TWO CASES OF FUSARIUM SOLANI (MART.) SACC. INFECTION OF HUMAN FINGER NAILS

A. K. BARDE AND S. M. SINGH *

Summary

Fusarium solani, not known to produce onychomycosis, was repeatedly recovered from two healthy men with lesions in finger nails. Mycelial fragments and microconidia were observed in the diseased nails and the fungus was repeatedly isolated in the cycloheximide-free culture medium. The report indicates that many fungi, hitherto considered nonpathogens may still be able to colonize a variety of human tissues.

KEY WORDS: F. solani nail infection.

Members of the genus *Fusarium* are ubiquitous soil-borne fungi capable of causing disease in plants. Occasionally, species of *Fusarium* has been implicated in human diseases like skin ulcer[1], cutaneous infection[2], urinary tract infection[3], facial granuloma[4], mycotic keratitis[5] and superficial white onychomycosis[6,7]. Most *Fusarium* isolates from human infection were *F. oxysporum*. Cutaneous infection caused by *F. moniliforme*[2] and mycotic keratitis caused by *F. solani*[8] have also been reported.

The present communication reports two cases of onychomycosis, in which *F. saloni* has been isolated as the pathogenic organism.

* Department of Post-graduate Studies and Research in Biological Sciences, University of Jabalpur, Jabalpur-482002 (M.P.)

The present work is being supported by Indian Council of Medical Research in the form of Junior Research Fellowship to one of us (A. K. B.)

Present address:
Mycology Unit, Department of Botany, Govt. P. G. College, Balaghat-481001. (M P.)

Received for publication on 14—10—1981

Case Reports

Case 1

A 23 year old worker in the post and telegraph department at Balaghat (M.P.), India presented with dystrophy of the right thumb nail. It had started about six years earlier following trauma. The affected nail showed subungual hyperkeratosis with buff to ochre coloured debris and onycholysis. Part of the nail plate was thick and brittle. The adjoining skin appeared to be normal (Fig. 1).

Case 2

A 20 year old college student from Balaghat presented with dystrophy of left middle finger nail. It had appeared about 5 years previously following an injury. The nail plate was soft, friable and slightly lifted from the nail bed by ochre coloured subungual debris. The adjoining skin was normal (Fig. 2).

Investigations

Samples of the diseased finger nails were examined in 40% KOH squash

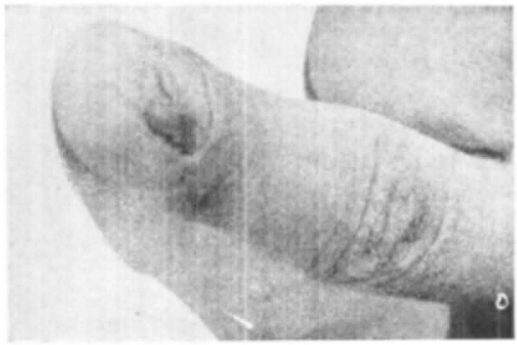

Fig. 1

The infected thumb nail of case 1.

preparations. The specimens were also cultured on slants containing (a) Sabouraud's dextrose agar incorporating cycloheximide (0.5 mg/ml) and chloramphenicol (.05 mg/ml) and (b) Sabouraud's dextrose agar incorporating only chloramphenicol (.5 mg/ml). The isolations were repeated over a period of 3 to 4 months. Measurements of the growth rate of the fungi were made on the 6th day of incubation at 28°C. Rayner[9] colour chart was followed in the description of the organism.

Results and discussion

Direct microscopic examination of the diseased nails from both the cases revealed the presence of hyaline, branched, septate and smooth walled mycelia. Numerous small, single-celled, hyaline, globose to subglobose microconidia were seen in the specimen from case 1 but not from case 2.

A summary of the mycological findings is given in Table 1. It shows that in all instances there have been repeated isolations over a period of 4 months of *F. solani* in cycloheximide-free medium. No dermatophyte was isolated on cycloheximide-containing medium.

Fungal colonies from case 1, on Sabouraud's dextrose agar attained a size 42 mm in 6 days at 26°C. The colonies were broadly spreading, floccose and white at first later becoming pale violaceous and finally turning to livid violaceous and on the reverse shaved apricot to dark violaceous colour. Mycelia were well developed, septate, hyaline and 2.5 to 6.7μm in width; conidiophores, simple or branched; microconidia, hyaline, single-celled, ovoid to oblong often embedded in mucilaginous mass of 5 - 13 x 5 - 7.5 μm (9 x 6μm); and macroconidia, few,

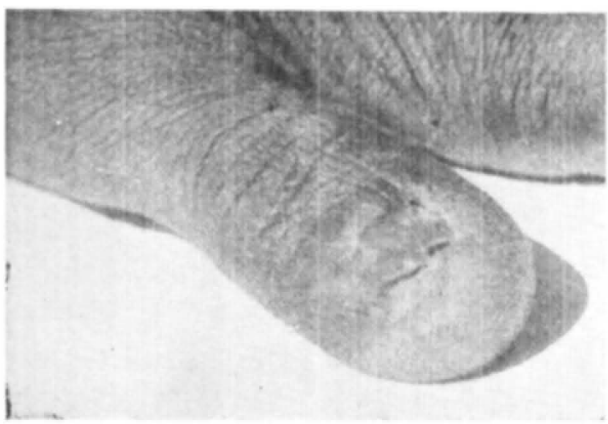

Fig. 2

The infected middle finger nail of case 2.

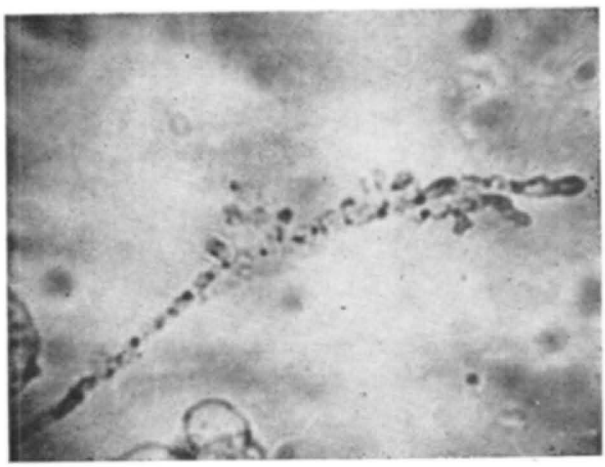

Fig. 3

KOH squash preparation of the disease nail showing hyphae (x300)

sickle shaped, septate, hyaline and 16.5 - 25.5 x 5 - 6.5μm (22 x 5.5μm). The culture has been deposited in the Herb. I.M.I. Kew No. 244078.

Fungal colonies from case 2 on Sabouraud's dextrose agar medium were 50 mm in 6 days at 28°C, broadly spreading, floccose, white at firs later becoming pale violaceous with reverse white to apricot in colour Mycelium was well developed, septate, hyaline, 2.5 to 6.5 μm in width ; macroconidia, septate, sickle-shaped, hyaline, 10-36.5 μm x 5 - 6.5 μm and microconidia, hyaline, single-celld, ovoid 10-13.5x5-6.5 μm. The culture has been deposited in the Herb. I.M.I. Kew No. 245379.

The spore size of both the strains of *F. Solani* does not conform to the standard description given by Booth[10] who identified these organisms. This may be either due to the effect of Sabouraud's dextrose agar culture medium used by us or because the organism belongs to an atypical strain of *F. solani*.

Both the strains of *F. solani* secreted violaceous to apricot pigment in the culture medium. This colour resembled the colour of the hyperkeratotic mass on the nail bed in both the patients.

TABLE I

Results of mycological investigation

Case No.	Date of Collection	Site of Disease	Direct Examination in KOH.	Culture results Sabouraud's dextrose agar	
				With Cycloheximide	Without Cycloheximide
1.	17—11—78	Right hand thumb nail	+	—	Fusarium solani
	2—2—79	same	+	—	Same
	27—2—79	same	+	—	Same
	27—3—79	same	+	—	Same
2.	16—9—80	Left hand middle finger	+	—	Same
	1—10—80	same	+	—	Same
	23—2—80	same	+	—	Same

Fungal infections of the nails have been observed and reported with increasing frequency during the past few years (Agarwal and Singh[11]; Singh and Barde[12]; Zaias[6]; English[13]). This has been due to the fact that several fungi which are usually considered as non-pathogens or saprophytes do have the ability to infect human nails. However, the pathogenicity of such fungi other than the commonly known dermatophytes has been poorly accepted by dermatologists.

English[13] has observed that the presence of mycelium and typical spores of the saprophyte on direct microscopic examination in the diseased tissue, repeated isolations of the fungus from the scrapings and absence of the dermatophyte on the medium containing cycloheximide should offer convincing proof that the saprophyte was invading the human tissue. Besides the above criteria given by English[13], we have found that the colour of the soft keratinogenous mass on the nail bed, the site of infection under the nail plate, similarly of the colour between the clincal lesion and that produced by the fungus in the culture medium and the 'in vitro' ability of the saprophyte to degrade keratin all strengthen the implication of the saprophyte being the cause of the disease.

In the present investigation we have found that both the strains of *F. solani* satisfy the criteria given by English[13]. It is therefore presumed that *F. solani* was the causal agent of onychomycosis in both the patients reported here.

Zaias[6] reported a case of superficial white onychomycosis of the toe nails caused by *F. oxysporum*. Clinically the nails were opaque with well defined white areas on the surface of the nail plates, unlike the appearance of the nail in our patients where violaceous to apricot coloured soft keratinogenous mass was present subungually. Whereas all toe nails were affected in the case reported by Zaias[6], each of our two patients had single finger nail involvement.

Acknowledgements

The authors are grateful to Dr. G. P. Agarwal, Head, Dept. of P. G. Studies and Research in Biological Sciences, University of Jabalpur for guidance and encouragement; to Dr. Booth, Mycologist, C. M. I. Kew, England for conforming the identification of the organism and to the Principal, Govt. P. G. College, Balaghat (M. P.) for providing laboratory facilities.

References :

1. English MP: Observation on the strains of Fusarium solani, F oxysporum and Candida parapsilosis from ulcerated leg, Sabouraudia, 1972; 10: 35-42.

2. Collins MS and Rinald MG: Cutaneous infection in man caused by Fusarium moniliforme. Sabouraudia, 1977; 15: 154-160.

3. Lazarus JA and Schwarz LH: Infection of urinary bladder with unusual fungus (Fusarium), Urologic and cutaneous Review, 1948; 62: 185-189.

4. Benjamin RP, Callaway JL and Conant NF: Facial granuloma associated with Fusarium infection. Archives of Dermatology, 1970; 101: 598-600.

5. Zapater RC and Arrechea A: Mycotic keratitis by Fusarium. A review and two cases. Ophthalmalogica (Basel), 1975; 170: 1-12.

6. Zaias N: Superficial white onychomycosis. Sabouraudia, 1966; 5 (2): 99-103.

7. Rush-Munro FM, Black H, Dingley JM: Onychomycosis caused by Fusarium oxysporum. Aust J Derm, 1971; 12: 18-29.

8. Gugnani HC, Talwar RS, Njoku-obi ANU and Kodimaye HC: Mycotic Keratitis

in Nigeria, a study of 21 cases, Brit J Ophthal, 1976; 60: 607-613.

9. Reyner RW: A mycological colour chart, Commonwealth Mycological Institute, Kew, Surrey, 1970.

10. Booth C: The genus Fusarium, Commonwealth Mycological Institute, Kew, Surrey, England.

11. Agarwal GP and Singh SM: Microascus cinereus infection of human nail. Ind J Med Sci, 1980; 34 (11) 263-265.

12. Singh SM and Barde AK: Hendersonula toruloidea Infection of human skin and nails. Ind J Dermatol Venereol Lepr 1980; 46: 350-355.

13. English MP: Invasion of the skin by filamentous non dermatophytic fungi, Brit J Derm, 1968; 80: 282-286.