INFEKSI FUNGI DERMATOFITA PADA PENDERITA MIKOSIS KUKU DI KELURAHAN RENGAS PULAU LINGKUNGAN 23 KECAMATAN MEDAN MARELAN

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ABSTRACT

Dermatofita is a group of fungi that cause abnormalities in the nails. Fungi that cause dermatofita are Trychophyton, Microsporum, and Epidermophyton. As many as 30 people suspected of being infected with dermatofita in Rengas Village, Environmental Island 23, Medan Marelan District were taken as samples, sampling was done by purposive sampling with the criteria of damaged toenails, with the characteristics: nails are not shiny, brownish to black ranging from the base to the end and then nail examination is done directly KOH 10% and cultured using sabouraud Dextrosa Agar (SDA) media. Fungi are isolated with a medium to tilt containing SDA and each species of fungi is then identified using preparations for microscope examination. The results showed that from 30 samples obtained 8 (eight) samples of nails that posistif dermatofita, namely: 5 (Five) people infected with fungi species Tricophyton mentagrophytes, 2 (two) people infected with fungi Trichophyton rubrum, and 1 (one) person infected with Epidermophyton floccosum.

Keywords: *Dermatofita,* Nails

CHAPTER I

INTRODUCTION

1.1 Background of Study

Indonesia is a tropical country with high temperature and humidity, which is a good environment for the growth of fungi, making fungi that can be found almost everywhere. In the wild, more than 100 species of fungi are pathogenic and live commensals in humans. Fungi live in a soil sphere that contains humus and animal feces, such as poultry and bats and grow in the soil rich in the nutrients needed (Widiati et al, 2016).

Fungi live on organic substances or in soil containing inorganic substances in the presence of cellulose enzymes that can convert inorganic substances into organic substances. Fungal infections are easy to attack if hygiene and health are not taken care of. The growth of fungal infections in humans is aggravated by moisture, sweat, and direct contact with fungi. Fungi can grow in certain body parts in humans such as skin, hair, and nails which will cause disease in humans (Khatimah et al, 2018).

Nail infections are common in hot or humid climates. Furthermore, this infection occurs among individuals who frequently wash or soak their hands with water, for example, those working as laundresses are very susceptible to fungal infections. It is because the ceaseless activity of water will damage the protective skin at the nail bed (Latifah et al, 2019).

Work environment is a latent place to affect the health of workers. Factors that can influence the health of workers

include physical factors, chemical factors, and biological factors. Work environment or type of labor, for instance, laundry workers, sand mining workers, and farmers. Such incidents can infect nails with direct foot contact on the ground, including farmer workers and sand mining workers so they can infect toenails, especially (Andini, 2015).

One of the causes of toenail or fingernail infection is dermatophyte fungi. Dermatophytes are a group of fungi that can form molecules binding to keratin and use nutrients from keratin to form colonies (Djuanda et al, 2013).

Dermatophyte fungi are classified into three genera, among others: Trichophyton, Microsporum, and Epidermophyton (Anwar, 2005). These fungi are known as dermatophyte fungi that prompt disease in human beings. Trichophyton and Epidermophyton induce abnormalities in nails and skin, and comprise various species, while Microsporum causes abnormalities in hair and skin. Species that are often found on nails or Tinea unguium are Trichophyton mentagrophytes, Trichophyton rubrum, and Epydermophyton floccosum species. infection may arise through direct contact with patients or through reservoirs which are a source of infection, poor hygiene in the nail area, especially under the nails. Workers who are in continuous contact with water and do not use footwear in damp such as tofu factory workers, laundry workers, and farmers are often infected by this disease (Gandahusda, 2000).

Based on the observation done on the changes in nail color and nail damage in Rengas Pulau Village Lingkungan 23,

Medan Marelan Subdistrict, changes in the nails were found due to negligence to take care of the hygiene of nails and between toes which are sweaty, allowing fungi to grow. Daily labor that does not consider hygiene can cause nails to crack, discolored, uneven surface, brittle or thick, and eroded (Jawetz et al, 2005).

1.2 Formulation of Study

The high incidence of mycoses was due to water-related work or humidity, causing nail infections in the Rengas Pulau Village Lingkungan 23, Medan Marelan Subdistrict. Therefore, it was necessary to know the cause of fungi and the percentage of nail mycoses patients in the area.

1.3 Objective of Study

This study aimed to find out fungal infections of the dermatophyte group on nails in the Rengas Pulau Village Lingkungan 23, Medan Marelan Subdistrict in 2020

1.4 Significance of Study

This study was to provide information material on the prevention and control of nail mycoses in the Rengas Pulau Village Lingkungan 23, Medan Marelan Subdistrict in 2020.

CHAPTER II

LITERATURE REVIEW

2.1 Fungi

The study of fungi is called mycology (from the Greek words *mykes* which means fungi and *logos* which is interpreted as science). Medical mycology is the study of fungi and the diseases they cause in humans. Diseases due to fungi are called mycosis. Mycoses that affect the surface of the body, such as skin, hair, and nails are called superficial mycoses (Irianto, 2013).

Fungi are eukaryotic microorganisms (Soedarto, 2015). Fungi can be in form of cells or branched threads and contain cell walls consisting mostly of chitin and glucans, and a small portion of cellulose or chitosan. The depiction distinguishes fungi from animal cells and plant cells. Animal cells do not possess a cell wall, whereas plant cells are mostly cellulose. Fungi have a protoplasm containing one or more nuclei, do not have chlorophyll, and reproduce asexually, sexually, and either way (Irianto, 2013).

In the wild, approximately 200,000 species of fungi, 300 species are pathogenic and cause infections in human beings. Pathogenic fungi do not produce toxins and the pathogenicity mechanism is very complex and polygenic. Fungal infections among humans are mainly caused by opportunistic fungi, which are not pathogenic but can promote disease in humans and the rest of the fungi are commensal that live on human saprophytes. The living habitat of fungi is any medium, while the main habitat is in the soil and water. However, fungi can adapt to the environment so they can live in dry and hot deserts (Kumala, 2009)

2.1.1 Fungi Properties

Fungi are heterotrophic, which are organisms that do not contain chlorophyll. Fungi generally use enzymes to convert and digest organic substances (Susanto et al, 2008).

Fungi that usually trigger disease in humans live on organic substances or soil containing organic substances, including humus, animal, or bird feces. Under these circumstances, fungi can live perpetual as a saprophyte without undergoing the cycle as a parasite in humans. On the other hand, fungi can also exist in nature or on the surface of inorganic solutions in the laboratory (Gandagusada, 2000).

2.1.2 Factors affecting the growth of fungi

In general, fungal growth is influenced by substrate factors, light, humidity, temperature, substrate acidity (pH), and chemical compounds in the environment (Gandjar et al, 2006).

1. Substrate

   Substrate is the main source of nutrition for fungi. Nutrients can only be utilized after the fungus excretes enzymes that can reduce complex compounds from the substrate into simpler compounds, numerous fungi have the ability to excrete types of enzymes into the environment that can be detrimental to complex carbohydrates, such as *cellulose, pectinase*, *dextranase,* and *xylanase.*

Cellulose is the main polysaccharide in plant tissue which is a potential carbon source for fungi.

2. Light

   The light spectrum with a wavelength of 380-720 nm is relatively influential on the growth of fungi and also transforms sporulation. The effect of light on fungi reproduction is rather complex. Different development stages form different rays. The intensity, duration, and quality of light determine the notability of the effect of light on fungi. Generally, light becomes either stimulating factors or inhibiting factors for the structure formation of reproductive organs and spores in fungi.

3. Humidity

   Typically, low-level fungi require moisture. Areas that frequently sweat, such as the groin and between the fingers, are mostly affected by fungal diseases.

4. Temperature

   Based on the environmental temperature range that is adequate for growth, fungi are fallen into psychrophilic, mesophilic, and thermophilic fungi. Psychrophile fungi are those that grow at or below 0°C and at a maximum temperature of 20°C. A few fungal species are psychrophile. Mesophyll fungi are those that grow at a temperature of 10°C -35°C, the optimal temperature is 20°C -35°C. Fungi can grow properly at room temperature 22°C -25°C and most fungi are mesophilic. Thermophilic fungi live at a minimum temperature of 20°C, an optimum temperature of 40°C, and a maximum temperature of 50°C-60°C. To illustrate, Aspergillus fumigatus lives at a temperature of 12°C-55°C.

5. Acidity level of substrate (pH)

   Acidity level of substrate is significant for the growth of fungi because certain enzymes will only reduce a substrate according to its activity at a certain pH. Generally, the pH is below 7.0 (Irianto, 2013).

2.1.3 Body Structure of Fungi

From the structure of the body, fungi display a single branched thread called *mycelium* which is useful for identifying a fungus or otherwise. Organisms including fungi may contain only one cell or many cells. Single-celled fungi, such as yeast (*Saccharomyces cerevisiae*). Meanwhile, the multi-celled fungi (Multicellular) can be either microscopic fungi or macroscopic fungi. Microscopic fungi are fungi that can only be detected under a microscope due to their very small size and macroscopic are fungal growths that form colonies resembling cotton (cottony, woolly) or solid (velvet, powdery, granular) (Andini, 2015.

2.2 Dermatophytosis

Dermatophytosis is a disease of tissues containing keratin, such as the *stratum corneum* in the epidermal layer of skin, hair, and nails (Anggarini et al, 2015). Diseases caused by fungal infections are referred to as mycoses. Dermatophytosis or ringworm is produced by fungi belonging to the dermatophyte group. Dermatophytes are a group of fungi that can digest keratin in the epidermal layer, resulting in abnormalities and damage to infected skin, nails, and hair tissue (Adelberg et al, 2008). Dermatophytes come from the Greek,

which means skin fungi, and dermatophytes belong to the fungi imperfecti class which is divided into genera, namely *Microsporum, Trichophyton*, and *Epidermophyton*. Each genus has a species that are often found, including Trichophyton rubrum, Trichophyton mentagrophytes, and Epidermophyton flocosum. One of the dermatophytoses based on its localization is *Tinea unguium* which infects fingernails and toenails. This infection occurs due to poor hygiene, humid conditions, and especially around the nails which facilitates nail infection (Gandagusada, 2000).

Mycosis is a disease caused by fungi. Fungal diseases or mycoses fall into two categories; superficial mycoses and deep mycoses. Infections caused by fungi can be complex on a mild or severe scale. The mycoses in Indonesia have a very high prevalence. This is influenced by climatic factors since Indonesia is a tropical climate country and has high humidity that supports the growth of fungi. The occurrence of mycoses is influenced by factors such as the immune system which plays a pivotal role in mycoses. Declining immunity will ease fungal infections in humans. Sweating, moisture body, and a long term use of antibiotics also greatly affect fungal infections in humans (Siregar, 2005).

Superficial mycoses are fungal diseases that affect the stratum corneum of the skin, hair, and nails. Superficial mycoses are divided into two groups; those caused by dermatophyte fungi, including dermatophytosis, and those caused by non-dermatophyte

fungi. Dermatophytosis based on area consists of *Tinea capitis, Tinea barbae, Tinea cruris, Tinea Pedis* or *Tinea manus, Tinea Unguium* and *Tinea Corporis*, whereas non-dermatophytosis consists of *Pityriasis vesicolour*, Black Piedra, White Piedra, *Tinea nigra palmaris, Otomycosis*, and Keratomycosis (Djuanda, et al, 2013).

Deep mycoses comprise several fungal diseases with certain clinical symptoms, including *Candida albicans*. The cause of this disease is *candidiasis*, which is a yeast that commonly lives in humans and animals as a saprophyte. In the wild, this fungus is found in soil, fruit, animal feces, and water. Furthermore, *Candida* may cause nail infections. Such abnormality can arise due to poor hygiene in the nail area as a result of scratching from skin infected with the fungus or contaminated after defecation (Djuanda et al, 2013).

Etiologically, dermatophytosis is provoked by the disease. Apart from keratolytic properties, there are many principle characteristics among dermatophytes, such as physiological, taxonomic, and antigenic properties as nutrients for growth. The cause of disease should be adjusted to the source so that system becomes dermatophytosis. Microsporosis is originated by the genus *Microsporum* and epidermophytosis is caused by the genus *Epidermophyto*n (Karyadini et al, 2018). The etiologic diagnosis is complex indeed because the fungal culture results should be anticipated and it consumes a lot of time and is not practical (Susanto et al, 2008).

2.2.1 Dermatophyte Fungi

Dermatophytes are a group of fungi that can break down keratin. Based on morphological characteristics, dermatophytes are categorized into three genera: *Trichophyton, Microsporum*, and *Epidermophyton* (Amanah et al, 2015).

1. Trichophyton

This category infects hair, skin, and nails, and forms cylindrical macroconidia with thin, fine, club-shaped walls with 8-10 septa measuring 4 x 8^{-15} µm. Microconidia are characteristically round, piriform (teardrop-shaped), or clavate (club-shaped) with a size of 2-4 m (Irianto, 2013).

a. Trichophyton rubrum

The origin of Trichophyton rubrum *is Tinea (capitis, corporis, cruris, pedis, manuum, unguium*). The properties contained in Trichophyton rubrum are; anthropophilic dermatophytes, infectious to hair, skin, and nails, culture: slow-growing (2-3), white velvety colonies, covered by aerial mycelium, giving a burgundy pigment observed from the reverse slide, microscopic view of culture: hyphae, pencil-shaped macroconidia, and tears drops-shaped microconidia (Karyadini et al, 2018).

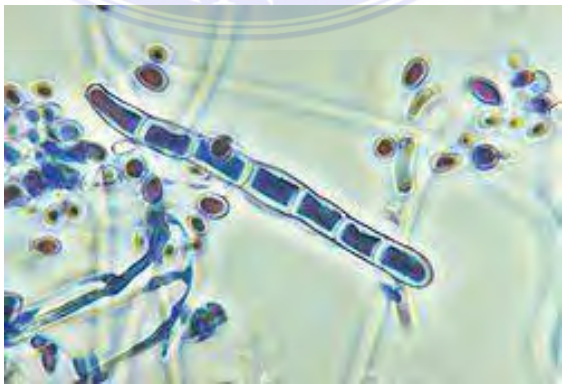

Figure 2.1 *Trichophyton rubrum*
Source: Irianto, 2013

b. Trichophyton mentagrophytes

The cause of Trichophyton mentagrophytes is t*inea* (*capitis, corporis, cruris, pedis, manuum, unguium*). The properties are; anthropophilic dermatophytes, ectothrix, colonies growing in media after 8-10 days, colony surface shaped like cotton and granules, burgundy medium, microscopic appearance of colonies: round microconidia clustered similar to grapes, spiral hyphae, cigar-shaped macroconidia with 2-5 a narrowed septum at the base of the attachment (Siregar, 2005).

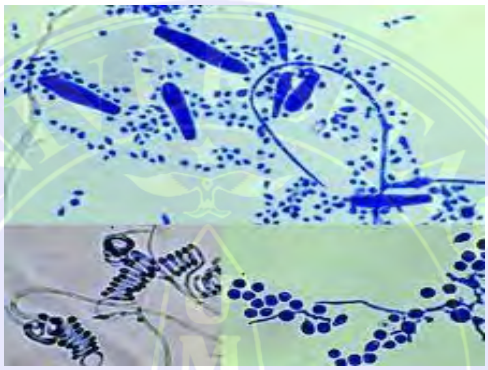

Figure 2.2 *Trichophyton mentagrophytes*
Source: Irianto, 2013

2. Microsporum

The genus *Microsporum* infects hair and skin. The shape resembles banana macroconidia, with thick walls, rough, and has 8-15 bulkheads, size of 20-50µ (Dwidjoseputro et al, 1998).

Figure 2.3 *Microsporum*
Source: Errol et al, 2011

a. Microsporum gypseum

Soil-living in nature (geophilic), *Microsporum gypseum* is a fungus that commonly attacks skin and hair. Colonies spread on a flat surface and grow rapidly. On the surface of the colony, a large number of macroconidia can be found. The walls of the macroconidia are thin, $8^{-16 \times 20}$ µm thick, have 4-6 septa, rough and oval. In addition, macroconidia grow easily in subcultures after several media changes (Siregar, 2005).

b. Microsporum canis

This fungus generally infects superficial keratinized tissues such as skin and hair. This fungus has septate hyphae and macroconidia and microconidia for reproduction. *Microsporum canis* has large, rough wall, multicellular conidia, and hyphae ends. Macroconidia consist of 8-15 cells, thick-wall, and are often curved or spindle-shaped, yellow-orange pigments are usually formed on the opposite side of the colony (Siregar, 2005).

3. Epidermophyton

The genus Epidermophyton infects skin and nails. It forms macroconidia that are slightly round, has thin walls, 2-4 cells, 10-40µ large. It only consists of one species. Each fungal species can choose particular host (Dwidjoseputro et al, 1998).

a. Epidermophyton floccosum

This fungus infects the skin and nails, and cannot penetrate the hair. The cause is tinea (*corporis, cruris, manuum, unguium*). This fungus is sensitive to cold temperatures (germination media should not be stored in the refrigerator). Colonies grow slowly, flat, velvety, yellow to green to light brown (khaki color), periphery surrounded by orange to brown for several weeks, and cottony colonies with white aerial hyphae. Microscopy: macroconidia thin and smooth, clavate, septate macroconidia (septum 2-4), 2-3 arrangement (resembling fingers) on conidiophores. Microconidia are absent, spiral hyphae are rare, and chlamydospores are easily found.

Figure 2.4 *Epidermophyton floccosum*
Source: Errol et al, 2011

2.2.3 Pathogenesis

Dermatophytes use keratin as a source of nutrition and also colonize dead layers of skin, nails, and hair. They also trigger the destruction of living cells by activating the immune system. Although fungi involved in cutaneous and subcutaneous infections exist in the soil, the disease is distinct to other superficial fungal infections because the infection requires lesions in the deeper layers.

Abnormalities can affect one nail or more, the surface of the nail appears uneven, the nail becomes brittle or thick, and the affected nail can erode. The treatment takes several months to a year (Susanto et al, 2008).

2.3 Nails

Nails are part of the finger that consists of dead cells which then thicken and harden. The function of nails is to protect the tips of the fingers with many nerve cells while increasing the ability to touch objects with the fingers (Tabri, 2016). Nails consist of keratin and high sulfur content that can grow in a week about 1mm. The white semicircle at the base of the nail is the growing nail, known as the lunula (Graha et al, 2005).

Nails are also transparent keratin plates that originate from the invagination of the epidermis on the fingers. The nail plate is the result of cell division in the nail matrix embedded in the proximal nail fold, but the partially visible is a whitish “half-moon” (lunula) on the underside of the nail. The nail plate is firmly attached to the underlying nail bed (Graha et al, 2005).

Figure 2.5 Clean and Healthy Nails
Source: Tresna, 2010

2.3.1 Discoloration of Nails

1. Green nails

   The discoloration can affect the entire nail surface or only part of the nail. The coloration can be prompted by *Candida albicans* or *Aspergillus flavus*. The fungal infection that blackens nails is *Candida albicans*.

2. Yellow nails

   Due to the slow growth of the nails, the nails are convex and thick, the lunula is not visible and the entire plate of the nail becomes yellow. Edema in the nails and face can also be found (Djuanda et al, 2013).

Figure 2.6 Nail Color
Source: Tresna, 2010

2.3.2 Tinea Unguium

Tinea unguium (Onychomycosis) is a nail infection that can occur after prolonged *tinea pedis*. With the hyphal invasion, the nails become yellow, brittle, thickened, and break easily. Infection can affect one or more fingernails or toenails (Jawetz et al, 2013).

Three clinical conditions of *Tinea unguium* can be distinguished as follows:

1. Distal subungual

   This form begins at the distal or distolateral edge of the nail. This process moves to the proximal and under the brittle nail is found under nail.

If the process continues, the distal nail surface will be cracked and the visible part is only brittle nails that resemble chalk.

2. *Leukonychia trichophytica*

   Nail abnormalities in this category are leukonychia or a whitish part on the surface of the nail that can be scraped off to observe fungal elements. This disorder is associated with *Trichophyton mentagrophytes* as the cause.

3. Proximal subungual

   This form starts from the base of the proximal of the nail, especially attacking the nail, and establishes a characteristic clinical picture, that is, the distal nail is still intact, while the proximal part is damaged. Commonly, *Tinea unguium* patients have dermatophytosis on another recovered or unrecovered area. Fingernails are more likely infected than toenails (Djuanda et al, 2013).

Tinea unguium is the most difficult and longest-treated dermatophytosis. Abnormalities in toenails are more difficult to cure than in fingernails (Rizkya et al, 2015).

2.3.3 Pathogenesis of *Tinea Unguium*

Paronychia is inflammation under the nail that can affect one or more nails. The nail surface is uneven, the nail becomes brittle or thick, and the affected nail may erode. Recovery may take several months to a year (Susanto et al, 2008).

2.3.4 Pathophysiology

Superficial fungi have to face several obstacles to invade keratinized tissue. Fungi must be resistant to the effects of ultraviolet light, variations in temperature and humidity, struggling against normal flora, fungistatic fatty acids, and sphingosines produced by keratinocytes. After the adhesion process, the spores must grow and penetrate the stratum corneum more quickly than through the desquamation processes. This penetration process occurs through secretions, proteinases, lipases, and mucolytic enzymes, which also provide nutrition. Trauma and maceration contribute to penetration as well. New defense mechanisms emerge after deeper layers of the epidermis have been reached, including competence with iron by unsaturated transferrin and also inhibition of fungal growth by progesterone. At this level, the degree of inflammation is highly dependent on the activation of the immune system (Siregar, 2005).

2.4 Prevention of fungal infections of the nails

Washing feet and hands with soap and clean water then drying, trimming nails regularly, and cleaning nail clippers with soap, clean water, and alcohol can be carried out to prevent the infection. Do not use nail polish to cover yellowed or discolored nails for it will aggravate the infection. Changing socks daily and using socks that can absorb sweat should also be carried out (Anurogo et al, 2016).

CHAPTER III

RESEARCH METHODS

3.1 Time and Site

The research was carried out from May 2020 to August 2020 at the Regional Health Laboratory (LABKESDA) Medan.

3.2 Research Sample

The sample in this study comprised scraping of nail beds of the individuals living in the Rengas Pulau Village Lingkungan 23, Medan Marelan Subdistrict, aged 20-60 years with a total of 30 samples.

3.3 Sampling

Before the sample was taken, the community was provided with a questionnaire, such as data on age, gender, and occupation. Sampling was carried out using purposive sampling with the criteria of damaged toenails with the following characteristics: nails are not shiny, brownish to black from the bottom to the tip. In addition, the nail surface looks parallel, uneven, thick, and hard. Before scraping the nail beds, they were disinfected using 70% alcohol then the tips of the nails were scraped using a scalpel and then placed in a petri dish, the sample was included in a plastic bag and coded according to the name (Khatimah et al, 2018).

3.4 Examination of scraping of nail bed

According to research by (Amanah et al, 2015), this method is used to determine the species of dermatophyte fungi using laboratory tests.

1. **Direct Examination**

   The results of the scraping of nail beds were placed on a glass object and then 1-2 drops of 10% KOH solution were added then covered with a deck glass. It was left for 15 minutes or passed over a Bunsen burner several times to speed up the lysis process. Subsequently, the preparations were examined in a microscope with a 10 times objective, then the presence or absence of hyphae or spores was observed in the research samples (Khatimah et al, 2018).

2. **Cultures**

   Of the 30 samples of scraping of nail beds, every 1 gram of nail scraping samples were diluted to obtain a correct colony calculation. If dilution is not carried out, the suspension will be too concentrated which causes the growth of fungi to accumulate and will not separate properly. Thus, it is necessary to perform dilution in the range of 10^{-1} to 10^{-2}, by dispensing 9 ml of sterile distilled water in a test tube. Each sample was made into 2 tubes as replication. Each tube containing 1 ml of sample was homogenized and cultured using a pour plate on *sabauroud dextrose agar* (SDA) medium added with chloramphenicol to prevent bacterial contamination, therefore each sample contained 2 Petri dishes. Cultures were incubated at room temperature (1-3 x 24 hours), and colony growth was observed for 1 to 2 weeks at room temperature (22 °C – 28 °C) with the lid of the petri dish on top.

After 2 weeks, the number of colonies that grew was calculated using the formula:

$$\text{Fungal Population (cfu)} = \frac{1}{X \times Y} \times Z$$

X = dilution factor (10^1)

Y = ml of sample suspension poured into Petri dish (1ml)

Z = average number of colonies

Each fungal colony that grew on SDA media was isolated, allowing those containing SDA slanted. Each fungal isolate was then placed on preparation for microscopic examination (Arantika et al, 2019)

3.5 Research Parameters

The main parameters observed in this study were the type of fungus and the percentage of infected people which were calculated using following formula;

$$\text{Percentage} = \frac{\text{Number of patients}}{\text{Number of examination}} \times \text{Constant}$$

Information:

Constant = 100% (Latifah *et al*, 2019)

3.6 Data Analysis

Data obtained from the research results were processed descriptively by describing the results obtained to explain and calculate the percentage of colonies and types of fungi based on age, gender, and occupation. The results of the presentation of this study were discovered from the positive results of fungal growth and negative results of fungus which are presented in the table.

CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

Based on the results of research and discussion regarding dermatophyte fungal infections in Rengas Pulau Village Lingkungan 23, Medan Marelan Subdistrict, 8 people were found to experience dermatophytes (27%). The percentage based on age was mostly found in the 31-40 year age group, totaling 4 participants (50%). The percentage of dermatophyte cases based on gender obtained 5 females (62.5%) and 3 males (37.5%). The percentage of dermatophytes patients by occupation found laundry workers as many as 4 participants (50%) and the fungi *Trichophyton mentagrophytes* were found in 5 sufferers, *Trichophyton rubrum* in 2 people, *Epidermophyton floccosum* in 1 person, and *Candida Albicans* in 2 people.

5.2 Suggestion

1. For patients

   To maintain personal hygiene after work in order to avoid fungal infections and maintain healthy nails, trim long nails, dry nails, clean between toes after washing to avoid fungal infections, and provide treatment.

2. For further research

It is expected that the results of the study can be used as primary data for reference and guidance in conducting further research on fungal in nail scrapings by studying other culture method.