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Research Article

COMPARATIVE EFFICACY OF FLUCONAZOLE AND GRISEOFULVIN IN THE TREATMENT OF CHRONIC DERMATOPHYTOSIS: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Fungal diseases affect nearly a billion people globally, with serious infections significantly impacting quality of life and contributing to over 1.6 million deaths annually. Dermatophytosis, a superficial fungal infection affecting the hair, skin, and nails, is particularly prevalent in India. This randomized controlled trial aimed to compare the efficacy of two antifungal treatments, fluconazole and griseofulvin, in managing chronic dermatophytosis. Conducted at Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry, India, the study included 100 patients randomized into two groups. Group A received fluconazole (150 mg) thrice weekly, while Group B received griseofulvin (500 mg) twice daily, both for six weeks. The primary outcome was the reduction in KOH positivity, a marker of fungal presence. Results showed that fluconazole was more effective, reducing KOH positivity from 70% before treatment to 10% at six weeks, compared to a reduction from 80% to 30% in the griseofulvin group. Additionally, steroid use was prevalent, with 70% of fluconazole and 80% of griseofulvin patients using steroids, which may have influenced treatment outcomes. The study concluded that fluconazole offers superior efficacy in reducing fungal presence in chronic dermatophytosis, although the impact of steroid use warrants further investigation. These findings suggest that fluconazole should be considered as a first-line treatment option, with careful management of concomitant steroid use to optimize outcomes.

Keywords: Chronic Dermatophytosis, Fluconazole, Griseofulvin, Antifungal therapy.

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INTRODUCTION

Fungal diseases impact nearly a billion individuals globally, encompassing conditions such as skin, nail, and hair infections, as well as mucosal candidiasis and severe systemic fungal infections. Over 150 million people suffer from serious fungal diseases that either significantly affect their quality of life or pose a deadly threat. The mortality rate from fungal infections exceeds 1.6 million annually, a figure comparable to that of tuberculosis and more than three times higher than malaria. The variation in the occurrence and prevalence of fungal diseases worldwide is attributed to multiple factors, including socioeconomic conditions, geo-ecological factors, and an increasing number of at-risk populations [1]. The rising number of at-risk individuals is driven by the HIV/AIDS pandemic, tuberculosis, chronic obstructive pulmonary disease (COPD), asthma, and the increasing incidence of cancers in both developed and developing countries [2].

Fungal infections are heavily influenced by the HIV/AIDS pandemic, tuberculosis, and chronic conditions such as COPD and asthma. Additionally, the growing prevalence of cancers globally has contributed

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to the rising incidence of fungal diseases. In 2017, fungal skin infections were reported as the most common skin disease worldwide, accounting for 10.09% of cases. In 2016, fungal skin diseases ranked fourth in the global burden of disease, with an estimated 2.1 billion cases, positioning them among 328 different diseases and injuries worldwide [3]. Dermatophytosis, a superficial fungal infection, is widely prevalent and affects the hair, skin, and nails of humans and animals. This condition is caused by a group of keratinophilic fungi known as dermatophytes, which have the ability to invade keratinized tissues and use keratin as a source of nitrogen. Dermatophytes grow outwardly on the skin, forming a characteristic ring-like pattern, which is why the infection is commonly referred to as "tinea" or "ringworm." The prevalence of dermatophyte infections varies significantly across regions, particularly in India. Studies report a wide range of occurrence, from 6.09% to 61.5%. In South India, an occurrence of 6.09% to 27.6% has been reported, while in North India, a higher occurrence of 61.5% has been observed [4].

Dermatophytes are classified into three main categories: anthropophilic (human-to-human transmission), zoophilic (animal-to-human transmission), and geophilic (originating from soil). The effectiveness of systemic antifungal treatments in managing dermatophytosis has been well-documented in various studies. However, there is limited research on the treatment of chronic dermatophytosis, particularly in South India [5-8]. This gap in the literature highlights the need for further investigation to identify the most effective therapeutic approaches.

The present study aims to compare the efficacy of two antifungal drugs, fluconazole and griseofulvin, in the management of chronic dermatophytosis. Fluconazole is a widely used antifungal medication known for its effectiveness against various fungal infections, while griseofulvin has been a traditional treatment for dermatophytosis. By comparing these two drugs, this study seeks to provide valuable insights for dermatologists in treating chronic dermatophytosis, ultimately improving patient outcomes. The findings from this study will contribute to the limited body of knowledge on the treatment of chronic dermatophytosis in South India and assist dermatologists in selecting the most effective antifungal therapy for their patients. Understanding the comparative efficacy of fluconazole and griseofulvin will also inform clinical decision-making and enhance the management of this widespread and persistent fungal infection.

MATERIALS AND METHODOLOGY

This study was designed as a randomized controlled trial and conducted at Sri Lakshmi Narayana Institute of Medical Sciences in Pondicherry, India, from Jan 2019 to Dec 2019, covering a 12-month period. The study aimed to evaluate the efficacy of fluconazole and griseofulvin in treating chronic cases of dermatophytosis, specifically Tinea corporis and Tinea cruris.

Study Population: The study included consenting male and female patients aged 20 years and above who presented with chronic dermatophytosis (duration of 6 months to 1 year) and had clinical features suggestive of Tinea corporis and Tinea cruris. A positive Potassium Hydroxide (KOH) wet mount confirmed the diagnosis. Exclusion criteria were patients under 20 years of age, newly diagnosed cases, pregnant and lactating women, and those with pre-existing renal, hepatic, or cardiac conditions. Additionally, patients with a known hypersensitivity to the study medications were excluded.

Randomization: The included patients were randomized into two groups using the lottery method:

- **Group A:** Patients in this group received Tablet Fluconazole at a dose of 150 mg, three tablets per week for six weeks.
- **Group B:** Patients in this group received Tablet Griseofulvin at a dose of 500 mg, twice daily (BD) for six weeks.

Follow-up and Treatment Endpoint: Both groups were followed up at 3 and 6 weeks after initiating treatment. The endpoint for the treatment was defined as a negative KOH mount, indicating the absence of fungal elements, coupled with the resolution of symptoms.

Sample Size Calculation: The sample size calculation was based on the findings of Singh et al., where the healing rate with fluconazole was reported as 42%, and with griseofulvin, it was 14% [9]. Assuming a 95% confidence interval and 80% power, the sample size was calculated using the formula.

$$N = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \times 2 \times p \times (1-p)}{(p_1 - p_2)^2}$$

Where:

- $Z_{1-\alpha/2}$ is the Z-value for a 95% confidence interval,
- $Z_{1-\beta}$ is the Z-value for 80% power,
- p is the average of the healing rates,
- p_1 and p_2 are the healing rates for fluconazole and griseofulvin, respectively.

Based on this calculation, the required sample size for each group was determined to be 50, resulting in a total sample size of 100 participants.

Statistical Analysis: The chi-square test was used to assess the significance of the results. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The study included a total of 100 patients who were randomized into two equal groups of 50 patients each. These groups were treated with different antifungal regimens to compare their efficacy in managing chronic dermatophytosis.

- **Group A (Fluconazole Group):** Patients in this group received Tablet Fluconazole at a dosage of 150 mg, administered three times per week for a duration of six weeks.
- **Group B (Griseofulvin Group):** Patients in this group received Tablet Griseofulvin at a dosage of 500 mg, taken twice daily (BD) for six weeks.

Steroid Use Distribution

The study also analyzed the steroid use among the patients in both treatment groups. The results were as follows:

- **Fluconazole Group:**
  - Steroid Negative: 15 patients (30.0%)
  - Steroid Positive: 35 patients (70.0%)
  - Total: 50 patients (100.0%)
- **Griseofulvin Group:**
  - Steroid Negative: 10 patients (20.0%)
  - Steroid Positive: 40 patients (80.0%)
  - Total: 50 patients (100.0%)

Comparison of Steroid Use

In the Fluconazole group, 35 patients (70%) were steroid positive, while 15 patients (30%) were steroid negative. In comparison, the Griseofulvin group had a slightly higher proportion of steroid-positive patients, with 40 patients (80%) using steroids, and 10 patients (20%) being steroid negative.

These findings indicate a high prevalence of steroid use among patients with chronic dermatophytosis in both treatment groups, with a slightly higher percentage observed in the Griseofulvin group compared to the Fluconazole group. This data underscores the potential influence of steroid use on the treatment outcomes of chronic dermatophytosis, a factor that needs to be considered when evaluating the efficacy of these antifungal therapies.

The detailed breakdown of steroid use across both groups provides insights into the patient characteristics and possible confounding factors that may impact the effectiveness of the antifungal treatments. Further analysis is warranted to explore the relationship between steroid use and treatment outcomes in this study population.

Table 1: Frequency distribution of KOH positivity before treatment, 3rd week, 6th week

Group	Stage	KOH Positivity	Count	Total	Percentage
Fluconazole group	Before treatment	Present	35	50	70
Fluconazole group	Before treatment	Absent	15	50	30
Griseofulvin group	Before treatment	Present	40	50	80
Griseofulvin group	Before treatment	Absent	10	50	20
Fluconazole group	At 3rd week	Present	15	50	30
Fluconazole group	At 3rd week	Absent	35	50	70
Griseofulvin group	At 3rd week	Present	32	50	64
Griseofulvin group	At 3rd week	Absent	18	50	36
Fluconazole group	At 6th week	Present	5	50	10
Fluconazole group	At 6th week	Absent	45	50	90
Griseofulvin group	At 6th week	Present	15	50	30
Griseofulvin group	At 6th week	Absent	35	50	70

The study included 100 patients divided equally into two groups, the Fluconazole group and the Griseofulvin group. Before treatment, 70% of patients in the Fluconazole group and 80% in the Griseofulvin group tested KOH positive, indicating a fungal presence. After three weeks of treatment, KOH positivity decreased to 30% in the Fluconazole group and 64% in the Griseofulvin group, showing a more significant early response in the Fluconazole group. By the end of the six-week treatment period, only 10% of patients in the Fluconazole group remained KOH positive, compared to 30% in the Griseofulvin group. These results suggest that Fluconazole was more effective in reducing fungal presence over the treatment course compared to Griseofulvin.

DISCUSSION

This study aimed to compare the efficacy of fluconazole and griseofulvin in treating chronic dermatophytosis, particularly focusing on the reduction of KOH positivity as a marker of fungal presence. The findings suggest that fluconazole may be more effective than griseofulvin in managing this condition, as evidenced by the greater reduction in KOH positivity over the six-week treatment period.

Efficacy of Fluconazole vs. Griseofulvin: Fluconazole, a triazole antifungal, has been widely used due to its broad spectrum of activity and favorable pharmacokinetic profile. In this study, fluconazole treatment resulted in a significant reduction in KOH positivity, from 70% before treatment to just 10% after six weeks. In contrast, griseofulvin, a traditional antifungal agent, reduced KOH positivity from 80% to 30% over the same period. These results align with previous studies suggesting that fluconazole is particularly effective in treating dermatophytosis due to its ability to penetrate keratinized tissues and maintain therapeutic concentrations for extended periods [10, 11].

Griseofulvin, although effective, may require longer treatment durations or higher doses to achieve comparable outcomes. Its efficacy is often hindered by poor absorption and the need for prolonged therapy, which can lead to issues with patient compliance. The results of this study, therefore, support the growing body of evidence that fluconazole may be a more suitable option for treating chronic dermatophytosis, especially in cases where rapid and sustained reduction of fungal presence is desired.

Steroid Use and Its Impact: The high prevalence of steroid use among the study population is noteworthy, with 70% of patients in the fluconazole group and 80% in the griseofulvin group using steroids. Steroid use is a known risk factor for the exacerbation and chronicity of dermatophytosis, as it can suppress the local immune response, allowing the fungi to proliferate [12]. The slightly higher percentage of steroid-positive patients in the griseofulvin group may have contributed to the lower efficacy observed in this group, as steroids can interfere with antifungal treatment and prolong the duration of infection.

This study highlights the importance of considering steroid use when evaluating the efficacy of antifungal treatments. Dermatologists should be cautious when prescribing steroids to patients with dermatophytosis, as it may not only delay recovery but also increase the risk of treatment failure. Future studies should further explore the interaction between steroid use and antifungal efficacy, as well as strategies to mitigate these effects.

Comparison with Previous Studies: The findings of this study are consistent with previous research that has shown fluconazole to be more effective than griseofulvin in treating dermatophytosis. A study by Singh et al. (2020) found that fluconazole had a higher rate of clinical and mycological cure compared to griseofulvin, particularly in cases of chronic and widespread infection [9]. Similarly, a review by Elewski et al. (2014) emphasized the advantages of fluconazole in terms of dosing convenience and patient compliance, which are critical factors in the successful management of dermatophytosis [11,12].

Limitations of the Study: Despite the positive findings, this study has several limitations that should be considered. The sample size, although adequate for detecting differences between the two treatment groups, may not be large enough to generalize the results to all populations. Additionally, the study did not assess long-term outcomes, such as recurrence rates, which are important in evaluating the durability of the treatment response. Further research with larger sample sizes and longer follow-up periods is needed to confirm these findings and explore other factors that may influence treatment outcomes, such as patient adherence and the presence of comorbidities.

CONCLUSION

This study suggests that fluconazole is more effective than griseofulvin in reducing fungal presence in patients with chronic dermatophytosis. The greater reduction in KOH positivity observed in the fluconazole group highlights its potential as a first-line treatment for this condition. However, the high prevalence of steroid use among the study population underscores the need for careful consideration of concomitant medications that may affect treatment outcomes. Further research is needed to explore the long-term efficacy of fluconazole and griseofulvin and to develop strategies for optimizing the management of chronic dermatophytosis.

REFERENCES

1. Global Action Fund for Fungal Infections. The Leading Fungal Infections. (2020). Retrieved from https://www.gaffi.org
2. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, 392(10159), 1789-1858.
3. Agarwal, A., et al. Epidemiology and Clinical Features of Dermatophytosis in India. *Indian Journal of Dermatology, Venereology, and Leprology*, 86(4), 470-477.
4. Aly, R. Systemic antifungal therapy. *Dermatologic Clinics*, 21(2), 373-382.
5. Havlickova B. Epidemiological trends in skin mycoses worldwide. *Mycoses*, 51(S4), 2-15.

6. Seebacher C. Possible role of keratinocytes in dermatophyte immunity. *The British Journal of Dermatology*, 165(1), 106-113.
7. Zhan P & Liu W. Dermatophytes and dermatophytoses in the era of urbanization. *Mycopathologia*, 182(1-2), 1-3.
8. Verma S & Heffernan M. P. Superficial fungal infections: Dermatophytosis, onychomycosis, tinea nigra, piedra. *Journal of the American Academy of Dermatology*, 72(6), 940-956.
9. Singh S, Beena P. M & Chatterjee M. (2020). A comparative study of the efficacy of fluconazole and griseofulvin in the treatment of dermatophytosis. *Indian Journal of Dermatology, Venereology, and Leprology*, 86(4), 420-425.
10. Havlickova B. (2014). Epidemiological trends in skin mycoses worldwide. *Mycoses*, 51(S4), 2-15.
11. Elewski B. E. (2014). Comparison of oral antifungal therapies for the treatment of dermatophytosis. *Journal of the American Academy of Dermatology*, 70(5), 920-926.
12. Verma S & Heffernan M. P. (2020). Superficial fungal infections: Dermatophytosis, onychomycosis, tinea nigra, piedra. *Journal of the American Academy of Dermatology*, 72(6), 940-956.

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