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TINEA CAPITIS INFECTION IN CHILDREN ALONG WITH TERTIARY CARE HOSPITALS WITH REFERENCE TO IN VITRO ANTIFUNGAL SUSCEPTIBILITY TESTING OF DERMATOPHYTE ISOLATE

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ABSTRACT

Background

Fungal infection of scalp and hair is clinically known as Tinea capitis.¹Tinea capitis is the most common dermatophytic infection of childhood², especially in school going children.³ It is self limiting disease of children below 20 years of age and seldom beyond puberty.³Fungal infection of scalp and hair is superficial cutaneous mycotic infection. The causative agent of Tinea capitis varies with geography, social status and Time,¹⁵ although the clinical appearance is variable.^{15, 18}Late detection and lack of treatment of this disease can result in wide spread infection and in rare cases permanent alopecia. It presents with a variety of clinical picture and more or less depends upon type of dermatophyte involved. Fungal infection of scalp and hair has worldwide distribution. In India the superficial cutaneous mycotic infection is quite common because of the favorable climatic conditions such as high temperature and humidity. Ketaconazole, fluconazole and Griseofulvin seems to be promising therapies against Tinea capitis. The discoveries of azole derivative and allied group of antifungal drugs are having significant impact in managing dermatophytosis³. The present study suggests that every patient of Tinea capitis infection should be properly studied for mycological examination and should be treated accordingly. This study revealed that Ketaconazole, Fluconazole, and Griseofulvin were the most ideal antifungal drugs for the treatment of Tinea capitis fungal infection.

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KEYWORDS: Tinea capitis, Dermatophyte, agar dilution method and antifungal agents,

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INTRODUCTION

Fungal infection of scalp and hair is clinically known as Tinea capitis.¹ Tinea capitis is the most common dermatophytic infection of childhood², especially in school going children.³ It is a self-limiting disease of children below 20 years of age and seldom beyond puberty.³⁻⁷ Fungal infection of scalp and hair is a superficial cutaneous mycotic infection.⁸⁻¹⁴ The causative agent of Tinea capitis varies with geography, social status and time, although the clinical appearance is variable.¹⁵⁻¹⁸ Late detection and lack of treatment of this disease can result in wide spread infection and in rare cases permanent alopecia. It presents with a variety of clinical pictures and more or less depends upon the type of dermatophyte involved. Fungal infection of scalp and hair has worldwide distribution. In India the superficial cutaneous mycotic infection is quite common because of the favorable climatic conditions such as high temperature and humidity. Ketoconazole, fluconazole and griseofulvin seem to be promising therapies against Tinea capitis. The discoveries of azole derivatives and allied groups of antifungal drugs are having significant impact in managing dermatophytosis.¹⁹⁻²³ The objective of the present study was to a) To isolate and identify causative agents of T. capitis b) To perform antifungal susceptibility testing against causative agents of T. capitis by using commonly used antifungal agents (Ketoconazole, fluconazole and Griseofulvin) c) Clinical Correlation with age and sex. d) Study of fungal causative agents in specimens obtained after oral and topical antifungal therapy. e) To study the incidence of Tinea capitis infection in children age groups and compare with other age groups. Skin scraping and plucked hair KOH examination, culture on SDA with Chloramphenicol and Cycloheximide (SDA+CC), incubated at 24°C and 37°C. Dermatophytes were identified by microscopy and culture characteristics. Minimal Inhibitory Concentrations (MIC) was measured with an agar dilution method.

Material & Methods:

Total 3000 cases of fungal infection were clinically examined by dermatologists and among them 10 cases were found as Tinea capitis infection in children age group i.e. age group 1-10 yrs. After proper & aseptically sample collection, samples were used for culture. Identification was done as per the standard procedure. A total 10 cases of Tinea capitis were included in this study. The antifungal drugs such as Ketoconazole, Fluconazole and Griseofulvin were used by agar dilution method. Out of 10 cases of Tinea capitis cases, two isolates were grown on Sabouraud's Dextrose agar. MIC was determined as the lowest concentration of the antifungal drug preventing growth of visible colonies on drug-containing slants and compared with visible growth of drug-free control tubes of *Aspergillus niger* NCIM 1165 from National Chemical Laboratory (NCL) Pune.

I) Age and Sex distribution:

Age group 1-10 was most predominant as compared to other study age groups, it consists of 10 cases, consist of 7 & 3 males and females respectively. Age group 11-20 showed 5 (25%) cases which comprised 4 & 1 Males & Female while age group above 21 were showed 5 (25%) cases, comprised 2 males and 3 females. Total 13 (65%) cases were males in all the age groups while 7 (35%) cases were females in all age groups (Table 1)²⁴⁻³².

Age groups	Patients		Total	Percentage (%)
	Male	Female		
0-10	7	3	10	50
11-20	4	1	5	25
21-above	2	3	5	25
Total	13(65%)	7(35%)	20	100

The age group most affected was 0-10 years (50%).

Table 1:- Age and Sex Distribution

Sr.No.	Clinical types	Males	Females	Percentage
1.	Grey patch	9(45%)	5(25%)	(14)70
2.	Kerion	2(10%)	2(10%)	(4)20
3.	Favus	-	-	-
4.	Black dots	2(10%)	-	(2)10
Total		13(65%)	7(35%)	(20)100

Table No 2 a:- Distribution of cases according to clinical types of Tinea capitis in all cases

Sr.No.	Clinical types	Males	Females	Total	Percentage
1.	Grey patch	3(30%)	1(10%)	4	40
2.	Kerion	2(20%)	2(20%)	4	40
3.	Favus	-	-	-	-
4.	Black dots	2(20%)	-	2	20
Total		7 (70%)	3(30%)	10	100

The most common clinical type grey patch was in male cases 3 (30%) while kerion was in female cases

Table No 2b:-Distribution of cases according to clinical types of Tinea capitis in children

II) KOH positive and culture positivity or negative:

KOH examination	Culture examination	
	Positive	Negative
Positive	2(10%)	9(45%)
Negative	1(5%)	8(40%)
Total	3(15%)	17(85%)

Table 3a:- KOH and culture study in all age groups

KOH examination	Culture examination	
	Positive	Negative
Positive	1(10%)	4(40%)
Negative	1(10%)	4(40%)
Total	2(20%)	8(80%)

Table 3b:-KOH and culture study in children

The KOH positive & growth on culture media cases were 2 (10%) while 9(45%) cases were showed KOH positivity and no growth on medium (Table 3). 8 (40%) cases were KOH negative and culture negative also. In the present study majority of the cases (45%) in all age groups while (40%) in children age group were KOH positive but culture negative.

III) KOH Negativity and culture positivity or negative:- KOH negative & growth on culture media case was found 1 (5%) and 17 (85%) cases were showed KOH negativity and no growth on culture media in all age groups while 1 (10%) & (40%) in children. This isolates belongs to two genera and four species, Out of four isolates two were Trichophyton violaceum and other two were Trichophyton tonsulans and Microsporum gypsum each respectively in all age groups while Trichophyton violaceum& Microsporum gypsum in children age group ³³⁻⁴⁰ .

Dermatophytes Isolated	Clinical types of Tinea capitis		
	Grey patch	Kerion	Black dots
T. violaceum	1	1	-
T. tonsurans	1	-	-
M. gypseum		1	-
Total	2	2	-

Table 4a:- Distribution of cases according to clinical types

The most common dermatophyte isolated from the cases was T.violaceum.

Dermatophytes isolated	Clinical types of Tinea capitis		
	Grey patch	Kerion	Black dots
T. violaceum	-	1	-
M. gypseum	-	1	-
Total	-	2	-

Table 4b:- Distribution of cases according to clinical types in children

Species Isolated	No. & Percentages
T. violaceum	2(10%)
T. tonsurans	1(5%)
M. gypseum	1(5%)
Total	4(20%)

Table 5a:- Incidence of species

The maximum number of isolates was T.violaceum (10%)

Species Isolated	No.& percentages
T. violaceum	1(50%)
M. gypseum	1(50%)
Total	2(100%)

Table 5b:- Incidence of species

Series	Total cases	Cases of T. capitis	Percentage
Mankodi series	600	30	10
Desai et al	467	43	9.2
Gupta series	620	20	3.2
Kalra series	454	14	3.1
S.A.Patil series*	150	1	0.67
Present series	3000	10	0.50

Table 6a:- Incidence of Tinea capitis with other series

Series	Region	Percentage
Grover C. et al	Delhi	40.5
Jayshreenath et al	Kolkata	32.1
D.Kundu et al	West Bengal	10
Varadraj et al	Karnataka	0.50
Present series	Maharashtra	0.50

Table 6b:- Incidence of Tinea capitis in children

Isolates	No	0.0001 µg/ml	0.001 µg/ml	0.01 µg/ ml	0.1 µg/ ml	0.5 µg/ ml	1 µg/ ml	2.5 µg/ ml	5 µg/ ml	10 µg/ ml	100 µg/ ml
T. violaceum	1	+	+	+	+	+					

T.violaceum- MIC: 1µg/ml

Table7:- In Vitro susceptibility of dermatophyte to Ketoconazole

Isolates	No	0.0001 µg/ml	0.001 µg/ml	0.01 µg/ml	0.1 µg/ml	0.5 µg/ ml	1 µg/ ml	2.5 µg/ ml	5 µg/ ml	10 µg/ m	100 µg/ ml
T. violaceum	1	+	+	+	+						

T.violaceum-MIC:0.5µg/ml

Table 8:- In Vitro susceptibility of dermatophyte to Griseofulvin

Isolates	No	0.0001 µg/ml	0.001 µg/ml	0.01 µg/ml	0.1 µg/ml	0.5 µg/ ml	1 µg/ ml	2.5 µg/ ml	5 µg/ ml	10 µg/ m	100 µg/ ml
T. violaceum	1	+	+	+	+	+					

T.violaceum-MIC: 1µg/ml

Table 9:- In Vitro susceptibility of dermatophyte to Fluconazole

Antifungal Susceptibility Testing was done with Trichophyton violaceum by using three drugs. It showed MIC 1µg/ml and 0.5 µg/ml and 1µg/ml to Ketoconazole, Griseofulvin and Fluconazole respectively.

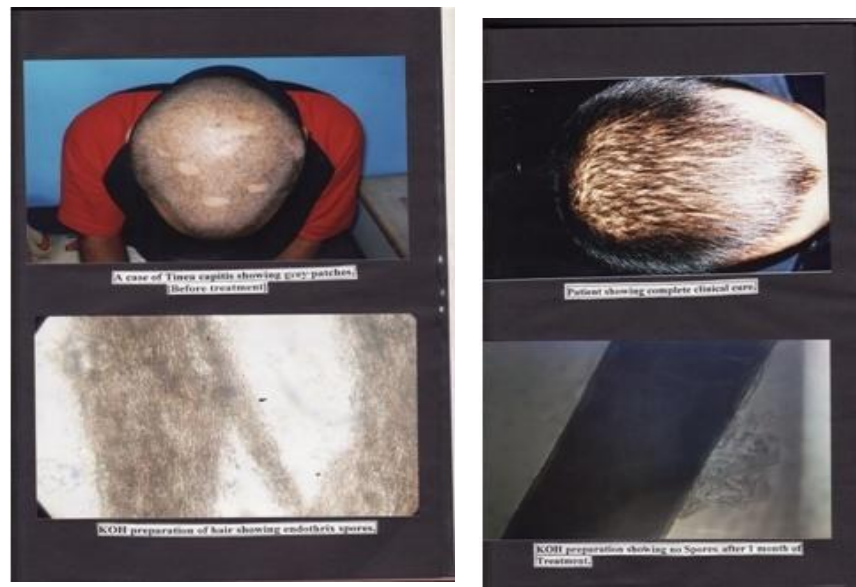


Figure 1&2:- Before and 3 month after treatment of drugs for Tinea capitis fungal infection.

RESULT AND DISCUSSION:

Clinical presentation of Tinea capitis were done by dermatologists on the basis of clinical types, Grey patch was 30% in males and 10 % in females. Kerion showed 2(20%) & 2 (20%) in males and females case. Black dot was 20 % in both Male and female cases respectively. Males showed 7 (70%) cases in all types of clinical types than the females, showed 3 (30%) cases. About 40% cases showed KOH positivity and culture negativity and KOH negativity and culture negativity respectively. While 10 % cases showed KOH positivity and culture positivity and KOH negativity and culture negativity respectively. Both species of dermatophytes were in kerion, which was 10% respectively. Incidence of both species of Dermatophyte was 50% each. Incidence of Tinea capitis was 0.50 % in children age group. Ketaconazoler & Fluconazole were sensitive at concentration of 1.0 µg/ml respectively and Griseofulvin at 0.5.µg/ml.

CONCLUSION:

The present study suggests that every patient of scalp hair infection should be properly studied for mycological examination and should be treated accordingly. This study revealed that Ketaconazole, fluconazole, and Griseofulvin were the most ideal antifungal drugs for the treatment of Tinea capitis

fungal infection. Rate of isolation dermatophytes was decreased due to increasing socio-economic status and awareness about infection. In most cases KOH mount showed positivity but not grew on SDA culture may be patients were being taken antifungal systemically or topically. About 3000 clinically suspected fungal infection patients examined in Skin OPD, *T. capitis* was suspected in 10 cases (0.50 %). KOH mount was positive for fungal elements in 5 (50%) cases. Culture was positive in 2 (20%) cases. Age group 1-10 is more predominant in this study as compare to other age groups. It comprises 10 (50%) cases. Out of 10 cases 7(70%) were male patients and 3 (30%) cases were female patients. *Trichophyton violaceum* and *Microsporum gypseum* species of dermatophyte were isolated in all age groups while *Trichophyton violaceum* and *Microsporum gypseum* species of dermatophyte were isolated in 1-10 age groups this present study. *Trichophyton violaceum* was sensitive to Ketoconazole & fluconazole at concentration of 1.0 µg/ml respectively and Griseofulvin at 0.5 µg/ml. The retrospective study showed that the cure rate was excellent for *Trichophyton violaceum*

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