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Original Article

DRUG PRESCRIBING PATTERN OF VARIOUS ANTIFUNGAL DRUGS FOR DERMATOPHYTOSIS IN A TERTIARY HEALTHCARE AND TEACHING HOSPITAL

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ABSTRACT

Objective: To analyze the pattern of drug prescription and the rationality of pharmacotherapy used in dermatophytosis.

Methods: A prospective observational study was conducted from January 2021 to June 2022 in the Department of Skin and Venereal Diseases. Prescriptions included all newly diagnosed patients with cutaneous fungal infections of both genders who attended Dermatology OPD. Factors considered were sociodemographic parameters, clinical manifestations, combination and monotherapy along with prescribed topical and systemic agents, and details of prescribing indicators.

Results: A total of 362 dermatophytosis cases were observed, which included 230 males and 132 females. Patients in the age group of 13-40 y (65.47%) have shown the dominance of dermatophytosis infection with a high prevalence among the student category, which accounts for 177. Tinea corporis (40.85%) was the prominent clinical manifestation of dermatophytosis infection. Among single topical agents, the most commonly prescribed drug is Clotrimazole (15.19%), and among topical combinations, sertaconazole and ketoconazole (29.28%). Itraconazole (48.75%) is the most commonly used oral formulation, followed by the itraconazole and terbinafine combination (22.56%). While imidazoles were the maximally prescribed topical antifungals according to the therapeutic class.

Conclusion: Tinea corporis is the prominent clinical manifestation and the majority of prescriptions were for a combination of three agents mainly oral itraconazole with topical sertaconazole, and ketoconazole.

Keywords: Drugs, Prescription, Dermatophytosis, Topical, Systemic antifungal

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INTRODUCTION

The pattern of skin diseases varies from one country to another and across different regions of the same country [1]. 2% of total Out Patient Department (OPD) consultations worldwide are for dermatophyte organisms infecting humans across the world, with extensively varying prevalence and epidemiology [2]. The frequency of skin disease in the general population varies from 11.16 % to 63 % [3]. Nevertheless, treatment approaches are analogous across the world, and ultramodern antifungal medicaments can hand over effective treatment for the majority of presentations of dermatophytosis constituted by skin ailments [4, 5].

Dermatophytosis, also known as ringworm, a fungal infection of superficial keratinized structures, namely skin, hair, and nail affecting nearly all age groups and sex has been on the rise in India over the last several generations. Symptoms begin four to fourteen days after exposure affecting multiple areas at a given time resulting in a red, itchy, scaled, circular rash along with hair loss in some cases in the affected areas. Inflammation assists in colonization and may result in vesicles on the margins of the affected area.

The guideline for the treatment of tinea infection is subjected to continuous modification. A wide diversity of topical Antifungal Agents (AFA) for treatment is accessible in form of creams, gels, lotions, soap formulations, etc. presently available in the market [6]. Substitutive antifungal medicaments are also in the channel of progress. A modernized guideline regimen should be defined for the treatment of tinea infection.

Topical drugs applied once or twice daily are the primary treatment indicated for tinea corporis/tinea cruris and tinea pedis/tinea manuum. Both the azole group of an antifungal family (luliconazole, miconazole, sertaconazole, itraconazole, fluconazole, etc.) and allylamine (Terbinafine and naftifine) are known for their high efficiency against dermatophytes. Among AFAs terbinafine is the incomparable fungicidal drug [7-9].

Standard recommendations for systemic remedy of dermatophytosis are required for the conditions like the presence of multiple-locus involvement, widespread tinea corporis, recurring or chronic dermatophytosis, and tinea unguium. It can also be beneficial for localized infections such as tinea capitis, tinea pedis unresponsive to topical AFAs, and immuno-compromised states [10, 11].

It's obligatory to perform a baseline hemogram, and liver and renal function assays, whenever up-dosing or combination therapy is considered and thereafter, periodical monitoring has to be ensured. Baseline serum electrolytes and cardiac assessment are to be done when itraconazole is planned for the long run.

The flourishing outcome of remedy would depend on the decent use of medicaments, which represents the significant aspect of prescription. The study of a prescribing pattern is a building block of medical scrutiny. This will help prescribers to furnish rational and cost-effective medical care along with cost analysis which will be favorable to patients and society [6]. Thus, drug prescriptions form a veritably significant juncture of connection between the health care provider and patients. Therefore, there have been calls for their rational use.

Rational use of drugs means that the right drugs should be prescribed for the right patient in a required dose for a sufficient duration and at a reasonable cost [12]. According to WHO the rational use of drugs helps in developing standard treatment guidelines, preventing drug abuse, taking up an essential list of medicines, and determining irrational prescriptions [13].

Therefore, this study is undertaken to analyze the pattern of drug prescription and the rationality of the use of pharmacotherapy in dermatophytosis in patients attending outpatient departments (OPD) of skin and venereal diseases at G. S. V. M Medical College.

MATERIALS AND METHODS

Study setting

The study was conducted in the department of pharmacology in collaboration with the dermatology department at G. S. V. M. Medical College, Kanpur for 18 mo embarking from January 2021 to June 2022.

Study design

A prospective observational study.

Source of data

The cases who attended the outpatient clinic of the dermatology department, GSVM Medical College, Kanpur (U. P), and diagnosed as a case of dermatophytosis were registered in the study. Written informed consent was taken from each agreed case.

Ethical approval

The study was approved by the Institutional Ethics Committee (EC/BMHR/2021/64).

Inclusion criteria

All patients of either sex and all age groups who were willing to participate diagnosed with dermatophytosis, attend the outdoor department, and were on prescription medicaments for dermatophytosis.

Exclusion criteria

Patients having other medical or psychiatric comorbidities and/or coexisting skin diseases like eczema, superficial bacterial infection, and other concomitant systemic ailments or those who were treated with drugs that are known to cause drug-drug interaction were excluded along with Pregnant and lactating females. Patients who were already on antifungal treatment for other fungal infections like candidiasis, blast mycosis, aspergillosis, etc.

Data collection and methods

All necessary and applicable information regarding the case and drugs prescribed were collected from the case prescription and the mandatory data was registered using a structured data collection sheet prepared for study.

Follow-up

Patients were followed up for 8 w, comprising of visits after every 2 w. On each follow-up visit, self-reported compliance and a prescription given were noted or carried out telephonically. The lab analysis report of the patient's random blood glucose (RBS) level, LFT, and RFT were also noted.

Statistical data analysis

These data were compiled into the data collection sheet in the form of tables to analyze prescriptions prepared for the study. The Chi-Square test was used to confirm the statistical significance of the obtained results.

Observations and results

This study was conducted on 425 patients and finally completed with 362 patients diagnosed with dermatophytosis.

Table 1: Socio-demographic variables of dermatophytosis patients

Variables	Categories	n = 362	Percentage
Gender	Male	230	63.54%
	Female	132	36.46%
	Total	362	100%
	Chi-square	26.39	
	P-Value	<0.001	
Age group	0-12 y	09	2.49%
	13-40 y	237	65.47%
	41-60 y	95	26.24%
	>60 y	21	5.8%
	Total	362	100%
	Chi-square	364.14	
	P-Value	<0.0001	
Residence	Urban	271	74.86%
	Rural	91	25.14%
	Total	362	100%
	Chi-square	89.50	
	P-Value	<0.001	
Socioeconomic status Kuppuswamy scale (Urban)	I	0	0%
	II	129	35.64%
	III	92	25.41%
	IV	50	13.81%
	V	0	0%
	Total	271	100%
	Chi-square	34.59	
	P-Value	<0.001	
Socioeconomic status B G Prasad Scale (Rural)	I	68	18.78%
	II	23	6.35%
	Total	91	100%
	Chi-square	22.25	
	P-Value	<0.001	

n = Number of patients

Among 425 Dermatophytosis patients involved in this study, the response rate came out to be 85.18% as 63 patients were lost to follow-up. Among the total 362 patients (table 1), 230 (63.54%) were male and 132 (36.46%) were female (*p-value<0.05). The majority of patients were of the age group 13-40 y i. e 65.47%. Patients in the age group 41-60 y were 26.24%, patients in the age

group>60 y were 5.8% and 2.49% belong to the less than equal to 12 y age group (*p-value<0.05). A large proportion of patients 271 (74.86%) were urban residents, which is highly significant (*p-value<0.05). As shown in the table, among the urban population as per modified kuppuswamy classification, the majority of the patients, i. e 129 (35.64%) belong to socioeconomic class II. 25.41% belong to socio-economic class III and 13.81% belong to class IV (*p-value<0.05). In the rural population as per B. G. Prasad's classification, most patients, i.e 18.78% belong to socioeconomic class I, and 6.35% belong to class II (*p-value<0.05).

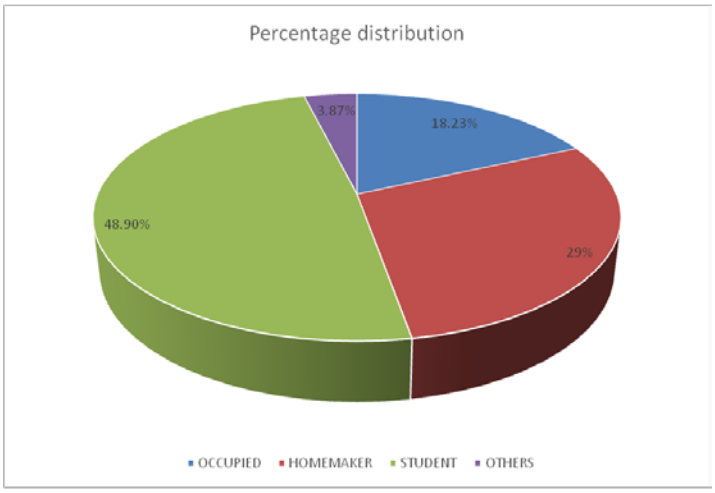

Fig. 1: Occupation distribution

The maximum number of patients belonged to the student category (48.90%) (fig. 1), which accounts for 177. This was followed by homemakers (29%), which constituted about 105. The remaining patients belonged to the occupied group, which was 66 (18.23%) and others came around 14 (3.87%) (*p-value<0.05).

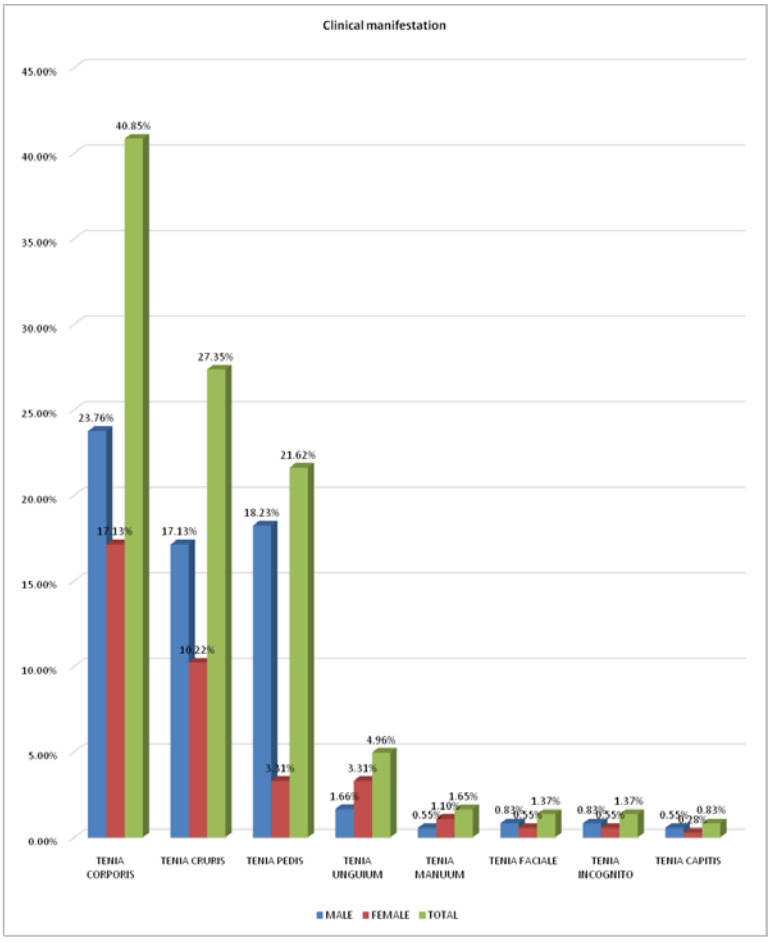

Fig. 2: Clinical manifestations of dermatophytosis

Out of 362 patients diagnosed with dermatophytosis (fig. 2), Tinea corporis (40.85%) was the prominent clinical manifestation of dermatophytosis infection, followed by Tinea cruris (27.53%), Tinea pedis (21.62%), Tinea unguium (4.96%), Tinea manuum (1.65%), Tinea faciale (1.37%), Tinea incognito (1.37%), and Tinea capitis (0.83%).

Table 2: Topical monotherapy and polytherapy in tinea infections

Drugs	Male (230)				Female (132)				Total patient	
	Mono		Poly		Mono		Poly			
	No.	%	No.	%	No.	%	No.	%	No.	%
Clotrimazole	30	8.28%	-	-	25	6.90%	-	-	55	15.19%
Sertaconazole	15	4.14%	-	-	11	3.03%	-	-	26	7.18%
Ketoconazole	05	1.38%	-	-	07	1.93%	-	-	12	3.31%
Luliconazole	04	1.10%	-	-	01	0.28%	-	-	05	1.38%
Sertaconazole+ketoconazole	-	-	61	16.85%	-	-	45	12.43%	106	29.28%
Sertaconazole+clotrimazole	-	-	78	21.54%	-	-	24	6.62%	102	28.17%
Sertaconazole+luliconazole	-	-	25	6.9%	-	-	13	3.59%	38	10.50%
Ketoconazole+luliconazole	-	-	10	2.76%	-	-	03	0.82%	13	3.59%
Clotrimazole+luliconazole	-	-	02	0.55%	-	-	03	0.82%	05	1.38%
									362	100%

MONO=Monotherapy, POLY=Polytherapy, No=Number of patients, %=Percentage of the patient, n = the total number of patients.

It is observed that clotrimazole is the most commonly prescribed drug in single topical agents, which is 15.19% (table 2). This is followed by sertaconazole (7.18%) and ketoconazole (3.31%) and luliconazole (1.38%). Among the topical combinations, sertaconazole and ketoconazole (29.28%) followed by sertaconazole and clotrimazole (28.17%) were used. Itraconazole is the most commonly used oral formulation (48.75%) followed by the itraconazole and terbinafine combination (22.56%) (table 3).

Table 3: Systemic monotherapy and polytherapy in tinea infections

Drugs	Male (229)				Female (130)				Total	
	Mono		Poly		Mono		Poly			
	No.	%	No.	%	No.	%	No.	%	No.	%
Itraconazole	110	30.64%	-	-	65	18.11%	-	-	175	48.75%
Terbinafine	10	2.79%	-	-	08	2.23%	-	-	18	5.01%
Fluconazole	08	2.23%	-	-	07	1.95%	-	-	15	4.18%
Griseofulvin	01	0.28%	-	-	-	-	-	-	01	0.28%
Itraconazole+Terbinafine	-	-	59	16.43%	-	-	22	6.13%	81	22.56%
Itraconazole+Fluconazole	-	-	30	8.36%	-	-	21	5.85%	51	14.21%
Terbinafine+Fluconazole	-	-	07	1.95%	-	-	05	1.39%	12	3.34%
Itraconazole+Griseofulvin	-	-	04	1.11%	-	-	02	0.56%	06	1.67%
									359	100%

MONO=Monotherapy, POLY=Polytherapy, No=Number of patients, %=Percentage of patients, mg=milligram, n = total number of patients. **(***As 3 (1M, 2F) patients were only on topical therapy)

The other commonly co-prescribed drugs along with antifungals in skin OPD were antihistamines, topical steroids, and vitamins. The average number of drugs prescribed per encounter is 4.13. The average number of antifungals prescribed per encounter is 3.14. The average number of systemic and topical antifungal drugs prescribed per encounter is 1.76 and 1.84, respectively. The percentage of drugs prescribed by the National List of Essential Medicine (NLEM) was 62.13%. Data is represented in table 4 below.

Table 4: Details on prescribing indicators

S. No.	Prescribing indicators	Numbers
1.	An average number of drugs prescribed per encounter.	4.13
2.	An average number of antifungals prescribed per encounter.	3.16
3.	Average Number of systemic antifungal drugs prescribed per encounter.	1.76
4.	Average Number of topical antifungal drugs prescribed per encounter.	1.84
5.	Percentage of encounters with injections.	0%
6.	Percentage of encounters with fixed-dose combinations.	0%
7.	Percentage of drugs prescribed from NLEM.	62.13%

According to the therapeutic class, imidazoles were the only topical and maximally prescribed antifungal followed by triazoles among oral antifungals (*p-value<0.05) (table 5).

Table 5: Distribution of antifungal drugs according to therapeutic class (Total drugs prescribed = 1135)

Therapeutic class	Total prescribed	Percentage
Imidazoles	626	55.15%
Triazoles	391	34.45%
Allylamine	111	9.78%
Heterocyclic benzofuran	07	0.62%
Total	1135	100%
Chi-Square	828.44	
P-Value	<0.001	

DISCUSSION

Skin diseases have a serious impact on people's quality of life in developing countries, especially in a country like India, where climate, socioeconomic status, religions, and customs are widely varied in different parts of the country [14]. The high prevalence rate and moderate morbidity make skin diseases very important from the public health point of view. The factors associated with the high prevalence of skin diseases include low socioeconomic status, malnutrition, overcrowding, and poor standards of hygiene [15]. Rational prescription of medicines has a pivotal role in the health care system. Time-to-time evaluation of prescriptions is also very much important for proper drug utilization and proper patient compliance. Therefore, a generic prescription is considered the most rational and economical method of prescription [16].

This study is a prospective observational study conducted and completed with 362 dermatophytosis patients and analyzed prescription patterns, cost, and pharmacotherapeutic adherence of antifungal drugs used in dermatophytosis in our tertiary care hospital. Out of the total of 362 enrolled patients with dermatophytosis, showed male preponderance i. e 63.54% and 36.46% female patients, which is similar to the study conducted by *Prasad Durga B, et al.* [17], which showed 51.6% of patients were male and 48.4% female. In our study, the most common age group diagnosed with dermatophytosis infection came out to be 13-40 y, making up to 65.47% of total respondents and this finding was in line with the studies conducted by *Parvathy G et al.* [2]. In this study, 74.86% of the patient comprises an urban population which is in line with studies in the last 5 y that have shown greater proportions of patients from urban areas (around 80% of patients) [18, 19]. Among them, a maximum (35.64%) belongs to class II as per modified kuppuswamy socioeconomic classification and is attributed to increased awareness, literacy, and cosmetic concerns in the urban population, leading them to seek medical attention. A higher proportion of patients with dermatophyte infections are still from lower socioeconomic groups, with studies reporting an incidence of 61–67% [20-22]. This is followed by lower-middle and medium socioeconomic strata [22-24]. Poor standards of living, lack of hygiene, overcrowding, and poor nutrition in the lower socioeconomic groups promote the growth of dermatophytes, increasing the risks of infection, chronicity, and recurrence.

In this study, the maximum number of patients belonged to the student category (48.90%), which accounts for 177, followed by homemakers (29%), which is in line with *Parvathy G et al.* [2] which showed that most of the patients of fungal infections were students followed by homeworkers (housewife and retired person). Out of 362 patients diagnosed with dermatophytosis, Tinea corporis (40.85%) was the prominent clinical manifestation, followed by Tinea cruris (27.53%), which is in line with the findings in the study carried out by *Naglot A, et al.* [25], *Veganda BN et al.* [26]. They also reported a similar observation in their study as tinea corporis (44.3%) followed by tinea cruris (38.2%) as the most common clinical pattern.

According to *Koshley V, et al.* [27] in topical antifungals, the most commonly prescribed drug was clotrimazole (67.04%), and *Kamerkar, et al.* [28] and *Vegada BN et al.* [26], also reported Clotrimazole as the commonest topical in their studies which are in line with the findings in our study in case of monotherapy as well as sertaconazole along with ketoconazole in case of topical polytherapy. According to the study conducted by *Koshley V, et al.* [27] regarding treatment patterns, drugs prescribed in tinea cases were oral fluconazole in 2305(31.75%) followed by itraconazole in combination with Fluconazole. Systemic Fluconazole being the commonest prescribed antifungal drug was also seen in studies by *Vegada BN et al.* [26], *Kamerkar et al.* [28], and *Khalid A et al.* [29] in their study.

In another study by *Deb P et al.* [30], the most commonly prescribed individual antifungal was oral Terbinafine (64.81%) and topical was eberconazole (58.49%). In their study, they observed systemic polytherapy, consisting of simultaneous use of itraconazole and fluconazole as commonest, instead of Terbinafine showing gradual shifting in favor of oral antifungals from Fluconazole to terbinafine, and from Terbinafine to itraconazole recently making itraconazole as most favoring oral antifungal nowadays. It is in line with our study findings. According to this, itraconazole is the maximum prescribed followed by the itraconazole and terbinafine combination. According to our study, on average 4.13 drugs were prescribed per encounter. *Parvathy G et al.* [2] conducted a study that showed that an average of 3.12 drugs per encounter were prescribed. *Vegada BN et al.* [26] conducted a study that showed that an average of 3.39 drugs per encounter were prescribed.

In our study, according to the therapeutic class, imidazoles (55.15%) were the only topical and prescribed maximally, followed by triazoles (34.45%) followed by allylamines (9.78%) among oral antifungals results which are in line with the study conducted by *Deb P et al.* [30] according to which azoles were the most commonly prescribed anti-fungal drug group followed closely by the Allylamines. In Azoles, Imidazoles (53.33%) were the ones more often recommended. In tinea, the majority of prescriptions were for a combination of three agents consisting of oral and topical formulations. It consisted mainly of oral itraconazole followed by itraconazole in combination with terbinafine, topical sertaconazole, and ketoconazole followed by clotrimazole.

CONCLUSION

In our study, Tinea corporis is the most prominent clinical manifestation, and clotrimazole ointment is prescribed as the commonest topical monotherapy and sertaconazole along with ketoconazole in case of topical polytherapy. While most prescriptions were for a combination of three agents consisting of oral and topical formulations consisting mainly oral itraconazole followed by itraconazole in combination with terbinafine, topical sertaconazole, and ketoconazole followed by clotrimazole.

LIMITATIONS OF STUDY

The self-reported questionnaire may overestimate the collected data, which is specific to one geographical area of Kanpur, Uttar Pradesh. So, further studies are recommended by using more accurate methods such as electronic measurement to assess rationality and prescription audit. Further studies are recommended to address the most cost‑effective interventions to improve patient Quality of Life and adherence to treatment.

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CONFLICT OF INTERESTS

Declared none

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