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Research Article

Corticosteroid utilization patterns in a tertiary care teaching hospital, Rupandehi, Nepal

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ABSTRACT

Background & Objectives: Corticosteroids are synthetic drugs that mimic the natural hormones produced by the adrenal cortex. Long-term or high-dose corticosteroid use is associated with significant adverse effects. Drug utilization research plays a critical role in monitoring and evaluating corticosteroid use and promote adherence to standard treatment guidelines. This study ais was to find out the utilization pattern of corticosteroids in outpatient settings

Materials and Methods: A Prospective cross-sectional study was conducted to assess the prescription pattern of corticosteroid drugs in the outpatient department of Universal College of Medical Sciences. A total of 237 patients were included over a period of six months. Patients on any type of corticosteroid treatment were enrolled in the study and the prescribing as well as tapering patterns of steroids was reviewed.

Results: Steroids were prescribed for various respiratory conditions 28.7%, dermatological conditions 28.7% and musculoskeletal disorders 22.4%. Budesonide was the most commonly prescribed drug, followed by prednisolone, deflazacort and methylprednisolone. The 39.53% of steroid drugs were administered through the oral route followed by inhalation 23.59% and topical route 22.92%. Among all steroid drugs, methylprednisolone was the most commonly tapered, followed by prednisolone and deflazacort. The combination of steroid drugs with other drugs accounted for 39%, among which formoterol and fusidic acid were found to be the most common.

Conclusions: Findings indicate largely rational prescribing patterns; however, standardized guidelines and stricter regulatory enforcement are necessary to optimize corticosteroid use in Nepal.

Involving clinical pharmacists can enhance therapy optimization, improve quality of life, and minimize adverse reactions and costs.

Keywords: Corticosteroids, Tapering, Drug utilization

INTRODUCTION

Corticosteroids are effective in relieving symptoms of allergy, inflammation, or undesirable immunological reactions [1]. Corticosteroids regulates fluid-electrolyte, cardiovascular, and energy metabolism, as well as skeletal muscle and neurological system function. They strengthen the body's resistance to noxious stimuli and stress [2]. Corticosteroids imitate the natural steroid hormones produced by adrenal cortex. Steroid therapeutic effects sometimes coincide with undesired side effects, particularly when high dosages and long-term treatment are necessary [3]. Adverse effects occur in up to 90% of individuals who take glucocorticoids for more than 60 days [4].

In Nepal and India, the majority of these medications, especially topical corticosteroids are available without a prescription or patients can readily purchase them from a local pharmacy [5]. Non-registered practitioners or chemists using it inappropriately to treat various dermatological conditions such as acne, bacterial and fungal infections raise concern about potential adverse effects [6]. Due to hesitation in visiting hospitals, many individuals used topical corticosteroids (TCS) based on the advice of pharmacists or friends, continuing use until visible cutaneous adverse effects developed or the condition worsened [7]. Inappropriate prescriptions are a major healthcare issue worldwide, especially in developing countries, so prescriptions should be audited on a regular basis to improve therapeutic effectiveness, reduce side effects, provide feedback to prescribers and ensure compliance with medical treatment guidelines [2,8].

The World Health Organization (WHO) defined drug utilization research as “the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences [9]. Drug utilization research is an essential part of pharmacoepidemiology, as it describes the extent, nature, and determinants of drug exposure, helps in identifying problems in drug use and reduces adverse drug reactions, optimizing the drug therapy [10]. To improve patient care, it is important to monitor, evaluate, and analyze the utilization pattern of corticosteroids. This analysis will enhance medical treatment standards at all levels and aid in identifying problems related to the health system [11]. Adherence to standard treatment guidelines during corticosteroid treatment is crucial for rational drug use [12]. Periodic monitoring of drug utilization pattern analyzes the rationality of drugs and also helps in easy identification of problem related to drug use like drug interaction, adverse reactions and polypharmacy [6]. The main objective of this study was to evaluate the utilization patterns of corticosteroids in a tertiary care teaching hospital in Rupandehi, Nepal.

MATERIALS AND METHODS

A Prospective, cross-sectional study was conducted over six month’s duration (November 2024 to April 2025). The study was conducted in the out-patient departments of Universal College of Medical Sciences and Teaching Hospital, Ranigaun, Bhairahawa, Nepal. The study population comprised patients who were receiving

corticosteroids at the hospital's out-patient department. Purposive sampling technique was utilized to select participants who met the specific inclusion criteria, continuing until the required sample size was fulfilled. Relevant information was systematically gathered through the review of demographic data and patient prescriptions. Ethical approval for this study was obtained from the Institutional Review committee (IRC) of Universal College of Medical Sciences (Approval No: UCMS/IRC/100/24). Prior to data collection, the research objectives were clearly explained to all participants and verbal informed consent was obtained before each interview. All respondents were assured that their participation was voluntary and that the information collected would be maintained with strict confidentiality, being utilized solely for research purposes.

Sample size[2]

The sample size was calculated by using the formula: $n=z^2pq/d^2$ with 95% level of confidence interval, 5% margin of error and the prevalence of patients prescribed with steroids for skin related disorders was taken as 19% among the patients visiting outpatient departments of district hospital, Amravati, India. Sample size was calculated using formula:

Sample size (n) = $[z^2\times p\times q\div d^2]$

= $[(1.96)^2\times 0.19\times 0.81\div (0.05)^2]$

= 237

Where, Prevalence (p) = 19% =0.19, Complement of p, i.e., q=1−p

(1-0.19) = 0.81

Z-score corresponding to the desired confidence level (z) = 1.96

Margin of error (d) = 5% = 0.05

Sampling criteria

Patients of all ages and both sexes prescribed with any form of corticosteroids (oral, parenteral, topical, or inhalation) were included in the study. However, those treated on an inpatient or emergency basis, and patients or relatives who declined to provide consent, were excluded.

Data collection tools and techniques

Data were collected using a pre-designed data collection form structured to capture comprehensive information. The tools and techniques involved extracting patient demographic data such as age, gender and income, which were then documented systematically. Additionally, clinical details including medication names, dosage forms, and duration of therapy, frequency and quantities were recorded from the prescriptions into the same standardized form.

Statistical analysis

SPSS Version.20 was used for the data analysis in this study. Descriptive statistics were calculated to capture patient demographics and presented in terms of frequency and percentage. In summary, the data analysis was conducted in alignment with the study objectives, utilizing SPSS for comprehensive statistical analysis.

RESULTS

The socio-demographic characteristics of the patient are mentioned in table 1. The mean age of the population was 45.89±21.48 (mean ± SD). Among the patients included in this study, 25 were smokers and 34

consumed alcohols. Of these, 18 engaged in both smoking and alcohol consumption.

Table 1: Basic socio-demographic data of patients

Variables	No. of patients (n=237)	Percentages (%)
Gender		
Male	109	46.0
Female	**128**	**54.0**
Age (years)		
Less than 20		
21-40	28	11.8
41-60	**73**	**30.8**
Above 60	67	28.3
	69	29.1
Social Habits		
Smokers		
Alcoholic	7	3.0
Both smoking and	16	6.8
Alcohol	18	7.6
None	**196**	**82.6**

Table 2 depicts the distribution of corticosteroid use across various outpatient departments.

Table 2: Distribution of departments associated with steroid use

Department	No. of Patients (n=237)	Percentage (%)
General Medicine	61	25.7
Orthopedics	55	23.2
ENT	34	14.3
Dermatology	**68**	**28.7**
Pediatrics	12	5.1
Others	7	3

Table 3 illustrates the distribution of corticosteroid use according to the associated physiological systems. The common indications for corticosteroid use across various departments.

Table 3: Distribution of corticosteroid utilization according to the associated physiological system

Physiological System	No. of patients (n=237)	Percentage (%)
Respiratory	**68**	**28.7**
Musculoskeletal	53	22.4
Nervous	8	3.4
Skin	**68**	**28.7**
Ear, Eye, Nose	37	15.6
Others	3	1.3

Table 4: Indication for usage of steroid

Department	Indication	No. of Patients
Orthopedics (n = 55, 23.2%)	Osteoarthritis	12
	Polyarthritis	13
	Rheumatoid Arthritis	4
	Spondylitis	4
	Degenerative Disc Disease	3
	Others	19
General Medicine (n = 61, 25.7%)	COPD	38
	Bronchial Asthma	15
	Others	8
Dermatology (n = 68, 28.7%)	Eczema	28
	Erythema	7
	Urticaria	6
	Allergic Contact Dermatitis	4
	Alopecia Areata	3
	Insect Bite	3
	Others	17
Pediatrics (n = 12, 5.1%)	Bronchiolitis	5
	Bronchial Asthma	3
	LRTI (Lower Respiratory Tract Infection)	4
ENT (n = 34, 14.3%)	Ear Infection	12
	Otitis Media	5
	Sinusitis	6
	Allergic Rhinitis	7
	Others	4
Others (n = 7, 3%)	Facial Palsy	3
	Eye Infection	2
	Encephalitis	1
	Sciatica	1

Figure 1 illustrates the total number of corticosteroids prescribed per patient. The data reveal that most patients were prescribed a single corticosteroid, accounting for 183 cases (77.2%) followed by prescriptions including two corticosteroids in 46 cases (19.4%), three in 6 cases (2.5%), and four in 2 cases (0.8%).

Table 5 illustrates the Frequency of distribution of different corticosteroid prescribed. The oral route was the most common, with 119 cases (39.53%), followed by inhalation at 71 cases (23.59%) and topical applications at 69 cases (22.92%). The

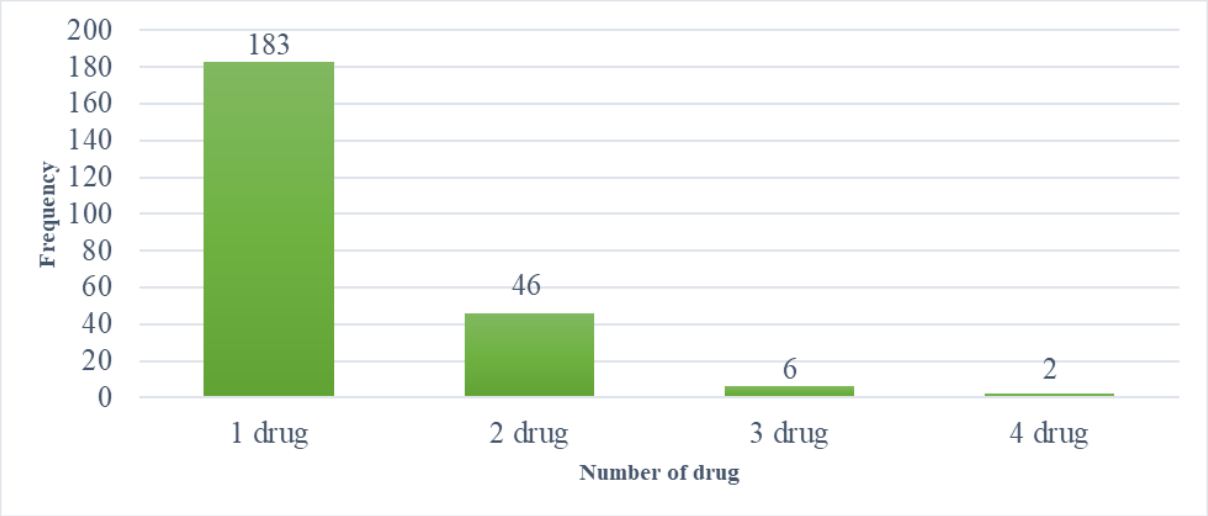

Figure 1: Number of steroidal drugs prescribed per prescription

Table 1: Frequency of distribution of different corticosteroid prescribed

Steroid	Frequency (n=301)	Percentage (%)
Budesonide	66	21.9
Prednisolone	53	17.6
Deflazacort	41	13.6
Methylprednisolone	24	8.0
Hydrocortisone	14	4.7
Mometasone	20	6.6
Betamethasone	11	3.7
Clobetasol	15	5.0
Halobetasol	8	2.7
Beclomethasone	13	4.3
Fluticasone	9	3.0
Dexamethasone	15	5.0
Triamcinolone	10	3.3
Fluocinolone	2	0.7

otic route accounted for 21 cases (6.98%), while nasal administration was less frequent, with 13 cases (4.32%). Parenteral use was relatively rare, seen in just 2.33% of outpatient cases. Additionally, a case of corticosteroid administration via the ophthalmic route was observed during the study period. The distribution of corticosteroid therapy duration is presented in Figure 2.

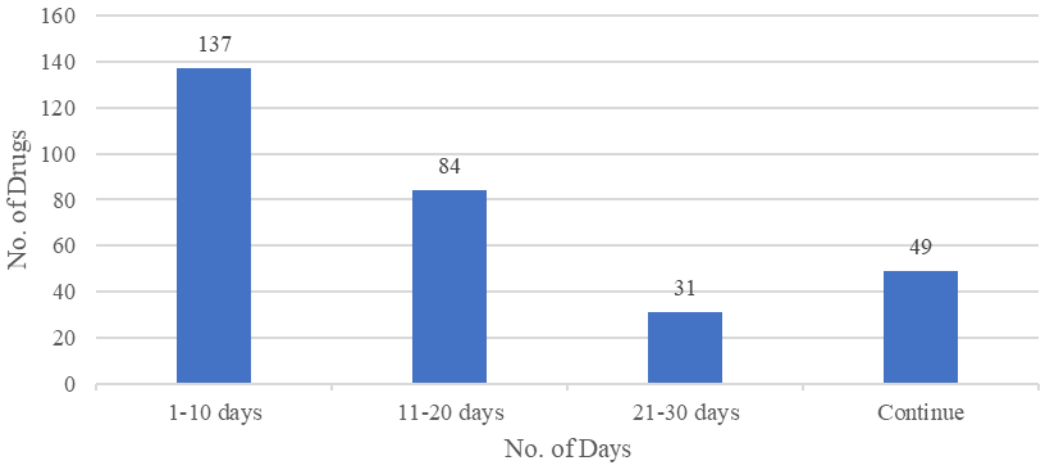

Figure 2: Representing the duration of corticosteroid therapy

DISCUSSION

This study examined 237 prescriptions involving corticosteroids, among them 54% were female and 46% were male, which is consistent with the findings of a study conducted by Chowdhury et al. where 53% were female and 47% were male [9]. In this study, there was not much difference in the age distribution among participants above 20 years; however, fewer individuals were found in the age group below 20. The mean age of participants in this study was 45.89 ± 21.48 years. Similarly, in the study conducted by Chowdhury et al., the mean age was 46.66 ± 15.23 years [9]. Regarding social habits, among the participants, 25 were smokers, 34 consumed alcohol, and 18 engaged in both smoking and alcohol use. This pattern is consistent with the findings of Gouda et al., where non-users of both alcohol and tobacco outnumbered users, followed by those who used both substances [3]. According to the department-wise distribution of prescriptions, 28.7% were from the Department of Dermatology, 25.7% from General Medicine, and 23.2% from Orthopedics, followed by prescriptions from the ENT and Pediatrics departments. This distribution is similar to the findings of a study conducted by CH Pavithra et al., in which the highest number of prescriptions came from General Medicine (59%), followed by Dermatology (34%) and Orthopedics (7%) [13].

The data collected included 68 patients (28.7%) with respiratory conditions, 68 patients (28.7%) with dermatological conditions, 53 patients (22.4%) with musculoskeletal disorders, 37 patients (15.6%) with complaints related to sense organs (ear, eye, and nose), and 8 patients (3.4%) with central nervous system complaints. A similar study by Shende et al. reported comparable findings, with the

majority of complaints being respiratory (29.6%), followed by dermatological complaints (19%) [2]. Corticosteroids possess powerful anti-inflammatory action, which shows that they are frequently used to reduce inflammation in respiratory tract and dermatological conditions. The majority of prescriptions in this study contained one steroidal drug per prescription (77.2%), which is similar to study performed by Gouda et al., where 89% of prescription contains one drug [3].

According to our study, the major clinical complaints of patients visiting the general medicine department were related to respiratory tract infections, primarily chronic obstructive pulmonary disease (COPD) and bronchial asthma. This finding is consistent with the study conducted by Varkey S et al. [14]. Similarly, a study conducted by Seth HJ et al. in India reported that eczema was the predominant dermatological condition treated with corticosteroids in the Dermatology department [12]. Our findings support this, revealing that eczema was the most common dermatological complaint managed with corticosteroids, followed by erythema and urticaria. In the ENT (Otorhinolaryngology) department, ear infections were the primary indication for corticosteroid therapy, which aligns with the findings of Islam B et al, who also observed predominant corticosteroid use for similar conditions in ENT settings [15]. In the Orthopedics department, corticosteroids were chiefly prescribed for arthritis-related conditions, including polyarthritis, rheumatoid arthritis, and osteoarthritis. In the Pediatrics department, respiratory tract infections such as bronchiolitis and bronchial asthma were the leading indications for corticosteroid use. Additionally, a few cases of facial palsy (Bell's palsy) were reported in the Neurosurgery department, where corticosteroids were prescribed as part of the treatment regimen. This is supported by the findings of Kang et al., who also documented corticosteroid use in the management of Bell's palsy [16]. The variation in results among different studies may be due to several factors, including geographical and environmental differences, differing inclusion criteria, and seasonal variations. For instance, conditions such as arthritis, COPD, and eczema are known to flare up during the winter season, which may influence the frequency of corticosteroid prescriptions during this period.

In this study, the most widely prescribed corticosteroids were Budesonide (21.93%), followed by Prednisolone (17.61%), Deflazacort (13.62%), and Methylprednisolone (7.97%). These findings are comparable to the study by Aryal et al., where Budesonide was the most commonly prescribed (44.45%), followed by Prednisolone (15.25%) and Hydrocortisone (14.9%). Clobetasol was the most commonly prescribed topical corticosteroid, followed by Beclomethasone and Betamethasone [6]. This prescribing trend is consistent with the study by Adhikari P et al., which also reported Clobetasol as the most frequently used, followed by Mometasone and Betamethasone [17]. Within the ENT department, Mometasone was primarily administered as a nasal spray, while Dexamethasone was commonly used in the form of ear drops. The higher prescription rate of Budesonide in our study can be linked to the greater number of respiratory-related complications reported in the General Medicine and Pediatrics departments. On the other hand, unlike the findings of Aryal et al. and Wondmkun and Ayele, the lower usage of Hydrocortisone in

our study can be explained by our inclusion criteria. Hydrocortisone is primarily administered intravenously to inpatients, whereas our study focused solely on outpatient department data [6, 8].

Among the total number of prescription Oral route (39.53%) is the most preferred route of administration followed by inhaler (23.59%) and Topical (22.92%). This finding was consistent with the study of Chowdhoury et al. [9], where oral route was most preferred route (37.75%) but not consistent to the study of Thakur P. et al. [11] and Wondmkun and Ayele [8], where inhalation (46.9%) and intravenous (51.3%) was the most preferred route of administration respectively. This can be due to the difference in the inclusion criteria of the study.

According to duration of corticosteroid therapy, our study revealed that most of the corticosteroids were used for less than 10 days (46%), the numbers decreases with increase in duration, 28% prescribed for duration of 10-20 days while 10% were prescribed for up to one month. Similar study conducted by John et al. support the result of our study [10], which signifies that the corticosteroids were used for short term therapy with precaution, due to its severe adverse reaction on long term use. Additionally, 16% of total steroid were prescribed for long term management which were low dose inhalation corticosteroids combine with another class of drug to maintain the remission and prevent frequent exacerbation of respiratory complication. Out of 301 drugs, only a small fraction (1.33%) was prescribed by their generic names. A study conducted in India by Aryal et al. revealed similar results, with only 23% of drugs prescribed using generic name [6]. The predominance of brand-name prescriptions in our study is likely due to limited availability of generic medicines. In this study, a total of 49 corticosteroid prescriptions involved dose tapering. Among them, 44 drugs were administered orally, while 5 were applied topically. This finding suggests that systemic (oral) corticosteroids are more likely to require dose tapering compared to topical formulations, this is likely due to differences in bioavailability between the oral and topical routes.

Among the orally prescribed corticosteroids, methylprednisolone was tapered in 100% of encounters, followed by prednisolone (24%) and deflazacort (15%). The potency of the drug and its ability to suppress the hypothalamic-pituitary-adrenal (HPA) axis are important factors in determining the need for dose tapering. More potent corticosteroids suppress the HPA axis more strongly and therefore require a slower and more careful reduction in dosage to prevent adrenal insufficiency. According to the study conducted by Parente L, the dose equivalence ratio of deflazacort: prednisolone: methylprednisolone is 1:0.667:0.533, indicating that methylprednisolone is the most potent, followed by prednisolone, and then deflazacort. This potency ranking is consistent with our findings and supports the observed differences in tapering practices among these drugs [18]. In our study, corticosteroids administered through other routes such as inhalation, nasal, or otic, were not associated with dose tapering. This is likely because these routes result in minimal systemic absorption, act primarily at the local site, involve lower doses, and cause less suppression of the hypothalamic-pituitary-adrenal (HPA) axis [19].

Our study revealed that 39% of prescribed steroids were in combination with drugs from other therapeutic classes. Mostly, inhalation corticosteroids were combined with long-acting beta receptor agonists such as formoterol and salmeterol. This finding is consistent with the study by Varkey S et al. conducted in the pulmonology department, which identified formoterol as the most frequently combined inhalation drug with corticosteroids [14]. This is due to the reason that the combination of inhalational corticosteroid (ICS) and long-acting beta agonist (LABA) reduced the frequency of exacerbation of COPD. Furthermore, current clinical guidelines Global Initiative for Chronic Obstructive Lung Disease (GOLD) recommend that ICS should not be used alone in the management of COPD but rather in combination with bronchodilators, due to its limited efficacy as monotherapy and increased risk of adverse effects such as pneumonia [20]. Additionally, majority of topical corticosteroids were used in conjunction with antimicrobials like gentamycin, clotrimazole, and fusidic acid. The study conducted by Shrestha D et al., at the dermatology department in Kathmandu are consistent with our finding [21]. Topical corticosteroids are frequently used in conjunction with antimicrobial agents to treat inflammatory skin conditions that are complicated by infection.

CONCLUSIONS

From our findings, we concluded that most of the prescriptions were rational. However, the establishment of standardized treatment guidelines, along with strong regulatory enforcement for the appropriate use of corticosteroids across various indications is highly essential in the context of Nepal. Involving clinical pharmacists in patient care plays a vital role in preventing side effects, drug-drug interactions and adverse drug reactions (ADRs).

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