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Moleculer Detection of Oral and Dermal Candidiasis Among Infants at AL-Batool Teaching Hospital, Diyala, Iraq

A Thesis
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Chapter One
Introduction

1- Introduction

The most common yeast infecting humans are the genus *Candida. Candida albicans*, which are involved in the major opportunistic yeast infection in the world candidiasis, but continued to be the most common among the species of the genus. While this yeast is responsible for around (50-90) % of human candidiasis (Wächtler *etal*, 2012; Vázquez-González *et al*, 2013; Brunke and Hube, 2013) and rising in the incidence of yeast infections induced by *non-Albicans* including *Candida* such as *C. glabrata, C. krusei, C. tropicalis and C. parapsilosis* was recorded elsewhere (Talaro and Talaro, 1996; Pfaller and Diekema, 2007; and Miceli *et al*., 2011).

Candida albicans is a diploid, opportunistic polymorphic pathogen which is part of most humans' healthy humans. Microflora *C. albicans* (Ruhnke & Maschmeyer,2002 and Sarvtin *et al*., 2014). Diverse locations from which *C. albicans* have been identified including: oral mucosa, vaginal mucosa, gut and skin. The oral cavity, gastrointestinal tract and urinogenic tract was colonized by up to 70% or more of the population (Ruhnke, 2002 and Mavor *et al*, 2005). Nevertheless, under some circumstances, these specific mucosa, such as oropharyngeal candidiasis (OPC) or vulvovaginal candidiasis (VVC), can cause superficial infections (Sundstrom , 2002 and Tronchin *et al*, 2008).

Candidiasis may be classified as oropharyngeal / esophageal (OPC), genital / vulvovaginal (VVC), and invasive candidiasis by the site of the infection. The most danger is invasive candidiasis or candidemia, because it has the highest mortality rate among other types of candida infection (CDC, 2016).

Systemic candidiasis is usually seen in cell-mediated immune deficiency patients and those receiving aggressive cancer treatment, immunosuppressant's, or transplant therapy (Lamagni *et al*., 2001). Immunocompromised patients include, but are not limited to, people with AIDS neutropenia, post-transplantation infections, premature babies and patients with cancer. Moreover, patients with inhabited catheters, invasive surgery, extensive burns, wide-spectrum antibiotic therapy, and mechanical ventilation are more susceptible to Candida infection than normal healthy individuals (Berdal *etal*, 2014).

The human oral cavity includes a vast variety of microorganisms including yeasts and bacteria (Behzadi and Behzadi, 2006.). There are several species of yeast found among the normal microbial flora of the mouth; but a huge number of isolates belong to the species Candida (Behzadi and Behzadi , 2003). Candida's fungal genus is considered one of the most important opportunistic pathogenic yeast-like organisms through human pathogens. Candida's broad genus includes more than 200 species which are recognized as medically essential pathogenic yeast by some of them, including *Candida albicans* (Williams and Lewis ,2011, Behzadi and Behzadi, 2012).

Among healthy adults, candidiasis is rare in the mouth, throat, or esophagus. People at higher risk of developing candidiasis in the mouth and throat including infants, particularly those younger than 1 month of age, and people with at least one of these factors (Baley, 1991) According to numerous studies, oral candidiasis in neonates is estimated to be(0.5–20)% (Dangi *etal*, 2010, Mathes and Howard, 2018).

The most common type of candidiasis affecting this age group is acute pseudo membranous candidacies (Ben Abdeljelil et *al*, 2012) White patches on the tongue and/or oral mucosa of an infant (generally under 1 year old) are usually referred to as neonatal thrush and oral candidiasis (Brecht *etal*, 2009). An infection caused by *Candida albicans* appears to occur several weeks after birth or in an older infant, frequently presenting as an oral thrush (white sticky plaques on a reddish mucosa) or napkin dermatitis. Infections of candida are distinguished by very superficial blisters and pustules in interregional sites associated with erythematous papules and plaques. Systemic mycosis with disseminated candida can also occur in neonates (Benjamin *etal*, 2010)

Diaper dermatitis happens mostly within 9 to 12 months. The condition is more common in infants but can also be seen on diapers in adults. There is no distinction between racial and gender groupings (Birol *etal*, 2008). Clinically, the form of irritant contact dermatitis mostly seen in the genital region, buttocks, upper part of the femoral region and lower abdominal area, that becomes due to the reaction between accumulated bacterial enzymes in the feces and ammonia that accumulated in the diaper. These presence may also be seen in incontinent older (Baykal ., 2004).

In contrast with those feeding formula, breastfed babies are less likely to experience extreme DD (Stamatas and Tierney, 2014; Merrill, 2015). Breastfed stools have been shown to have a lower pH and therefore may be less irritating to the skin (Stamatas and Tierney, 2014). A deficiency of zinc and biotin is also known to predispose to DD (Tüzün *et al*, 2015). Premature babies may be more prone to DD because the skin takes several weeks to develop the proper pH and full barrier function to defend against repeated irritant exposure (Shin, 2014).

1-2 Aim of study

The study aims to:

1. Isolate and identify the *Candida spp.* in infant at Al-Battol Teaching Hosbital in Diyala by routing laboratory procedure.
2. Study the frequency distribution of *candida spp* by different age groups and different clinical status of children patients.
3. Assessment of antifungal activity of some antifungal agents to *C.albicans and non-albicans.*
4. Identify and detection for *Candida albicans* among infants by PCR technique.

Summary

The most common fungal pathogen in humans is the *candida albicans.* This fungus occurs in healthy individuals as a commensally organism by colonizing many human body niches. As a commensally organism, *Candida albicans* inhabits various body surfaces such as oral cavity, gastrointestinal tract, vagina, and healthy individuals' skin. The study aims to isolate and identify the oral and dermal *Candida spp* also to study the susceptibility of *C. albicans* to some antifungal agents and genotype detection of *C. albicans*, from infant in Al-Battol Teaching Hospital in Diyala by routine laboratory procedure and PCR.

150 oral and dermal samples of children less than two years referred to AL-Batool Teaching Hospital, in Diyala province during the period 5 mouth (October 2019 to February 2020) were collected ninety-one samples of them were diagnosed as *Candida spp*. infections by a routine and confirmative diagnostic processes by direct microscopic examination, cultured on Sabouraud dextrose agar (SDA) and sub cultured on CHROM agar which is selective media to identify *candida species.* Germ tube test was done to identify *C. albicans.*

The current study show that the infection rate of oral Candidiasis caused by *C. albicans* (24.0%), *nonalbican*s (36.0%), and dermal Candidiasis caused by *C.albican*s (20.0%), *non albican* (34.0%), and mix between oral and dermal Candidiasis caused by *C. albican*s (26.0%), *non-albican*s results (42.0%).

The assessment of antifungal susceptibility test of 60 isolates of *Candida spp*. Show that 56.7% of isolates were sensitive, 1.7% intermediate and 41.7% resistant to nystatine and amphoterisin B. Whereas, 13.3% of isolates were sensitive, 1.7% intermediate and 85.0% resistant to ketoconazole, in addition 25.0% of isolates were sensitive, 23,3% intermediate and 51.7% were resistant to polymexine.

Finally, DNAs of *C.albicans* isolates were extracted for polymerase chain reaction (PCR) assay by targeting 25S rDNA of transposable in to 1 region and were analyzed by using gel image patterns of bands based on ultraviolet transilluminator band software.

Our study demonstrate sizes polymer chain reaction products for *Candida albicans* was (535 bp). The results of PCR study by detecting the 25S rDNA showed that 15(%) isolates belonged to the genotype A; 1(%) isolates belonged for genotype B and 4(%) isolates belonged for genotype C and B of the *C. albicans*.

There is non-significant, relationship was found between *Candida* infection and age group, gender, feeding history, body weight, address, bottle feeding, mother and baby information, soother using, drug up taking and water supply.