

## HENDERSONULA TORULOIDEA INFECTION OF HUMAN SKIN AND NAILS

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### Summary

Four cases of skin and nail infection by *Hendersonula toruloidea* (*H. toruloides*) are described from India. Infections were confined to the feet which showed scaling and dystrophic nails. The presence of brown hyphae with knobbed swellings in nail tissue and repeated isolation of *H. toruloidea* in pure culture are taken as evidence that this fungus was invading the tissues.

*Hendersonula toruloidea* is a member of Coelomycetes and unrelated to dermatophytes. It was originally described as a fungal parasite on deciduous trees in Egypt (Natrass)<sup>1</sup>. In India, Mathur and Singh<sup>2</sup> have reported it on twigs of *Psidium guajava*. Gentles and Evans<sup>3</sup> were the first to present evidence of its possible pathogenicity to man. Since then, Kurwa and Campbell<sup>4</sup>, Campbell et al<sup>5</sup>, Eady and Moore<sup>6</sup> and Moore<sup>7</sup> have reported its pathogenic role in man.

The present paper reports four cases of nail and skin infection for the first time from India, in which *H. toruloidea* have been implicated.

### Methods

Samples of the nail and skin, suspected of fungal infection were brought to the laboratory. Specimens were examined in 40% KOH squash preparation in

case of nail samples and 10% KOH in case of skin samples. The specimens were then cultured in triplicate on slants containing (a) Sabouraud's dextrose agar incorporating cycloheximide (0.5 mg/ml) and chloramphenicol (.05mg/ml) and (b) Sabouraud's dextrose agar incorporating only chloramphenicol (.5 mg/ml). The isolations were repeated for over a period of three months. Measurements for the growth rate were made for each isolate on 10th day of incubation at 25°C.

### Case Reports

#### Case 1

A 38 year old male resident of Balaghat, Madhya Pradesh (M.P.), India employed as a waterman presented with chronic nail dystrophy. Initially, some 14 years back his right great toe had got involved. Gradually, the dystrophy spread to all the toe nails. The nails were dystrophic, hyperkeratotic, partly destroyed and brittle with yellowish brown discolouration. (Fig. 1).

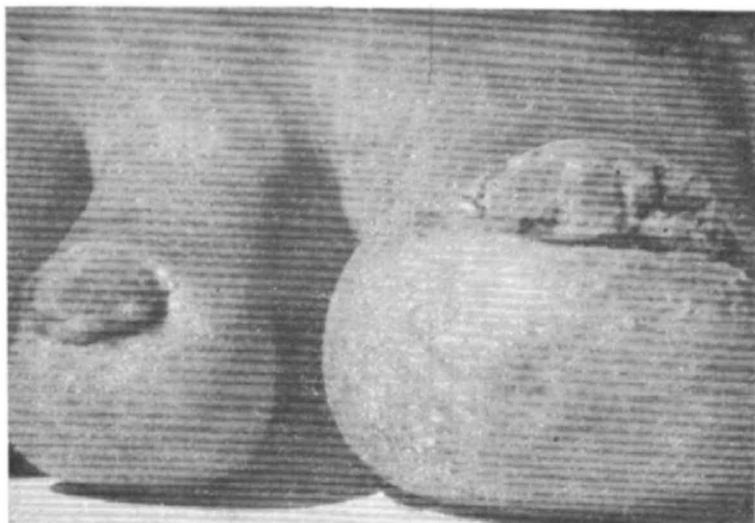
#### Case 2

A 32 year old male resident of Balaghat (M.P.), India serving as a drycleaner, presented with skin lesion on the great toe. This was present for about 12

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**Fig. 1**

*Case ; 1*

toe of right foot showing nail dystrophy and hyperkeratosis.

years and presented as scales which were yellowish brown. The scales separated out easily from the toe clefts of both the feet. (Fig. 2)

*Case 3*

A 50 year old male resident of Balaghat (M.P.), India working as a blacksmith presented with nail dystrophy which had followed a trauma. Duration of the disease was 7 years and site of involvement was the great toe nail of

the right foot. The nail was dystrophic, showed slight hyperkeratosis, yellowish colour and a rough surface (Fig. 3).

*Case 4*

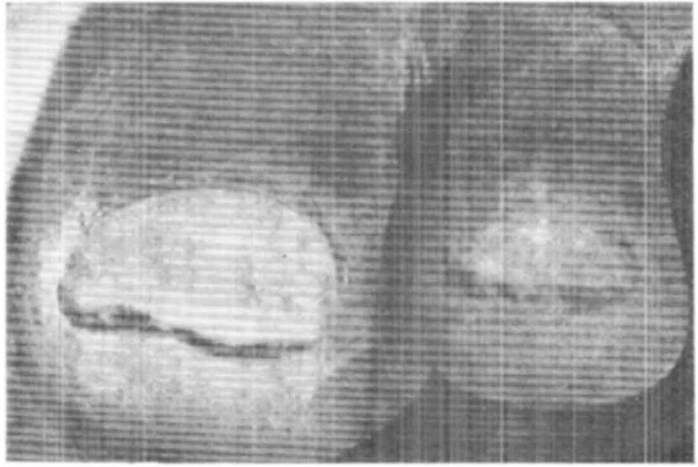
A 40 year old male resident of Balaghat (M.P.), India working as a farmer presented with dystrophy of great toe nails. According to him the nails became diseased due to parha (planting of rice seedlings in water filled fields). Duration of the disease was for about



**Fig. 2**

*Case : 2*

toe skin of right foot showing scaling.



**Fig. 3**

Case 3 :

toe of right foot showing nail dystrophy and slight hyperkeratosis.

15 years. The nail plates were dystrophic and hyperkeratotic showing yellowish brown colour and rough surfaces.

**Results and Discussion**

A summary of the mycological findings of the patients is given in Table 1. All the diseased specimens contained brownish hyphae in KOH squash preparations (Fig. 4,5,6). In two samples (nail of case 1 and skin of great toe of case 2) brown coloured hyphae with knobbled hyphal wall swellings were seen on direct examination (Fig. 4 and 5).

Table I shows that in all instances there have been repeated isolations of *H. toruloidea* in cycloheximide free



**Fig. 4** Case 2 : KOH squash preparation of skin showing brown walled hyphae with hyphal swellings (x 645)

medium except in case 4 where an unidentified fungus was isolated on first two occasions. However, in the third isolation the unidentified fungus failed to appear and *H. toruloidea* grew pure in culture.

All the isolates exhibited slow growth 16-40 mm in diameter in 10 days at 25°C with low aerial mycelium (2 mm high). The colony was pale olivaceous grey, whilst the reverse was pale mouse grey (Rayner<sup>6</sup>). The hyphal wall swellings and coils were present in the older mycelium of all the strains (Fig. 7 and 8).

Microscopically, the cultures showed arthrospores from all the strains. Arthrospores were globose, ovoid, cylindrical to barrel shaped, olivaceous to light brown in colour and 13-13.5 x 3-10 μm in diameter. The strain from case 4 was very slow growing (16 mm in 10 days) with less aerial mycelium and lesser tendency to arthrospores formation.

The cases presented above give support to the view put forth by Gentles and Evans<sup>3</sup>, Kurwa and Campbell<sup>4</sup>, Eady and Moore<sup>6</sup> and Moore<sup>7</sup> that *H. toruloidea* is capable of

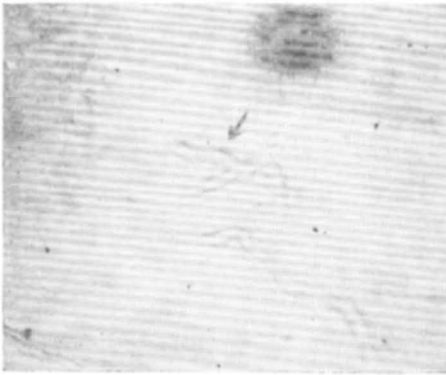


Fig. 5 Case 1: KOH squash preparation of nail tissue showing brown walled hyphae with hyphal wall swellings. (x 645)

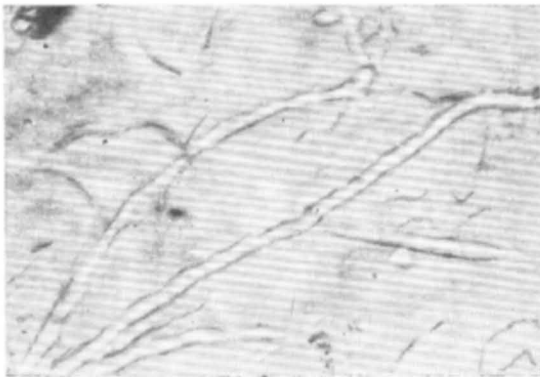


Fig. 6 Case 4: KOH squash preparation of nail tissue showing brown walled hyphae (x 645)

invading skin and nail tissues. The most convincing evidence apart from the repeated isolations of this species from the same site of all the patients for over a period of three months is that brown coloured hyphae with hyphal wall swellings similar to those seen in pure culture have been found for the first time on direct examination in all the diseased samples (Fig. 5 and 6). Hence, it is reasonable to say that organisms isolated in culture was identical to that marked on direct microscopy.

Three of the four cases described here showed nail involvement and one showed skin infection. Only two of the eight reported by Gentles and Evans<sup>3</sup> showed nail involvement. Seven of the ten cases described by Campbell et al<sup>5</sup> involved nails, their findings thus being very similar to ours. The ability of *H. toruloidea* to invade the skin of hands and feet is limited. Other non-dermatophytes infections are typically restricted to nail tissues (Walshe and English<sup>9</sup>; English<sup>10</sup>; Zaias et al<sup>11</sup>).

TABLE I  
Results of mycological investigation

Case No.	Date of collection	Site of disease	Direct examination	Cultural results	
				Chloramphenicol + cycloheximide	Chloramphenicol
1.	24-1-79	toe nail	+	-	<i>Hendersonula toruloidea</i>
	24-3-79	toe nail	+	-	same
	24-4-79	toe nail	+	-	same
2.	29-1-79	toe skin	+	-	same
	29-2-79	toe skin	+	-	same
	29-3-79	toe skin	+	-	same
3.	12-12-78	toe nail	+	-	same
	12-1-79	toe nail	+	-	same
	12-3-79	toe nail	+	-	same
4.	17-1-79	toe nail	+	-	<i>H. toruloidea</i> + unidentified fungi
	17-2-79	toe nail	+	-	same
	17-3-79	toe nail	+	-	<i>H. toruloidea</i> only

+ = Present; - = Absent

**Fig. 7**

Case 1 :

Hyphal wall swellings in culture (x 645).



The skin and nail infections did not cause physical discomfort to the patients, who did not realise that their hands and feet were abnormal. The nails in the present cases were dystrophic, showed variable degree of hyperkeratosis and exhibited yellowish to brownish discolouration. These features are similar to the findings of Campbell et al<sup>5</sup>.

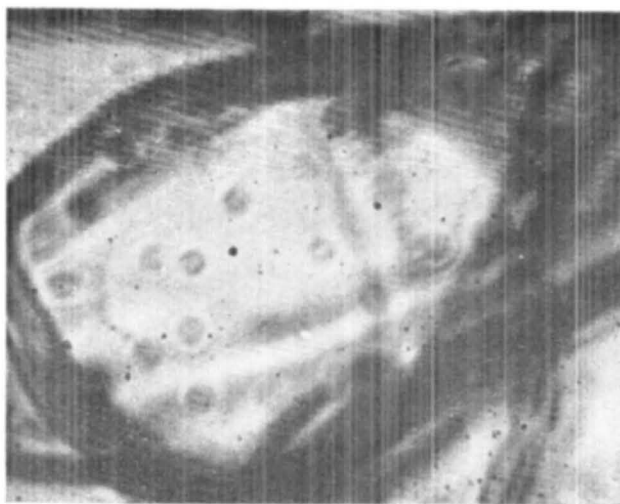
The case histories of all the patients except that of case 3, revealed that water had been in some way or the other used while the patients were at work. It can, therefore, be presumed that water or moisture contributed to susceptibility to the infection. In case 3, the infection must have occurred through an injured site.

All the present isolates showed slow growth, low aerial mycelium with knobbed hyphal wall swellings and coils and few arthrospores corresponding to the cultural type B as reported by Campbell<sup>12</sup>. The present report provides evidence that type B morphology of *H. toruloidea* is seen in the Indian sub continent.

In the first case, infection which first involved one toe nail gradually spread to involve all the toe nails. It is thus possible that the infection is transmissible. Campbell et al<sup>5</sup> have shown that infected skin scales kept dry for six months contained viable fungus. It seems, therefore, that potential for the spread of the infection always exists. However, this fact needs to be confirmed by further studies.

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**Fig. 8** Case 1 : Hyphal coils in culture (x 645).

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