Onychomycosis caused by *Rhodotorula glutinis*: A Case Report

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**Abstract**

Onychomycosis is a general term used for fungal nail infections caused by *Dermatophytes*, non-dermatophyte filamentous molds and also by yeasts (Gupta, 2001). Onychomycosis affects approximately 5% of population worldwide and represents 20–40% of onychopathies and about 30% of mycotic cutaneous infections. Various workers have reported the incidence to vary from 0.5 to 5% in the general population in India (Kaur et al., 2008). Old age, nail deformities, onychodystrophy, repeated trauma, diabetes mellitus, psoriasis, cellular immunity disorders, genetic predisposition, peripheral arterial circulatory disorder, hyperhidrosis pedium, long term use of immunosuppressant and HIV/AIDS are considered as risk factors for onychomycosis (Nenoff *et al.*, 2014; Zisova *et al.*, 2012).

Superficial fungal infections by *Rhodotorula* species are not seen in immunocompetent individuals, but cases have been reported in critically ill or immunocompromised hosts (Vartivarian *et al.*, 1993; Menon *et al.*, 2014). *Rhodotorula* are uncommon agents in etiology of onychomycosis. To date very few cases of onychomycosis caused by *Rhodotorula* species have been reported (Uludag Altun *et al.*, 2014; da Cunha *et al.*, 2014). "Rhodotorula* species is generally not considered pathogenic in immunocompetent individuals, though cases with *Rhodotorula* infections have been reported in immunocompromised patients and patients on central venous catheter. The current study reports a case of onychomycosis in an immunocompetent 63 years old male. The causative agent was identified as *R. glutinis* by pinkish-orange color, mucoid-appearing yeast colonies on Sabouraud Dextrose Agar, oval budding yeast cells with no pseudohyphae on corn-meal agar tween-80, urease test positive and sugar assimilation tests. Positive nitrate assimilation differentiates it from *R. mucilaginosa*. Antifungal susceptibility testing by using CLSI M44 A-2 disc diffusion method showed the isolate is sensitive to voriconazole, ketoconazole, nystatin, and amphotericin-B and resistant for fluconazole, itraconazole, miconazole and clotrimazole."

**Keywords**

Onychomycosis, *Rhodotorula glutinis*, Disc diffusion method
Only one case of onychomycosis by *Rhodotorula glutinis* has been reported (Uludag Altun et al., 2014).

### Case report

A 63 year old male patient farmer by occupation reported at department of dermatology for complaints of nail deformity and thickness of toe nails of both feet for more than 3 years duration. In the dermatological examinations there was bilateral discoloration and subungual hyperkeratosis of toe nails and onychomycosis was observed clinically (Figure 1). Finger nails were normal. Patient gave history of tinea cruris infection few months back, which was cured by topical antifungal ( clotrimazole ) application. Patient did not have any chronic disease, malignancy or familial genetic disorder. There was no history of long term broad spectrum antibiotic or systemic steroids intake. Other immunosuppressive states like AIDS were absent. Patient was sent to our Department of Microbiology for fungus culture and sensitivity for infected toe nails.

Nail clippings from affected toes were collected aseptically after cleaning with 70% alcohol and were subjected to 40% KOH mount and Culture on Sabouraud dextrose agar media at 25°C. Culture showed pink-orange colored creamy colony (Figure 2) and identified as Yeast cells forming blastospores on grams staining (Figure 3).

The yeast was identified as *Rhodotorula glutinis* by Vitek 2 automated identification system using Yeast Biochemical Card 2 (YCB). The morphological identification after 72 hour incubation at 25°C on corn meal agar tween-80 showed oval budding yeast cells, no pseudo hyphae (Figure 4). Assimilation features using Vitek 2 automated system along with conventional methods identified the yeast as *Rhodotorula glutinis* (Larone, 2002). On subculture pinkish-orange color yeast colony was grown again (Figure 5).

In vitro Antifungal sensitivity testing was done as per CLSI M44-A2 guidelines using disc diffusion method on Mueller-Hinton Agar with 2% Glucose and 0.5 µg/ml methylene blue. Quality control was performed using Candida parapsilosis ATCC 22019. Zone of inhibition was measured and the yeast was found to be sensitive for ketoconazole, voriconazole, amphotericin-B and nystatin, and resistant to clotrimazole, itraconazole, fluconazole and miconazole (Figure 6).

### Discussion

*Rhodotorula* species are prevalent in nature found in soil and lakes. They are also found as resident flora on human skin. *Rhodotorula* infections are more frequently isolated in Asia-pacific region (Micieli et al., 2011). Infections caused by *Rhodotorula* are rare though in recent years cases by *Rhodotorula* infections are being reported in patients on central venous catheter (García-Suárez et al., 2011; Braun and Kauffman, 1992) *Rhodotorula* spp. were found to be the fourth most frequently observed species among non-Candida yeasts isolated from clinical specimens (Pfaller et al., 2009). In recent years, infection by fungi which were previously thought to be non-pathogenic are being reported in clinical samples. Infections by medically insignificant fungi are also emerging (Walsh et al., 2004).

According to recent studies *Rhodotorula* species could also cause onychomycosis (da Cunha et al., 2009). To date only one case of onychomycosis caused by *Rhodotorula glutinis* has been reported (Uludag Altun et al., 2014). As onychomycosis by *Rhodotorula* species is rare we did re-
sampling and culture of nail specimen. The same species with same biochemical and sensitivity pattern was grown again. Therefore we assumed that the *Rhodotorula glutinis* is the causative agent of onychomycosis in our patient. As this yeast is normally found in soil and our patient is also a farmer by occupation, there could be a possibility that the patient contracted the infection by repeated microtrauma during working in his fields.

**Figure.1** Discoloration and onycholysis in toenails

**Figure.2** Yeast colony on SDA after culture

**Figure.3** Oval budding yeast cells on Gram’s staining

**Figure.4** Morphology of yeast on Corn meal agar tween-80
Rhodotorula species are similar to the Cryptococcus species and it also forms capsule but the capsule is very thin compared to Cryptococcus. Production of carotenoid pigment and inability to assimilate inositol differentiate it from Cryptococcus. Sporobolomyces salmonicolor also produces Rhodotorula like pigment but formation of satellite colonies and production of ballistoconidia differentiates it from Rhodotorula. Positive nitrate assimilation differentiates Rhodotorula glutinis from Rhodotorula mucilaginosa (Larone, 2002).

In vitro susceptibility for Rhodotorula glutinis isolated in case of onychomycosis by Uludag Altun et al. (2014) were similar for fluconazole, voriconazole and amphotericin-B, but itraconazole to which our isolate was resistant. Some studies have reported resistance to Itraconazole in Rhodotorula glutinis similar to our case (Preney et al., 2003; Serena et al., 2004; Garcia-Martos et al., 2001; Zaas et al., 2003). Our isolate was also tested sensitive to ketoconazole and nystatin also which were not tested in other studies. Our disc diffusion testing also showed drug synergism between ketoconazole & clotrimazole, and antagonism between ketoconazole & nystatin and voriconazole & amphotericin-B.

Conclusion

Although Rhodotorula species rarely cause onychomycosis, our case supports that Rhodotorula glutinis can cause onychomycosis in immunocompetent individuals. Susceptibility test results show that resistance to commonly used oral antifungal agents like fluconazole and itraconazole are of great concern.

Reference


