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Original Research Article

A study on drug usage pattern of antibiotics in patients with skin disorders

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ABSTRACT

Background: Antibiotics are the crucial drugs of choice, and they are the greatest contributors to the treatment of bacterial skin diseases. The objective of the present study is to assess the drug usage patterns of antibiotics in the Department of Dermatology, Venereology, & Leprosy (DVL).
Materials and Methods: A Cross-Sectional Study was conducted with ethical approval for a period of 6 calendar months. Patients were recruited according to the eligibility criteria. Relevant details were collected according to the objectives and analyzed using Microsoft Excel.
Results: During the study period, 200 patients were recruited, of which 64% were male. Most patients were in the age group of 21-40 (36%). The most commonly reported disease during our study was secondary pyoderma occurring over eczema (29.5%), followed by Psoriasis (9.5%). Penicillin (32%) and Cephalosporin (32%) were the most prescribed categories. Mainly, a duration of less than or equal to 1 week was recommended. A total of 680 drugs were prescribed, and the average number of drugs per encounter with an antibiotic was 4.50%. The percentage of encounters with injections was 12%, and the percentage of medicine from the Essential Medicine List (EML) was 43%. Most drugs were prescribed from the access groups according to the World Health Organization (WHO) AWARE (Access, Watch, Reserve) classification.
Conclusion: According to the AWARE classification, drugs with lower resistance potential were commonly practiced here. This reflects good prescribing practice. The findings provide insight that, during our study period, the burden of bacterial skin diseases is lower in this locality when compared with other skin diseases.

1. Introduction

Drug therapy plays a predominant role in medical expenditures, which are necessary to improve the quality of a patient's life. A convenient and practical strategy for reducing the healthcare financial burden is drug utilization research, as it forms the basis for making amendments in drugs.[1]

In 1993, the World Health Organization (WHO) provided standard guidelines for the investigation of drug use in health facilities using indicators. The prescribing indicators are primarily designed to measure the extent of polypharmacy and to assess the incidence of local infections.[2]

Pyoderma refers to a skin infection, and there are mainly two types of pyoderma: Primary and Secondary pyoderma. Primary pyoderma occurs as a result of the colonization of bacterial pathogens directly without any underlying cause. A few examples of primary pyodermas are folliculitis,

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furuncle, impetigo, and carbuncles. Secondary pyoderma usually occurs as an outbreak of a primary skin disease, and some examples are atopic dermatitis, infected scabies, and tropic ulcers. The most common etiologies behind these are Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas, and coryneform bacteria.[3] Impetigo is a common superficial infection of the epidermis that is highly contagious, seen mostly in children aged two to five years and is classified as bullous or non bullous. The lesions in the region are highly contagious and spread very easily.[4–6] The epidemiology of impetigo accounts for approximately 10% of total skin diseases in the age group of <18. Out of total bullous impetigo cases, young children (i.e < 2 years) accounts for almost 90% of the cases.[7,8] Folliculitis is a common, generally benign, inflammation of the hair follicle. Carbuncles are an aggregate of infected hair follicles (two or more furuncles) that extends into the surrounding skin and deep underlying subcutaneous tissue, which is erythematous, tender, inflamed, fluctuant nodule with multiple draining pustules on the surface of the skin.[9,10] Paronychia is an infection of nail which is usually a result of break-down of the protective barrier between the nail and the nail fold.[11,12] A boil, also known as a furuncle, is a bacterial infection involving the perifollicular tissue which appears as a painful red swelling around the follicular opening that may progress to form an abscess.[13] Acne is a multi-factorial disease of the pilosebaceous glands in the skin and can be attributed to factors such as stress, genetics, and excessive sweating.[14–16]

Bacterial secondary infections occur due to the invasion of pathogens. This is a common skin condition that may appear after primary dermatoses, primary nonbacterial skin infections, traumatic lesions, ulcers, autoimmune diseases, and others. It can also occur in diseases such as psoriasis, eczema, and bullous disorders, etc.[17]

Syphilis is a sexually transmitted disease caused by Treponema pallidum and it is one of the common infections. The clinical presentation of the patients varies according to the stages such as early, latent and late latent. The infection is primarily symptomatic and it progresses to asymptomatic stage (latent).[18]

When looking at the risk factors for skin and soft tissue infections, specific age groups, including children and the elderly, healthcare professionals, immunocompromised patients, and those with poor nutrition, are more susceptible. Patients with mild infections typically present with erythema, warmth, edema, and pain over the affected site, with the lower extremities being the most commonly involved.[19]

Antibiotics are the crucial drug of choice and provide the greatest contribution to the treatment of bacterial skin diseases. These antibiotics are obtained from microorganisms, which either suppress or kill the growth of microorganisms. Topical antibiotics, either alone or in combination with systemic antibiotics, are used in the treatment of impetigo. Antibiotic treatment reduces the chances of complications from primary lesions. Initiating a 5- to 10-day course of oral antibiotics induces rapid healing of the disease.[20,21] Beta-lactams are effective in children with non-purulent SSTIs (Skin and Soft Tissue Infections) and, in adults, in cases of mild to moderate SSTIs without suppuration.[22,23] Topical antibiotics are the preferred treatment of choice; however, in cases of deeper folliculitis such as furunculosis and carbunculosis or more extensive involvement of the skin, oral antibiotics such as cephalexin and dicloxacillin are management options.[24] Incision, evacuation of pus and debris, and probing of the cavity to break up loculations provide effective treatment for cutaneous abscesses. However, the addition of systemic antibiotics to incision and drainage of cutaneous abscesses does not improve cure rates.[25–27]

As per WHO, Drug utilization study plays a pivotal tool that influences the distribution and prescription pattern of drugs. The drug utilization study helps in the understanding of treatment trends as well as the quality of prescription. By these studies, the quality of the prescription may be improved, in-turn it provides good health-care facility to patients.[28,29] This study investigates the drug usage pattern of antibiotics with the help of WHO indicators and also intended to study the commonly reported bacterial skin infections.

2. Materials and Methods

A cross-sectional observational study was conducted in the Department of Dermatology, Venereology, and Leprosy (DVL) over a period of six months (July-December 2022) with the ethical approval of the Institutional Human Ethical Committee (IHEC). We analyzed a total of 200 prescriptions that included antibiotics. Both in-patients and out-patients attending the DVL department were included in the study. The inclusion criteria were patients with bacterial skin diseases of all age groups and those with non-infectious inflammatory disorders.

The dependent variables in our study are the WHO prescribing indicators and the WHO AWARE (Access, Watch, Reserve) tool. The socio-demographic characteristics such as age and gender serve as predictor variables. The prescribing indicators include the average number of drugs prescribed per encounter, the percentage of encounters with antibiotics, the percentage of encounters with injections, and the percentage of medicines from the Essential Medicine List (EML). The formulas for deriving these values are adopted from WHO guidelines2.

WHO has developed an antibiotic stewardship tool and categorized antibiotics based on their resistance mechanisms. This classification is known as AWARE (Access, Watch, and Reserve). We collected and analyzed various details such as demographic information, clinical

presentation, diagnosis, and treatment charts for bacterial skin diseases using Microsoft Excel. The primary objective of the study is to identify commonly reported bacterial skin infections and to study the most frequently prescribed antibiotics using the WHO prescribing indicators.

3. Results

With the analysis of basic demographic details, we found that males were predominantly affected than females with the percentage of 64% and 36% respectively (Figure 1). Patients from the age group between 21- 40 (36%) are mostly affected followed by 41-60 (30%), <21 (25%), >60 (9%) (Table 1).

When analyzing the prescriptions, we found the following results: the most frequently prescribed route of administration was oral (80%), followed by injection (24%) and cream (9%) in our study. Based on the category of antibiotics, penicillins (32%) and cephalosporins (32%) were the most commonly prescribed to treat the disease. In our study, Cephalexin (27%) and Amoxicillin (20%) were the most commonly prescribed drugs of choice (Fig. 2).

Among the oral route of administration (80% of total prescriptions), Cephalexin (34%) was mostly given, followed by Amoxicillin (25.5%). Among the parenterals (11% of total prescriptions), Benzathine Penicillin (34%) was mostly prescribed, followed by Cefotaxime (29%) and Ampicillin (29%). In the topical route (9% of total prescriptions), the most frequently prescribed topical drug of choice was Silver Sulfadiazine (45%), followed by Fusidic Acid (40%) and Mupirocin (15%).

When exploring the length of treatment, the current study showed that a duration of ≤ 1 week (92%) was most common, followed by > 1 week (8%). During our study period, secondary pyoderma occurring over eczema (30%) was commonly encountered, followed by secondary pyoderma occurring over psoriasis (10%), and primary pyodermas such as furuncles and impetigo (9%) (Table 2).

In this study, the average number of drugs per encounter was 3.4. The percentage of encounters with antibiotics was 4.50%. The percentage of encounters with injections was 12%. The percentage of drugs from the Essential Medicine List was 43% (Table 3). According to AWARE classification, drugs from the access group (57%) are mostly recommended, followed by the watch group (43%). The drug Mupirocin was not categorized in this classification (Table 4).

Table 1: Age-wise classification of patients

0	Age	Percentage (%)
1	<14	14%
2	14-21	11%
3	21-40	36%
4	41-60	30%
5	>60	9%

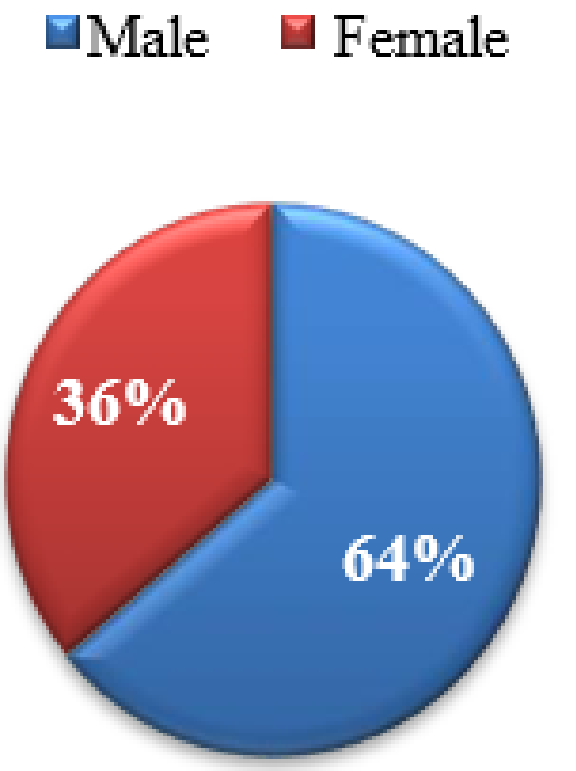

Figure 1: Sex wise distribution of patients

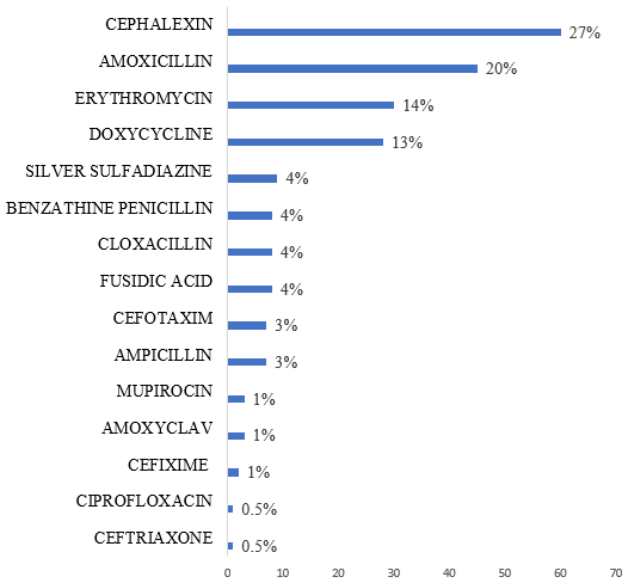

Figure 2: Distribution of drugs among patients

Table 2: Distribution of diseases

S.No.	Diseases	Percentage
1	Eczema	29.5%
2	Psoriasis	9.5%
3	Furuncles	8.5%
4	Impetigo	8.5%
5	Acne vulgaris	8%
6	Folliculitis	6%
7	Tropic ulcer	5%
8	Scabies with secondary Infection	5%
9	Syphilis	4%
10	Autoimmune bullous disorders	2.5%
11	Pitted keratolysis	2.5%
12	Tinea corporis with Secondary infection	2%
13	Herpes zoster with Secondary infection	1%
14	Cellulitis	1%
15	Vasculitis	1%
16	Pityriasis rosea	1%
17	Varicose ulcer with Secondary infection	1%
18	Acute paronychia	0.5%
19	Cutaneous larva migrans with secondary infection	0.5%
20	Hypertropic lichen planus with secondary infection	0.5%
21	Insect bite allergy secondary infection	0.5%
22	Pediculosis with Secondary infection	0.5%
23	Infected sebaceous cyst	0.5%
24	Henoch schonelin Purpuria	0.5%
25	Resolving right breast Abscess	0.5%

Table 3: WHO prescribing indicators

Indicator No.	Indicating measures	Observed values
1	Average number of medicines prescribed per patient encounter	3.4
2	Percentage of encounters with an antibiotic prescribed	4.5%
3	Percentage of encounters with an injection prescribed	12%
4	Percentage of medicines from essential medicines list or formulary	43%

4. Discussion

The analysis of the collected data shows similarities and differences with the prior studies. Our findings showed that males were predominantly affected by bacterial skin diseases than the female with percentages 64% and 36% respectively. This result is similar to studies by Divyashanthi et al.,[30] (60.48% males and 39.5% females), Chakrawarty et al.,[31] (male 51.48% and female 48.52%). Our study is contradictory to the study of Sultana et al.,[32] that demonstrated a percentage of 57 for females and 43 for males. It is not similar to the study of Bahelah et al.,[33] in which females had a percentage of 57.2.

Table 4: Classification of most commonly prescribed antibiotics as per WHO AWARE tool

Antibiotic	AWARE Classification
Cephalexin	Access
Amoxicillin	Access
Erythromycin	Watch
Doxycycline	Access

Our findings show that, the most people affected are in the age group 21- 40 (36%), which is similar to the studies of Sultana et al.,[32] and Chakrawarty et al.,[31] with percentages 58% and 47% respectively. These findings are different from the study of Divyashanthi et al.,[30] where 41-60 age group was predominantly affected.

The findings from route of administration show that oral route (80%) ranked the top to treat the patients, followed by parenteral (11%) and topical (9%). These findings are similar to the study by Divyashanthi et al.,[30] The study by Chakrawarty et al.,[31] demonstrates two interesting facts; first, their most preferred route was oral which is similar to our study, but the least preferred route was parenteral which is in contrast to our study. Our study findings deviate from the studies by Gupta et al.,[34] Bahela et al.,[33] and Sultana et al.,[32] in which the combination of oral and topical were the most preferred choices.

The category wise distribution in the present study shows that penicillins (32%) and cephalosporins (32%) contributed to a higher percentage which is in contrast to the studies of Bahelah et al.,[33] Sultana et al.,[32] where macrolides contributed a larger volume (39.5% and 33.2% respectively) and study by Chakrawarty et al.,[31] where tetracyclines was commonly prescribed 33.8%.

The most frequently prescribed oral antibiotics were Cephalexin and Amoxicillin (27% and 20% respectively) which is almost similar to the study of Chakrawarty et al.,[31] their study showed that the most commonly prescribed drugs were Doxycycline (33.87%) and Amoxicillin (24.34%).Our study results are in contrast to the studies of Divyashanthi et al.,[30] Gupta et al.,[34] Sultana et al.,[32] where amoxicillin clavulanic acid (29.6%), Doxycycline(16.3%), Azithromycin(22%) are commonly prescribed drugs.

Among the parenteral formulations, Benzathine penicillin (4%) was mainly given and this is similar to the study by Chakrawarty et al.,[31] (1.3%). Benzathine penicillin is followed by cefotaxime (3%) and Ampicillin (3%). The preferred parenteral choice in the study of Divyashanthi et al.,[30] was cefotaxime which is in contrast with our study. Gupta et al.,[34] stated that only one injectable is used, which is in contrast with our study, where about 6

injectables are given.

Among the topical formulations, the frequently prescribed drug of choice is silver sulphadiazine (4%) followed by fusidic acid (4%) mupirocin (1%). This is in contrast with the study of Divyashanthi et al.,[30] and Chakrawarty et al.,[31] where Mupirocin is the topical drug of choice. In addition to this, the study also differs from the study by Gupta et al.,[34] in which metronidazole was mostly preferred.

Talking about the duration of therapy, the present study shows that a duration of ≤ 1 week (92%) is the preferred duration of treatment, which is in contrast with the study of Sultana et al.,[32] where more than one week duration of therapy is preferred for 60% drugs and also with the study of Bahelah et al.,[33] where, a single week of treatment is recommended – 78.4%.

Our study reveals, the most commonly reported disease was Eczema (Secondary pyoderma) (30%) which is similar to studies of Sultana et al.,[32] (19% for eczema) and Bahelah et al.,[33] (28.4%). The eczema is followed by psoriasis (10%) which is less likely similar with Divyashanthi et al.,[30] study where the commonly encountered disease is Psoriasis (24.82%) followed by Eczema (12.24 %). This is different from the study of Gupta et al.,[34] where the commonly diagnosed disease is Steroid induced rosacea (26.97%) also in contrast to Chakrawarty et al.,[31] a study in which Scabies (9.51%) and Acne vulgaris (8.16%) are the commonly encountered diseases.

Our study assessed the drug use pattern by employing one of the 3 core WHO indicators i.e. (prescribing indicators). In this study, the average number of drugs per encounter is 3.4. The value was slightly higher than WHO standard value (normal range < 2). Moreover, the value was also higher compared to the findings from one of the South Indian studies by Priyadharshini et al.,[35] (2.5) and also lesser than that of study conducted by Pradeep kumar et al.,[36] (3.53). The percentage of encounters with antibiotics is 4.50% which lies within WHO standard value (normal range <30%), but lower when compared with studies of Priyadharshini et al.,[35] (17.5%), Mani et al.,[37] (29%) and Pradeep kumar et al.,[36] (50.0%). The percentage of encounters with injection is 12% which is within the range of WHO value (<20%) but lower than the study conducted by Mani et al.,[37] (48%). The percentage of drugs from the essential medicine list in our present study is 43%. This is lower than the WHO standard value (100%). Moreover our values are lower comparing with the various other Indian studies conducted by Priyadharshini et al.,[35] (62.5%) Mani et al.,[37] (69%) and Pradeep kumar et al.,[36] (91.48%). The Essential Medicine List (EML) or Essential Drug List is intended to satisfy the major health care needs of the majority of the population. Despite prescribing drugs from the essential medicine list the health care practitioners aim to prescribe the right medicine to treat their patients with affordable cost.

In our present study, according to AWARE classification of antibiotics, drugs from access classification accounted for major proportion than watch classification (57% and 43% respectively). The commonly prescribed drugs were from the access group and this result is similar to the study conducted by Priyadharshini et al.[35]

5. Conclusion

According to the AWARE classification, drugs with lower resistance potential, such as Cephalexin and Amoxicillin, were commonly prescribed, reflecting good prescribing practices. Our study's interpretations reveal that secondary pyodermas occurring over eczema and psoriasis are the commonly encountered diseases in this locality. Secondary infections are more prevalent in this region than primary infections. These findings provide insight that during our study period, the burden of bacterial skin diseases is actually lower when compared to other skin diseases.

In this study, the average number of drugs per encounter was 3.4. The percentage of encounters with antibiotics was 4.50%, with injections accounting for 12% of encounters. The percentage of drugs from the Essential Medicine List was 43%. We recommend maintaining an adequate supply of drugs from the Essential Drug List (EML) to satisfy the healthcare needs of the population. This study also suggests that patients follow good hygiene practices and seek early treatment for inflammatory disorders with proper medication adherence to prevent the occurrence of secondary infections.

Furthermore, this study recommends that patients avoid using natural home remedies without a proper diagnosis of the actual disease condition and refrain from taking Over-The-Counter (OTC) medications of their own choice. Using these natural home remedies and OTC medications can lead to consequences such as the rapid development of secondary dermatoses, complicating the treatment of the disease and prolonging the treatment duration.

6. Source of Funding

None.

7. Conflict of Interest

None.

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