ANALYSIS OF PRESCRIBING PATTERN OF DRUGS AMONG PATIENTS ATTENDING DERMATOLOGY OUTPATIENT DEPARTMENT OF A TERTIARY CARE HOSPITAL

Rohini Gambre[1], Akash Khobragade*[1], Kamagonda Jalikar[1], Sadiq Patel[1] and Sanket Gaidhane[1]

Department of Pharmacology, Grant Govt. Medical College, Mumbai, India.

*Corresponding Author: Dr. Akash Khobragade

Department of Pharmacology, Grant Govt. Medical College, Mumbai, India.

ABSTRACT

Objectives: Drug utilization study enables us to describe the pattern of prescribed drugs as well as to detect the problems in drug prescribing and use. This study was undertaken to reveal the same among dermatological outpatient practice with an objective to provide remedial messages to prescribers and to provide the baseline data to drug and health policy makers and planners. **Methods**: A total of 600 prescriptions from dermatological outpatients were randomly selected and analyzed using the guidelines of World Health Organization (WHO) to find the various parameters of prescribing indicators and the pattern of prescribed drugs. **Results:** The average number of drugs per encounter was 3.86($\pm$0.32). Drugs prescribed by their generic name were 89.33% and those prescribed from National essential medicines list were 92.27% and those prescribed from WHO list of Essential Medicines were 90.3%. Analysis of polypharmacy showed maximum 7 and minimum 1 drug was prescribed. Overall analysis of the drugs showed, the most common route of the prescribed drug was oral followed by topical. Antifungals, Antihistaminics, and steroids constitute the major bulk of drug prescribed to the participants. **Conclusion:** In our study, though polypharmacy was found but it was necessary as per the condition of the patients and mainly prescribed drugs were for common disorders found in the study population. Prescription audit can be an eye opener and therefore, it should be done periodically to rationalize the prescription, reduce error and suggest cost effective management.

KEYWORDS: Dermatological outpatients, drug utilization, polypharmacy, prescribing pattern.

INTRODUCTION

Skin is the part of integumentary system that constitutes the largest organ of human body and thus it is exposed to injury by various extrinsic factors such as environmental, chemical, infectious agents as well as intrinsic factors such as metabolic, genetic and immunological. In addition to this, many systemic diseases are also identified by their dermatological manifestations thus it is said metaphorically as a mirror to various internal diseases.[1,2]

Skin diseases are common and cause a huge disease burden globally. Collectively skin is the 18th leading cause of health burden worldwide and it was 4th leading cause of nonfatal health burden in 2010 globally.[3] The skin disorders constitute 2% of total Out Patient Department (OPD) consultations worldwide.[4] However no such data is available from India but still skin disorders in India are common and include pyoderma, acne, urticaria, dermatitis, scabies fungal skin infections and alopecia etc.[5]

The skin disorders have serious detrimental effect on quality of life of the general population by increasing the suffering in terms of physical, social, psychological as well as it increases financial burden as most of the skin diseases are chronic and requires longer duration of treatment.[6]

In India, there are various problems in prescription pattern of drugs like irrational drug combinations, overuse of multivitamins, unnecessary use of antibacterial in fungal conditions and prescribing drugs from same class.[7,8] It contributes to the emergence of antimicrobial resistance. Dermatologists account for almost 5% of antibiotic prescriptions worldwide and most of the conditions require prolonged treatment.[9,10]

Further, the skin conditions are wrongly diagnosed and treated. Thus continuous monitoring is needed to evaluate pattern of drug use to detect any changes from contemporary practices or available guidelines. Hence in order to generate data, drug utilization studies are need of the hour.

As per WHO, Drug utilization studies or research are tools that deals with the marketing, distribution and prescription pattern of drugs and helps to assess the subsequent impact of these on medical and socioeconomic status of patients.[11] Thus drug utilization studies help in the understanding of prescription pattern as well as the quality of prescription in terms of rationality, drug interactions and financial burden of disease to the individual. These studies have a favorable impact on improving the standards of treatment and identify the problems related to polypharmacy, drug-drug interaction and adverse drug reactions. Periodic auditing of prescriptions in form of drug utilization studies are important tool to enhance the therapeutic efficacy, to minimize the adverse effect, to optimize the cost of the treatment and to provide useful feedback to the clinician.[12,13]

The WHO also estimates that 50 percent of all medicines are inappropriately prescribed, dispensed, or sold.[14] According to the 1985 WHO Conference of Experts on drug-use, appropriate or rational use of medicines is only when drugs are prescribed when clinically indicated, and at correct dosages for the right duration and at the lowest cost both to the patient and their community. Inappropriate drug use has direct and indirect cost to the health system and individuals.[15]

Therefore periodic evaluation of drug utilization patterns needed to be done to enable suitable modifications in prescription of drugs to increase the therapeutic benefits and decrease the adverse effects. People often have very rational reasons for using medicines irrationally. Causes of irrational use include lack of knowledge, skills or independent information, unrestricted availability of medicines, overwork of health personnel, inappropriate promotion of medicines and profit motives from selling medicines. The study of prescribing patterns seeks to monitor, evaluate and if necessary, suggest modifications in the prescribing behavior of medical practitioners to make medical care rational and cost effective.[16,17]

This study utilized these drug-use core indicators to describe patterns of drug use at dermatology department in a tertiary care hospital to provide feedback to the prescriber and to create awareness among them about rational use of medicines. In this study an attempt was made to assess the drug prescribing patterns in dermatology outpatient department in a tertiary care hospital and to obtain information on demographic characteristics of the patients selected for analysis.

With this information, we intend to provide feedback and recommendation for the health care providers and policy makers.

MATERIAL AND METHODS
In the present study entitled, "Analysis of prescribing pattern of drugs among patients attending dermatology outpatient department of a tertiary care hospital" we applied the following materials and methodology, after taking prior approval from Institutional Ethical Committee (IEC).

Study Design
The present study was a single centric, observational, cross sectional descriptive study.

Study Site
The study was conducted in Department Of Pharmacology in collaboration with the outpatient department of Dermatology in a tertiary care teaching hospital.

Study Duration
The study was conducted from 1st August 2015 to 31st July 2016.

Study Population
Patients attending Dermatology Outpatient department (OPD) of a tertiary care hospital in the study period.

Sample Size
Prescriptions of 600 patients attending the Dermatology OPD were analyzed. The sample size was selected as per the WHO recommendations for conducting Drug Utilization Study (DUS).[18]

METHODOLOGY
Ethical Consideration
The study was conducted after obtaining the permission from the Institutional Ethics Committee (IEC) and the Department Of Dermatology.
All data collected as a part of the study was kept strictly confidential and used for the purpose of study only.

Steps taken to maintain the confidentiality were:
1. Identification of the patients by initials of the name only and not by the name
2. Case records to be assessed by principal investigator only
3. Patients detail not to be divulged to any party.

Sample Selection
The study population was the patients attending dermatology outpatient department (OPD) and diagnosed if they have any dermatological disorder fulfilling following inclusion and exclusion criteria.

Selection Criteria
Inclusion Criteria
1. Patient of all age and of either gender attending the Dermatology Outpatient Department (OPD).
2. Patients who were prescribed at least one drug.
3. Patient who were ready to give written informed consent.

Exclusion Criteria
1. All the patient with serious dermatological condition requiring hospitalization.

2. Patients with Non-Dermatological Emergency coming to dermatology OPD.
3. All pregnant/Lactating females.
4. Patients who were already a part of other clinical trial.
5. Patients who were not ready to give consent.

Study Procedures
After the health check up by the concerned dermatologist, patients were given brief idea about the study and after taking the written informed consent from them, data were recorded in a pre-designed case record form(Annexure A), which includes:-
a. Demographic data- Patients detail like age, gender, and registration number.
b. Diagnosis
c. Prescription details like number of drugs, names of individual drugs (generic/brand), any Fixed dose combination (FDC) prescribed, whether the prescribed drug(s) were available from the hospital pharmacy or to be bought from private chemist, dose, dosage form, dosing schedule and duration of the treatment.
d. Cost of various drugs as obtained from hospital drug store.
e. Drugs included in National & WHO Essential Drug List.
f. Drugs included in hospital drug schedule were obtained from hospital drug store.

Data Analysis
The data obtained from the prescription were sorted and analyzed for demographic characteristics, drug use pattern, percentage of drugs prescribed as fixed dose combination (FDC) and WHO core drug prescribing indicators. All the data were compiled into Microsoft Office Excel 2010 version and a descriptive statistical analysis was carried out. The results on continuous measurement scale were presented as Mean ± SD and results on categorical measurement type were presented as simple percentage (%).
Descriptive statistics were used for assessment of prescription pattern and following indicators:
1. Demographic characteristics of study population
a. Age distribution
b. Gender distribution
2. Disease distribution among study population
3. Analysis of prescription of study population
a. Total and average drugs prescribed per prescription.
b. Different classes of drugs prescribed.
c. Drugs prescribed by various routes.
d. Various dosage forms used in the prescribed drugs.
4. Percentage of drugs prescribed as Fixed Drug Combinations (FDC)
5. Percentage of prescribed drugs included in Hospital pharmacy
6. Percentage of Prescribed drugs included in National Essential List of medicines, 2015
7. Percentage of Prescribed Drugs included in WHO Essential List of Medicines, 2015
8. Percentage of drugs prescribed by Generic Name
9. Analysis of prescribed drugs according to the Anatomical Therapeutic chemical (ATC)- Daily Defined Dose (DDD) classification.
10. Cost analysis of the prescriptions.
11. WHO/INURD drug use indicator.

The formulas used for calculation of the above parameter are as follows:
1. Average no. of drugs per encounter
The following points were considered while calculating this parameter:
• Any medicines prescribed including vitamins, iron tablets etc, were included as a drug.
• Fixed Drug combinations (FDC) were counted as one medication.
The formula used for calculation:

$$\text{Average} = \frac{\text{Total number of drugs prescribed}}{\text{Total number of Encounter surveyed}}$$

2. Percentage of encounters with an antibiotic prescribed
The formula used for calculation:

$$\text{Percentage} = \frac{\text{Number of Encounters with an antibiotic prescribed}}{\text{Total number of Encounter Surveyed}} \times 100$$

3. Percentage of Encounters with an injection prescribed
The formula used for calculation:

$$\text{Percentage} = \frac{\text{Number of encounters with an injection was prescribed}}{\text{Total Number of Encounter Surveyed}} \times 100$$

4. Percentage of drugs prescribed by generic name
The formula used for calculation:

$$\text{Percentage} = \frac{\text{Number of drug prescribed by generic name}}{\text{Total number of drug prescribed}} \times 100$$

5. Percentage of drugs prescribed from the National Essential list of Medicines (NLEM) of India 2015
The formula used for the calculation:

$$Percentage = \frac{Number\ of\ drugs\ prescribed\ included\ in\ NLEM\text{-}2015}{Total\ number\ of\ drug\ prescribed} \times 100$$

6. Percentage of drugs prescribed from WHO List of Essential List,2015
The formula used for calculation:

$$Percentage = \frac{Number\ of\ drug\ prescribed\ from\ WHO\ Essential\ list,\ 2015}{Total\ number\ of\ drugs\ prescribed} \times 100$$

7. Percentage of drugs actually dispensed from the Hospital Drug Store
The formula used for the calculation:

$$Percentage = \frac{Number\ of\ Drugs\ dispensed\ from\ the\ Hospital\ Drug\ Store}{Total\ number\ of\ drugs\ prescribed} \times 100$$

RESULTS
The present study was an observational study conducted in Department of Pharmacology in collaboration with Department of Dermatology of a tertiary care hospital after obtaining permission from the Institutional Ethics Committee and Department of Dermatology. In the study prescriptions of 600 patients attending the Outpatient Department (OPD) were assessed.

The results were formulated in various sections:
1. Demographic characteristics of the study participants.
a. Age distribution
b. Gender distribution
2. Disease distribution among study participants.
3. Analysis of prescription of study population
a. Total and average number of drugs prescribed.
b. Different classes of drugs prescribed.
c. Drugs prescribed by various routes.
d. Various dosage forms used in the prescribed drugs.
4. Percentage of drugs prescribed as Fixed Drug Combinations (FDC)
5. Percentage of prescribed drugs included in Hospital pharmacy
6. Percentage of Prescribed drugs included in National Essential List of medicines, 2015
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8. Percentage of drugs prescribed by generic name
9. Analysis of prescribed drugs according to the Anatomical Therapeutic chemical (ATC)- Daily Defined Dose (DDD) classification.
10. Cost analysis of the prescriptions.
11. WHO/INURD drug use indicator.

The observations of the study were as follows
1. Demographic characteristics of the patients
A). Age distribution
All the study participants were in the range of age group 1 to 76 years. More than 50% of our patients were in the age group of 21-40 years, amongst whom, majority of the patients were in the age group of 21-30 years (31.66%), followed by 31-40 years (18.5%). Numbers of patients at two extremes of age were very less i.e. above 61 years were only 6.3% and 1-12 years, were 5.83%. **(Table1A) (Figure 1A)**

B). Gender wise distribution
Amongst all study participants, 352(58.66%) were male and 248(41.34%) were female. The male to female ratio was 1.41. **(Table 1B)(Figure 1B).**

Table 1A. Age wise distribution of the study participants.

Age Group (In years)	Total Number of patients	Percentage (%)
≤12	35	5.83
13-20	87	14.5
21-30	190	31.66
31-40	111	18.5
41-50	77	12.83
51-60	62	10.33
61>	38	6.3
Total	600	100

Table 1B. Gender wise distribution of the study participants.

Gender	Number of patients	Percentage (%)
Male	352	58.66
Female	248	41.34
Total	600	100

Figure 1A. Age wise distribution of the study participants.

2. Disease distribution among study participants.
The diagnosis made in the prescription was analyzed and it was found that, Dermatophytosis (199, 33.16%) was the most common dermatological disorder followed by eczema (18%), acne (10.33%) and pyoderma (10.1%). Other disorders were like Allergic Contact Dermatitis (ACD) / Irritant Contact Dermatitis (ICD) (5.34%), urticaria (4.83%), psoriasis (4.66%), scabies (3.83%), photo dermatitis (2.83%) and alopecia (2.66%). Diseases like pigmentation disorders, vitiligo, and keloids together constituted 4.17%. Only **(Table 2) (Figure 2).**
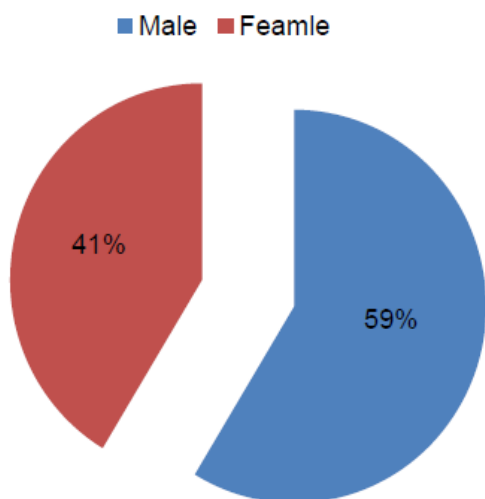

Figure 1B. Gender wise distribution of the study participants.

Table 2. Disease distribution among study participants.

Disease distribution	Number of patients	Percentage(%)
Dermatophytosis	199	33.16
Acne	62	10.33
Eczema	108	18
Pyoderma	61	10.1
Urticaria	29	4.83
ACD/ICD	32	5.34
Psoriasis	28	4.66
Photodermatitis	17	2.83
Scabies	23	3.83
Alopecia	16	2.66
Others*	25	4.17
Total	600	100

* Others include pigmentation disorders, vitiligo, keloids

Figure 2: Disease distribution in the study participants.

Figure 3A: Analysis of number of drugs prescribed per prescription.

3. Analysis of prescription of the study participants
A.)Total and average number of drugs prescribed

Analysis of the prescription showed, a total of 2316 drugs were prescribed. The average number of drugs prescribed per prescription was 3.86($\pm$0.32). Analysis of polypharmacy showed maximum 7 and minimum 1 drug was prescribed. Majority of study participants (232, 38.66%) received 4 drugs followed by 3 drugs in 216(36.0%) participants. **(Table 3A) (Figure 3A).**

Table 3A. Analysis of number of drugs prescribed per prescription

Number of drugs/prescription	Number of prescription	Percentage (%)
One	41	6.8
Two	48	8
Three	216	36
Four	232	38.66
Five	61	10.16
Six	32	5.3
Seven	15	2.5
Total(2316 drugs)	600	100
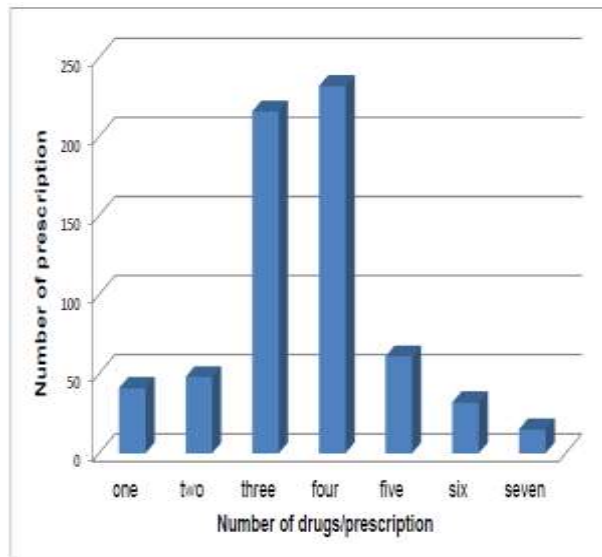
B.) Analysis of different classes of drugs prescribed.

Overall, 2316 drugs of 13 different classes were prescribed. Of these, Antifungals were the most common class of drugs prescribed, i.e. 810(34.97%). Antihistaminics (546, 23.57%) were the second most common class of drugs prescribed, followed by steroids (276, 11.91%). Antibacterial, Vitamin and mineral supplements, antacids, emollients, adsorbents and protectives were the other common class of drugs prescribed. **(Table 3B-I,3B-II) (Figure 3B-1,3B-II).**

Table 3B-I. Analysis of different classes of antimicrobials prescribed.

Class of drug	Drug name	Total number prescribed	% of the class	Total number of drugs prescribed in the class	% of total prescribed drugs
Antifungal	Fluconazole	294	36.29	810	34.97
	Miconazole	276	34.07		
	Griseofulvin	102	12.59		
	Terbinafine	46	5.6		
	Ketoconazole	35	4.3		
	Itraconazole	31	3.8		
	Clotrimazole	12	1.4		
	Amorolfine	8	0.9		
	Luliconazole	6	0.7		
Antibacterial	Framycetin	72	40	180	7.77
	Doxycycline	61	33.88		
	Clindamycin	15	8.3		
	Amoxicillin	13	7.2		
	Azithromycin	11	6.1		
	Nadifloxacin	8	4.4		
Antiparasitic & Antihelminthic	Pyrethrin	23	42.59	54	2.33
	Invermectin	17	31.48		
	Albendazole	14	25.92		

Table 3B-II. Analysis of different classes of non-antimicrobial drugs prescribed.

Class of drug	Drug name	Total number prescribed	% of the class	Total number of drugs prescribed in the class	% of total prescribed drugs
Antihistaminic	Cetrizine	408	74.72	546	23.57
	Chlorpheniramine	123	22.52		
	Pheniramine	9	1.64		
	Fexofenadine	6	1.09		
Steroids	Flucinolone	162	58.69	276	11.91
	Betamethasone	66	23.91		
	Clobetasol	15	5.41		
	Budesonide	13	4.72		
	Triamcinolone	11	3.93		
	Hydrocortisone	9	3.22		
Vitamin & Mineral Supplements	Ferrous sulphate	54	34.61	156	6.73
	Ferrrous sulphate +Folic acid	37	23.71		
	B-Complex	25	16.02		
	Retinol	21	13.46		
	Calcium lactate + Vitamin D	19	12.17		
Antacid	Ranitidine	102	100	102	4.4
Emollients	Liquid paraffin	87	100	87	3.75
Adsorbants & Protectives	Calamine	54	81.81	66	2.84
	Aloevera gel	12	18.18		
others	Keratolytics	15	38.46	39	1.68
	Sunscreen	10	25.64		
	Immunomodulator	8	20.51		
	NSAIDS	6	15.38		
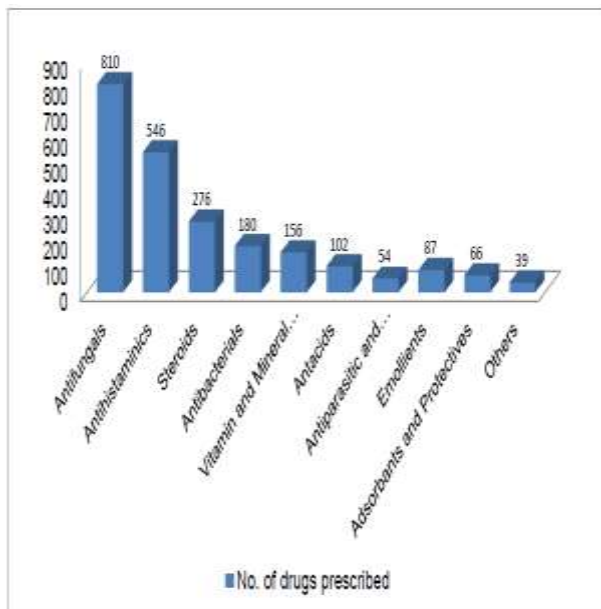
Figure 3B-I. Number Analysis of different classes of drugs prescribed.

Table 3C. Drugs prescribed through various routes.

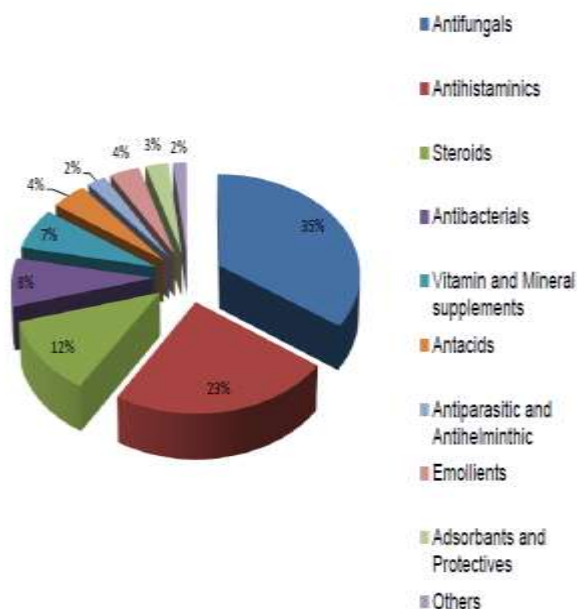| Route of Administration	Number of drugs prescribed	Percentage (%)
Oral	1422	61.39
Topical	846	36.52
Intralesional	30	1.2
Intramuscular	18	0.7
Total	2316	100

Figure 3B-II. Percentage analysis of different classes of drug prescribed.

C.) Analysis of drugs prescribed by various routes.
Overall analysis of the 2316 drugs showed, the most common route of the prescribed drug was oral followed by topical. Total 1422(61.39%) drugs were prescribed through oral route and 846 (36.52%) drugs were prescribed through topical route. The other routes through which drugs prescribed were intralesional (30, 1.2%) and intramuscular (18, 0.7%). **(Table 3C) (Figure 3C).**
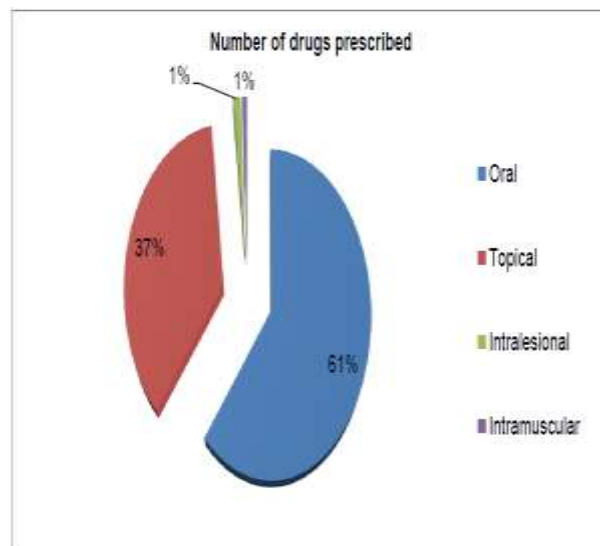

Figure 3C. Percentage analysis of drugs prescribed through different routes.
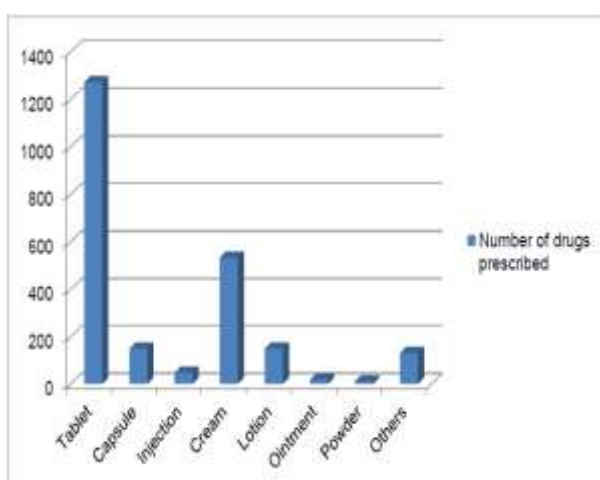
D) Analysis of Various dosage forms used in the prescribed drugs
Total 2316 drugs were prescribed in 8 different dosage forms. The most common dosage form prescribed was tablet (1272, 54.9%) followed by cream (534, 23.05%). The other dosage forms were lotion (150, 6.44%), capsule (150, 6.44%), injection (48, 2.07%). Powder, ointment and other dosage forms like liquid, solution were very less in the prescribed drugs. **(Table 3D) (Figure 3D).**

Table 3D: Analysis of various dosage forms used in the prescribed drugs.

Dosage form	Number of drugs prescribed	Percentage (%)
Tablet	1272	54.9
Capsule	150	6.44
Injection	48	2.07
Cream	534	23.05
Lotion	150	6.44
Ointment	18	0.70
Powder	12	0.50
Others	132	5.60
Total	2316	100

Figure 3D. Number analysis of dosage forms used in the prescribed drugs.

4. Analysis of drugs prescribed as Fixed Drug Combinations(FDC)
Of the total number of drugs prescribed i.e. 2316, 84(3.6%) drugs were prescribed as FDC among the study participants. The different FDC used in the study participants were ferrous sulphate+folic acid, calcium lactate+vitamin D and multivitamins.

5. Analysis of drugs prescribed included in Hospital pharmacy
Of all the 2316 drugs prescribed, 2045(88.29%) were prescribed from hospital pharmacy and the remaining 271(11.71%) drugs were prescribed from outside medical store.

6. Analysis of drugs prescribed included in National Essential List of Medicines,2015
Of the 2316 drugs prescribed among study population, 2137(92.27%) drugs were included in National Essential List of Medicines, 2015.

7. Analysis of drugs prescribed included in WHO list of Essential Medicines,2015
Of the 2316 drugs prescribed among study population, 2092(90.3%) drugs were included in WHO list of Essential Medicines, 2015.

8. Analysis of drugs prescribed by generic name.
Of the 2316 drugs prescribed among study population, majority of drugs, 2069(89.33%), were prescribed by their generic name and the remaining 247(10.67%) drugs were prescribed by their brand names.

9. Analysis of prescribed drugs according to the Anatomical Therapeutic chemical (ATC) - Daily Defined Dose (DDD) classification.
The different drugs prescribed among study participants were classified according to the Anatomical Therapeutic Chemical (ATC) - Daily Defined Dose (DDD) classification.

The prescribed daily dose (PDD)/ Daily Defined Dose(DDD) ratio of the prescribed drugs were calculated which showed, majority of drugs i.e. 57.89% had PDD/DDD ratio 1 followed by 36.84 drugs whose PDD/DDD was >1 and very few drugs i.e. 5.14% had PDD/DDD ratio <1. **(Table 4) (Figure 8).**

Table 4. ATC/DDD classification of drugs prescribed among study participants.

Drug	ATC Code	DDD	PDD	PDD/DDD
Amoxicillin	J01CA04	1 gm	1.5 gm	1.5
Doxycycline	J01AA02	100 mg	200mg	2
Clindamycin	J01FF01	1200mg	750mg	1.6
Azithromycin	J01FF10	300 mg	500 mg	1.7
Framycetin	S01AA07	-	-	-
Fluocinolone Acetonide	D07AC04	-	-	-
Betamethasone	D07AC01	1.5 gm	3.0 gm	2
Clobetasol	D07AD01	-	-	-
Cetrizine	R06AE07	10 mg	20 mg	2
Chlorpheniramine	R06AB04	12 mg	12 mg	1
Pneniramine maleate	D04AA16	-	-	-
Fexofenadine	R06AX26	120 mg	150 mg	1.25
Fluconazole	J02AC01	200 mg	150 mg	0.75
Griseofulvin	D01BA01	500 mg	500 mg	1
Miconazole	D01AC02	-	-	-
Acetic acid	G01AD02	-	-	-
B- Complex	A11EA	-	-	-
Diclofenac	M01AB05	100 mg	100 mg	1
Ferrous sulphate	B03AA07	200 mg	200 mg	1
Ferrous sulphate + Folic acid	B03AD03	-	-	-
Calcium Lactate + Vitamin D	A12AX	-	-	-
Ranitidine	A02BA02	300 mg	300 mg	1
Retinol	A11CA01	50 TU	50 TU	1
Tacrolimus	D11AH01	-	-	-
Ketoconazole	D01AC08	-	-	-
Mometasone	D07AC13	-	-	-
Pyrmethrin	P03AC04	-	-	-
Minoxidil	D11AX01	-	-	-
Ivermectin	D11AX22	-	-	-
Albendazole	P02CA03	400 mg	400 mg	1
Clotrimazole	D01AC01	-	-	-
Terbenafine	D01AE15	-	-	-

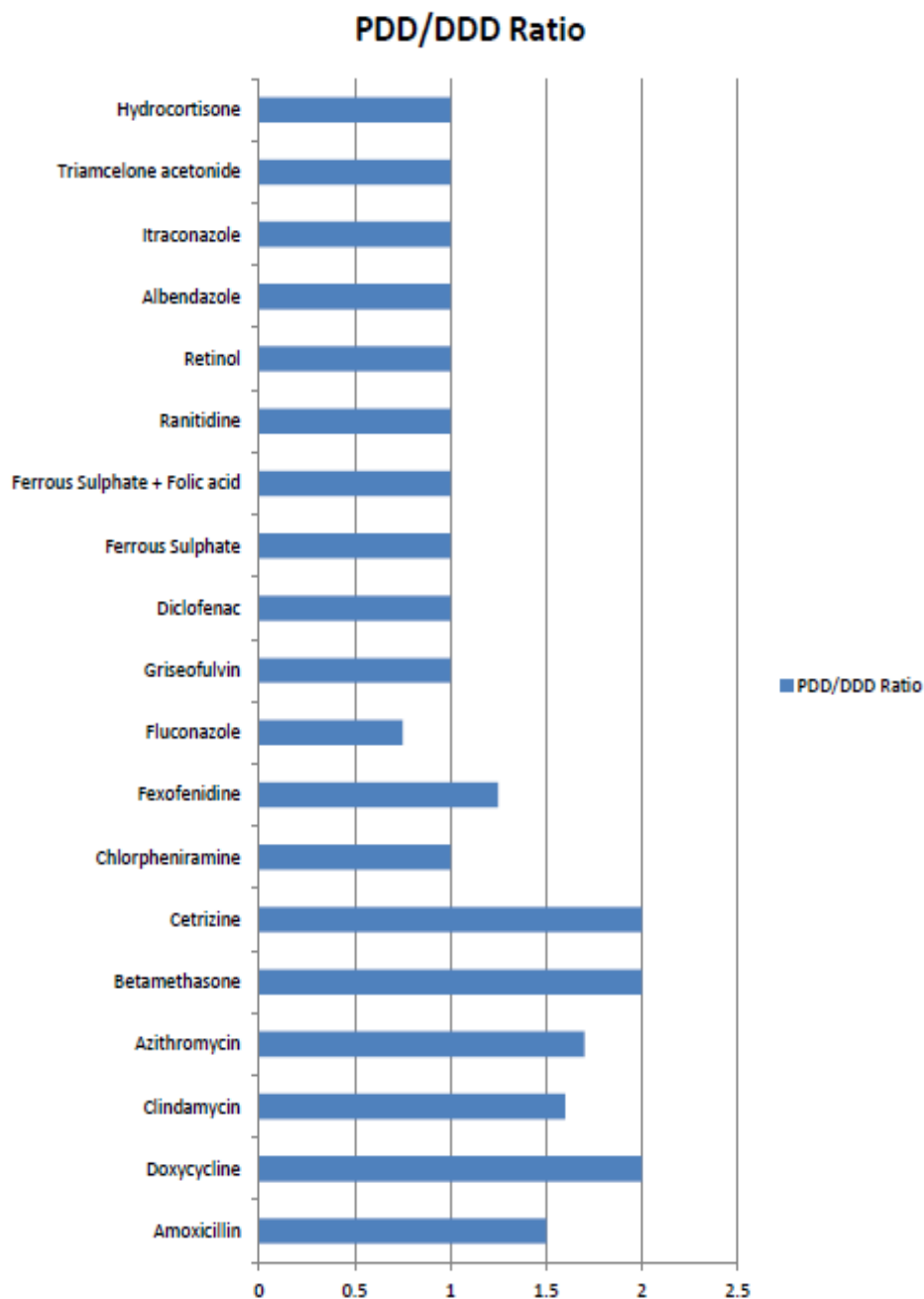| Drug	ATC Code	DDD	PDD	PDD/DDD
Budesonide	D07BB02	-	-	-
Itraconazole	J02AC02	200 mg	200 mg	1
Biotin	A11HA05	-	-	-
Amorolfine	D01AE16	-	-	-
Nadifloxacin	D10AE05	-	-	-
Luliconazole	D01AC18	-	-	-
Liquid paraffin	D02AC	-	-	-
Calamine	D04AX	-	-	-
Triamcinolone Acetonide	H02AB08	7.5 mg	7.5 mg	1
5 Fluorourasil	L01BC02	-	-	-
Bleomycin	L01DC01	-	-	-
Hydrocortisone	H02AB09	30 mg	30 mg	1

PDD/DDD Ratio

Figure 4. PDD/DDD ratio of drugs prescribed among study participants.

10. Cost analysis of the prescriptions.

The average cost per prescription was 212.77 INR, out of which, the cost borne by the hospital was almost twice the cost borne by the patient. In the present study the cost bore by the hospital was 145.6 INR (68.3%) and the cost bore by the participant was 67.17(31.7%) respectively. **(Table 5).**

Table 5. Cost analysis of the prescription among the study participants

Parameter	Values
Average cost per prescription	212.77 INR
Percentage of cost borne by hospital	68.3%
Cost borne by hospital	145.6 INR
Percentage of cost borne by participants	31.7%
Cost borne by participants	67.17

11. WHO/INURD drug use indicators
Table 6. WHO/INURD drug use indicators.

Average number of drugs per encounter	3.86
Percentage of drugs prescribed by generic name	89.33%
Percentage of encounter with an antibiotic prescribed	23.17%
Percentage of encounter with an injection prescribed	3.1%
Percentage of drugs prescribed from Hospital pharmacy	88.29%
Percentage of drugs prescribed from National Essential List of Medicines(NLEM,2015)	92.27%
Percentage of drugs prescribed from WHO List of Essential Medicines(WHO,2015)	90.3%

DISCUSSION

Skin diseases are one of the commonly encountered medical conditions in the outpatient department. Commonly encountered skin conditions in India are eczema, dermatitis, urticaria, fungal skin infections, acne etc. Skin diseases have a serious impact on people's quality of life in developing countries; more in India where climate, socioeconomic status, religions and customs are widely varied in different parts of the country.[19]

Prescription order is an important document between the physician and the patient. It is an order for a scientific medication for a person at a particular time.[20] Prescribing of drugs is an important skill, which needs to be continuously assessed and refined. It reflects the doctor's skill in diagnosis and attitude towards selecting the most appropriate cost-effective treatment.[21] Irrational use of medicines is now a worldwide problem. Irrational prescribing has a serious impact on health and economy, resulting in wastage of resources.[22] The patterns of drug use in a hospital setting need to be monitored intermittently in order to analyze their rationality and increase the therapeutic benefits and reduce adverse effects.

The present study was an observational study conducted in Department of Pharmacology in collaboration with the outpatient department of Dermatology in a tertiary care teaching hospital after obtaining permission from the Institutional Ethics committee (IEC) and Department of Dermatology. In this study, prescription of 600 patients attending the outpatient department (OPD) of Department of Dermatology, were assessed.

In the present study, all participants were in the range of age group 1 to 76 years. Amongst the study participants, more than 50% of the patients were in the age group 21-40 years which was in accordance with the studies conducted by Pathak et.al.[23] in Patna, where 50.94% of the participants were in 21-40 years age group. In another study conducted by Vineeta et.al.[24] in Belgaum,

71.84% of patients were in the age group of 18-75 years. This includes new as well as follows up patients.

In the present study, there were more male patients 352(58.66%) as compared to the female patients i.e. 248(41.34%). The ratio of male to female was 1.41. This ratio was in accordance with study conducted by Sarkar et.al.[25] in Nepal i.e.1.39 and Vineeta et.al.[24] in Belgaum i.e. 1.64, but in contrast with the study conducted by Pathak et.al.[23] in Patna and Sumana et.al.[26] in Mandya where the male to female ratio was0.88 and 0.7 respectively.

In our study, dermatophytosis was the most common dermatological disorder (33.16%) followed by eczema (18%), acne (10.33%) and pyoderma (10.1%). The other disorders were comparatively less in the study participants. Results of our study were in accordance with the study conducted by Vineeta et.al.[24] where the most common dermatological disorder was fungal and bacterial infections of the skin (25.62%) followed by eczema and dermatitis (23.4%) and Sarkar et.al.[25] where the most common dermatological disorder was fungal and bacterial infections of skin (40%) followed by eczema (31%). Result of our study is in contrast with Pathak et.al.[23], where eczema was the most common dermatological disorder i.e. 16.62% followed by dermatophytosis i.e. 14.89%. Hot and humid condition, poor hygiene can be the cause of the variation in the disease distribution in our study participants.

A total of 2316 drugs were prescribed in the present study. The average drug per prescription was 3.86. Analysis of polypharmacy showed maximum 7 and minimum 1 drug was prescribed. Majority of study participants (232, 38.66%) received 4 drugs followed by 3 drugs in 216(36.0%) participants. The average number of drugs per encounter in the present study is lower than the studies conducted by Pathak et.al.[23] in Patna i.e. 5.13 and is higher than the study conducted by Saleem et.al.[27] in Kerala, Sumana et.al.[26] in Mandya,Vineeta et.al.[24] in Belgaum, Tikoo et.al.[28] in Ludhiana, Maini et.al.[29] in Delhi and Sarkar et.al.[25] in Nepal, where the values were 2.46, 3.04, 2.95, 3.26, 2.6 respectively. The increase in average number of drugs prescribed in the present study may have resulted from difference in the disease distribution pattern in the region of the study.

In our study, overall 2316 drugs of 13 different classes were prescribed. Of these, Antifungals were the most common class of drugs prescribed i.e. 810(34.97%). Antihistaminics (546, 23.57%) were the second most common class of drugs prescribed followed by steroids (276, 11.91%). Antibacterial, Vitamin and mineral supplements, antacids, emollients, adsorbants and protectives were the other common class of drugs prescribed.

Among the 810 antifungal drugs prescribed, fluconazole was the most common (294, 36.29%) antifungals

prescribed followed by miconazole (276, 34.07%) and griseofulvin (102, 12.59%). Other antifungal which were prescribed are itraconazole, clotrimazole and luliconazole. Fluconazole and griseofulvin were mainly prescribed in tablet form while miconazole, itraconazole and luliconazole were prescribed in topical cream form. Clotrimazole was prescribed in powder form.

Among the 546 antihistaminic drugs prescribed, cetrizine was the most common drug i.e. 408(74.72%) followed by chlorpheniramine (123, 22.52%). Drugs like pheniramine (9, 1.64%) and fexofenadine (6, 1.09%), were prescribed to very few participants. Cetrizine and chlorpheniramine were prescribed in tablet form while pheniramine was prescribed in injection form.

Among the 276 steroids prescribed fluocinolone was the most common drug i.e. 162(58.69%) which was prescribed in tablet form, followed by betamethasone (66, 23.91%) which was prescribed in cream as well as tablet form. Other steroids which were prescribed are budesonide, triamcelone and hydrocortisone. Among the antimicrobials framycetin (72, 40%) was the most common drug followed by doxycycline i.e. 61(33.88%). Other antimicrobials which were prescribed are azithromycin, clindamycin and amoxicillin. Framycetin was prescribed in cream form while doxycycline, amoxicillin, clindamycin were prescribed in capsule form. Azithromycin was prescribed in tablet form in the study.

Our study result is in accordance with study conducted by Sarkar et.al.[25] where antifungals were the most common group of drugs followed by steroids. Our result is in contrast with the study done by Pathak et.al.[23] in Patna, where antihistaminics were the most common class of drugs prescribed i.e. 24.13% followed by antifungals (21.62%). In the study conducted by Sumana et.al.[26] in Mandya, antihistaminics were the most common class of drugs prescribed i.e. 29.6% followed by steroids (22.2%).

Among the 2316 drugs prescribed, total 1422(61.39%) were prescribed through oral route followed by 846(36.52%) through the topical route. Other routes through which drugs were prescribed are intralesional and intramuscular route. Tablet form was the most common dosage form used in the prescriptions i.e. 54.9% followed by cream form which was 23.05 %. Other dosage form which were used in the prescriptions were lotion (6.44%), capsule (6.44%), injection, ointment, powder, liquid, and solution. Our study result is in contrast with the study conducted by Pathak et.al.[23] in Patna, Sumana et.al.[26] in Mandya and Tikoo et.al.[28] in Ludhiana, where topical route was most common followed by oral route.

Of the total number of drugs prescribed in the study participants i.e. 2316, 84(3.6%) drugs were prescribed as fixed drug combination. The different FDC used were,

ferrous sulphate+ folic acid, Calcium lactate+ Vitamin D and multivitamins. Other FDC were albendazole+ivermectin, amolorfine+ phenoxyethanol, adapalane+ benzyl peroxide etc.

Our study result was low compared to study conducted by Saleem et.al. in Kerala, where 9.75% of the drugs were prescribed as FDC.

Of all the 2316 drugs prescribed in the study population, 2045(88.29%) were prescribed from hospital pharmacy and the remaining 271(11.71%) drugs were prescribed from outside medical store. The reason may be unavailability of some drugs in hospital pharmacy or absence of some drugs in the rate contract (RC) list of state government.

This was in contrast with the previous studies where maximum drugs were prescribed from outside pharmacy.[24,27,25]

Majority of drugs prescribed in our study were included in the National[30] and WHO essential list of medicine.[31] Essential medicines are those that satisfy the priority health care need of the majority of the population. The primary purpose of the NLEM is to promote rational use of medicine considering the three important aspects i.e. cost, safety and efficacy.[30] Of the 2316 drugs prescribed in the study population, 2137(92.27%) drugs were included in National Essential List of Medicines, 2015 and 2092 (90.3%) drugs were included in WHO list of Essential Medicines, 2015. This finding was in accordance with the study conducted by Sumana et.al.[26], where 92.6% drugs were prescribed from the National Essential list of medicine, 2011. But our result was in contrast with the study conducted by Vineeta et.al.[24], Sarkar et.al.[25] and Saleem et.al.[27], where the percentage was very less i.e. 11.51%, 18.78% and 23% respectively. Of the 2316 drugs prescribed in the study population, majority of drugs, 2069(89.33%), were prescribed by their generic name and the remaining 247(10.67%) drugs were prescribed by their brand names. This is an encouraging finding as it does not promote specific brand and avoids confusion and errors at the level of the pharmacist, involved in dispensing and also it helps in decreasing the overall cost of the treatment and hence recommended. Generic substitution can be beneficial provided adequate quality control can be maintained and bioequivalence is assured. This finding is in contrast with the study conducted by Vineeta et.al.[24] and Sumana et.al.[26] where 12.8% and 30.6% of the drugs were prescribed by their generic names.

All the different type of drugs prescribed were classified according to the Anatomical Therapeutic Chemical (ATC) - Daily Defined Dose (DDD) classification, which showed, majority of drugs i.e. 57.89% has PDD/DDD ratio 1 while 36.84% drugs had PDD/DDD was >1 and very few drugs i.e. 5.14% had PDD/DDD

ratio <1. When the PDD/DDD ratio is either less than or greater than 1, it may indicate that there is either under or over utilization of drugs. It is important to note that the PDD can vary according to both the illness treated and national therapeutic practices. The PDDs also vary substantially between different countries, for example, PDDs are often lower in Asian than in Caucasian populations. Because of this it may seem as if there is underutilization a particular drug as per the PDD/DDD ratio. Also, the DDDs obtained from the WHO ATC/DDD website are based on international data and are applicable for management of conditions of moderate intensity. The WHO encourages countries to have their own DDD list based on indigenous data.

The ATC classification system divides drugs into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties.[32] The 'DDD' concept was developed to overcome the objections against the traditional units of the measurement of drug consumption and to ensure comparability between the drug utilization studies which were carried out at different locations and at different time periods.[18] It is important to remember that the DDD is the assumed average maintenance dose per day for a drug which is used for its main indication in adults.[32] The prescribed daily dose (PDD) is defined as the average dose prescribed according to a representative sample of prescriptions. When there is a substantial discrepancy between the PDD and the DDD, it is important to take this difference into consideration when evaluating and comparing drug utilization figures.[18]

The average cost per prescription was 212.77 INR, out of which, the cost borne by the hospital was almost twice the cost borne by the patient. The average cost bore by the hospital in our study was 145.6 INR (68.3%) while the cost bore by the participants were 67.17(31.7%) per prescription. This was because of large number of drugs were prescribed and available in the hospital pharmacy. These drugs were provided free of cost to the patients thereby reducing their cost burden. Being a general hospital, most of the patients were from low socioeconomic background, thus providing free drugs to them helps improve compliance.[33] Our study result is in contrast with the study conducted by Pathak et.al.[23] in Patna and Vineeta et.al.[24] in Belgaum the average cost per prescription were 487.5 INR and 376.97 INR respectively. The cost per prescription was high in the above study were because of large number of drugs prescribed from outside pharmacy.

There exists some limitation to our study, as the pharmacotherapeutic aspect of the prescriptions in relation to health problem or diagnosis of the patients was not assessed. The study was conducted in a tertiary care hospital located in urban area which cannot reflect the health care facilities available to all health centers particularly in the rural areas. This research was limited by size and site of the study population, a larger population size could give a better result and more reliable outcomes which could be generalize for the entire community.

Subsequent research in this subject is necessary to continuously establish the safety and effectiveness of majority of medicine used in dermatology outpatient department (OPD). This will enable the healthcare workers to be better informed to improve the quality of medication usage.

CONCLUSION
From the present study we conclude that:
- The drug utilization pattern among patients attending dermatology outpatientdepartment (OPD) at our tertiary care hospital is as per the WHO recommendations on conducting drug utilization study.
- In our study, though polypharmacy was found but it was necessary as per the condition of the patients and mainly prescribed drugs were for common disorders found in the study population.
- Antifungals, Antihistaminics and steroids were the most common drugs prescribed in our study population and as such no deviations in the prescription of the drugs were found which can be harmful to the patients.
- Prescriptions encountered with injections and steroids were less in the study population. This is an encouraging sign and need to be encouraged.
- Maximum drugs were prescribed by their generic name and were mentioned or present in the essential list of medicines, which is an encouraging sign.
- Prescription audit can be an eye opener and therefore, it should be done periodically to rationalize the prescription, reduce error and suggest cost effective management.

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