นิพนธ์ต้นฉบับ

Childhood superficial fungal infection in pediatric dermatologic clinic, Chulalongkorn University

Siriwan Wananukul*
Prapai Pongprasit*

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Objectives : *To review the clinical of childhood superficial fungal infection at the pediatric skin clinic, Chulalongkorn University.*

Design : *Retrospective study.*

Setting : *Pediatric skin clinic, Chulalongkorn University.*

Subjects : *Patients whom clinically diagnosed as superficial fungal infection during the period January 1993 - October 1996.*

Results : *There were 117 cases. The age ranged from 1 month to 14 years (mean age was 7 years). Male: female ratio was 1.25:1. They were diagnosed as candidiasis (40%), dermatophytosis (33%) and tinea versicolor (27%). Tinea capitis was found in 28% of the dermatophytosis. KOH preparation were positive 92% in candidiasis and 83% in dermatophytosis. Methylene blue stain showed 100% positive in the tinea versicolor.*

Conclusion : *Superficial fungal infection is still a common problem. Besides the clinical presentation, proper site to collect the specimen for KOH or methylene blue are practical and useful in making diagnosis.*

Key words : *Superficial fungal infection, Candidiasis, Dermatophytosis, Tinea versicolor.*

Reprint request : Wananukul S. Department of Pediatric, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand.

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*Department of Pediatrics, Faculty of Medicine, Chulalongkorn University.

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เป้าหมาย : *รวบรวมผู้ป่วยเด็กที่เป็นโรคติดเชื้อราของผิวหนังชั้นบนในเด็กที่มารับการรักษาที่คลินิกผิวหนังเด็ก จุฬาลงกรณ์มหาวิทยาลัย*

ลักษณะการศึกษา : *Retrospective study*

ประเภทโรงพยาบาล : *คลินิกผิวหนังเด็ก จุฬาลงกรณ์มหาวิทยาลัย*

การคัดเลือกผู้ป่วย : *ผู้ป่วยเด็กที่ได้รับการวินิจฉัยว่าเป็นโรคติดเชื้อราบนผิวหนังชั้นบนในระหว่างมกราคม 2536-ตุลาคม 2539*

ผลการศึกษา : *มีผู้ป่วยจำนวน 117 ราย อายุ ระหว่าง 1 เดือน ถึง 14 ปี (ค่าเฉลี่ย 7 ปี) เป็นเด็กผู้ชาย 65 ราย เด็กผู้หญิง 52 ราย คิดเป็นอัตราส่วน ชาย : หญิง = 1.25 : 1 โรคที่พบบ่อยตามลำดับคือ candidiasis (ร้อยละ 40) dermatophytosis (ร้อยละ 33) และ tinea versicolor (ร้อยละ 27) โรค tinea capitis พบถึงร้อยละ 28 ของกลุ่มโรค tinea infection การตรวจวินิจฉัยโดย KOH ให้ผลบวกร้อยละ 92 และ 83 ในโรค candidiasis และ dermatophytosis ตามลำดับ การตรวจวินิจฉัยโดยการย้อม methylene blue ให้ผลบวกร้อยละ 100 ในโรค tinea versicolor*

สรุป : *การติดเชื้อราบนผิวหนังชั้นบนยังเป็นโรคที่พบได้บ่อยในเด็กนอกจากอาการและอาการแสดงทางคลินิค การเก็บตัวอย่างที่เหมาะสมเพื่อตรวจสอบด้วยวิธี KOH หรือ methylene blue เป็นวิธีที่ง่ายในการช่วยการวินิจฉัย*

Superficial fungal infection is still a common problem in Thailand.[1] The incidence of superficial fungal infections has been studied elsewhere extensively.[2-6] As our's is a tertiary care center, about 20% of our patients came in after topical medication provided no improvement, and these were mostly topical corticosteroids. To date, few studies have been done to characterize the clinical aspects of superficial fungal infection among Thai children. The purpose of this study is to present the clinical spectrum of superficial fungal infections.

Material and Methods

All patients diagnosed with superficial fungal infections registered at the pediatric dermatologic clinic of Chulalongkorn University during the period January 1993-October 1996 were retrieved. Their clinical data included age, sex, distribution of lesions, underlying diseases and treatment were review. According to the clinical criteria (as Table 1), they were broadly classified into 3 main groups; candidiasis, dermatophytosis and tinea versicolor. With respect to age, they were divided into infants (0-2 years), preschoolers (2-6 years) and schoolers (7-15 years old). KOH preparation was done by scraping the scales at the border of the lesion and using 10% KOH. In tinea versicolor, the skin lesions were stripped with vinyl plastic tape and then methylene blue was used to observe the organism.

Results

One hundred and seventeen patients were diagnosed with superficial fungal infection. The incidence was 5.3% of the total cases in the clinic. The male-female ratio was 1.25:1, and ages ranged from 1 month to 14 years (mean age of 7 years). Candidiasis, tinea versicolor and dermatophytosis were 39.3%, 27.4% and 33.3% respectively.

Candidiasis was the most common superficial fungal infection in infant group (Table 2). Thirty seven out of 46 (80.5%) of candidiasis were infants and 9 (19.5%) were older than 2 years. Among the infant, 25 out of 37 were under 1 year old. The mean age of the candiasis was 73 months. Four patients were on steroid therapy and 1 patient had obesity. The most common site of involvement was the intertriginous area of the neck (43%), followed by the groin (22%) and oral cavity (22%) (Table 3). Four cases (8%) had candida paronychia and 2 cases (4%) had interdigital candidiasis. Sixteen patients (34.8%) had more than one site. Thirty nine (87%) patients were given the fungal scrape test, and 92% (36/39) of them had positive for the test. All patients were treated with topical medications. Imidazole cream was the most common agent prescribed (76%), followed by gentian violet (15%) and nystatin cream (9%). The follow-up rate was 60%, and all patients conditions were either resolved or showed improvement by the second visit, except for one patient who was on systemic steroid therapy.

Table 1. Clinical criteria for diagnosis of various type superficial fungal infection.

A. Candidiasis: The lesion which was diagnosed as candidiasis should meet the following criteria.

A1. Oral candidiasis

A1.1 Grayish white membranous plaques on the surface of the mucous membrane

A1.2 The plague was not easily removed

A1.3 Its base is moist, reddish macerated.

A2. Cutaneous candidiasis

A2.1 Scaly erythematous macules and /or vesicle with maceration

A2.2 Small erythematous desquamating satellite or daughter lesions scattered along the edges of the larger macules.

A3. Candida paronychia

A3.1 Gradual thickening of paronychia tissue with erosion of lateral borders of the nail

A3.2 Whitish thin pus or brownish discoloration of the nail plate and transverse ridge.

B. Tinea versicolor: The lesion which was diagnosed as tinea versicolor should meet the following criteria

B1. Sharply marginated hypopigmented or brownish macule or patch with fine scale

B2. The scales will be easily seen by light scratching with the finger nail over the involved area.

C. Dermatophytosis: The lesion which was diagnosed as dermatophytosis should meet the following criteria

C1. Tinea corporis

C1.1 Sharply circumscribed, dry scaly circular patches

C1.2 Slightly elevated at the border which are more inflamed and scaly than at the central part thus produces central clearing

C2. Tinea unguium

C2.1 Distal or proximal subungual hyperkeratosis or white superficial onychomycosis. Other dermatosis involving nail was excluded.

C3. Tinea capitis

C3.1 Inflammatory type: loose and broken off hair on boggy and indurated areas with exuding pus on the scalp

C3.2 Gray-patch: Localized single or multiple scaly lesions with stubs of broken hair

C3.3 Black dot: Localized single or multiple areas of alopecia studded with black dots representing infected hairs broken off at or below the surface of the scalp

Table 2. Age distribution in different clinical types of superficial fungal infection.

Age(years)	Candidiasis	Tinea versicolor	Dermatophytosis	total
	No.(%)	No.(%)	No.(%)	No.(%)
≤ 2	37 (70)	7 (13)	9 (17)	53 (100)
2⁺-7	7 (35)	2 (10)	11 (55)	20 (100)
7⁺-14	2 (5)	23 (52)	19 (43)	44 (100)

Table 3. Distribution of locations of cutaneous candidiasis in pediatric population.

Location	No.	%
Neck	20	43
Diaper area	13	28
Oral	10	22
Axillar	9	20
Back	7	15
Paronychia	4	8
Interdigital	2	4

Note There were 46 patients but 13 patients had 2 sites and 3 patients had 3 sites.

Tinea versicolor made up 32 (27.4%) of the cases. There were 23 (71.9%) schoolers, 7 (21.9%) infants and 2 (6.2%) pre-schoolers (Table 2). The most common site of involvement was the face (78%), followed by upper back (28%), (Table 4). Twenty two percent had more than one site. In the infants, all had hypopigmented macules with fine scales at the forehead between the eyebrows. Direct examination with methylene blue was done in 78% of the cases and 100% proved positive. All patients were treated with either 25% sodium thiosulfate or imidazole cream. Only 40% returned for a second visit. All cases were resolved and only post inflammatory hypopigmentation remained.

Table 4. Distribution of location of tinea versicolor in pediatric population.

Location	n = 32	%
Face	25	78
Upper back	9	28
Scalp	4	13
Proximal extremities	1	3

Note There were 32 patients but 7 patients had 2 sites.

There were 39 patients who had dermatophytosis. Five of these patients (12.8%) had more than one site. The most common type was tinea corporis (31%) which consisted of classic annular or circinate lesions and were commonly on the trunk (Table 5). Tinea capitis, the rare

condition in adults, was 28% (11 cases) of the dermatophytos is in our series. Among the tinea capitis, 6 of them (54.4%) were Kerion or inflammatory type. KOH was done in 80% of the cases and 83% were positive. Gresiofulvin was given in cases of tinea capitis, tinea unguium and other widespread infections. All 11 tinea capitis patients had significant improvement after one month, of treatment and seven patients (63.6%) were followed-up at the end of the course showed complete recovery. All 7 tinea unguium patients had significant improvement after one month and five patients (71.4%) were followed-up for six months had complete recoveries. Imidazole cream was given, as the topical antifungal therapy, for patients with tinea faciei, tinea corporis, tinea cruris and tinea pedis. Gresiofulvin was prescribed for only 9 patients who had widespread infections. Sixty percent of the patients returned for a second visit, and all were either improved or totally resolved. Only one patient had an allergic reaction to tioconazole, so gresiofulvin was given at the second visit.

Table 5. Distribution of locations of dermatophytosis in pediatric population.

	Age			Total	
	0.2	2-7	7-14		
Location	**No.**	**No.**	**No.**	**No.**	**(%)**
T. corporis	4	2	6	12	(31)
T. capitis	-	5	6	11	(28)
T. faciei	4	2	1	7	(18)
T. unguium	2	2	3	7	(18)
T. cruris	-	-	6	6	(15)
T. pedis	-	-	1	1	(3)

Note There were 39 patients but 5 patients had 2 sites.

Discussion

Superficial fungal infection is one of a common problem. Our patients may not represent the whole Thai children population because of being a tertiary care center and about 20% came in after unsuccessful topical medication, mostly topical corticosteroids. Candidiasis is the most common superficial fungal infection in infants. In this study, 70% of cases were candidiasis. Candida albicans is colonized in as many as 80%

of normal individuals in the oropharynx, gastrointestinal tract and vagina.[7] Infants acquire Candida albicans at the time of delivery during passage through the vaginal canal. Candida can produce cutaneous disease only if the site of inoculation is occluded.[8] Candida albicans has a predilection for colonization in moist, macerated locations especially at intertriginous areas. In our series, candidiasis was also found at the predilection area as neck, diaper area, oral area and axillar area. Seven infants had candidiasis at their backs and this was due to the use of plastic sheets to cover the bed to prevent soiling from urine or stool. In the patients older than 2 years, many of them had predisposing factors of either being on systemic steroid therapy or obesity. Other suspected predisposing factors which were not found in our patients include prolonged administration of antibiotics, immune deficiency state, physiologic change in pregnancy and iatrogenic causes such as barrier- weak factors.[9] Thirty-five percent of the patients had more than one site of infection. Complete physical examinations are very important for disease management, especially when being treated with topical antifungal agents.

Tinea versicolor has been reported to be rare in very young infants or in the neonatal period but we saw it in seven neonates. The most common location was at glabella. In adults the more common locations are the upper thorax, back and shoulder. But in children it usually involves the face.[10] The easiest way to confirm the diagnosis of tinea versicolor is by using stripping (clear) tape and methylene blue to visualize short hyphae and yeast with an appearance of "spaghetti and meatballs". Our finding suggested the useful of this test.

Tinea corporis was the most commonly (31%) encountered dermatophytosis in our patients. Tinea capitis, which was the most common dermatophytosis in Kuwaiti and Iranian children,[3-4] was the second most common superficial fungal infection in our series (28%). The children in the middle east had long hair and covered their hair with veil and also that the temperature in the middle east is higher than in Thailand. These might contribute the higher incidence than ours. However, it was markedly higher than that of the Thai adult patients (2%).[7] Tinea capitis is much more common in children than in adults.[5, 10-11] The causing mechanism is unknown, but it has been proposed that increasing resistance to fungus after puberty is due to a higher content of fungistatic even-numbered fatty acids of medium length in the sebum of postpubertal individuals.[12] Tinea faciei and Tinea unguium were the next most common (18% in both groups). Although rare at the schoolers, they do occur.[3,13]

Our study demonstrated that direct examinations from skin scrapings and the stripping method are very useful. KOH preparations gave a high yield in confirming the diagnosis in our series (92% and 83% in candidiasis and dermatophytosis respectively). Proper site to collect specimen is one of the determinant factor.

Scraping from the periphery of the scaling lesion will give the best yield for sites other than the scalp. Gentle heat may speed the dissolution for keratinous cells.[14] In Tinea capitis, we extracted remnants of infected hair with epilating forceps so as to look for spores and hyphae. In tinea versicolor, vinyl plastic tape was used to strip the scaling hypopigmentation patches at the periphery, and methylene blue was used to visualize the spaghetti and meat-balls appearance.[15] This method showed very high result in confirming the diagnosis. The goals standard for diagnosis of fungal infection is culture but it is not practical in clinical setting. Direct examination is a simple test and showed more promising useful. Our study can not demonstrate their sensitivity or specificity. The further specific design is needed. In conclusion, superficial fungal infection is still a common problem among Thai children and were different among the different age groups. Besides the clinical presentation, proper site to collect the specimens and KOH or methylene blue test are practical and useful in making the diagnosis and for proper management.

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