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## CLINICAL AND MICROBIOLOGICAL STUDY OF SCALY SCALP IN PRESCHOOL CHILDREN

Samia Abd El-Naby

*Department of Dermatology, Andrology & STDs Mansoura Faculty of Medicine*

Ayman Elkholy

*Department of Dermatology, Andrology & STDs Mansoura Faculty of Medicine*

Ahmed Noor

*Department of Dermatology, Andrology & STDs Mansoura Faculty of Medicine*

Salah Agha

*Department of Clinical Pathology Mansoura Faculty of Medicine*

Noha El-Mashad

*Department of Clinical Pathology Mansoura Faculty of Medicine*

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# CLINICAL AND MICROBIOLOGICAL STUDY OF SCALY SCALP IN PRESCHOOL CHILDREN

*By*

**Samia E. Abd El-Naby, Ayman A-M Elkholy,  
Ahmed H. Noor, Salah A. Agha\* & Noha El-Mashad\***

*From*

*Department of Dermatology, Andrology & STDs and \*Department of  
Clinical Pathology Mansoura Faculty of Medicine*

## **ABSTRACT**

*Background* : Scaling of scalp is a common feature of many skin diseases and can be observed in different ages. Despite the diversity of causes of scaly scalp in preschool age group, there are few studies to document the etiologies of scalp scaling in preschool children.

*Objective* : To categorize the cases of scaly scalp in preschool children in our locality on clinical and microbiological bases.

*Methods* : Fifty child of preschool age, having scaly scalp from Dermatology outpatient clinic of Mansoura university hospital, were subjected to thorough history taking and clinical dermatologic examination for the le-

sions of the scalp and any other associated dermatological lesions anywhere in the body. Scales and hairs from the scaly scalp lesions were obtained and subjected to direct microscopic examination using KOH and culture on Sabouraud's dextrose agar with chloramphenicol, with and without cyclohexamide. The growth was identified by macroscopic & microscopic characters.

*Results* : Ages of the studied patients were from 3 months up to 5.5 years. Thirty six percent of them were infants while 64% were in the 2-6 years age group. The most common cause of scaly scalp found was *T. capitis* (62%), then seborrhoeic dermatitis (24%), psoriasis (10%) and lastly atopic dermatitis and PRP (2% each).

Distribution of these causes did not differ between boys & girls or between rural & urban residence but differ in the different age groups. Tinea capitis was found in both age groups but more in the 2-6 years age group than infants, while seborrhoeic dermatitis was found only in infants group. Direct microscopic KOH examination was positive in only 71% of cases of T. capitis, while fungal culture was positive in 87.1% of cases. The commonest dermatophyte isolated was *Trichophyton violaceum* (77.8%).

*Conclusions* : The most common cause of scaly scalp in infants was seborrhoeic dermatitis followed by tinea capitis, while in the 2-6 years age group it was tinea capitis. A cultural method is a very important method in diagnosis of dermatophyte infection even if KOH microscopic examination is negative.

## INTRODUCTION

Scaling of the scalp is a feature of number of clinical disorders including tinea capitis, seborrhoeic dermatitis, atopic dermatitis and psoriasis.<sup>(1)</sup> Occasionally scaly scalp can occur in

other diseases like scabies, dermatomyositis,<sup>(1)</sup> discoid lupus erythematosus,<sup>(2)</sup> pityriasis rubra pilaris<sup>(3)</sup> and Langerhans cell histiocytosis.<sup>(4)</sup>

Although pityriasis capitis was previously thought to be uncommon in children, an epidemiological study from Australia found that approximately 40% of children under the age of 6 years showed at least mild pityriasis capitis, and 10% of neonates had seborrhoeic dermatitis of the scalp.<sup>(5)</sup>

Tinea capitis is the most common pediatric dermatophyte infection worldwide, accounting for up to 92.5% of dermatophyte in children under the age of 10 years.<sup>(6)</sup> The average age incidence is 4 to 6 years<sup>(7)</sup> but cases in infants as young as 9 days old,<sup>(8)</sup> 6 days old,<sup>(9)</sup> and elderly<sup>(10)</sup> had been reported.

The scalp has been identified as the most common site of involvement in childhood psoriasis. A family history of psoriasis often exists. A longitudinal study of nine infants with psoriasis showed that the majority did not have a severe disease course.<sup>(11)</sup>

There are reports that approximately half of all children with atopic dermatitis may manifest scaly scalp as found in children from birth to 12 years.<sup>(12)</sup>

Despite the diversity of causes of scaly scalp in preschool age group, there are few studies to document the prevalence and etiologies of scalp scaling in children. This study was done aiming at categorizing the cases of scaly scalp in preschool children in our locality on clinical and microbiological bases.

## SUBJECTS AND METHODS

This study was conducted on 50 patients at preschool age who attended the dermatology outpatient clinic of Mansoura University Hospital in the period from January to July 2005, and having scaly scalp. Any patient with history of intake of any topical or systemic treatment in the last month was excluded from this study.

### *Clinical evaluation :*

The patients were subjected to thorough history taking with special stress on age, sex, residence,

course, duration, recurrence and if recurrent what is the response to previous treatment, exposure to animals or any patient with scaly scalp, whether going to kinder garden or not, family history of scaly scalp and past history of similar condition.

Physical examination was performed to determine the configuration of the lesion whether diffuse or localized, and if localized whether single lesion or multiple lesions and morphology of scales whether white fine scales, yellowish scales or yellowish minute crusts. Also, underlying erythema was noted. The face, neck, trunk and extremities were examined for associated skin eruptions. Nails were examined for any pathology.

### *Mycological examination :*

#### • Collection of specimen:

The specimen were obtained from the scales on the affected scalp by the side of sterile glass slide which is considered the most convenient method of scraping<sup>(13)</sup> and were collected into folded squares of paper. Scraping with scalpel blade was not used as it causes fright to the pediatric patient. Affected hairs are plucked

with sterilized flat tipped forceps.

• Direct microscopic examination :

Scales and affected plucked hairs were put onto the center of clean slide and covered with a cover slip. From the edge, 20% potassium hydroxide is trickled from a dropper under the cover slip. The solution should flow evenly beneath the cover slip by the surface tension. Then the preparation were either gently heated avoiding boiling or better allowed to remain at room temperature for 15-20 minutes, (as heating too vigorously will result in crystallization of KOH and difficulty in interpretation), in this way the keratin will be dissolved or become transparent, while the elements of the fungus consisting of cellulose or chitin will remain. Light pressure on the cover slip makes the keratin cells move apart, so that the fungus is seen more easily. The preparation was examined at low and high power unstained, under a microscope with reduced light. Dermatophytes were identified by the presence of translucent, non pigmented, septate mycelium and arthrospores.

• Fungal culture :

Specimen for culture was collect-

ed as before and was put on sterile small petri dish labeled by the name and code number of the patient for subsequent culture.

Cultures of clinical specimens were done on Sabouraud's dextrose agar with chloramphenicol with and without cyclohexamide on plates and slopes, then they were labeled by the name, code number of the patient & the date of inoculation and incubated at room temperature and were observed starting from 5<sup>th</sup>-6<sup>th</sup> day for rapidly growing fungi and after 2-6 weeks for slowly growing ones. If no growth appears after 8 weeks, cultures were considered negative.

Isolated colonies were observed regarding the colour (both anterior and reverse color) and texture. A portion of these colonies were added to a drop of lactophenol blue stain and examined microscopically for fungal structures as conidia and hyphal structures.

Cases with classic picture of tinea capitis of scaly scalp with partial hair loss and showed negative mycological examination were recultured for

confirmation of the results.

*Clinical diagnosis :*

Diagnosis of the studied cases was determined according to the following criteria.

Tinea capitis was diagnosed in all cases with positive mycological examination whether with localized or diffuse scaling and with or without hair loss.

Seborrhoeic dermatitis was diagnosed in presence of greasy scales over scalp, eyebrows, nasolabial folds, cheeks, ears, presternal and interscapular regions and the direct microscopic examination and cultures of these cases were negative.

Psoriasis was diagnosed in presence of sharply demarcated erythematous plaques covered by silvery white scales whether affecting the scalp only or affecting also other parts of the body and the mycological examination revealed negative results.

Atopic dermatitis was diagnosed if scaly scalp associated with typical

clinical features of areas of severe pruritus, erythema and excoriation mainly over flexural surfaces or cheeks. The direct microscopic examination and culture should be negative.

Pityriasis rubra pilaris was diagnosed if the scaly scalp is associated with other features of pityriasis rubra pilaris as psoriasiform plaques, follicular papules, palmoplantar keratoderma, and at the same time the mycological examination revealed negative results.

*Statistical analysis :*

Clinical and laboratory data of this study were tabulated and statistically analyzed by SPSS version 10 for windows software (SPSS Inc, Chicago, IL, USA). Differences between the groups were tested using chi-square. The level of significance for the statistical tests was set at  $P < 0.05$ .

## RESULTS

A total of 50 patients of preschool age with scaly scalp were collected and studied. As regard the age distribution of studied cases, the smallest age was 3 months and the oldest age



was 5.5 years with the mean age  $3 \pm 1.9$ . Eighteen patients (36%) were infants while 32 patients (64%) were in the age group 2 -6 years. Thirty nine (78%) were boys while 11 (22%) were girls. Residence of patients was rural for 41 patients (82%) and was urban for 9 patients (18%).

Final diagnosis of the cases was done according to criteria mentioned before. Most of the cases, 31 patients (62%), were diagnosed as *T. capitis*; 12 patients (24%) were diagnosed as seborrhoeic dermatitis, 5 patients (10%) were diagnosed as psoriasis, while only 1 patient has atopic dermatitis and another patient has pityriasis rubra pilaris.

A statistically significant difference in distribution of the different causes was found between the 2 age groups, infants & 2 - 6 years age groups. The most prevalent diagnosis in the infant group was seborrhoeic dermatitis (66.7%), while the most prevalent diagnosis in the other age group (2 - 6 years) was *T. capitis* (81.3%) (Fig. 1). No statistically significant difference was detected between boys & girls or between rural & urban residence in

distribution of the different causes. (Table 1)

Most of cases of *T. capitis* and seborrhoeic dermatitis had localized lesions whether single or multiple while 3 of 5 cases of psoriasis and cases of pityriasis rubra pilaris and atopic dermatitis have diffuse configuration. Most of cases of *T. capitis* and psoriasis showed white fine scales while cases of seborrhoeic dermatitis, PRP and atopic dermatitis showed yellowish scales. (Table 2)

*T. capitis* was diagnosed in 31 patients. Direct microscopic examination was positive in 22 cases (71%) and negative in 9 cases (29%). Of the cases with positive direct microscopic examination, 18 cases (81.8%) have positive culture results and 4 cases (18.2%) have negative culture results. While of the cases with negative direct microscopic examination, 5 cases (55.6%) have positive cultures while 4 cases (44.4%) have negative cultures (Table 3). The 4 cases with both negative direct microscopic examination and culture were diagnosed as tinea capitis due to their typical picture of localized patches of

partial hair loss, broken hairs and fine white scales and show positive results on reculture.

As regard the species of isolated dermatophytes from *T. capitis* cases, *Trichophyton violaceum* (Fig. 2 & 3) was the commonest dermatophyte

that was isolated from 21 cases (77.8%). *Microsporum canis* is the second common dermatophyte being isolated from 4 cases (14.8%) followed by *Trichophyton mentagrophytes* that was isolated from 2 cases (7.4%).

**Table 1: Demographics by the different causes of the scaly scalp in preschool age children**

	<i>T. capitis</i> No= (31)	Seborrhoeic dermatitis No= (12)	Psoriasis No= (5)	P.R.P No= (1)	Atopic dermatitis No= (1)	X <sup>2</sup>	P
<b>Age:</b>							
Infants (18)	5 (27.8%)	12 (66.7%)	-	-	1 (5.6%)	17.24	0.001
2-6 years (32)	26 (81.3%)	-	5 (15.6%)	1 (3.1%)	-		
<b>Sex:</b>							
Boys (39)	24 (61.5%)	11 (28.2%)	4 (10.3%)	-	-	0.420	0.52
Girls (11)	7 (63.6%)	1 (9.1%)	1 (9.1%)	1 (9.1%)	1 (9.1%)		
<b>Residence:</b>							
Rural (41)	25 (61%)	10 (24.4%)	4 (9.8%)	1 (2.4%)	1 (2.4%)	1.26	0.26
Urban (9)	6 (66.7%)	2 (22.2%)	1 (11.1%)	-	-		



Table 2: Clinical criteria of the different diagnoses of the scaly scalp in preschool age children

	T. capitis No= (31)	Seborrhoeic dermatitis No= (12)	Psoriasis No= (5)	P.R.P No= (1)	Atopic dermatitis No= (1)	X <sup>2</sup>	P
<b>Configuration:</b>							
1) Diffuse	3 (9.7%)	2 (16.7%)	3 (60%)	1 (100%)	1 (100%)		
2) Localized							
Single	12 (38.7%)	7 (58.3%)	-	-	-	6.22	>0.05
Multiple	16 (51.6%)	3 (25%)	2 (40%)	-	-		
<b>Morphology of scales:</b>							
1) White fine scales	28 (90.4%)	-	5 (100%)	-	-		
2) Yellowish scales	2 (6.4%)	7 (58.3%)	-	1 (100%)	1 (100%)	13.65	*0.05
3) Yellowish silante crust	1 (3.2%)	5 (41.7%)	-	-	-		

Table 3: Results of mycological tests in the cases diagnosed as T. capitis

	Direct examination -ve cases (No. = 9)	Direct examination +ve cases (No. = 22)	Total (No. = 31)
Culture +ve case	5 (55.5%)	18 (81.8%)	23 (74.2%)
Culture -ve cases	4 (45.5%)	4 (18.2%)	8 (25.8%)

Fig 1: Disribution of the different causes of scaly scalp in both infant and 2-6 years age groups

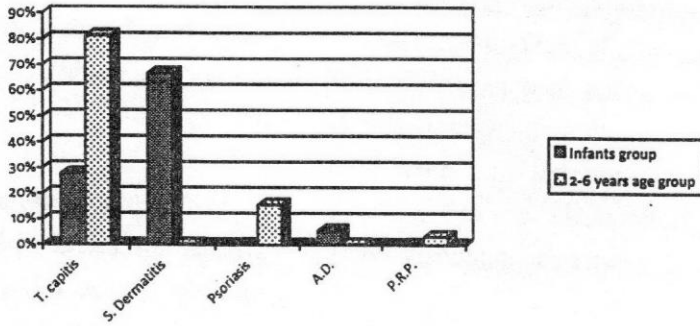


Fig 2: Macroscopic appearance of Trichophyton violaceum isolated from scaly scalp patient (slope)

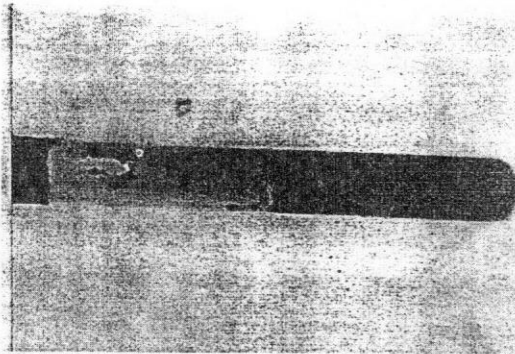
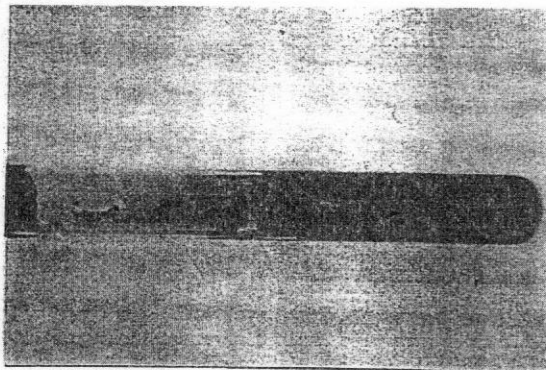


Fig 3: The reverse view of Trichophyton violaceum slope



## DISCUSSION

The cause of scaly scalp has puzzled dermatologists for decades and some attempts have been made to reveal a definitive etiology.<sup>(14)</sup> However these attempts were limited in number, conducted on a small number of patients,<sup>(15)</sup> or not inclusive of microbiological examinations.<sup>(16)</sup>

So, in this study all scaly scalp preschool patients were subjected to clinical and mycological examinations, and the results indicate that scaly scalp represents a particular reaction pattern of scalp to various inflammatory scalp diseases.

Most of cases in this study were boys and this reflects that scaly scalp in boys get more attention of parents than girls due to short shaved hairstyles.

The most common diagnosis in this study was tinea capitis and then seborrhoeic dermatitis. A study done in Australia recorded that atopic dermatitis is the most common cause of scaly scalp in preschool age children.<sup>(17)</sup> Also, another study recorded that the most common causes of

scaly scalp in Eastern Virginia, Norfolk were seborrhoeic dermatitis and atopic dermatitis.<sup>(18)</sup> Our different results may be due to higher prevalence of fungal infection in our locality.

In this study, percentage of tinea capitis as a cause of scaly scalp cases was significantly lower in infants group than in the 2-6 years age group (27.8% vs 81.3%). Only 10 infants aged under 1 year were diagnosed as having tinea capitis in three Spanish hospitals between 1998 and 2002 as it is uncommon in the 1<sup>st</sup> year of life. Half of these cases parents were immigrants from Africa<sup>(19)</sup>. So, relatively higher number of cases in our study can be attributed to the geographic locality and our group includes infants aged less than 2 years.

The localized form of tinea capitis was more common (90.3%) than the diffuse form (9.7%). The most common presentation of tinea capitis was white fine scales (90.4%), and the least common was the yellowish minute crust (3.2%). A previous study made in London showed that the diffuse form constitute about 11% of tin-

ea capitis cases.<sup>(20)</sup> Thus, tinea capitis should be suspected in any localized lesion of the scalp with fine white scales.

Direct microscopic examination was negative in 9 cases, 5 of them (55.6%) had positive culture results. This percent of negative microscopic examination supports the suggestion that arthrospores and hyphae are sometimes difficult to find in KOH smears in the inflammatory infections.<sup>(21)</sup> This reflects the importance of cultural methods in diagnosis of dermatophyte infection even if KOH preparation is negative.<sup>(22)</sup>

The isolated species were found to be *T. violaceum* (77.8%), *M. canis* (14.8%) and *T. mentagrophytes* (7.4%). In a previous study done in Mansoura on 97 cases of tinea capitis, 1 to 15 years old, the isolated dermatophytes were *T. violaceum* (38.1%), *M. canis* (25.8%), *T. tonsurans* and *M. gypseum* (4% for each).<sup>(23)</sup> In a study done in Diyarbakir, Turkey, the most frequently isolated agents were as follows: *T. violaceum* (43.6%), *M. canis* (37.9%), *T. mentagrophytes* (8.1%) and *T. verrucosum*

(4.8%).<sup>(24)</sup>

Seborrhoeic dermatitis was the second frequent diagnosis (24%) after *T. capitis*, and all these cases present before the 2<sup>nd</sup> age of life, and represent 66.7% of cases at this age group. Many reports noted that the most common diagnosis of scalp scaling before 2 years old, was seborrhoeic dermatitis.<sup>(18,25)</sup> One of these reports found cases of seborrhoeic dermatitis in the 2-6 years age group, presenting by infantile type (cradle cap) or pubertal type (dandruff) but in a prevalence less than that of infantile group (6% vs. 18%).<sup>(18)</sup> So, seborrhoeic dermatitis should be the first disease to be considered in scaly scalp patients in the first two years of life.

The most common form of seborrhoeic dermatitis was the localized form (83.3%) and most of the scales were in the form of yellowish scales (58.3%). So presence of localized yellowish scales of the scalp in the first two years of life is highly suggestive of seborrhoeic dermatitis.

Psoriasis comes in the third order

following both *T. capitis* and seborrhoeic dermatitis. Male affection of psoriatic patients is slightly higher than female affection (10.3% vs. 9.1%). A study done in India reported that 52.2% of the psoriatic patient were boys and 47.8% were girls.<sup>(26)</sup> Many cases of psoriasis were affecting the scalp diffusely (60%) and all the scales in the studied cases of psoriasis were white fine scales, but these data cannot be generalized from this study due to the low number of cases diagnosed as psoriasis.

In this study, only 1 cases was diagnosed as atopic dermatitis and another cases as pityriasis rubra pilaris, so their data can not be compared with other studies.

#### *Conclusions :*

*T. capitis* is the most common cause of scaly scalp in infants and preschool children followed by seborrhoeic dermatitis, while psoriasis, atopic dermatitis and P.R.P. are rare causes of scalp scaling at this age group.

Presence of localized yellowish scales of the scalp in the first two

years of life is highly suggestive of seborrhoeic dermatitis. However, *T. capitis* cannot be excluded.

*T. capitis* should be considered in scaly scalp patients at age group from 2-6 years old regardless sex or residence and should be suspected in any localized scaly lesion of the scalp. A cultural method is a very important method in diagnosis of Dermatophyte infection even if KOH preparation is negative.

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## دراسة إكلينيكية و ميكروبية لفروة الرأس الحرشفية في أطفال ما قبل مرحلة الدراسة

د. سامية عبد النبي ، د. أيمن أحمد منير ، د. أحمد هانى نور  
د. صلاح أغا\* ، د. نها المشد\*

قسمى الجلدية و التناسلية و طب الذكورة و الباثولوجيا الإكلينيكية\*

كلية الطب - جامعة المنصورة

خلفية البحث: ان تحرشف فروة الرأس يعد خاصة منتشرة لعديد من الأمراض الجلدية و التى يمكن ملاحظتها فى الأعمار المختلفة . و على الرغم من تنوع أسباب تحرشف فروة الرأس إلا انه يوجد القليل من الدراسات حول الأسباب المختلفة له فى الرضع و أطفال ما قبل مرحلة الدراسة

الهدف: تصنيف حالات فروة الرأس الحرشفية فى أطفال ما قبل مرحلة الدراسة على اسس سريرية و ميكروبية .

التصميم: تم اجراء هذه الدراسة على ٥٠ طفلا فى مرحلة ما قبل الدراسة و تم اختيارهم من عيادة الجلدية بمستشفى المنصورة الجامعى و كانوا ٣٩ صبى و ١١ صبوية . و تم أخذ التاريخ المرضى و فحص اصابات فروة الرأس و اى عرض جلدى مصاحب فى بقية الجسم . و قد أخذت عينة من الحراشف و الشعر من اصابات فروة الرأس و تم فحصها مجهريا بعد معاملتها بمحلول هيدروكسيد البوتاسيوم و زراعتها على مزرعة مناسبة للفطريات و عند حدوث نمو فطرى على المزرعة تم التعرف عليه من خصائصه الظاهرية و المجهرية .

النتائج: تراوحت أعمار الأطفال قيد الدراسة بين سن ٣ شهور و حتى سن ٥.٥ سنوات و كان ٣٦% منهم رضع و ٦٤% منهم فى مرحلة ٢-٦ سنوات . و كان أكثر الأسباب انتشارا لتحرشف فروة الرأس فى هذه المرحلة من العمر هو سعفة الرأس (٦٢%) ثم الإكزيما الزهامية (٢٤%) ثم الصدفية (١٠%) و التأتب و النخالة الشعرية الحمراء (٢% لكل منهما) . و لم يختلف انتشار هذه الأسباب باختلاف الجنس و محل الإقامة و لكن اختلف بحسب السن حيث كانت تنيا الرأس فى مرحلة ٢-٦ سنوات أكثر منها فى مرحلة الرضاعة و تم تشخيص حالات الإكزيما الزهامية فى

مرحلة الرضاعة فقط . وكان الفحص المجهرى ايجابيا فى ٧١% و النزع الفطرى ايجابيا فى ٨٧.١% من حالات سعفة الرأس . وكان اكثر فصيل فطرى تم اكتشافه هو الترايكوفيتون فيوليشيم (٧٧%).

الخلاصة : ان اكثر اسباب تحرشف فروة الرأس فى الرضع هو الإكزيما الزهامية تليها سعفة الرأس والتي تعد السبب الرئيس فى مرحلة ٢-٦ سنوات . و يعد النزع الفطرى وسيلة هامة جدا لتشخيص الأمراض الفطرية حتى وان كان الفحص المجهرى سلبيا .

