



**A COST ANALYSIS STUDY ON DRUG PRESCRIBING PATTERN OF ANTIFUNGALS  
IN DERMATOLOGICAL CONDITIONS AT TERTIARY CARE TEACHING HOSPITAL,  
PUNJAB.**

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**ABSTRACT**

This study was carried out to bring out cost analysis and prescribing pattern of antifungals in dermatology department of tertiary care teaching hospital in Faridkot, India. Prescriptions of total 192 Patients were collected from outpatient department over a period of 2 months (January to march 2016) while 99 of them followed up time to time. The most commonly prescribed antifungals are Ketoconazole, itraconazole, fluconazole, miconazole, eberconazole, terfenadine, clotrimazole etc. Antifungals are one of the commonly used drugs for treating dermatological disorders. Periodic evaluation of prescribing patterns can increase the therapeutic efficacy, decrease adverse effects and provide feedback to prescribers. The most frequent diseases seen in department are urticaria, acne, tinea, seborrhic and acute dermatitis, eczema and many other diseases that are less frequent like PMLE, xerosis. The pattern of drugs seen in different age groups from 0-15, 16-30, 31-45, 46-60, >60. Fungal infections are common dermatological conditions that can become a curse to a life if it is not treated by rational prescription. The prescribing pattern and follow up always varied the prescription numbers and economic and efficacy status reveals the follow up.

**KEYWORDS:** antihistamines, dermatology, cost analysis, prescribing pattern, rationality.

**INTRODUCTION**

Drugs play an important role in protecting, maintaining and restoring health. Rational drug prescribing is defined as the use of the least number of drugs to obtain the best possible effect in the shortest period and at a reasonable cost.<sup>[1]</sup> Prescription writing is a science and an art, as it conveys the message from the prescriber to the patient.<sup>[2]</sup> An antifungal medication is a pharmaceutical fungicide or fungistatic used to treat and prevent mycoses such as athlete's foot, ringworm, candidiasis (thrush), serious systemic infections such as cryptococcal meningitis and others. In the United States, only 10 antifungal drugs are currently approved by the Food and Drug Administration (FDA) for the therapy of systemic fungal infections. These drugs belong to 3 principal classes: polyenes, pyrimidines and azoles.<sup>[3]</sup> Pathogenic fungi of animals and humans are generally filamentous molds or intracellular yeasts. The fungal cell wall contains chitin and polysaccharides making it rigid and acts as a barrier to drug penetration. The cell membrane contains ergosterol, which influences the efficacy and the risk of drug resistance. Most antifungal agents are fungistatic with infection clearance largely dependent on host response.<sup>[4]</sup> Fungal infections are extremely common in

the tropical region like India and some of them are serious and even fatal.<sup>[5]</sup> Prescription is a written instruction given by a qualified medical practitioner with the intent to provide medicine or treatment for the benefit of the patient. Thus the prescription in other words reflects the doctors knowledge and his attitude to treat the patient with due consideration of the patient's condition physically as well as financially.<sup>[6]</sup> In recent years, economic evaluation has become an integral part of health service research and soon it will become more influential. Four main analyses exist for full economic evaluation:

- Cost - Minimization
- Cost - Effectiveness
- Cost - Utility
- Cost - Benefit<sup>7</sup>

**Mechanism of action**

Antifungals work by exploiting differences between mammalian and fungal cells to kill the fungal organism with fewer adverse effects to the host. Unlike bacteria, both fungi and humans are eukaryotes. Thus, fungal and human cells are similar at the biological level. This makes it more difficult to discover drugs that target fungi

without affecting human cells. As a consequence, many antifungal drugs cause side-effects. Some of these side-effects can be life-threatening if the drugs are not used properly.<sup>[8]</sup>

### Pharmacokinetics

Amphotericin B is not absorbed orally. Hence it is indicated for intestinal candidiasis. For systemic fungal infection Amphotericin B is administered intravenously as slow infusion. This is also available as liposomal preparation and as a lipid complex. These preparations selectively transfer the drug to the ergosterol in the fungal cell wall thereby decreasing the toxicity to the mammalian cells. This drug has a long  $t_{1/2}$  of 15 days and is excreted slowly in the bile and urine.<sup>[9]</sup>

### Clinical uses

- i) Amphotericin B is used in most systemic infection including histoplasmosis, invasive aspergillosis blastomycosis and in fungal infection in immune compromised patients or patients with AIDS. However, Ketoconazole is preferred to amphotericin B because of its lower toxicity.<sup>[10]</sup>
- ii) Polyene antibiotics can also be used topically as creams or as 3% lotion; as ointment to treat cutaneous and oropharyngeal candidiasis. Eye drops are used for mycotic infections of the eye. It is also used topically for vaginal and otomycosis.<sup>[11]</sup>
- iii) Amphotericin B is used as a reserve drug for mucocutaneous Leishmaniasis and in resistant cases of Kala Azar.<sup>[12]</sup>

### Adverse effects

Amphotericin B is a toxic drug causing impairment of both hepatic and renal function.<sup>[13]</sup> Hepatic function impairment can lead to the development of jaundice and renal toxicity is manifested as tubular necrosis, azotemia and irreversible renal damage.<sup>[14]</sup> These adverse effects are dose dependent. Liposomal dosage form of amphotericin B has lesser incidence of renal toxicity.

Fluconazole was most commonly prescribed because its weekly dose provides cost effective treatment and decreased propensity for adverse effects.<sup>[15]</sup> Inappropriate use of antifungal agents is implicated in the development of antifungal resistance and can lead to adverse outcomes like persistent infections, unnecessary exposure and increased cost.<sup>[16,17]</sup>

### MATERIAL AND METHODS

A prospective study on "a cost analysis study on drug prescribing pattern of antifungals in dermatological conditions at tertiary care teaching hospital, Punjab" as carried out in department of dermatology of GGS Medical College & Hospital, Faridkot, Punjab, India. A data collection form was prepared which includes patient as well as medication related information. 192 prescriptions were collected during January 2016 to

March 2011 and 99 of them followed their prescriptions. All relevant and necessary information for the study was collected from the outpatient department cards, treatment charts and verbal communication with the patients. Patient related parameters includes age, sex and drug related data such as name of the drug, dosage form, dosing frequency, price and diagnosis data also noted.

### RESULT AND DISCUSSION

Antifungals are commonly used drugs in dermatological conditions and their rational use can minimize the side effects. The result of this study can indicate that the antifungals are commonly prescribed for patients attending to the dermatology department. We have collected 192 patients from OPD department from them 99 have followed their prescriptions time to time. Table 1. involves the antifungals that are used for the study and their prices according to different brand names. According to these, antifungals brand lobate cream and DK gel are having generic miconazole drug and drug itraconazole having capsule candiforce while for ketoconazoles; ketozac soap, K2 cream and as oral preparations tabet AFT is prescribed to patients. As well as fluconazole having 3 oral preparations like tablet ferocan and tablet osecan D, tablet quin -r and terbinafine, eberconazole and fexofenadiene having brands like tablet IFIN, tablet ebnet, tablet fexolar respectively, besides it clotrimazole included compounds as nuforce soap and zydip cream and benzoic acid involve acne star soap that are most commonly used on OPD department. As table 1 shows oral preparations involved terbinafine is having high and tablet fexofenadine is quite economic for patients and externally using preparations involved clotrimazole and miconazole are highly costly while fluconazole is more economic and highly cost effective. In Table 2, the categorization of drugs is according to the sex wise distribution. Itraconazole and miconazole are commonly given to most of the patients while terbinafine and fexofenadine are lessly prescribe to all patients. Itraconazole and miconazole are having same distribution in males and female but ketoconazole is prescribed more to males. In Table 3, distribution of drugs according to different age groups is included. Although all drugs are commonly prescribed in each group of patients but itraconazole and fluconazole are prescribed to 31-45 years old patients while others are equivalent to each other. As it is, in Table 4, drugs are prescribed according to different disease patterns like all drugs are commonly prescribed to different different diseased patient but itraconazole and fluconazole are mostly given to Tinea patients that involves different types of tinea like *T. faciei*, *T. cognitive*, *T. corporis*, *T. cruris*, *T.inconguito* etc. Others included diseases like Lichenoid CMLE, Chi Paraday, Perniosis, PPK, Prurigo nodularis, natalgia parastelsis, DLE, Lichen Planus, shingles.

**Table 1: Classification of antifungals that are involved to treat dermatological conditions.**

Drug	Dose & route	Preparation	Price
Miconazole	0.5% (LA)	Lobate cream	25*1 Pck
	2% (20 gm) (LA)	DK gel	125*1 Pck
Itraconazole	200 mg oral	Cap. Candiforce	96* 4 Caps
Ketoconazole	2% (LA)	K2 Cream	97.50 * 1 Pck
	200 mg oral	Tab. AFT	32*1 tab
	75 gm (LA)	Ketotec Soap	80*1 pc.
	2% (LA)	Konaz CT Shampoo	145*1 bottle
Fluconazole	150 mg oral	Tab. Ferocan	38 * 1 tabs
	150 mg oral	Tab. Osecan D	11.54*1 tab
	150 mg oral	Tab. Quin r	34.20*10 tabs
Terbinafine	500 mg oral	Tab. IFIN	68.50 * 1 tab
Eberconazole	30 gm (LA)	Ebernet cream	139.50*1 pck
Fexofenadine	120 mg oral	Tab. Fexolar	122.7*10 tabs
Clotrimazole	75 gm (LA)	Nuforce soap	34.20*1 pc.
	20 gm (LA)	Zy dip Cream	86.13*1 pc.
Benzoic acid	75 gm	Acne star soap	73.50*1 pc.

**Table 2: Sex wise distribution**

Drug name	Males	Females	Total
Miconazole	1	3	4
Itraconazole	17	17	34
Ketoconazole	22	12	34
Fluconazole	32	30	62
Terbinafine	3	0	3
Eberconazole	3	8	11
Fexofenadine	1	2	3
Clotrimazole	5	2	7
Benzoic acid	12	2	14

**Table 3: Drug distribution according to age groups**

Drugs/Age (in yrs)	0-15	16-30	31-45	46-60	>60
Miconazole	1	1	2	0	0
Itraconazole	4	7	19	4	0
Ketoconazole	3	8	14	7	2
Fluconazole	1	15	28	9	5
Terbinafine	1	1	1	0	0
Eberconazole	0	1	9	0	1
Fexofenadine	0	2	1	0	0
Clotrimazole	2	2	1	2	0
Benzoic acid	2	2	5	3	1

**Table 4: Drug distribution according to disease**

Drugs/disease	Acne	Urticaria	Dermatitis	Tinea	Others
Miconazole	0	0	0	3	1
Itraconazole	1	1	13	31	2
Ketoconazole	2	3	1	31	0
Fluconazole	2	3	10	27	17
Terbinafine	0	0	1	2	0
Eberconazole	0	0	0	11	0
Fexofenadine	0	2	1	0	0
Clotrimazole	0	0	5	0	2
Benzoic acid	1	0	1	10	2

Fluconazole and Itraconazole are commonly used in all types of dermatological diseases as well as eberconazole drug is used some little dermatological conditions. By

illustrating all these it's concluded that fluconazole is more effective more economical drug that used for

common diseases. As follow up by the patients there are no harmful effects after receiving the therapy.

## CONCLUSION

As discussed earlier, brand lobate, candiforce, K2 cream, ferocan, quin r, AFT, IFIN, zydip cream, ebernet cream, DK gel, ketozac soap, fexolar, nuforce soap, acne star soap are used to treat diseases like acne, urticaria, scabies, dermatitis, tinea and some others. By comprising all factors ketoconazole and fluconazole are most effective drugs that are used and terbinafine is less commonly used drug for treatment of dermatological conditions. Fluconazole fulfill all aspects, having equal variability in males and females as well mostly used for tinea patients and middle aged patients. So we can say that fluconazole is a best antifungal to treat all types of fungal infection and having oral as well as externally applied brands are also available. It provides a great availability and safety to the patients.

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