus or Aspergillus fumigatus are two types of fungi that produce various types of aflatoxins. Aflatoxin can cause liver damage, a very important organ of the body and also plays a role in detoxifying aflatoxin itself. If aflatoxin is consumed in small amounts but continuously, it can cause liver cancer (Faturachman, 2019).

This study is in line with research conducted by Faturachman et al (2019). The results of the study showed the presence of fungi on the surface of prayer mats in 28 mosques and prayer rooms at Unpad

Jatinangor with the growth of fungi with a total of 8 species of opportunistic fungi (Alternaria spp., Aspergillus spp., Candida spp., Fonsecaea spp., Mucor spp., Penicillium spp., Rhizopus spp., Rhodotorula spp.) which are opportunistic fungi and no pathogenic fungal species were found.

According to research by Anindita Riesti Retno Arimurti et al (2021), all rooms in one of the Islamic Boarding Schools in East Surabaya were contaminated with airborne mold and the swab results of 30 samples of clothing from students at this Islamic Boarding School showed that 80% were contaminated with Aspergillus sp. and 20% were not contaminated. Based on research by Hurbelina Menezes (2020), the results obtained from the identification of Aspergillus Sp. fungi in 10 samples of used clothing sold at the Pon Jombang market showed that all used clothing was positive for Aspergillus sp. fungi.

In the study of Agus Subagyo et al, (2019) the number of germs on prayer mats in all mosques that were examined was positive with the lowest ALT being 103 colonies/cm2 and the highest being 1,483 colonies/cm2, while dust mites showed that 3 mosques (27.3%) were negative for dust mites while 8 mosques (72.7%) were positive for dust mites.

According to research by Jean-Ralph Zahar (2018), the large number of *Aspergillus sp* found in rooms with open characteristics and good ventilation systems, it is suspected that *Aspergillus sp* which is widely found in the soil as a saprophyte, enters the room through meteorological conditions/dry weather that provides humidity and temperature that allows.

In accordance with this study, researchers also found *Aspergillus sp* in mosques that have large and open rooms. The presence of mold on the surface of the prayer rug is thought to be caused by several reasons. First, it could be due to the lack of cleaning of the prayer rug, either by washing or sucking with a vacuum cleaner. In addition, several factors such as contact of the prayer rug surface with the indoor environment, lack of hygiene of prayer rug users, especially with wet or dirty feet, the open condition of the mosque room, little exposure to sunlight and flying dust also help create optimal conditions for fungal growth.

Fungi are susceptible to contamination because dust and fungi from outside (soil) can enter the room with the help of wind through ventilation. In a study by Namita Kumari et al (2018) in India, it was found that the genus of fungi *Aspergillus sp* often appears indoors, as was also found in this study. Based on the impact caused by inhaling objects that have been contaminated with fungi, the public is advised to maintain the hygiene of the place of worship environment because it can affect the growth of fungi on prayer rugs.

CONCLUSION

This study has found that a small proportion (16.6%) of the prayer mats were infected with *Aspergillus sp* fungi with the positive parts being samples A5, B5, D4, F4, and G3. Samples that were overgrown with Aspergillus fumigatus fungi were 2 colonies (samples A5 and G3), Aspergillus niger fungi were 2 colonies (samples D4 and F4), and Aspergillus flavus fungi were 1 colony (sample B5). While the other 25 samples (83.4%) did not show any growth of *Aspergillus sp* fungi

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