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Original Article

Analysis of antibiotics prescribed to patients attending dermatology OPD of a teaching hospital in Rohilkhand region

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Abstract

Background To assess the prescription pattern of antibiotics in dermatology OPD of a teaching tertiary care hospital.

Methods All the prescriptions issued to the patients attending the DVL OPD from October 2019 to January 2020 were recorded and evaluated for antibiotics used.

Results Out of the total number of prescriptions (21,015) issued in dermatology OPD in the study duration, prescriptions including antibiotics were 3,010. Antibiotics were most commonly prescribed for steroid induced rosacea followed by acne vulgaris followed by secondary infection over primary dermatosis. Oral, topical and injectable modes were used to administer antibiotics. The most common mode of administration was combination of oral and topical antibiotics. Total of 5,768 antibiotics drugs were prescribed in 3,010 prescriptions. Oral antibiotic drugs used in 2,679 prescriptions were 3,267, most common being doxycycline followed by cefadroxil. Injectables were prescribed only in 3 patients. Topical antibiotic prescriptions were 2,437. Total number of topical antibiotics drugs used were 2498, most common being metronidazole followed by clindamycin.

Conclusion A good prescribing pattern was found in our study resulting in rational use of antibiotics in dermatology OPD. It was found that alternate therapy was considered wherever possible. Such study conducted periodically helps in identifying the mistakes and correcting them. Hence, aids in preventing antibiotic resistance.

Key words
Antibiotics, dermatology OPD, prescription pattern.

Introduction

Dermatological conditions account for up to 2% of consultation in general practice worldwide.[1,2] Cutaneous infections contribute a significant amount of skin diseases seen in dermatology OPD. Bacterial infections are responsible for a majority of these cutaneous infections, most of which are caused by gram positive bacteria. Very few are caused by gram negative bacteria.[3]

Skin provides the first defence against a wide variety of bacterial invaders. When skin integrity gets compromised by factors like infection or trauma, its natural defence action is weakened to have the required antibacterial effect. In order to compensate for the lost natural barrier and to bring out necessary action, antibiotics use is indicated.[4] Antibiotics are naturally occurring, semi-synthetic or synthetic type of agents that destroy or inhibit growth of micro-organisms.[5] Although the term 'antibiotics' is used for antibacterial, antifungal, antiviral and

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antiparasitic agents, 'antibacterials' and 'antibiotics' are commonly used interchangeably. In addition to their antibacterial properties, many antibiotic agents, such as tetracycline & macrolide groups possess significant anti-inflammatory activities which has led to their use for treatment of various inflammatory dermatoses.[5]

In localised bacterial superficial skin infections, topical antibiotic treatment is adequate. In cases of widespread & deeper infections, systemic antibiotic treatment is needed. The latter are mostly treated by beta lactam antibiotics, macrolides and tetracyclines. In topical treatment, commonly clindamycin, metronidazole, nadifloxacin, fusidic acid and mupirocin are used in dermatology OPD.[1]

Common bacterial skin diseases where topical treatment is sufficient are: impetigo contagiosa, folliculitis, grade I acne & erythrasma. Systemic treatment is required in case of: severe staphylococcal and streptococcal infections, STDs, secondary bacterial infections, acne vulgaris, rosacea and dermatosis where bacterial antigens have role in pathogenesis (psoriasis esp guttate psoriasis).[1]

Since antibiotics use is common in dermatology practice their rational use is important to be considered by a health care provider.[10] The clinical consequences after antibiotic use include disruption of normal oropharyngeal flora resulting in pharyngitis, development of inflammatory bowel disease with the use of tetracycline-class antibiotics, increased risk of colon cancer with chronic antibiotic use seen in few studies and antibiotic resistance. The rational use of antibiotics means that right antibiotics should be prescribed for the right patient in adequate dose for the sufficient duration.[4] Periodic auditing of prescriptions having antibiotics to assess and revise the antibiotic prescription pattern in dermatology OPD provides an important educational tool enhancing the therapeutic efficacy, minimizing the adverse effects, optimizing the cost of treatment and to provide useful feedback to the health care provider.

Material and Methods

The study is a prospective observational study carried out in the OPD of DVL, Rohilkhand Medical College and Hospital, Bareilly, UP for a time period of 4 months from October 2019 to January 2020.

All the prescriptions issued to the patients attending the DVL OPD were entered in the case record forms. The prescriptions were carefully assessed and the relevant data was collected which included age, gender, symptoms of patients, the diagnosis made by the health care provider and the number and class of drugs, name of antibiotics prescribed for the disease, with the dose, duration, quantity of antibiotics to be applied and their frequency of administration.

Results

This study included 21,015 prescriptions collected from the patients attending dermatology OPD from 1st October 2019 to 31st January 2020. Antibiotics were prescribed to patients affected with bacterial infections and other dermatoses where antibiotics served an anti-inflammatory role. Different modes were used to administer these antibiotics i.e. local and systemic including oral and injectables.

Out of 21,015 total prescriptions, antibiotics were prescribed in 3,010 (14.32% of total prescriptions).

Table 1 Indications for antibiotic prescriptions.

Diagnosis	*No. of Prescriptions*	*% of Antibiotic Prescriptions (n=3010)*	*% Out of Total Prescriptions (n=21015)*
Topical steroid induced rosacea	812	26.97%	3.86%
Acne vulgaris	806	26.77%	3.83%
Secondary infection over primary diseases like Tinea; Scabies; Herpes zoster; Chicken pox etc	373	12.39%	1.77%
Hansen's disease	353	11.72%	1.68%
Folliculitis; furuncle; carbuncle	186	6.17%	0.88%
Irritant dermatitis	109	3.62%	0.51%
Acneform eruption (topical steroid/systemic steroid/other systemic drugs)	65	2.15%	0.31%
Infective eczema	52	1.73%	0.24%
Lichen planus	42	1.39%	0.19%
Sexually transmitted diseases	42	1.39%	0.19%
Cellulitis	15	0.49%	0.07%
Others (lupus vulgaris, scrofuloderma, trophic ulcer, post traumatic ulcer, burns ulcer, erysipelas, diabetic foot, etc)	155	5.15%	0.73%

Table 2 Modes of administration.

Route of administration	*Frequency of prescriptions*	*Percentage (Out of total antibiotic prescriptions) (n=3010)*
Topical+ oral combination	2109	70.066%
Oral only	570	18.936%
Topical only	328	10.897%
Injectable	3	0.0999%

Indications for which antibiotics were prescribed included acne vulgaris, rosacea, folliculitis, eczema, leprosy, secondary infections over primary dermatoses etc. The majority of the patients prescribed with antibiotic therapy in our study were of steroid induced rosacea, 812 out of 3,010 (26.97% of antibiotic prescriptions) followed by the patients diagnosed with acne vulgaris, 806 out of 3,010 (26.77% of antibiotic prescriptions) **(Table 1)**.

The commonest mode to administer these antibiotics was via combination of oral and topical route, 2,109 out of 3,010 (70.066%). Only oral route for antibiotic administration was used in 570 out of 3,010 patients (18.936%). Only topical antibiotics were prescribed in 328 out of 3,010 patients (10.897%). Injectable antibiotics were used only in 3 out of 3,010 prescriptions (0.0999%) **(Table 2)**.

Total number of antibiotic drugs given in these 3,010 prescriptions was 5,768, which included drugs administered systemically and locally. Out of the prescriptions containing oral antibiotics (2,679), some prescriptions had more than one orally administered antibiotics. Oral antibiotic drugs given in these prescriptions were 3,267 (56.64%) out of total 5,768 antibiotics. Most common oral antibiotic used was doxycycline, contributing 16.383% of total antibiotics followed by cefadroxil (6.119%). The injectable antibiotics were 3 out of total antibiotics contributing only 0.052% of total antibiotics. Only one drug was given via injectable route i.e. benzathine penicillin. Prescription pattern and indications of systemic antibiotics used are illustrated in **Table 3**.

Out of the total prescriptions, topical antibiotics were given in 2,437 prescriptions. Few

Table 3 Prescription pattern of systemic antibiotics.

Class/Group	*Drug*	*Frequency (n=3270)*	*Percentage Out of Total No of Antibiotics (5768)*	*Disease*
Cephalosporin	Cefadroxil	353	6.119%	Folliculitis, secondary infection over primary disease, irritant dermatitis, infective eczema
	Cefixime	3	0.052%	Gonorrhoea
Fluoroquinolone	Ofloxacin	40	0.693%	Folliculitis, furuncle
Macrolides	Azithromycin	195	3.380%	Acne vulgaris, steroid induced rosacea/acne, genital ulcer
	Erythromycin	11	0.190%	Pitted keratolysis, erythrasma, P. rosea
Nitroimidazole	Metronidazole	163	2.825%	Steroid induced rosacea, lichen planus
Oxazolidinones	Linezolid	5	0.086%	Trophic ulcer
Penicillins	Amoxicillin	166	2.877%	Folliculitis, furuncle, infective eczema, trophic ulcer, diabetic foot
	Amox-clav	72	1.248%	Folliculitis, furuncle, Carbuncle
Sulphonamide	Cotrimoxazole	9	0.156%	Recurrent furunculosis, Acne vulgaris
	Dapsone	43	0.745%	Lichen planus, recurrent aphthosis, neutrophilicdermatoses, bullous pemphigoid
Tetracycline	Doxycycline	945	16.383%	Acne vulgaris, steroid induced rosacea/acne, syphilis, genital ulcers
	Minocycline	223	3.866%	Acne vulgaris, steroid induced rosacea/acne, syphilis, genital ulcers
DOTS (cat-1)	Isoniazid	8	0.138%	Scrofuloderma, lupus vulgaris
	Pyrazinamide	8	0.138%	
	Rifampicin	8	0.138%	
	Ethambutol	8	0.138%	
Kit-1	Azithromycin	10	0.173%	Urethral discharge, cervical discharge
	Cefixime	10	0.173%	
Kit-6	Cefixime	4	0.069%	Genital ulcer disease, lower abdominal pain syndrome
	Doxycycline	4	0.069%	
	Metronidazole	4	0.069%	
MDT(MB)	Rifampicin	325	5.634%	Hansen's disease
	Dapsone	325	5.634%	Hansen's disease
	Clofazimine	325	5.634%	Hansen's disease
Inj. Penicillin	Benzathine penicillin	3	0.052%	Syphilis

prescriptions included more than one topically administered drug. In these 2,437 prescriptions individual topical antibiotic drugs were 2,498. Most common antibiotic prescribed topically was metronidazole, contributing 11.494% of total antibiotics, used for steroid induced rosacea followed by clindamycin, 10.939% of total antibiotics, used for acne vulgaris followed by fusidic acid contributing 10.766% of total antibiotics **(Table 4)**.

Majority of the patients prescribed with antibiotics in dermatology OPD either orally, topically or a combination of both were those affected with steroid induced rosacea followed by acne vulgaris. Systemic treatment of acne vulgaris and steroid induced rosacea was further assessed in detail which included both antibiotics and non antibiotic therapy. Number of prescriptions given for acne vulgaris affected patients attending the skin OPD in 4 months were 1,734 of 21,015. Among these 1,734 patients of acne vulgaris, systemic therapy was given in 1,056 (60.89%) patients, out of which

Table 4 Prescription pattern of topical antibiotics.

Drug	*Frequency (n=2498)*	*Percentage out of total no. of antibiotics (n=5768)*	*Diseases*
Metronidazole	663	11.494%	Rosacea, bacterial vaginosis
Clindamycin	631	10.939%	Acne vulgaris, steroid induced acne/rosacea
Fusidic acid	621	10.766%	Ulcers, folliculitis, Impetigo, diabetic foot, secondary infections
Mupirocin 2%	498	8.633%	Folliculitis, furuncle, carbuncle, recurrent furunculosis, secondary infection
Retapamulin	50	0.866%	Impetigo
Nadifloxacin	22	0.381%	Acne vulgaris
Silver sulfadiazine 1%	13	0.225%	Chronic burn ulcer

Table 5 Prescription pattern of systemic drugs in acne vulgaris and steroid induced rosacea.

Disease	*Oral Antibiotics*	*Other Oral Drugs*
Acne Vulgaris (n=1734 patients)	Doxycycline (416) Azithromycin (154) Minocycline (77) Cotrimoxazole (4) (n= 651 drugs in 598 patients)	Isotretinoin (415) OCPs (43) (n= 458 in 458 patients)
Steroid induced Rosacea (n=1227 patients)	Doxycycline (476) Metronidazole (154) Minocycline (136) Azithromycin (22) (n=788 drugs in 772 patients)	Vitamin C (49) Vitamin E (32) (n= 81 in 68 patients)

oral antibiotics including doxycycline, minocycline, azithromycin, cotrimoxazole were given in 598 patients (34.48% of 1,734), other oral drugs given were isotretinoin in 415 (23.93% of 1,734) patients and OCPs in 43 patients (2.47% of 1,734). Some patients out of these 1056 were also prescribed with topical antibiotics, either in combination with oral antibiotics or in combination with oral other drugs. In the 598 prescriptions of acne vulgaris including systemic antibiotics, total no. of oral antibiotic drugs were 651, as doxycycline & azithromycin were advised together in few prescriptions. Topical antibiotics were given in combination with oral other drugs in majority prescriptions, in combination with oral antibiotics in some prescriptions and only topical antibiotics were given in few prescriptions. 678 patients out of 1,734 (39.10%) were given only topical therapy where topical antibiotics used were clindamycin or nadifloxacin and topical others drugs used were tretinoin, adapalene, benzoyl peroxide. In these 678 patients, topical antibiotics were given in combination with other topicals drugs in some prescriptions.

Number of prescriptions given for steroid induced rosacea affected patients attending the OPD were 1,227. Among these patients, systemic therapy was given in 840 patients, out which oral antibiotics were given in 772 (62.92% of 1,227) patients and other oral drugs in 68 patients. In these 840 patients, topical antibiotics were also given in some prescriptions either in combination with oral antibiotics or with other oral drugs. Oral antibiotics included oral doxycycline used in 476, metronidazole in 154, minocycline in 136 patients and azithromycin in 22 patients of steroid induced rosacea. Total number of antibiotics prescribed in these 772 prescriptions were 788, as doxycycline and metronidazole were used in combination in few prescriptions. Oral drugs

other than antibiotics used in steroid induced rosacea were vitamin C in 49 and vitamin E in 32. In few patients vitamin C & E were given in combination. 387 patients out of 1,227 prescriptions were prescribed topical drugs i.e. **(Table 5)**.

Discussion

Analysis of the data in our study revealed that the use of antibiotics prescriptions accounted for 14.32% similar to a study done by Rajnesh Chakrawarty *et al.* in year 2017 where antibiotic prescriptions contributed 18.68% of total prescriptions in dermatology OPD. Similar findings were seen in studies conducted by Arun patil *et al.* and Anuj pathak where prescriptions with antibiotics were 11.08% and 15.91% respectively.[9,11]

Majority of antibiotics were given as combination of oral and topical therapy. Overall, the most preferred route for antibiotics was oral and the least preferred route was injection. These findings are comparable with studies by Bahelah *et al.* in year 2016, Khan et el in year 2010 and Kayode *et al.* in year 2012 and Rajnesh chakrawarty *et al.* in year 2017 but different than the study done by Anuj Pathak *et al.* where the most preferred route was topical.[1,4,6,7]

In our study, the most common indication for which antibiotics were used was steroid induced rosacea followed by acne vulgaris unlike the study by Rajnesh Chakrawarty *et al.* and Anuj Pathak *et al.* where antibiotics were most commonly indicated for acne vulgaris.[1,9] While in a study conducted by Bahelal *et al.* in Yemen, eczema and dermatitis were most common indications for antibiotics use in dermatology OPD.[4]

In the current study, antibiotic most commonly given by oral route was doxycycline followed by cefadroxil followed by dapsone. Hence, overall tetracyclines and cephalosporin group of drugs were most commonly used in our study similar to the findings of Barbieri *et al.* where doxycycline, minocycli1ne and cephalexin were the most commonly prescribed antibiotics.[10] In studies by Rajnesh chakrawarty *et al*. & Steven *et al.* beta lactam antibiotics were used.[1,8] Behlal *et al.* found macrolides to be the most commonly prescribed antibiotics in yemen.[4]

Topical antibiotics most commonly used were metronidazole followed by clindamycin followed by fusidic acid. This is unlike the study by Khan *et al.* & Rajnesh *et al.* where mupirocin was most preferred followed by clindamycin. Injectable antibiotics were minimally prescribed.[1,6]

The most common indication for prolonged use of oral antibiotic was found to be rosacea in which doxycycline (61.65%), minocycline (17.6%) were commonly used. This was comparable to the prescriptions of doxycycline (67%) and minocycline (25.93%) in rosacea patients in the study conducted by Barbieri *et al*. Oral metronidazole was given in (19.94%) of rosacea prescriptions in our study while it was not used by Barbieri *et al*.[1,10]

In acne vulgaris which was the second most common indication for the use of oral antibiotics, doxycycline was majorly used in our study (69.56%). It is comparable to the study conducted by Patro *et al*. Dharrao *et al.* and Barbieri *et al.* used azithromycin as most common antibiotic prescribed for acne.[10,12,13] The use of isotretinoin was 39.29% in acne patients in our study whereas it was 22.32% in study by Dharrao and was as high as 68.10% by Patro *et al*.[12,13]

Doxycycline and topical metronidazole and

clindamycin are the most common preferred drugs in steroid induced rosacea and acne in our study. This may be due the overuse and misuse of topical steroids commonly seen in our setting where people use them for acne and fairer skin without proper consultation. This overuse has increased in recent time due to increased prescription by quacks, increased accessibility of drugs even in rural and remote areas and false information propagated by various media platforms.

Also, since our study period was during winter season, impetigo and periporitis were less common resulting in beta lactams and mupirocin being used more frequently in other studies.

The use of drugs other than antimicrobials in various dermatological conditions wherever possible can help in avoiding irrational use of antimicrobials. Patients affected with acne vulgaris can be prescribed retinoids (isotretinoin) and oral contraceptives and topical retinoids (tretinoin, adapelene) and benzoyl peroxide. Those affected with steroid induced rosacea can use systemic vitamin C & E and topically tacrolimus. Also, giving combination of drugs rather than monotherapy helps avoid development of resistance to antibiotics. This can be seen in case of patients prescribed with combination of clindamycin and benzoyl peroxide both instead of clindamycin alone in acne vulgaris patients.

Giving antibiotics in lower doses (suboptimum doses) imposes anti-inflammatory effects without bringing the unnecessary antibiotic effect which would rather result in more side effects and development of resistance. In our study, this aspect of lower dosing has been used in conditions like rosacea and acne vulgaris where doxycycline in 50mg has been used in some patients instead of doxycycline in 100 mg dosage.

As increasing prevalence of antibiotics resistance is encountered by health care provider, such studies help in keeping a check on irrational usage and ensuring optimum dose of antibiotics, duration of therapy and considering alternate therapy to prevent this problem.[9]

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