Oral and Dermal Candidiasis Among Infants in Al-Battol Teaching Hospital

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Abstract

Background: Candida spp. is the yeast caused infection termed candidiasis; this is naturally found on the skin and inner the body, in an area like the gut, intestines, throat, vagina, and mouth, with the absence inciting any problems. Candida albicans is yeast naturally found in the skin; intestinal tract; vaginal and mouth. This is a polymorphic yeast (that capable of growing either as avoid shaped budding yeast, when it affect the mouth, it is typically termed oral thrush, and when it affect the dermal (diaper area) called diaper rash. clinical signs and symptoms involve white patches on the or other areas of the mouth and throat, `other signs may involve soreness and problems of swallowing.

Objective: To study detection, isolation, and identification of C. albicans from infants in Al-Battol Teaching Hospital in Diyala Province by routine laboratory procedure, and identification of other species of Candida.

Patients and Methods: Two hundred samples were taken from infants less than 2 years who attended Al-Battol teaching Hospital in Diyala, province during the period from October 2019 to February 2020. Method of this study by making a routine and confirmative diagnosis processes involve a microscopic examination, culture on Sabouraud’s dextrose agar for diagnosis of primary invasive candidiasis, and culture on chrome agar for differentiating between C. albicans and other spp.

Results: The results of this study showed the isolates of oral samples were 12 (24%) C. albicans and 18(36.0%) C. non albicans; for dermal isolates were 10(20.0%) C. albicans and 17(34.0%) C. non albicans; and for both isolates oral and dermal samples were 13(26.0%) C. albicans and 21 (42.0) C. non albicans.

Conclusion: In this study found that the male are more infected by Candida than female. And also we concluded that small age children more infected than large age.

Keywords: C. albican, non-albicans Candida spp., infants

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Introduction

Candida is a type of fungus caused an infection called Candidiasis. Candida normally lives on the skin and inner of the body. In areas like vagina, mouth, throat and gut without causing any problems [1]. Among the at least 15 species of Candida
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yeasts that can infect humans. *Candida albicans* is the most prevalent [2, 3]. *Candida albicans* is the most common human fungal pathogen [4]. This also termed monilia; a fungus naturally found in the vagina mouth and intestinal tract. Under the circumstance, it’s able to infect the surface of mucous membranes or skin. The *C.albicans*, *C.parapsilosis*, *C.tropicalis*, and *C.glabrata* these four species together account for 95% of identifiable candida infection [5].

It is usually termed oral thrush when it infected the oral cavity [6]. Symptoms and clinical signs include white patches on the tongue and other areas of the oral cavity and throat [7], other manifestation may involve problems swallowing and soreness [8], and it is naturally transferred vertically from mothers to infants through birth canal, and steal as a portion of normal human’s microflora [9].

The highest prevalent human fungal infection is *C.albicans*, which described by an overgrowth of Candida species in the epithelium of the oral mucosa [10,11]. Candida species compose a portion of oral safe commensal flora in about 2-70% of the common populace [12].

Babies who are at highest risk for infection with candidiasis in the throat and mouth, and especially those less than one month of age and it’s infrequent in the healthy adults [13,14]. Candidiasis in infants is reported to be 0.5-20%, depending upon the different studies [15, 16].

The most prevalent type of candidiasis influence this age cluster is acute pseudomembranous candidiasis [17]. White patches on an infant’s tongue and/or oral mucosa are typically termed neonate thrush and named to as oral candidiasis [18, 19]. An infection induced by *C.albicans* tends to happen not many weeks after birth. Often presenting as napkin dermatitis or oral thrush, Candida infection is marked by very superficial blisters and plaques in intertriginous sites and pustules associated with the erythema. In the neonates it can also happen as systemic mycosis with disseminated candidiasis [20].

Diaper dermatitis is an irritant contact dermatitis occurring beneath the diaper of an infant related to factors like dampness, friction, urea, and feces. With technological improvement, the frequency of diaper dermatitis has decreased but the disease has not been eradicated[21]. Diaper dermatitis is seen mostly between 9 and 12 months. This condition is more common in children, but also can be seen in adults using diapers.

There is no difference between ethnic groups and gender [22]. The aim of this study detection, isolation and identification of *C.albican* from infants in Al-Battol Teaching Hospital in Diyala Province by using routine laboratory procedures , and identification of other species of Candida.

**Patients and Methods**

A study of 200 infants less than 2 years was carried out in Al- Battol Teaching Hospital, Diyala province for a period from October 2019 to February 2020. A detailed history of the infant, age, gender, body weight, and residency as urban, and rural . General physical and systemic examinations of all neonates were undertaken.An exhaustive dermatological examination was conducted to record physiological and
pathological manifestations in neonatal skin and mouth. Special emphasis was laid on simple non-invasive laboratory investigations such as scraping for candida, pus swabs for bacterial culture, smear from pustules for gram's stain, as indicated, and culturing of collected samples on Sabouraud’s dextrose agar (SDA). To enhance the cultivation, the agar was used for primary isolation of Candida species selectivity; (0.005 g/L) of chloramphenicol vial was added to the media. Oral and dermal samples that were collected by cotton swabs were streaked on the plates that contained the prepared media and incubated at 30ºC for 48 hrs for isolation of pure fungus (Candida) colonies. After the incubation period, the isolates were examined for their shape, color, size, and consistency. The plates were enclosed by parafilm to prevent contamination. Finally, they were stored in the refrigerator to keep for the culture [23]. Chromogenic Agar Candida (CAC) This method was prepared according to (Sheerihan, et al., 1999; Ibrahim et al., 2001). Chromogenic agar Candida is a medium used for the isolation and identification Candida spp. [24].

Statistical analysis

All data were statistically analyzed depending on SPSS (Statistical Package for Social Science) version 18 (2009). Chi-square and Yates's correction was used to compare the variables in this study. Statistical results were considered significant when being under or equal to 0.05[25].

Results

According to the gender in this study, the results showed that the percentage of males in the oral samples were (56%) and (44%) of females. Negative isolation accounted the highest percentage (40%) followed by the C. non albicans (36%). Through Table (1), we note that the percentage of negative of males is the highest rate, as it reached (22%), and for females, the highest rate was (18%).

Demonstrated that the percentage of males in the dermal samples were (64%) and the percentage of females (36%), while the negative percentage was the highest at (46%) followed by the C. non albicans (34%). Through Table (1), we note that the percentage of negative of males is the highest rate, as it reached (30%). while for females, the negative samples was the highest rate (16%).

In addition, the percentage of males in the mix samples were (50%), and the percentage of females (50%), while the C.non albicans percentage was the highest rate at (42%) followed by the negative samples (32%). Through Table (1), we note that the percentage of C.non albicans of males is the highest, as it reached (20%). As for females, the C.non albicans samples were the highest by (22%).

From the table, we conclude that there was no relationship between the results of the examination and gender in oral, dermal and mixed samples.
Table (1): Candida infection rate among patients according to the gender

| Group | Gender | Result | C. albicans | C. non albicans | Negative | Total | p-value |
|-------|--------|--------|-------------|----------------|----------|-------|--------|
| Oral  | Male   | Count  | 5           | 12             | 11       | 28    | 0.399  |
|       | % of Total |       | 10.0%       | 24.0%          | 22.0%    | 56.0% |        |
|       | Female | Count  | 7           | 6              | 9        | 22    |        |
|       | % of Total |       | 14.0%       | 12.0%          | 18.0%    | 44.0% |        |
|       | Total  | Count  | 12          | 18             | 20       | 50    |        |
|       | % of Total |       | 24.0%       | 36.0%          | 40.0%    | 100.0%|        |
| Derma | Male   | Count  | 6           | 11             | 15       | 32    | 0.957  |
|       | % of Total |       | 12.0%       | 22.0%          | 30.0%    | 64.0% |        |
|       | Female | Count  | 4           | 6              | 8        | 18    |        |
|       | % of Total |       | 8.0%        | 12.0%          | 16.0%    | 36.0% |        |
|       | Total  | Count  | 10          | 17             | 23       | 50    |        |
|       | % of Total |       | 20.0%       | 34.0%          | 46.0%    | 100.0%|        |
| Mix   | Male   | Count  | 7           | 10             | 8        | 25    | 0.94   |
|       | % of Total |       | 14.0%       | 20.0%          | 16.0%    | 50.0% |        |
|       | Female | Count  | 6           | 11             | 8        | 25    |        |
|       | % of Total |       | 12.0%       | 22.0%          | 16.0%    | 50.0% |        |
|       | Total  | Count  | 13          | 21             | 16       | 50    |        |
|       | % of Total |       | 26.0%       | 42.0%          | 32.0%    | 100.0%|        |

The analysis of data according to age showed that the minimum age for oral samples was 4 days and the maximum was 1080 days, and the Mean± SE was (229.98±27.15) and the SD was 191.98, and the minimum of body weight for oral samples was 2 kg and the maximum was 12kg , and the Mean± SE was (6.7±0.328) and the SD was 2.32.

In addition, results showed the minimum age for dermal samples is 5 days and maximum was 360 days, and the Mean± SE was (175.32 ±16.99) and the SD was 120.15,and a minimum of body weight for oral sample was 1 kg and the maximum was 13kg , and the Mean± SE was (6.56±0.37) and the SD is 2.643.

The minimum age for mixed samples was 6 days and the maximum was 390 days , and the Mean± SE is (1828.42 ±13.31) and the SD is 94.13,and a minimum body weight for oral samples is 3 kg and the maximum is 10 kg , and the Mean± SE is (6.16±0.273) and the SD is 1.931.
Table (2): Candida infection rate among patients according to the age

| Descriptive Statistics for oral | Count | Minimum | Maximum | Mean±S.E | Std. Deviation Statistic |
|--------------------------------|-------|---------|---------|---------|-------------------------|
| age per day                    | 50    | 4.00    | 1080.00 | 229.98±27.15 | 191.98                  |
| Bodyweight(kg)                 | 50    | 2.00    | 12.00   | 6.7±0.328   | 2.32                    |

Descriptive Statistics for derma

| Age per day | Count | Minimum | Maximum | Mean±S.E | Std. Deviation Statistic |
|-------------|-------|---------|---------|---------|-------------------------|
| 5.00        | 50    | 1080.00 | 175.32±16.99 | 120.15  |
| 1.00        | 50    | 12.00   | 5.56±0.37  | 2.643   |

Descriptive Statistics for mix

| Age per day | Count | Minimum | Maximum | Mean±S.E | Std. Deviation Statistic |
|-------------|-------|---------|---------|---------|-------------------------|
| 6.00        | 50    | 390.00  | 1828.42±13.31 | 94.13   |
| 3.00        | 50    | 10.00   | 6.16±0.273  | 1.931   |

According to the residency, the study showed that the percentage of urban in the oral samples were (50%) and the percentage of rural (50%), while the negative percentage was (40%) followed by C. non albicans (36%). In Table (3), we note that the percentage of negative of urban is reached (20%), while for rural areas accounted 20%.

In addition, we observe that the percentage of urban in the dermal samples were (36%) and the percentage of rural (64%), while the negative percentage was the highest rate at (46%) followed by the C.non albicans (34%). In Table (3), we observe that the percentage of negative of urban is was (22%), while for rural, the C.non albicans accounted (30%).

The percentage of urban in the mixed samples were (54%) and the percentage of females (46%), while the C.non albicans percentage was the highest rate at (42%) followed by the negative (32%). Through Table (3), we notice that the percentage of C. non albicans of urban is (26%), while for rural, the negative was (20%). This indicates that there is no relationship between the results of isolation and residency in oral and mixed samples, and between the results of the isolation and residency in dermal Candida.

Table (3): Candida infection rate among patients according to the address

| Group          | Result               | Total | Count | p-value |
|----------------|----------------------|-------|-------|---------|
|                | C. albicans | C.non albicans | negative |       |
| Oral Residency | Urban        | 5      | 10    | 20      | 10     | 50.0% | 0.757 |
|                | % of Total    | 10.0%  | 20.0% | 20.0%   | 50.0%  |
|                | Rural        | 7      | 8     | 10      | 25     |
|                | % of Total    | 14.0%  | 16.0% | 20.0%   | 50.0%  |
| Total          | Urban        | 12     | 18    | 20      | 50     |
|                | % of Total    | 24.0%  | 36.0% | 40.0%   | 100.0% |
| Dermal Residency | Urban       | 5      | 2     | 11      | 18     |
|                | % of Total    | 10.0%  | 4.0%  | 22.0%   | 36.0%  |
|                | Rural        | 5      | 15    | 12      | 32     |
|                | % of Total    | 10.0%  | 30.0% | 24.0%   | 64.0%  |
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Through this study, it appeared that the percentage of soother used in the oral samples were (60%) and the percentage of not soother used (40%), while the negative percentage was (40%) followed by the C. non albicans (36%). Through Table (4), we notice that the percentage of negative of soother used was (26%), while for non-soother users, the C. non albicans and negative was the highest percentage (14%). The study also showed that the percentage of using soother in the dermal samples were (66%) and the percentage of non-using soother was (34%), while the negative percentage was the highest rate at (46%) followed by the C. non albicans (34%). Through Table (4), we notice that the percentage of C. non albicans and negative of using soother is (28%), while non-using soother, the negative percentage was (18%).

In addition, the results showed that the percentage of using soother in the mixed samples was (48%) and the percentage of non-using soother was (52%), while the C. non albican percentage was the highest percentage at (42%) followed by the negative (32%). In Table (4), we notice that the percentage of C. non albicans of using soother (24%). As for non-using soother, the negative and C. non albicans was the highest percentage (18%). This was due to the contamination of using the soother by children [32]. So this indicates that there was no relationship between the results of the examination and drug in the dermal, oral and mixed samples.

Table (4): Candida infection rate among patients according to the soother

| Group | Soother | Result | Count | % of Total | p-value |
|-------|---------|--------|-------|-----------|---------|
| Oral  | Used    | C. albicans | 6 | 12.0% | 0.699 |
|       |         | C. non albicans | 11 | 22.0% | |
|       |         | Negative | 13 | 26.0% | |
|       |         | Total | 30 | 60.0% | |
|       | not used | C. albicans | 6 | 12.0% | |
|       |         | C. non albicans | 7 | 14.0% | |
|       |         | Negative | 7 | 14.0% | |
|       |         | Total | 20 | 40.0% | |
| Total | Used    | C. albicans | 5 | 10.0% | 0.179 |
|       |         | C. non albicans | 14 | 28.0% | |
|       |         | Negative | 14 | 28.0% | |
|       |         | Total | 33 | 66.0% | |
|       | not used | C. albicans | 5 | 10.0% | |
|       |         | C. non albicans | 3 | 6.0% | |
|       |         | Negative | 9 | 18.0% | |
|       |         | Total | 17 | 34.0% | |

| Group | Soother | Result | Count | % of Total | p-value |
|-------|---------|--------|-------|-----------|---------|
| Oral  | Used    | C. albicans | 6 | 12.0% | 0.699 |
|       |         | C. non albicans | 11 | 22.0% | |
|       |         | Negative | 13 | 26.0% | |
|       |         | Total | 30 | 60.0% | |
|       | not used | C. albicans | 6 | 12.0% | |
|       |         | C. non albicans | 7 | 14.0% | |
|       |         | Negative | 7 | 14.0% | |
|       |         | Total | 20 | 40.0% | |
| Total | Used    | C. albicans | 5 | 10.0% | 0.179 |
|       |         | C. non albicans | 14 | 28.0% | |
|       |         | Negative | 14 | 28.0% | |
|       |         | Total | 33 | 66.0% | |
|       | not used | C. albicans | 5 | 10.0% | |
|       |         | C. non albicans | 3 | 6.0% | |
|       |         | Negative | 9 | 18.0% | |
|       |         | Total | 17 | 34.0% | |
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| Mix | Total Count | % of Total |
|-----|-------------|------------|
|     | 10          | 17         | 23         | 50          |

| Used Soother | Count | % of Total |
|--------------|-------|------------|
|              | 5     | 10.0%      |            | 24          |
| not used     | 8     | 16.0%      | 18.0%      | 26          |

| Total       | Count | % of Total |
|-------------|-------|------------|
|             | 13    | 26.0%      | 42.0%      | 32.0%      | 100.0%    |

Discussion

Fungal infections still create the main health problem overall the world and affecting all ages particularly children. Therefore, many studies have been conducted concerning different epidemiological economic control as well as therapeutic features of this infection [40].

Candida organism is ubiquitous as it is commonly found on the skin and mucosal surfaces. It is estimated that 5-7% of babies less than one-month-old generally develop oral thrush. In general, the oral microbial flora and the body defenses keep this organism under control. But, when the body’s defenses are compromised (such as HIV, cancer, chemotherapy/radiotherapy treatment, immunosuppression, or use of broad-spectrum antibiotics, etc.), then the colonization of this organism takes place [41]. In studies by Bassiri-Jahromi and Sberna, female patients were less affected by fungal infections than male patients [26,27]. On the other hand, several studies have indicated a higher incidence of superficial and cutaneous fungal infections in men compared to women [28,29]. The results also were similar to Sousa and coworkers [30] who found in their study that males (32.0%) and females (67.7%) and it was also non-significant in their study, and the result similar to Sanitá coworkers [31] who found that the number of females was more than males with non-significant differences among the groups. Also the results agreed with Premkumar coworkers [32] in their study that showed that females were higher infected (Male 47.5, Female 52.5).

But this study disagreed with Mohammadi coworkers (33) that have males higher than females (34 (56.5%) -23 (40.4%) respectively. There was a non-significant relationship between Candida spp. isolation and gender. The explanation for such discrepancy may be due to the nature of the societies and duration of time for sample collection, hormonal factors and the highest incidence of iron insufficiency in women could be responsible for that disparity [34]. There was significant variation between males and females [34].

The results were in disagreement with Handa (2016), whom showed that 30.6 % (83) of rural and 81.5 % (440) of urban [35]. And Overall common of caries among infants was 54.6% in urban and 50.2% in rural areas [36]. Urban areas generally have the highest cases of caries than rural areas due to most availability of refined diets. In comparison nearly half (46.0%). of the children (8 days – 16 years ) in the University of Port-Harcourt Teaching Hospital (UPTH) clinic had dental caries. This may be attributed to the more socioeconomic class of infants who patronize...
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The odds of having sexually transmitted infection was 1.85 times higher in women living in urban areas compared to the rural region [99%C.I.2.65; p < 0.001], and 3.73 times most in women with vaginal discharge [99%C.I. 2.60–5.35; p < 0.001] [38].

For weight infants with low weight suffers from candidiasis due to 10% of infants had candidemia for 14 days. Death or neurodevelopment injury was shown for 73% of enormously low birth weight infants who lead to expanding candidiasis. Persistent candidiasis was mutual, delayed catheter extract was associated with rising NDI and death [39].

Conclusions

For the residency, children who lived in the urban are more infected than those living in rural areas. And finally, we concluded that children who used soothers are more infected than those not using soothers.

Recommendations

1. Genotyping of the isolated Candida spp.
2. We recommend that further confirmatory tests need to identify the genotypes origin by MLST technique or others modern technique.

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