

Prevalence of Oral Candidiasis among Children Caused by Different Candida Species

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Abstract

Introduction: Oral candidiasis, which is caused by *Candida* species by the involvement of hard and soft palates, tongue, buccal mucosa, and floor of the mouth, is becoming a very common threat to oral health. Although in the majority of the cases, this infection is caused by *Candida albicans* which is a normal commensal organism in humans, however, it might be also caused by other *Candida* species, such as *C. glabrata*, *C. tropicalis*, and *C. krusei*. **Objectives:** This study aimed to evaluate the prevalence of oral candidiasis among children and to compare the type of causative candida species among them. **Materials and Methods:** This prospective observational study was conducted in the Shishu Hospital, Shamoly, Dhaka, spanned January 2016 through December 2016. A total of 286 oral swab samples were collected, and three methods including direct wet mount smear, staining, and culture were used for laboratory investigation of *Candida* infections. **Results:** Among 286 respondents, 161 (56.29%) were culturally and microscopically confirmed to have oral candidiasis. Among all of the detected species, *C. Albicans* was by far the highest species with 139(86.34%) followed by *C. tropicalis* with 14 (8.68%). Whereas 05(3.12%) cases were infected by *C. krusei*. On the other hand, the least detected species were *C. glabrata* and *C. guilliermondii* with 01(0.62%) and 02(1.24%) respectively. **Conclusion:** These days accurate and prompt identification of the infectious candida strains is crucial because isolates of *Candida* species differ extremely, both in their ability to produce infection and also in their susceptibility to antifungal agents.

Key words: Oral candidiasis, *Candida* species, laboratory investigation.

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Introduction:

Over the last few decades, the role of fungi as a causative agent of nosocomial infections in children has been skyrocketed¹. These fungi are a major cause of child morbidity, given the increased length of hospital stay also^{2,3}. Oral candidiasis, which is caused by *Candida* species by the involvement of hard and soft palates, tongue, buccal mucosa, and floor of the mouth, is becoming a very common threat to oral health. Although in the majority of the cases, this infection is caused by *Candida albicans* which is a normal commensal organism in human^{1,4,6} however, it might be also caused by other *Candida* species, such as *C. glabrata*, *C. tropicalis*, and *C. krusei*^{1,7}. Despite the recent revolution in laboratory techniques, primary diagnosis of invasive candidiasis remains challenging, which causing the delayed detection of candidiasis⁸. Specific and accurate identification of *Candida* strains is crucially important, considering the diseases producing ability of the strains and induce susceptibility to the antifungal drugs. Therefore, the present study aimed to evaluate the prevalence of oral candidiasis among children and to compare the type of causative candida species among them.

Material and Methods:

This prospective observational study was conducted in the Shishu Hospital, Shamoly, Dhaka with the ethical clearance of the review board, spanned January 2016 through December 2016. In this study, a total of 286 oral swab samples were collected, and three methods including direct wet mount smear, staining, and culture were used for laboratory investigation of *Candida* infections. Fresh smear with 20% potassium hydroxide (KOH) and direct microscopic examination with Gram staining of each sample was performed. By the gram stain technique, candidal hyphae and yeasts appeared in dark blue.

Budding yeast was seen by direct microscopy in wet mount preparation.

Subsequently, the samples were inoculated aerobically at 37°C for 24–48 hours into Sabouraud dextrose agar (SDA) media with the supplement of chloramphenicol and gentamycin in a screw-capped test tube where *Candida* produced cream, smooth, pasty convex moist colonies with a distinctive yeast smell. Then the positive cultures were transferred to CHROMagar *Candida* media for further analysis and differentiation between species⁹ based on colony appearance and color following primary culture.

The germ-tube test was performed for identifying *C. Albicans* and to differentiate *Candida Albicans* from non-*albicans* groups. The test involves the induction of hyphal outgrowths (germ-tubes) when subcultured in fresh human pooled serum at 37°C for 2–4 hours. The wet mount preparation also presented a germ tube which was a hyphal projection without having constriction at the point of origin from the yeast cell. A commercial Analytic Index (API) yeast indication kit (named API *Candida*) was used to perform the biochemical test (bioMerieux, Franch) for the isolation of *Candida* sp which was consist of twelve biochemical tests.

Results:

Socio-demographic findings of the study population. A total of 286 patients were included in this study according to the inclusion criteria of the study. Out of those majority, 169 (59.09%) were females whereas, 117(40.91%) was male patient. By far the highest study population was within the age ranging from 1 year to 05 years with 137(47.90%). The cases gradually reduced with the increase of the age where 87(30.42%) patients were between 6-10 years and 62(21.68%) patients were from 11 to 15 years age group.

Regarding the parent’s income level, low socio-economic condition patient was by far the highest number with 217(75.87%) followed by middle socio-economic and higher socio-economic groups with 66(23.08%) and 03(1.05%) respectively. At the same time, the highest number of the patient’s parents were illiterate 166(58.04%), in contrast, 120(41.96%) had completed their education and had knowledge about oral hygiene (Table I).

Table-I: Socio-demographic data of the study population (n= 286).

Variables	Total Number	Percentage (%)
Sex	Male	117
	Female	169
Age	1-5 years	137
	6-10 years	87
	11-15 years	62
Income of the parents	Low	217
	Middle	66
	High	03
The educational level of the parents	Illiterate	166
	Literate	120

Among 286 respondents, 161 (56.29%) were culturally and microscopically confirmed to have oral candidiasis. Among all of the detected species, *C. Albicans* was by far the

highest species with 139(86.34%) followed by *C. tropicalis* with 14 (8.68%). Whereas 05(3.12%)cases were infected by *C. krusei*. On the other hand, the least detected species were *C. glabrata* and *C. guilliermondii* with 01(0.62%) and 02(1.24%) respectively (Table II).

Table-II: Rate of Isolation of *Candida* species among the study group (n=161).

Name of species	Total Number	Percentage (%)
<i>C. albicans</i>	139	86.34
<i>C. guilliermondii</i>	02	1.24
<i>C. glabrata</i>	01	0.62
<i>C. krusei</i>	05	3.12
<i>C. tropicalis</i>	14	8.68

Discussion:

Fungal organisms are a dire source of nosocomial infections as well as cause significant ailments among children. Modern medicine is faced with great challenges, considering the increased length of hospital stay and high healthcare costs in children and patients with nosocomial infections^{3,10-14}. A relevant study by Walsh et al. in France found a strong correlation between mortality of acute candidiasis and children. He noted that about 10-15% of oral *Candida*-infected children are suspected of septicemia¹⁵. The present study was highlighted to evaluate the prevalence of oral candidiasis and to compare the type of causative *Candida* species in children.

In our study female *Candida* infected patient was remarkably high with 169 (59.09%) than male. It was probably for the reluctant attitude to the girls in the low socio-economic condition’s population as in our study the low-income people were significantly high with 217(75.87%). We noted that age ranged from one year to five years was the grave victim of oral *Candida* infection which plummeted with the increase of age. As this early age group population is fully dependent on their parents for maintaining their oral hygiene so it was purely for the lack of proper oral care knowledge and lack of education of their guardians.

In our study, the most commonly detected *Candida* species were *C. Albicans* (86.34%), *C. tropicalis* (8.68%), *C. guilliermondii* (1.24%), *C. glabrata* (0.62%), and *C. krusei* (3.12%). *C. Albicans* has been found to be the long recognized as well as the most common cause of disseminated candidiasis, followed by *C. glabrata* *Albicans* species in both child and adult patients^{16,17,18}. Another factor of *Candida* infection is the imposition of economic burden on the patient due to the increased costs of care including the investigation fees, the use of antifungal agents and, even more for some time the prolonged length of hospital stay due to the development of fungal pneumonia¹⁹⁻²².

Conclusion:

Candida species were the most common fungal pathogens in the child department. Nowadays a greater emphasis has been given for the reliable, less time-consuming, and cost-effective identification methods for detecting *Candida* species. It is also important to identify the infecting strains of the

Candida because isolates of Candida species differ extremely, both in their ability to produce infection and also in their susceptibility to antifungal agents. Therefore, efforts should be made to prevent this fungal infection.

Conflict of Interest: None.

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