GENERAL RESISTANCE OF DERMATOPHYTES TO GRISEOFULVIN

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ABSTRACT

Objective: To determine the effect and resistance of oral griseofulvin in the treatment of tinea capitis and dermatophytes.

Methods: A retrospective study was carried out at Prince Rashid Bin AL-Hassan Hospital in Irbid, Jordan, from January 2002 to January 2003. Data were randomly collected from 60 patients with age group ranging from (8-18 years) and average age of (12.73 ± 2.79) years.(30 males; 30 females). Tinea capitis was diagnosed by direct microscopy of the hair. Patients were divided into three groups regarding the reception of oral griseofulvin in three divided periods. Follow up visits took place at 6 and 12 weeks. The absence of tinea spores and mycilia on microscopic examination was considered as a cure.

Results: Patients who received the treatment for the first time showed the highest rate of cure which reached 85% after 6 weeks and 95% after 12 weeks. But those who received griseofulvin for the second time showed 60% cure after 6 weeks and 85% after 12 weeks. Those who received the medicine for the third time showed 45% cure after 6 weeks and 60% after 12 weeks.

Conclusion: These findings suggest that griseofulvin is effective in the treatment of tinea capitis if given for the first time in patients life time. It also shows that repeated therapy with griseofulvin increases the resistance of fungus infection to the drug.

Key words: Griseofulvin, resistance, dermatophyte, Tinea capitis.

JRMS April 2007; 14(1): 76-78

Introduction

Tinea capitis is a fungal infection of the scalp primarily affecting children[1].

The infection could be epidemic because it is highly contagious. Tinea capitis is caused by dermatophytes, that are able to invade the hair shaft. The two major forms of hair shaft invasion are ectothrix and endothrix infections. Ectothrix infections leave most of their fungal spores outside the hair shaft, allowing them to flouresce under wood's light, while endothrix infections are predominantly within the hair shaft, protected from wood's light[2].

Currently the most common scalp pathogen is *Trichophyton tonsurans*, an endothrix infection of humans only and it does not fluoresce, so we can not use wood's light to detect Tinea capitis[2-4].

Tinea capitis occurs in two clinical variants: non-inflammatory and inflammatory, or kerion. Non-inflammatory tinea capitis produces a typical black dot appearance due to hair weakening and breakage near the scalp. Kerions may cause scarring of the scalp and permanent hair loss, which may simulate such scarring processes as discoid lupus.

Most tinea capitis is acquired from human fomites. Shared combs, hats, and close play with contact have been shown to be sources of infection. Siblings, classmates, and parents of infected individuals may become carriers of the organism, and later develop the infection, or just pass it to others.

Methods

A retrospective study was carried out at Prince Rashid

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Manuscript received March 4, 2006. Accepted July 15, 2006

Bin AL-Hasan Hospital in Irbid, Jordan, from January 2002 to January 2003. Data were randomly collected from 60 patients (30 males and 30 females) with age group ranging from (8-18 years) and average age of (12.73 ± 2.79) years. Tinea capitis was diagnosed by microscopic examination of the hairs.

Patients were divided into three equal groups according to the number of times they received oral griseofulvin in their life depending on patients records, group A (20 patients; 10 males and 10 females) they received oral griseofulvin for the first time in their life, group B (20 patients; 10 males and 10 females) were given oral griseofulvin for the second time in their life and group C (20 patients, 10 males and 10 females) were given oral griseofulvin for the third time in their life.

Patients were followed up after 6 weeks and 12 weeks to study the clearance of their heads hair from tinea capitis. Absence of tinea capitis from the microscopic slide indicated complete cure.

In this study the method used for diagnosis of tinea capitis on the scalp of school children was by potassium hydroxide preparation and microscopy. We pull the hair and moistened it with potassium hydroxide solution for a few minutes, and then we prepare a slide and see it under the microscop. Cure of tinea capitis is confirmed by negative microscopic examination.

Results

In Table I the majority of patients were in the age range of 8-18 years, who were students from different schools, where the tinea capitis is common among them.

In Table II we find that the group who received oral griseofulvin for the first time in their life showed the highest cure rate which is (85%) at 6 weeks and (95%) at 12 weeks.

Treatment with oral griseofulvin for the second time in their life showed (60%) cure rate at 6 weeks and (85%) at 12 weeks. Treatment with oral griseofulvin for the third time in their life showed (45%) cure rate at 6 weeks and (60%) at 12 weeks.

Table II shows the effect of sex on cure rate, this means that when we used the oral griseofulvin therapy for the first time in the life of patients (group A) the rate of cure in females was (80%) at 6 weeks and (90%) at 12 weeks, while in males the cure rate was (90%) at 6 weeks and (100%) at 12 weeks, so the cure rate in males was higher than in females. This is possibly due to the long hair in females, which is suitable medium for tinea capitis.

Discussion

Griseofulvin continues to be the most effective treatment and has been used safely for more than 20 years. It is also safe and not expensive[5,6]. Griseofulvin will affect the micro tubular system of fungi, by interfering with its mitotic spindle and cytoplasmic microtubules and cause death of the fungi. The effective dose of griseofulvin could reach (10-25 mg/Kg/day)[7]. Absorption of the medication is improved when taken with fatty foods[8]. Therapy should be continued until absence of tinea capitis from the microscopic slide, which is a minimum of 6 weeks and may be as long as 12 weeks.

In this study, it was found that the percentage of cure in group C is less than that in group B, while the highest cure rate is in group A. This was due to the repetition of griseofulvin therapy for more than once in the patient's life, which increased the dermatophyte resistance of griseofulvin in groups B and C[9-11].

This resistance was developed by the fact that the cell walls of the fungi consisted of eight layers, among which the inner layer was loose and contained cytoplasm. It was also found that all structures within the cytoplasm possessed a (1-3) layer intact envelope and there was chromatin in the nucleus. These may be contributing factors in the development of resistance to griseofulvin. This multiple-layered thick cell wall may act as a barrier responsible for the impermeability of the cell of fungi to griseofulvin[12].

So in this study it is found that approximatly 20% of patients of all groups did not respond to griseofulvin and have resistance to this drug. This observation is similar to studies describing the resistance to griseofulvin in dermatophytes[9-11].

In 1981, Hantschke *et al* showed that the total number of dermatophytes studied by them was 489 of which 5 proved resistant; that is 4 strains of *Trichophyton rubrum* and one strain of *Trichophyton mentagrophytes*, which were still growing at a concentration 100 gamma griseofulvin per ml culture medium. In addition, Abdel-Rahman *et al*, in 1997, suggested that griseofulvin, the current drug of choice, may be ineffective in at least one-third of pediatric patients with tinea capitis. Another study showed that the survey of griseofulvin treatment of tinea capitis in a practic setting in The United States, approximately 40% of patients did not respond to griseofulvin and they required additional treatment[11].

Conclusion

These findings suggest that griseofulvin is effective in the treatment of tinea capitis if given for the first time in patients life time. It also shows that repeated therapy with griseofulvin increases the resistance of fungus infection to the drug.

Acknowledgment

I would like to thank Dr. Hussein Edebat for his support.

Table I. Patients Characteristics

Characteristics	Group A oral griseofulvin for the first time in their life	Group B Oral griseofulvin for the second time in their life	Group C oral griseofulvin for the third time in their life
Number of patients	20	20	20
Sex (male: female)	10:10	10:10	10:10
Age(years)	8-17	9-16	8-18
Age (mean±S.D)	12.45 ±3.05	12.56 ±2.52	13.10 ±2.88
Weight (Kg)	23-57	25-56	24-59
Weight (mean±S.D)	34.70 ±10.42	38.85 ±10.37	41.60 ±12.52

Table II. Sex and number (%) of patients cure after (6-12) weeks.

Groups	Weeks	Cure	
		Male (10)	Female (10)
Group A	After 6 weeks	9(90%)	8(80%)
	After 12 weeks	10(100%)	9(90%)
Group B	After 6 weeks	8(80%)	4(40%)
	After 12 weeks	9(90%)	8(80%)
Group C	After 6 weeks	6(60%)	3(30%)
	After 12 weeks	8(80%)	4(40%)

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