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Description of *Candida albicans* Fungus in The Oral Mucosa of Patients With Fe Deficiency Anemia in RSUD Ciamis

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ABSTRACT

Background & Objective Indonesia is a developing country where Fe deficiency anemia is common. Fe deficiency anemia is a malnutrition disease caused by a lack of Fe in the patient's body. Fe deficiency anemia is triggered by a lack of Fe in the body for the formation of hemoglobin, causing patients to experience blood deficiency and thinning of oral mucosal epithelial cells which can cause oral candidiasis. Analyzing the description of oral candidiasis in patients with Fe deficiency anemia.
Methods This study is a descriptive study that recruited a total sampling of 17 patients with Fe deficiency anemia. Oral candidiasis in Fe deficiency anemia was measured by planting on sabouraud dextrose agar (SDA) media and sugars media then observed macroscopically and microscopically from SDA and sugars cultures using a microscope.
Results Based on the results of the study, 15 (88%) positive respondents and 2 (12%) negative respondents.
Conclusion The results of the examination of oral candidiasis as many as 15 samples were affected by oral candidiasis caused by *Candida albicans*.

Keywords *Candida albicans* , Fe Deficiency Anemia, Oral Mucosa

Introduction

Indonesia is a developing country where Fe deficiency anemia is common. Fe deficiency anemia is a malnutrition disease caused by a lack of Fe in the patient's body. Fe deficiency anemia is triggered by a lack of Fe in the body for the formation of hemoglobin, causing patients to experience blood deficiency and thinning of oral mucosal epithelial cells which can cause oral candidiasis. Fe deficiency anemia is the most common nutrient deficiency or malnutrition problem in people around the world, especially in developing countries, including Indonesia (Fitriany & Saputri, 2018). Anemia is a disease that occurs due to a decrease in the number of red blood cells characterized by a decrease in hemoglobin levels,

hematocrit, and erythrocyte cell count. Fe deficiency anemia mostly occurs due to iron deficiency (Nasruddin et al., 2021).

Diagnosis of anemia can be seen from changes in the oral mucosa. The most common oral manifestations of Fe deficiency anemia are *angular cheilitis* and *atrophic glossitis*. Liu et al., (2016) reported that of 31 patients with candidiasis, 23 were due to Fe deficiency which has been implicated in the pathogenesis of oral candidiasis. In Fe deficiency anemia, there is a deficiency of red blood and Fe substances that inhibit the growth of epithelial cells, as a result, epithelial cells in the oral mucosa experience thinning, making it easier for infections such as oral candidiasis (Lu, 2016). The oral mucosa contains two layers, namely epithelium and connective tissue (lamina propria). The microscopic picture of the oral mucosa in Fe deficiency anemia is the presence of epithelial atrophy (thinning) and thinning of the lamina propria, making it easier for *Candida albicans* infection to occur (Mersil & SA, 2017).

Candida albicans is a normal microflora in the human body that lives in several parts of the body including the oral cavity, gastrointestinal tract, vagina and skin. Apart from being the normal microflora, this fungus can also be pathogenic if there are changes in the host (Luqmanul Hakim, 2016). The normal microflora of *Candida albicans* in the mouth of healthy adults is around 30% and in infants around 45% and can infect if there are changes in the host (Millsop & Fazel, 2016).

The prevalence of candidiasis in Indonesia is 20%-25% (Puspitasari et al., 2019). There are predisposing factors for candidiasis that cause the transition from commensal to pathogenic. Predisposing factors that cause oral candidiasis include the use of false teeth, dental hygiene that is not paid attention to, immunosuppression, HIV infection, leukemia, malnutrition, decreased immunization due to age, diabetes (Millsop & Fazel, 2016).

Objective

The purpose of this study was to analyze the description of oral candidiasis in patients with Fe deficiency anemia.

Method

This study is a descriptive study that recruited a total sampling of 17 patients with Fe deficiency anemia. Oral candidiasis in Fe deficiency anemia was measured by planting on SDA media and sugars media then observed macroscopically and microscopically from SDA and sugars cultures using a microscope.

Results

The study found 15 (88%) positive respondents and 2 (12%) negative respondents.

TABLE 1. Observation Results on Sugars Media from SDA Media

No.	Sample Code	Biochemical Test				*Candida albicans*	*Other Candida*
		Glucose	Maltose	Sucrose	Lactose		
1.	Ny. I	**(+) A** **(+) G**	**(+)A** **(+)G**	**(+)A**	**-**	**+**	**-**
2.	Ny. KK	**(+) A** **(+) G**	**(+)A** **(+)G**	**(+)A**	**-**	**+**	**-**
3.	Tn. UG	**(+) A** **(+) G**	**(+)A** **(+)G**	**(+)A**	**-**	**+**	**-**

No.	Sample Code	Biochemical Test				*Candida albicans*	*Other Candida*
		Glucose	Maltose	Sucrose	Lactose		
4.	Tn. S	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
5.	Ny. D	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
6.	Ny. R	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
7.	Tn. MS	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
8.	Tn. K	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
9.	Ny. EH	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
10.	Tn. BP	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
11.	Ny. DK	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
12.	Tn. HH	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
13.	Ny. R	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
14.	Tn. DF	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				
15.	Tn. DP	**(+) A**	**(+)A**	**(+)A**	**-**	**+**	**-**
		(+) G	**(+)G**				

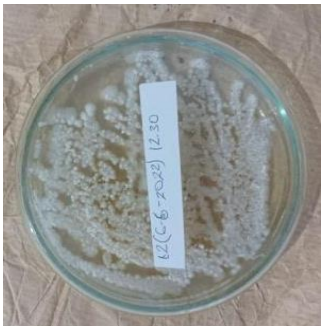

FIGURE 1. Colony shape of *Candida sp.* on SDA media
Source: Personal Documentation

Discussion

Oral candidiasis is a disease caused by *Candida sp.* fungi that affect the oral mucosa. The fungi that cause candidiasis are *C. albicans, C. parapsilosis, C. krusei, C. tropicalis, C. kefyr and, C. dubliniensis.* But the most common cause of oral candidiasis is *Candida albicans.* There are several factors that cause candidiasis, such as HIV, diabetes mellitus, use of dentures, poor oral hygiene, malnutrition, and leukemia (Kurniawan, 2019).

Fe deficiency anemia is anemia that occurs due to Fe deficiency. As a result of Fe

deficiency, the process of red blood cell formation is disrupted. This situation makes a person affected by anemia become tired, lethargic, weak, foggy eyes, pale lip mucosa and atrophic tongue (Prasetya et al., 2019).

Oral candidiasis in Fe deficiency anemia can be more risky because there is a decrease in hemoglobin and Fe levels which results in enzyme activity in the mitochondria. In cells decreases because oxygen and nutrient transportation is disrupted, thus inhibiting the differentiation and growth of epithelial cells as a result the process of differentiation of epithelial cells towards the stratum corneum is inhibited. As a result, the epithelial layer of the oral mucosa will become thinner. In a normal oral mucosa, the role of the oral mucosa will be more optimal because the oral mucosal epithelium functions as a counterweight to the population of microorganisms in the mouth. Apart from thinning of the oral mucosa, nutritional deficiency in anemia is one of the factors for oral candidiasis (Mersil, 2021).

Fe deficiency anemia and candidiasis are causal conditions that are interrelated with each other. Fe deficiency anemia leads to decreased immunity and loss of epithelial integration, which will facilitate *Candida sp*. infection and invasion. Under normal Fe conditions, there is a good lymphocytic response and immune response, but when Fe deficiency occurs, the lymphocytic response and immune response are reduced. Lymphocytes are known to play a role through the production of interferon cytokines and activate natural killer cells against *Candida sp*. infection (Mersil, 2021).

Conclusion

Based on the results of the study of *Candida albicans* fungus in patients with Fe deficiency anemia at Ciamis Hospital from a total of 17 patients, there were 15 positive samples of *Candida albicans*..

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