The Prevalence of Microorganism in Paediatric Angular Cheilitis Patients

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Abstract

Angular cheilitis presents as infected fissures of the commissures of the mouth, often surrounded by erythema. Angular cheilitis has many different etiologies, such as infection. Colonizing organisms such as β-haemolytic streptococci, Staphylococcus aureus, and Candida albicans can develop into pathogens. The aim of this study was to determine the prevalence of microorganism in paediatric angular cheilitis patients. The research was clinical and laboratory study with 42 paediatric angular cheilitis patients. The research was conducted in Universitas Sumatera Utara Dental Hospital and Universitas Sumatera Utara Hospital in Medan. Demographic data was obtained from medical record. Diagnosis of angular cheilitis was done with clinical examination. Microorganism examination was done in Microbiology Laboratory Universitas Sumatera Utara Hospital, Medan. The results showed Staphylococcus aureus was found in 21 patients (50%), followed by Enterobacter cloacae 5 patients (11.9%), and Staphylococcus warneri 2 patients (4.76%). Meanwhile Klebsiella pneumonia, Streptococcus gordonii, Streptococcus oralis, Bordetellabronchiseptica, Streptococcus pseudoporcinus, Streptococcus agalactiae, Streptococcus salivarius, Gamellamorbilorium, and D. nishinomiyaensis was found in 1 patient. Furthermore, Polymicrobial culture consist of Staphylococcus aureus and Candida tropicalis and D. nishinomiyaensis and Candida tropicalis was also found in 1 patient. This study showed that microorganism have an important role in angular cheilitis with Staphylococcus aureus being the most found microorganism.

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Introduction

Angular cheilitis is a term used to describe redness and cracking at the corners of the mouth.[1] Typical clinical features are characterized by fissures, lip-angular cracks, redness, ulceration sometimes accompanied by burning, pain, and dryness at the corners of the mouth.[2] It is the most common bacterial/fungal infection of the lips.[3] Angular cheilitis often seen on children and teenagers.[4] It has a bimodal distribution, occurring most frequently in children, and then again in adults.[3] Angular cheilitis can be a serious problem if it is not treat properly. Angular cheilitis is not limited to a certain age but frequently in child aged 4-6 years.[5]

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The cause of angular cheilitis is usually multifactorial, due to a primary infection and/or non-infectious causes, such as mechanical irritation, nutritional deficiency, or other dermatologic condition.[6] Vitamin B12 deficiency, iron deficiencies, and loss of vertical dimension have been associated with angular cheilitis. Atopy has also been associated with the formation of angular cheilitis. Dry skin may promote the development of fissures in the commissures, allowing invasion by the microorganisms.[7] Microbiologic studies suggest that the condition is caused by Candida albicans and/or Staphylococcus aureus.[1] These microorganisms are involved as interacting predisposing factors, in most cases angular cheilitis is caused by a mixture of infective organisms such as Candida albicans, Staphylococcus aureus, and Streptococcus ß-hemolytic.[8]

The aim of this study was to determine the prevalence of microorganism in paediatric angular cheilitis patients.

Materials and methods

Research Design and Sample

This research was clinical and laboratory study to determine the prevalence of microorganism in paediatric angular cheilitis patients. The research was conducted in Universitas Sumatera Utara Dental Hospital and Microbiology Laboratory Universitas Sumatera Utara Hospital, Medan in June to October 2018.

The research involved 42 paediatric angular cheilitis patients. Sample collection was done in total sampling. The inclusion criteria were children from the age of 5-16 years with unilateral or bilateral angular cheilitis.

Demographic data was obtained from medical record. Diagnosis of angular cheilitis was done with clinical examination by oral medicine specialist. Diagnosis was made if there was visible fissure with erythema at the corner of the mouth. Microbiological examination was done by trained laboratory staff. Sampling begins by cleaning the angular cheilitis area with NaCl 0.85%. Swab was done by rotating the cotton swab around the lesion repeatedly. The sample was then taken to the laboratory using a cool box so that the sample quality remain good. The primary culture was cultured on Coloumbia agar 5% Blood Sheep, Mac-Conkey agar and Sabaroud's Dextrose agar were then incubated for 24 hours at 37°C. The growth of microorganisms is characterized by the emergence of colonies on the surface of the media. Furthermore, gram staining is carried out for microscopic observations to determine the type of identification card used. Identification and testing of antibiotic sensitivities are carried out simultaneously using the Vitek 2 Compact (Biomeruex) automatic tool.

Data Analysis

The demographic data were including distribution of patients based on age. The prevalence of microorganism and type of microorganism was shown in percentage. Data analysis was done with computer program.

Ethical Clearance

This research was in accordance with national and international ethics guidance and approved by Health Research Ethical Committee of Medical Faculty, Universitas Sumatera Utara/H. Adam Malik General Hospital No. …. All patients were also given informed consent and signed by their parent or guardian.

Results

Table 1 showed the prevalence of microorganism in paediatric angular cheilitis patients. It showed that 39 (92.86%) patients had microorganism in their lesions.

Microorganism	N	%
Yes	39	92.86
No	3	7.14
Total	**42**	**100**

Table 1. The prevalence of microorganism in paediatric angular cheilitis patients.

This study found 13 species of microorganism in form of pure or polymicrobial culture. The microorganism was consisting of bacteria and candida (Table 2). The most common microorganism found was Staphylococcus aureus in 21 (53.85%) of the patients.

Isolation	Microorganism	N	%
Pure culture	*Staphylococcus aureus*	21	53.85
	Enterobacter cloacae	5	12.82
	Staphylococcus warneri	2	5.13
	Klebsiella pneumonia	1	2.56
	Streptococcus gordonii	1	2.56
	Streptococcus oralis	1	2.56
	Bordetellabronchiseptica	1	2.56
	Streptococcus pseudoporcinus	1	2.56
	Streptococcus agalactiae	1	2.56
	Streptococcus salivarius	1	2.56
	Gamellamorbilorium	1	2.56
	D. nishinomiyaensis	1	2.56
Polymicrobial culture	*Staphylococcus aureus + Candida tropicalis*	1	2.56
	D. nishinomiyaensis + Candida tropicalis	1	2.56
Total		**39**	**100**

Table 2. The distribution of microorganisms in paediatric angular cheilitis patients.

Discussion

Angular cheilitis presents as infected fissures of the commissures of the mouth, often surrounded by erythema.[7] Angular cheilitis is a common problem in the young, old, and denture wearers.[9] In children, it is a global issue.[10]

Angular cheilitis occurs more in children and it is caused by children sensitivity against certain contact agents like toys, foods, sunlight, allergy against medicines, cosmetics, and long term antibiotic treatment.[5] In some young children, particularly those who slobber and use pacifiers.[11] An increased incidence of this condition has been observed in children who frequently lick their lips and suck their thumbs.[12]

Angular cheilitis in children can be a serious problem if it is not handled properly due to its rapid development, therefore there should be no delay in its treatment if symptoms of angular cheilitis have clearly occurred.[10]

Angular cheilitis has many different etiologies.[9] The most common etiology is infectious and includes such organisms as Candida albicans, Staphylococcus aureus, and β-haemolytic streptococci. About 30% to 50% of Candida albicans lives as normal or commensal oral microflora in healthy people.[13] The clinical observation of regression of lesions after treatment with antifungals and antibiotics is highly suggestive of the role these organisms play in this condition.[12] Angular cheilitis often represents an opportunistic infection of fungi and/or bacteria, with multiple local and systemic predisposing factors involved in the initiation and persistence of the lesion.[11] The Candida albicans hyphae overgrowth may be harmful in several conditions such as immunocompromised people due to mucosal or cutaneous barrier damage thus causes the development of lesions.[13] The lesions are frequently coinfected with both Candida albicans and Staphylococcus aureus.[7] Bacterial infection and mechanical factor often occur in children with bad habits such as licking the corner of the lip and sucking finger. These will accumulate the saliva on the corner of the mouth and unwittingly provide perfect environment for infectious agents in causing angular cheilitis.[5]

This study showed that 39 (92.86%) patients had microorganism. This result was in accordance with study by Oza in 2017 that showed out of 40 patients with angular cheilitis microorganisms was isolated from 33 (82.5%) cases. The fact that microorganisms, particularly Staphylococcus aureus, Candida, and Streptococci could be found from the lesions does not necessarily imply that these organisms initiated the lesion by invading the tissues at the corner of the mouth. It could be that they were there because of conditions that favoured their multiplication which are called predisposing factors. The predisposing factor may be hypovitaminosis, iron deficiency, age-related because of sagging of tissue of corner of the mouth, reduced vertical dimension of occlusion, denture related, etc., However, that these micro-organisms were isolated from the lesions showed profuse growth in most cases suggest that their presence cannot be denied. They may be secondary invaders, aggravating the process.[14]

The most common microorganisms found is study was Staphylococcus aureus (Table 2). One of the species of Staphylococcus that most commonly causes infection in humans is Staphylococcus aureus which is a gram-positive bacterium. The infections including abscess, angular cheilitis, and denture stomatitis.[15] This result was partly in accordance with study by Oza (2017) that showed the microorganism isolated from the 33 lesions were Staphylococcus aureus, Candida, or Streptococci either in pure culture or mixed culture which consist of Staphylococcus aureus in 25 (75.5%) cases, Candida in 16 (48.4%) cases, and Streptococci in 5 (13.5%) cases, respectively. Out of 16 cases positive for Candida, in 13 cases further isolation of Candida was possible. Candida albicans was found in 6 cases and Candida stellastodia in 7 cases.[14] In study by Smith (2003) Staphylococcus aureus was isolated from 1,017 (20.32%) specimen from 5,005 specimens submitted to the laboratory. This retrospective study suggests that Staphylococcus aureus may be a more frequent isolate from the oral cavity than suspected.[16]

This study showed the second most common microorganism found was Enterobacter cloacae. Enterobacter cloacae is now the most frequently observed clinical isolate among Enterobacter sp.[17] Enterobacter cloacae is ubiquitous in terrestrial and aquatic environments (water, sewage, soil, and food) and has emerged as a troublesome pathogen for healthcare institutions globally. These strains occur as commensal microflora in the intestinal tracts of humans and animals. The skin and the GI tract are the most common sites through which Enterobacter cloacae can be contracted.[18]

Another microorganism that found in this study was Candida tropicalis. In last 30 years there has been a significant increase in the incidence of fungal infections in humans either be superficial, affecting the skin, hair, nails, and mucosal membranes, or systemic, involving major body organs. In the last two decades, the number of infections due to non-Candida albicans Candida (NCAC) species has increased significantly.[19] Candida tropicalis has been identified as the most prevalent pathogenic yeast species of the NCAC group.[20] Biofilm formation is an important virulence factor for several Candida

species, as it confers significant resistance to antifungal therapy by limiting the penetration of substances through the matrix and protecting cells from host immune responses. Moreover, biofilms formed by Candida tropicalis isolates have been associated with higher morbidity and mortality rates compared with isolates unable to form biofilms. The presence of Saps (Secreted aspartyl proteinase) secreted by Candida tropicalis has also been reported on the surface of fungal elements penetrating tissues during disseminated infection and evading macrophages after phagocytosis of yeast cells.[19] The Sap secreted by Candida tropicalis have also been demonstrated on the surface of the fungal cell walls before invading tissues during disseminated infections and invading macrophages after phagocytosis of yeast cells.[20] Recently, Silva et al. demonstrated that, Sap expression during C. tropicalis colonization of an oral epithelium was not associated with invasion and tissue damage.[19]

Conclusions

This study showed further prove that microorganism have an important role in angular cheilitis. It is showed that most of patients examined had microorganism with Staphylococcus aureus being the most found microorganism.

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Declaration of Interest

The author declares that there is no conflict of interest regarding the publication of this paper.

Ethical Clearance

This research was in accordance with national and international ethics guidance and approved by Health Research Ethical Committee of Medical Faculty, Universitas Sumatera Utara/H. Adam Malik General Hospital No.06.

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