Jurnal eduHealt
Volume 15 , Number 01, 2024, DOI 10.54209/eduhealth.v15i01
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

Identification of the fungi causing onychomycosis to fish traders in the fish market Lhokseumawe city Pusong

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Article Info
Keywords:
Dermatophytes,
Non-dermatophytes,
Onychomycosis,
Fish market

ABSTRACT
Onychomycosis is a disease caused by dermatophyte fungi, including Microsporum, Trichophyton and Epidermophyton, apart from that, there are also non-dermatophyte fungi, including Aspergillus sp., and Malessezia furfur. This study aims to identify dermatophyte and non-dermatophyte fungi in the toenails of fish traders at the Pusong Fish Market and identify factors that can increase the risk of fungal infections in the toenails of fish traders, such as sanitation conditions, personal hygiene, or other environmental factors. This research uses a descriptive method by taking nail samples from fish traders, then analyzing them using Sabouraud Dextrose Agar (SDA) culture media. The results of the study showed that 100% of the samples showed nail abnormalities, with the distribution of non-dermatophyte fungal infections reaching 63.2% consisting of 24 people and dermatophyte 36.8% consisting of 14 people. Based on risk factor analysis, it indicates that sanitation conditions and personal hygiene of fish traders play an important role in the spread of fungal infections. The conclusion of this research is that all fish traders at the Pusong market experienced nail disorders (Onychomycosis) due to being infected with dermatophyte and non-dermatophyte fungi with the most common type of fungus being Aspergillus Niger which is a non-dermatophyte fungal group.

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INTRODUCTION

Environmental conditions in Indonesia, which have a tropical climate, have excellent supporting capacity for the growth and development of microorganisms, both beneficial and detrimental. One of the harmful microorganisms is fungus which grows well in damp conditions. Fungi will grow in certain parts of the human body and will cause disease, one of which is onychomycosis(1).

Onychomycosis is a disease caused by dermatophyte fungi including Microsporum, Trichophyton and Epidermophyton, besides that there are also non-dermatophyte fungi including Aspergillus sp., and Malessezia furfur(2).In general, based on the depth, fungal

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infections are divided into three, namely superficial, cutaneous and subcutaneous infections. Superficial infections occur because fungi infect tissue that contains keratin compounds, this causes nails, hair and skin to often become infected with dermatophyte and non-dermatophyte fungi.(3). Onychomycosis is a very common nail disease and causes dystrophy of the nails with a percentage of 50% of cases of fungal infections of the nails. Fungal contamination of fingernails is rare, but toenails often occur because they tend to be damp and closed, causing a higher frequency of exposure to fungus. Aspects that support the development of fungus are humid and hot conditions and other supporting factors such as lack of cleanliness.

Work environments such as markets are places that have the potential to influence fungal growth. The market is a place for residents to carry out transactions to meet their needs, not only as a place for buying and selling, traditional markets can spread disease due to aspects of the condition of the place that are poorly maintained.(4). Pusong Market is an open type fish market, this market is also a busy trading sector because it has a large area and is included in the group of traditional markets which are still not kept clean.(5). One of the jobs that has a risk of exposure to fungus is fish traders because they often have direct contact with water for a long time which causes their nails to become wet and damp, thus becoming a place for fungal growth, coupled with the lack of personal protective equipment to prevent direct contact with water and lack of attention. regarding personal hygiene, especially the foot area, which is very susceptible to exposure to dermatophyte and non-dermatophyte fungi(6).

About 20-25% of the world's population is affected by fungal infections. According to the World Health Organization (WHO), the prevalence in developing countries is 16% at the age of 13 years, 8-18% at the age of 14-15 years and 1% at the age of 5-9 years.(7). The prevalence rate of fungal infections in Indonesia is 2.93% -27.6% per year, while the prevalence of onychomycosis infections in East Java which are found at Dokter Soetomo Hospital Surabaya reaches 1.6%. In research on identifying the toenails of fish traders at the Legi Jombang market, it was found that the spread of nail fungus among fish traders included 86.7% in productive age, 13.3% in non-productive age, and 53.3% in women. Infections caused by the fungus Candida albicans were 46.7%, followed by Aspergillus niger at 20.0% and Aspergillus flavus at 6.7%. The results of research identifying onychomycosis in the nails of fish traders in the Bangkalan market showed that there were eightcases of Trichophyton sp fungus with a percentage of 25%, six cases of Aspergillus sp fungus with a percentage of 18% and no Candida albicans fungus.(8). Apart from that hIdentification results from traders at traditional markets in Denpasar showed that there were 18 Aspergillus sp fungi. which belongs to the non-dermatophyta group, 10 Trichophyton sp. which is included in the deramtophyta group and 10 fungi in the yeast group. Based on research results, it is known that non- dermatophyte fungi are the most commonly found fungal group.

In identifying fungi, there are various methods that can be used, both visual identification such as the Potassium Hydroxide (KOH) method, Periodic Acid Schiff (PAS)

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staining, dermoscopy, confocal microscopy or organism identification using the Sabouraud Dextrose Agar (SDA) culture method, mass spectroscopy, spectroscopy. Raman, to identification at the molecular level using Polymerase Chain Reaction (PCR)(9). These various diagnostic methods have their respective advantages and limitations. One of the most standard methods for diagnosing onychomycosis is identification of the organism by SDA culture. Culture examination is carried out because it is easy, fast and cheap to detect the presence of fungus and can provide accurate results to help diagnose the fungus causing infection. In general, the culture method is the standard method for fungal identification. Apart from that, the possibility of false negatives and result bias can also be overcome by using antibiotics in the examination procedure. Culture examination was carried out by growing cultures on Sabouraud Dextrose Agar media(10).

Based on the data above, it can be concluded that fish traders have a fairly high risk of being exposed to fungal infections, so it is necessary to carry out further research on the identification of demartophyte and non-dermatophyte fungi by examining with Sabouraud Dextrose Agar (SDA) media culture on the toenails of fish traders at fish markets. Pusong.

METHODS

Type Design of research

This type of research is descriptive research.cThis research uses a qualitative design.

Research Location and Time

This research was conducted at the Pusong fish market Jl. Pusong Baru, Kec. Banda Sakti, Lhokseumawe City and the Aceh Service Health Laboratory (KESDA) on Jl. Teuku Moh. Daud Beureueh, Beurawe, District. Kuta Alam, BandaAceh City, Aceh.

Research Preparation

Bring a research permit, determine inclusion and exclusion criteria, ask permission from the fish trader and explain the aims and objectives, prepare the necessary tools and materials, take nails directlyfrom the fish trader's toenails using one nail clipperper person, sample is placed in a plastic zipper clean, each sample is clearly marked with identity, samples are stored in different sample containers, samples are taken to the Aceh Department of Health microbiology laboratory, microscopic examination with Sabouraud dextrose agar (SDA) culture.

How to Research

Prepare the necessary equipment and materials,weigh 6.5 grams of SDA, add 100 ml of distilled water. heating on a hot plate and stirring until it boils,sterilizing the media using an autoclave for 15 minutes at a temperature of 121°C, adding the antibiotic chloramphenicol to the media after the sterilization process is complete. Therefore, pouring antibiotics is required aseptically or with spirit fire so that contamination does not occur, adding antibiotics in the amount of 1% or 1 ml in 100 ml ofmedia, the volume is sufficient to suppress the growth of bacteria in the media, pour the SDA media into a petri dish, homogenize the media in the petri dish so that it is evenly distributed, let the media in the petri dish freeze completely, insert the media in the correct position. upside down in an

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incubator for ± 24 hours at a temperature of ± 37°C to test the quality of the media, cut the nails into small sizes then plant them in the media, incubate the media at a temperature of 37°C for 7 days, observe the presence of colonies and identify colonies that grow under a microscope, document check up result(11).

Data analysis

The data analysis carried out in this research was univariate analysis, namely analysis that aims to explain/describe the characteristics of each variable studied. The form depends on the type of data, for numerical data the mean (average), median, standard deviation and minimum and maximum inter-quartile range are used.

RESULTS

Based on the results of research by examining 38 samples of fish traders' toenails at Pusong market using SDA culture, the following results were obtained:

Table 1 Examination Results Fish seller

Identify Mushrooms	Frequency (n=38)	Percentage (%)	Total
Positive	38	100	100
Negative	0	0	0
Total	38	100	100

Source: Data Processing, 2023

Based on table 1, it was found that all samples of fish traders' toenails at the Pusong fish market showed fungal infections. These results illustrate a significant prevalence rate in this population. This can be caused by exposure to the market environment which may support the growth of fungi, as well as the daily habits and activities of fish traders which can increase the risk of exposure to these microorganisms, such as lack of personal hygiene and frequent contamination of fish water, sea water and soil without using PPE. such as bootsand gloves.

Frequency Distribution of Dermatophyte and Non-dermatophyte Types

Based on the research results which can be seen in Table 1, data processing is then carried out whichcan be seen in Table 2 as follows:

Table 2 Results of Sabouraud Dextrose Agar (SDA) Culture Examination

Identify Mushroom s	Frequ ency (n=38)	Perce ntage (%)	Classificati on	Perce ntage (%)
Trichophyton Mentagrop hytes	7	18.4	Dermatoph ytes	36.8

Source: Data Processing, 2023

Table 2 shows the results of univariate analysis, namely the frequency distribution of

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the number of samples affected by dermatophyte and non- dermatophyte fungi. Based on the results of the analysis, it was found that 63.2% of fish traders in the Pusong market were infected with non- dermatophyte fungi with a frequency of 24 people and 36.8% of dermatophyte fungi with a frequency of 14 people.

Based on research results, the frequency of the fungus that is most commonly found is theAspergillus Niger fungus with the colony description consisting of a compact white or yellowbase covered by a dense layer of dark brown to black.

Discussion

The results showed that 38 people (100%) of the research sample had their toenails from fish traders at the Pusong market infected with fungus. Based on the results of data processing carried out in this study, 24 people were infected with non- dermatophyte fungi, Aspergillus Niger, 42.1% and Aspergillus Fumigatus, 21.1%. 14 people were infected with dermatophyte fungi of the type Trichophyton Mentagrophytes 18.4% and Trichophyton Rubrum 18.4%.

Aspergillus Niger fungus is the type of fungus that is most often found in the toenails of fish traders at the Pusong market. This is due to environmental conditions that support the growth of this type of fungus with exposure to fish water and direct contact with soil as well as environmental contamination. Aspergillus Niger is a type of fungus that is found everywhere in nature, such as most fish(12).

Without personal hygiene habits, it can cause direct contact between toenails and fish water, sea water and soil. So it was found that all fish traders at the Pusong market were infected with fungi, both dermatophyte and non-dermatophyte.(13).The type of fungus that most often infects fish traders' toenails is Aspergillus Niger, this is because this fungus has the ability to grow in soil containing highsalinity.(14).

Trichophyton rubrum	7	18.4		
Aspergillusfumigatus	8	21.1	Non- dermatophytes	63.2
Asperpillus niger	16	42.1		
Total	38	100		100

Fish traders at the Pusong market carry out work which results in workers often being contaminated by sea water and fish water while cleaning fish waste for a long time and repeatedly every day, but due to lack of personal hygiene, the workers do not use PPE such as boots. and gloves that cause direct contact with sea water or fish water. Sea water and fish are factors that increase the risk of exposure to dermatophyte and non-dermatophyte fungi(13). Sea water contains microorganisms, including fungi that can cause infections in toenails. The warm temperature and salt content in sea water create an ideal environment for fungal growth. When toenails are continuously exposed to sea water or fish water without adequate protection,fungus can easily enter and grow in the nail area(13).

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Based on the explanation above, it is importantfor fish traders to increase awareness of the importance of personal hygiene by using PPE consistently. The aim of using PPE is to reduce the risk of fungal infection which can arise due to repeated exposure to fish water and sea water(15).

This is in line with research conducted by Levita (2021) at the Ki Lemah Duwur Bangkalan Market, which stated that 23 samples were examined for nail fungus (onychomycosis) on fish sellers at the Bangkalan market which were infected with the fungus with a percentage of 71% and 9 samples were not infected with the fungus. samples with a percentage of 29% were contaminated with the Aspergillus sp type of fungus, which is the type of fungus that most often infects the toenails of fish traders at the Ki Lemah Duwur market. The cause of nails being infected with fungus (onychomycosis) is because fish sellers often do not use gloves, work in a damp environment and work for a long time, which can increase susceptibility to fungal exposure.(16).

Based on the research and several references above, the prevalence of fungal infections in toenails caused by non-dermatophyte fungi due to this variability can influence the ability of the fungus to reproduce, compete with other fungi and adapt to certain environmental conditions. Some types of non-dermatophyte fungi can survive better in certain environmental conditions, such as high humidity, warm temperatures or the presence of certain chemical compounds. If these conditions are presentin the fish trader's environment, then non- dermatophyte fungi are more likely to grow and cause infection. Fish traders who are continuously exposed to fish water are more susceptible to non-dermatophyte fungal infections that have adaptations to that environment. Individual habits in maintaining personal hygiene and wearing footwear can influence the risk of non-dermatophyte fungal infections(17).

However, although non-dermatophyte fungi are generally more dominant, there are several factors that can cause differences in the types of non- dermatophyte fungi that infect fish traders' toenails,namely that each type of fungus has preferences andadaptations to certain environments. For example, Aspergillus niger can live in acidic conditions and withstand certain high humidity levels while Trichophyton sp. can grow well at warm body temperatures. This significant difference is the reason why there are different types of fungus that infect fish traders. These adaptations may include tolerance to seawater salinity, temperature, and other environmental factors(18).

CONCLUSIONS

All fish traders (100%) at the Pusong market experienced fungal infections of their toenails. Dermatophyte fungal infections were 36.8% and non-dermatophyte infections were 63.2%. The types of fungus that identified the toenails of fish traders at the Pusong market were Aspergillus Niger (42.1%) and Aspergillus Fumigatus (21.1%) which are non-dermatophyte fungi, then Trichophyton Mentagrophytes (18.4%) and Trichophyton Rubrum (18.4%) which is a groupof dermatophyta fungi.

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