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CASE REPORT

FUNGAL FOOT INFECTION CAUSED BY CYLINDROCARPON SP.: A RARE CASE

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ABSTRACT

Background: Saprophytic soil species-rarely plant or human parasites—are included in the genus *Cylindrocarpon*. They are recognized as uncommon agents that can cause mycetomas, keratitis, or widespread infections. Although rare, tinea pedis due to *Cylindrocarpon sp.* was described for the first time in 1985.
Based on theory, the culture results of the *Cylindrocarpon* species gives an overview colonies on SDA show rapid growth reaching a diameter of 30 mm within 4 days. *C.* colonies are hyaline or brightly colored, like leather or wool. In our case, the culture grew 5 days after specimen collection but was contaminated, so a re-culture was done from the culture that had grown. Until now, there is no guideline for the treatment of *Cylindrocarpon* infection in humans, but in general, the treatment of *Cylindrocarpon* is similar to the treatment of other mold infections.
Case:A 68-year-old woman came to the outpatient clinic of Dermatology and Venereology at RSUD Dr. Soetomo Surabaya complaining of white spots between the toes that were felt since 4 months ago. Complaints were also accompanied by complaints of itching. The patient had a habit of walking on the ground barefoot. The patient's dermatologic status at March 15th, 2022 revealed multiple white macules with indistinct border, maceration, erosion, without any scale at interdigiti 4 and 5 pedis dextra and interdigiti 1 and 4 pedis sinistra region. Direct microscopic examination using potassium hydroxide of the lesion scrapings revealed the presence of hyphae. The patient was diagnosed with tinea pedis interdigitalis type. Patient revisited the hospital after 1 week (2nd visit). The lesions at the webspaces did not get any better. At the third visit, the patient said the lesion felt slightly reduced but not significant. It was also felt that the white lesions on the legs were not increasing.
Results: The results of KOH examination taken from the culture results gave a picture of macroconidia consisting of one to several septate, hyaline, straight, cylindrical to fusiform, with a rounded top and flat base, hyaline chlamydospores, spherical, formed singly, in chains or groups, intercalated or terminal. The fungal species was identified as *Cylindrocarpon sp*. Due to the change in the patient's diagnosis to fungal foot infection caused by *Cylindrocarpon sp*. then the patient's therapy was adjusted and the griseofulvin drug previously given was changed to itraconazole tablets 200mg twice daily and cetirizine 10mg once daily. At the 7th week visit, our patient said the lesion felt slightly increased and there was a wound on the lesion. The culture results showed a colony picture in the form of fast growing colonies, hyaline or brightly colored, like wool and the back of the fungal colonies showed a reddish brown pigmentation color.
Conclusion: The starting point of treatment for superficial or localized tinea pedis is topical antifungal medication. If the patient has impaired immune function, the condition is extensive, recurring, chronic, or resistant to topical antifungal treatment, or there is evidence of concurrent onychomycosis, systemic treatment should be taken into consideration.

Keywords*: Tinea pedis, Cylindrocarpon sp., Fungal foot infection, Rare Human Parasites*

INTRODUCTION

Saprophytic soil species—rarely plant or human parasites—are included in the genus *Cylindrocarpon*. They are recognized as uncommon agents that can cause mycetomas, keratitis, or widespread infections.[1,2,3] Although rare, tinea pedis due to *Cylindrocarpon sp.* was described for the first time by Lancy *et al.*[4], in 1985. The same is true for onychomycosis, which was also discovered in immunocompromised patients in a Brazilian investigation.[4,5] The species that infect humans are *C. cyanescens*, *C. destructans*, *C. lichenicola*, and *C. vaginae*.[6] Among these species, *Cylindrocarpon lichenicola* is known to cause invasive illness.[7]

The largest number of cases of *Cylindrocarpon* infections included people living in agricultural regions and/or who got into touch with plants[8,9] or those with

impaired immune systems; voriconazole and/or amphotericin B were utilized in the successful therapy.[10,11,12] It is known that there are three primary clinical variants of tinea pedis: vesiculobullous (inflammatory), hyperkeratotic (moccasin-type), and interdigital.[13,14,15] The most prevalent type of tinea pedis, known as interdigital, usually affects children more than adults. It usually manifests as erythema, silvery white scaling, peeling, and maceration in the web spaces, most commonly in the web space between the fourth and fifth toes.[16,17,18] The website could turn white and rubbery.[19] The predominant symptom is pruritus.[19,20] In many cases, peripheral fissuring occurs, which may be painful and cause burning sensation.[21,22]

A lot of clinicians use a clinical diagnosis for tinea pedis. But the clinical diagnosis of tinea pedis is not very accurate.[23] Though it is rarely done now, reflectance confocal microscopy, a non-invasive real-time imaging technique of the skin's superficial layers, can be utilized to diagnose tinea pedis.[24] KOH wet-mount examination of skin scrapings of the active border of the lesion or the roof of a specimen collected with a sterile instrument can be carried out to prevent misdiagnosis, particularly in the setting of tinea incognito.[25,26] The scrapings are placed on a microscopic slide and a drop of a 10–20% KOH solution is applied, either with or without dimethyl sulfoxide.[27] Fungal culture is the gold standard for diagnosing dermatophytosis and the pathogenic species, but it is rarely required unless the infection is severe, widespread, or resistant to antifungal treatment, or unless the diagnosis is still unclear following KOH wet-mount examination of skin scrapings of the active border of the lesion or roof of a vesicle.[14,28]

Topical antifungal medication is the basis of treatment for superficial or localized tinea pedis. Oral antifungal treatment need to be saved for patients with immunocompromised conditions, severe disease, or those who have not responded to topical antifungal medication. Patient compliance is frequently a problem since patients typically stop taking their medications too soon after their clinical symptoms have resolved, which can cause the illness to reoccur.[29] We presented a case of a female patient with superficial fungal skin infection tinea pedis due to *Cylindrocarpon sp.*

Case Report

A 68-year-old woman came to the outpatient clinic of Dermatology and Venereology at RSUD Dr. Soetomo Surabaya complaining of white spots between the toes that were felt since 4 months ago (day 0). Complaints were also accompanied by complaints of itching and did not worsen when sweating. There was no diurnal variation of the symptoms. The patient said that initially the complaints of white spots were felt because the patient often walked on the ground barefoot and when the conditions were wet. A history of previous trauma was denied, but the patient had a habit of walking on the ground barefoot. No history of eczema, psoriasis, or malignancy.

The patient had a history of rubbing with alcohol and povidone iodine as previous treatment, but the complaints were felt to have not improved. The patient had a history of hypertension and regularly takes Candesartan and Amlodipine. The patient also had a history of diabetes mellitus and regularly takes Glimepirid. Family history of suffering from the same complaint as the patient was denied. History of drug and food allergy was denied.

In the general status examination, the patient was 68 years old with a body weight of 65 kg and a height of 155 cm. Her heart rate was 88 beats per minute, respiratory rate 20 times per minute, temperature 36.4˚C. Physical examination revealed no anemia, icterus, cyanosis and dyspnea. Heart, lung and abdominal examinations were also normal. There's no oedema on both arms and leg. The extremity felt warm and dry. The patient's dermatologic status at March 15th, 2022 revealed multiple white macules with indistinct border, maceration, erosion, without any scale at interdigiti 4 and 5 pedis dextra and interdigiti 1 and 4 pedis sinistra region (**Figure 1**).

Figure 1. Patient's dermatological status at first visit.

Unlike scabies, the lesions did not spread outside of webspaces. Palpation revealed no induration.

The planning diagnosis of this patient was KOH examination and also we did the fungal culture. Direct microscopic examination using potassium hydroxide of the lesion scrapings revealed the presence of hyphae (**Figure 2**).

Figure 2. Direct microscopic examination showed the presence of hyphae

From the results of history taking, physical examination and microscopic examination, the patient was diagnosed with tinea pedis interdigitalis type. Patient was started on griseofulvin 500mg twice a day which was planned to be given for 2 weeks and cetirizine 10mg once a day. This oral medication was used in conjunction with a local sodium fusidate cream treatment on the erosion area twice daily and asked to revisit the outpatient department. Patient was monitored regarding her complaints, progress of the lesions, and side effects of the therapy. The patient had been educated to not manipulate the lesions, not to give any other topical medication to the lesion, avoid hot and humid environment, avoid long exposure to soil, plant and water, and routine control. Patient revisited the hospital after 1 week (day 7). The lesions at the webspaces did not get any better. On this 2nd visit, at interdigiti 4 and 5 pedis dextra and interdigiti 1 and 4 pedis sinistra region showed multiple white macules with indistinct border, maceration and erosion, but there was no scale (**Figure 3**).

Figure 3. Interdigital tinea pedis presenting with withe macules, maceration, and erosion between the toes and the adjacent skin.

At the third visit, the patient said the lesion felt slightly reduced but not significant. It was also felt that the white lesions on the legs were not increasing (day 14). At interdigiti 4 and 5 pedis dextra and interdigiti 1 and 4 pedis sinistra region still showed multiple white macules with indistinct border, maceration and erosion, but there was no scale (**Figure 4**).

Figure 4. Multiple white macules with indistinct border, maceration and erosion lesions in webspaces and skin over the proximal interphalangeal joints.

Culture results from skin scrapings taken 2 weeks before revealed a picture of fast growing colonies, hyaline or bright-coloured, woolly (**Figure 5**).

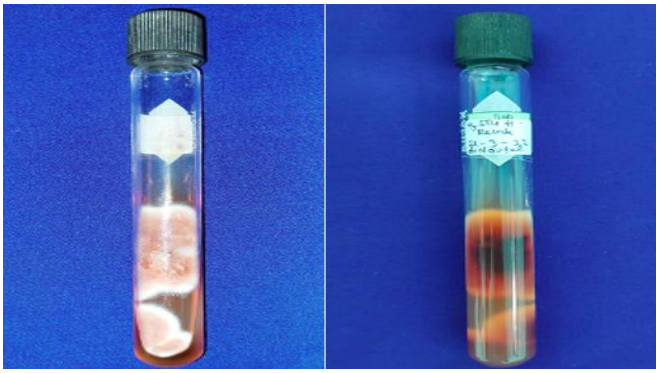

Figure 5. Culture results from skin scrapings after two weeks.

The results of KOH examination taken from the culture results gave a picture of macroconidia consisting of one to several septate, hyaline, straight, cylindrical to fusiform, with a rounded top and flat base, hyaline chlamydospores, spherical, formed singly, in chains or groups, intercalated or terminal. The fungal species was identified as *Cylindrocarpon sp*. (**Figure 6**).

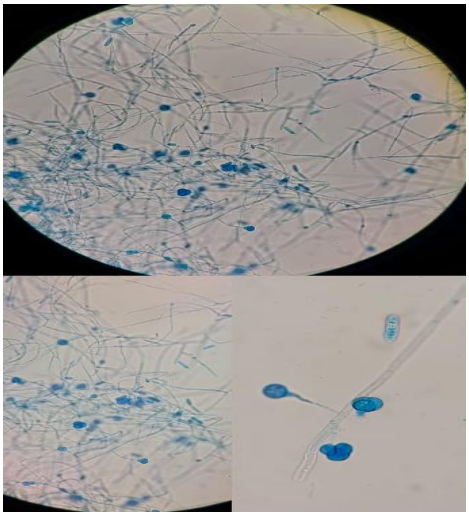

Figure 6. KOH examination from culture: macroconidia which are one to several septate, hyaline, straight, cylindrical to fusiform, with a rounded apex and flat base, chlamydospores hyaline, spherical, formed singly, in chains or in clumps, intercalary or terminal.

Due to the change in the patient's diagnosis to Fungal foot infection caused by *Cylindrocarpon sp*. then the patient's therapy was adjusted. The griseofulvin drug previously given was changed to itraconazole tablets 200mg twice daily and cetirizine 10mg once daily. Our patients monitored regarding her complaints, progress of the lesions, and side effects of the therapy. She educated to not manipulate the lesions, not give any other topical medication to the lesion, avoid hot and humid environment, avoid long exposure to soil, plant and water, and routine control too.

At the 5th visit (day 27), the patient said the complaints of white spots were felt to be reduced, moreover complaints of itching were also felt to be reduced (**Figure 7**).

Figure 7. Interdigiti 4 and 5 pedis dextra and interdigiti 1 and 4 pedis sinistra region still showed multiple white macules with indistinct border, maceration and erosion, but there was no scale.

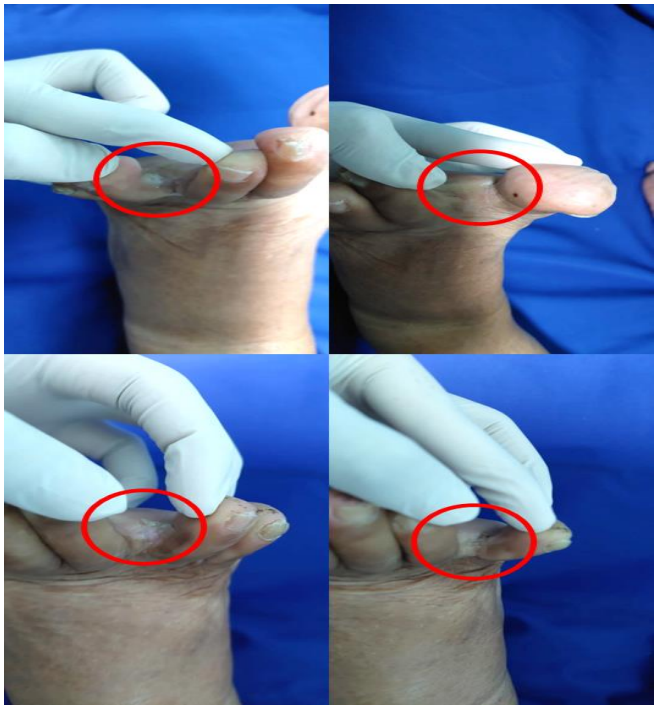

Figure 8. Increased multiple white macules with wound on the lesion, maceration, and erosion.

DISCUSSION

Saprophytic soil species-rarely plant or human parasites-are included in the genus *Cylindrocarpon*. They are recognized as uncommon agents that can cause mycetomas, keratitis, or widespread infections.[1,2,3] Although rare, tinea pedis due to *Cylindrocarpon sp.* was described for the first time by Lancy *et al*., in 1985. The same is true for onychomycosis, which was also discovered in immunocompromised patients in a Brazilian investigation.[4,5] Therefore, due to their anatomical proximity, the connection between these infections may have started at one point.[30]

Numerous pathogenic fungus belonging to the *Nectriaceae* (Hypocreales) genera *Cylindrocarpon*, *Fusarium*, and *Cylindrocladium* reveal a tight taxonomical connection to *C. destructans*.[31] Because of their similar macroscopic features, the genera *Cylindrocarpon* and *Fusarium* are sometimes confused with one another.[32,33] The genus *Cylindrocarpon* was stated by Mantiri *et al*.[34] to have about 125 species. Booth[35] further classified this genus into four groups based on the presence of chlamydospores and microconidia: *C. magnusianum*, *C. cylindroides*, *Nectria mammoidea*, and *C. destructans*. Species that infect humans are *C. cyanescens*, *C. destructans*, *C. lichenicola*, and *C. vaginae*.[6] Among these species, *Cylindrocarpon lichenicola* is known to cause invasive illness.[7]

Based on theory, the culture results of the *Cylindrocarpon* species gives an overview colonies on Sabouraud Dextrose Agar (SDA) show rapid growth reaching a diameter of 30 mm within 4 days. *C.* colonies are hyaline or brightly colored, like leather or wool (**Figure 9**). The opposite of fungal colonies on SDA showed diffuse pale reddish brown pigmentation.[8]

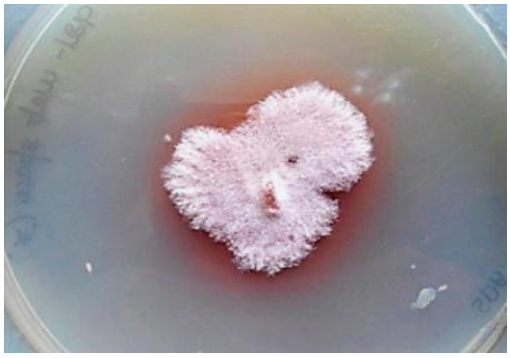

Figure 9. Colony of *C. lichenicola* on SDA after 4 days of incubation at 25˚C

In our case, the culture grew 5 days after specimen collection but was contaminated, so a re-culture was done from the culture that had grown. The culture results showed a colony picture in the form of fast growing colonies, hyaline or brightly colored, like wool and the back of the fungal colonies showed a reddish brown pigmentation color (**Figure 5**).
Based on the theory of KOH Microscopic examination results obtained the presence of macroconidia consisting of one to several septates, hyaline, straight or curved, cylindrical to fusiform, with rounded apex and flat base. Chlamydospores can be present or absent, hyaline to brown, spherical, formed singly, in chains or clusters, intercalated or terminal Figure (**Figure 6**).[8]

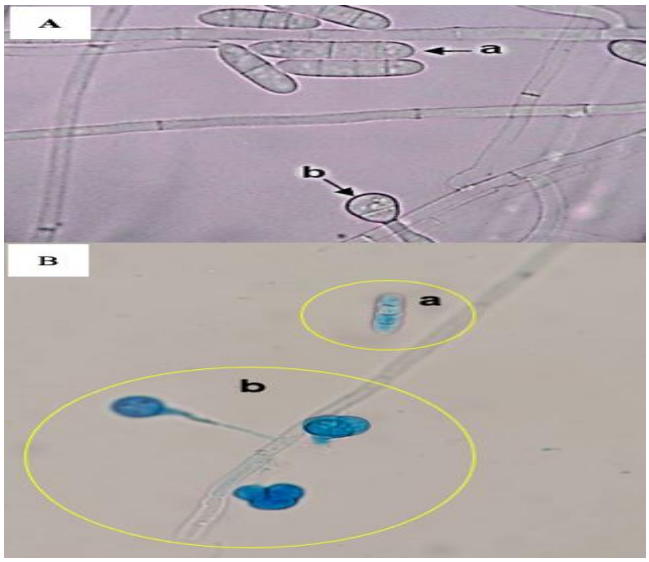

Figure 10. A) Slide culture showing (a) macroconidia and (b) terminal multicelled chlamydospore. Magnification, ×400.[8] B) KOH examination of the culture results in our case.

This description is in accordance with the results of the KOH examination of the culture results in our case (**Figure 6**).
The starting point of treatment for superficial or localized tinea pedis is topical antifungal medication.[21,36]

If the patient has impaired immune function, the condition is extensive, recurring, chronic, or resistant to topical antifungal treatment, or there is evidence of concurrent onychomycosis, systemic treatment should be taken into consideration.[16,26] Until now, there is no guideline for the treatment of *Cylindrocarpon* infection in humans, but in general, the treatment of *Cylindrocarpon* is similar to the treatment of other mold infections. James *et al.*[3] reported a clinical improvement in a previous case of disseminated infection caused by *C. lichenicola* after marrow regeneration and therapy with 1 mg of AmB per kg. In our case patient was given itraconazole tablets 200mg twice daily and cetirizine 10mg once daily.

DECLARATIONS

Ethics approval and consent to participate
Not applicable.
Consent for publication
Not applicable.
Competing interests
The authors declare no conflict of interest.
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