

Candida Colonization in Newborn in  
Neonatal Intensive Care Unit at Ain  
Shams University Hospitals

*Thesis*

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Medical science  
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## *List of Abbreviations*

ABCD	: Amphotericin B colloidal dispersion
AIDS	: acquired immuno deficiency syndrome
CDC	: Center for Disease Control
CNS	: central nervous system
CSF	: Cerebro spinal fluid
ELBW	: extreme low birth weight
FIP	: focal intestinal perforation
GIT	: <i>Gastro intestinal tract</i>
HCWs	: health care workers
HIV	: human immunodeficiency virus
ICU	: intensive care unit
LamB	: liposomal amphotericin B
LONS	: Late onset neonatal sepsis
NEC	: necrotizing enterocolitis
NICU	: Neonatal intensive care unit
PICU	: Premature intensive care unit
ROP	: retinopathy of prematurity
UTI	: Urinary tract infection
VLBW	: very low birth weight
VLONS	: Very Late onset neonatal sepsis

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✍ *Fatma Mohammed*

## استبيان لمعرفة مدى تطبيق برنامج مكافحة العدوى داخل الوحدة

م	البيان	لا	نعم	ملاحظات
١	تتوفر بالوحدة وثيقة مكتوبة بسياسات واجراءات مكافحة العدوي للآتى: الغسيل- طرق تنظيف الوحدة- طرق التعقيم- نظام التهوية- المعمل/ ومعلنة.			
٢	توجد بالوحدة لجنة للتحكم فى العدوى/ تجتمع بشكل دوري/ وتسجل محاضرها.			
٣	يوجد توصيف وظيفي لمسئول مكافحة العدوي/ ومعلن.			
٤	توجد خطة وجدول لتدريب العاملين بالوحدة/ ومعلن.			
٥	توفر استمارات خاصة للإبلاغ عن الامراض المعدية.			
٦	يتم تقييم معدلات العدوى بالوحدة دوريا.			
٧	توجد سجلات للمزارع المأخوذة من اماكن مختلفة من الوحدة.			
٨	يتم تسجيل نتيجة المزارع المرسلة.			

## Check list

**Specimen no.:**

**Name :**

**Sex:**

**Age:**

**Profession :**

**duration:**

<b>Hand washing</b>	<b>Yes</b>	<b>No</b>
Adequate hand facilities to need.		
Hand wash skins hand free, dedicated to hand washing.		
Antimicrobial soap available for invasive procedures.		
Plain soap available for routine procedures.		
Hands are washed between patient contacts.		
Hand are washed each time gloves are removed.		
<b>Barrier equipment.</b>		
Readily available when needed.		
Disposed off corretly.		
Clean ones located away from sinks & other splash areas.		
Gloves are worn for contact with any patient.		
Long sleeved gowns are available when needed.		
Antibiotic intake: <ul style="list-style-type: none"><li>- With doctor prescription.</li><li>- Without doctor prescription:</li><li>- Full course:</li></ul>		
Infection control training: <ul style="list-style-type: none"><li>- Before.</li><li>- After.</li><li>- Before and After.</li></ul>		

## Introduction

*Candida* species have become common causes of nosocomial invasive infections in neonatal intensive care units (NICUs) (*Roilides et al.*, २००२ and *Heljic et al.*, २००७). They are the third most frequent causal agent of late-onset sepsis in preterm neonates (*Stoll et al.*, २००२ and *Chapman*, २००१) with crude mortality rate of ३०% to १७% (*Karlowicz et al.*, २००२ and *Makhoul et al.* २००२). *Candida* species also account for 9 to 13 % of all blood stream isolates in NICUs (*Agarwal et al.*, २००६).

In the past decade colonization and infection with *Candida* species has risen dramatically and high rates of carriage in neonates, especially preterms, has been reported by many workers (*Sharp et al.*, 1992 and *Singh et al.*, 1999). This has been attributed to the advancement in medical field, life support systems, relative immunodeficiencies, extensive use of broad spectrum antibiotics, high prevalence of hand carriage of *Candida* in health care workers, ability of *Candida* to survive on environmental surfaces and colonization of maternal vagina (*Pfaller* 1998, *Seeling*, 1997, and *Mendiratta et al.*, २००१).

Colonization with *Candida* has been identified as the major risk factor and the first step in development of candidaemia (*Heljic et al., २००९ and Mendiratta et al., २००१*). The NICU babies become colonized very early. About १०% of these babies get colonized in the first week of life and up to १६% babies get colonized by ६ weeks of hospital stay. The gastrointestinal tract is the first to become colonized though multiple sites as oral cavity and skin may be involved (*Rao and Ali २००९, and Mendiratta et al., २००१*). *Candida* colonization has been greatly associated with prematurity, longer duration of rupture of membranes, administration of steroids and antibiotics and vaginal colonization of mothers (*Saiman et al, २००१ and Mendiratta et al., २००१*).

Broad-spectrum antibiotic therapy was found to promote fungal growth in neonates with prior colonization (*Charles et al., २००९*). Increased risk for systemic candidiasis was also found to be associated with parenteral nutrition, the presence of a central venous catheter and prolonged ICU stay (*Saiman et al., २००० and Manzoni et al., २००१*).

Although *Candida albicans* has been the most frequently isolated species in colonized or infected neonates,

non-*C.albicans* species particularly *C. parapsilosis* and *C. tropicalis* have emerged as important predominant fungal pathogens in many neonatal ICUs (*Huang et al., ۲۰۰۰, Roilides et al., ۲۰۰۳, Rao and Ali, ۲۰۰۵, and Chapman, ۲۰۰۷*). This could be because of selection of lesser susceptible non-albicans species due to frequent use of fluconazole (*Agarwal et al., ۲۰۰۴*).

## Aim of the Study

This work aims to study the *Candida* colonization on and after admission to NICU and progression to infection and to determine the risk factors and the possible source of colonization. This study also aims to identify the isolated *Candida* species and determine their susceptibility to different antifungal drugs.

## Candida

### **Genus Candida**

The heterogeneous genus candida belongs to the family candidaceae within the ascomycetes. The genus contains approximately 200 species. This number is not immutable. Technological advances that affect apparent taxonomic relationships will continually result in reassignments of present species and discovery of new species. These advances may also lead to the designation of new genera (*Mahieu et al.*, 2010).

Candida species are ubiquitous yeasts, being found on many plants and as normal flora of the alimentary tract of mammals and mucocutaneous membranes of humans (*Calderone*, 2002). Essentially all areas of the gastrointestinal tract of humans can harbor Candida. The most commonly