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Original Research Article

Study of Corticosteroids Utilization in the Department of General Medicine and Dermatology at a Tertiary Care Teaching Hospital, Nuh, Haryana

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Abstract:

Background: Corticosteroids are used consistently in healthcare for the management of several immunological and inflammatory diseases. To keep better regulation over the quality of drug utilization or prescribing in terms of appropriate/rational use of corticosteroids in any healthcare setting, it is necessary to estimate and evaluate its pattern of drug utilization by periodically conducting the DUE (drug utilization evaluation) studies.

Aim and Objectives: Estimation and evaluation of the pattern of corticosteroid utilization to promote their safer and appropriate use.

Materials and Methods: This was a 12 months long, observational, cross-sectional DUE study carried out in a total of 260 participants which included patients (OPD and IPD) of all ages receiving corticosteroid in the department of general medicine and dermatology, SHKM GMC, Nalhar. Outcomes measured were the socio-demographic characteristics, drug use related information of corticosteroids and evaluation of pattern of utilization using WHO Prescribing indicators. The results were expressed as frequencies, percentages, and averages.

Results: Out of 260 participants, with 66.9% (174) majority of the participants were males. A total of 333 corticosteroids were utilized with a prevalence of 16.9%. A higher corticosteroid use prevalence of 28.5% and FDCs prescribing of 46.8% was observed in the department of dermatology to that of general medicine department with use prevalence of 11% and FDC prescribing of 16.3%. However, in general medicine department, a higher injectable prescribing of 44.7%, generic prescribing of 89.5% and prescribing from NLEM of 100% was observed when compared to that of dermatology department with an injectable prescribing of 7.8%, generic prescribing of 42.2% and prescribing from NLEM of 29.2% only. WHO Prescribing indicators revealed that a total of 197 corticosteroids were prescribed in 160 outpatients, out of which 49.7% corticosteroids were generic and 41.1% were prescribed from NLEM, average number of drugs prescribed per outpatient was found to be 4.4, prescriptions with antibiotics and injectable were 65% and 4% respectively.

Conclusion: Corticosteroid use prevalence was found to be lower than the use prevalence reported by some previous studies conducted in different parts of India as well as internationally. However, to further enhance the appropriateness of corticosteroid utilization, reduction in the average number of drugs and corticosteroids per prescription, more prescribing from the essential medicines list and generic prescribing are needed.

Keywords: Corticosteroids, Drug Utilization, Prescription pattern evaluation, Steroids, Inflammation, rational use, prescribing indicators, overuse or misuse, dermatology, general medicine.

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Introduction

The discovery of the first corticosteroid, 'cortisone', in 1950 brought the Nobel Prize in medicine and physiology to Edward C. Kendall and Phillip S. Hench, and for the first time, a patient suffering from rheumatoid arthritis was treated with cortisone. [1] Since then, along with the discovery of cortisone's synthetic analogues, they have quickly become an integral part of modern-day healthcare. This is demonstrated by the fact that corticosteroids are among the most prescribed medication classes globally, with an estimated yearly market value of over $10 billion. [2]

Most corticosteroids have both glucocorticoid and mineralocorticoid activity. However, the glucocorticoid activity accounts for most of their therapeutic uses. This can be explained by the fact that inflammation is always the primary response, regardless of the kind of injury or damage, and which is inhibited effectively by glucocorticoid activity of corticosteroids. [3] Hence, they have a wide spectrum of clinical uses as anti-inflammatory and immunosuppressive drug in various diseases like asthma, anaphylaxis, angioedema, hives, eczema/atopic dermatitis, grave's disease, myasthenia gravis, guillian barre syndrome, multiple sclerosis, idiopathic thrombocytopenic purpura, pemphigus vulagris, bullous pemphigoid, vitiligo, post-streptococcal glomerulonephritis, RA, lupus, henoch-schnolein purpura, hypersensitivity pneumonitis, vasculitis, inflammatory bowel disease, SJS/TEN, contact dermatitis, fixed drug eruptions etc. [4]

Thus, it is evident that when used carefully and appropriately, corticosteroids not only allow better management of several autoimmune, inflammatory, and immunological reactions rather they can also be life-saving. However, corticosteroids are like a double edged sword, as their inappropriate use can lead to wide systemic adverse effects such as osteoporosis, fractures, HPA axis suppression, cushingoid features, drug induced diabetes and hyperglycemia, myopathy, raised IOP, psychiatric disturbances, immunosuppression (recurrent infections), hypertension and heart diseases, gastritis and peptic ulcers, decreased libido, skin atrophy and discoloration. Hence, they should be utilized or prescribed appropriately /rationally. [5-14]

WHO has defined appropriate use as "Patients receiving medications appropriate to their clinical needs, in doses that meet their requirements, for an adequate period, and at the lowest cost to them and their community". [15] In India, usually the bigger and more prevalent problem associated with the inappropriate use of corticosteroids is their overuse and misuse. In a study conducted by Savita Chaudhary et al in 2017, it was observed that, out of 5256 patients screened about 80% of the patients were using topical corticosteroids without consulting a qualified medical practitioner. [16]

For the purpose of promoting the appropriate /rational use of drugs WHO in 1977 came up with the idea of drug use evaluation (DUE) research and defining it is as, "The marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences". The ultimate goal of drug utilization study is to promote rational drug therapy. The process of drug use evaluation (DUE) is a continuous, systematic, criteria-based system of obtaining information to identify problems related to drug use or prescribing and providing means of correcting these problems. Thus by conducting DUE studies on corticosteroids, researchers can estimate their use prevalence, overuse or underuse, comparative evaluation over time and to the other group of prescribers (either from the same healthcare facility or with prescribers from different healthcare facilities or regions or even countries), and evaluation of drug use quality with regards to recommended guidelines. Hence, findings of such studies help us to estimate and evaluate the pattern of drug use and its efficiency in terms of treatment's effectiveness and cost. The insights generated can be utilized to establish priorities for the judicious distribution of health care funds. [17,18]

Tackling this problem of inappropriate (irrational) prescribing is not easy as it may take many different forms, for example, polypharmacy, overuse of injectable and antibiotics, failure to prescribe generic medications, prescribing irrational combinations, and failure to prescribe in accordance with clinical guidelines. Therefore, to have a better evaluation of utilization or prescribing pattern in terms of appropriateness, the WHO, in 1993, in collaboration with the International Network of Rational Use of Drugs (INRUD) formulated the Prescribing Indicators, which include the average number of drugs per encounter, the percentage of encounters with an antibiotic prescribed, the percentage of drugs prescribed by generic name, the percentage of encounters with an injection prescribed, and the percentage of drugs prescribed from EDL/NLEM. [19]

Therefore, for better regulation over the quality of drug use of corticosteroids, conducting DUE studies in the population with varying socio-demographics such as that of Mewat region becomes a necessity; as in this region of Northern India (Mewat, Haryana) due to paucity of DUE studies on corticosteroids the current pattern of corticosteroid utilization is not known. Hence, the aim of the study was to estimate the current drug utilization pattern of corticosteroids

and using WHO prescribing indicators for evaluation, in order to promote the appropriate/ rational use of corticosteroids.

Aim and Objectives

Aim

The aim of the study was to evaluate the pattern of corticosteroid utilization in order to promote the safer and appropriate use of corticosteroids.

Objective

To estimate the pattern of corticosteroid utilization in the patients from the department of general medicine and dermatology, SHKM GMC, a tertiary care teaching hospital.

Materials and Methods

Study Setting: The study was carried out in the outpatients and inpatients from the departments of general medicine and dermatology of Shaheed Hasan Khan Mewati Government Medical College, Nalhar (a 600-bedded tertiary care teaching hospital in Mewat, Haryana).

Study Design: This was a single centred, hospital based, cross-sectional, observational (non-interventional) study.

Study Period: This was a 12 months long study; starting after receiving approval from the IEC for the study number EC/OA-49/2022 through research study approval letter dated 21/10/2022 (letter number - SHKM/IEC/2022/87).

Target Population: Patients attending the outpatient department along with the patients admitted to the inpatient department in the departments of general medicine and dermatology, SHKM GMC, Nalhar, Nuh, Haryana.

Study Population: Patients fulfilling the below mentioned inclusion criteria from departments of general medicine and dermatology of SHKM GMC were included in the study.

Inclusion Criteria

1. Patients of all ages.
2. Patients of either gender.
3. Patients (outpatients as well inpatients) that were receiving corticosteroids for different indications in the department of general medicine and dermatology.

Exclusion Criteria

1. Patients who weren't willing to give the consent for the participation in the study.
2. Patients who weren't receiving corticosteroids.
3. Patients from departments other than the departments of general medicine and dermatology.

Sampling Technique

Systematic Random Sampling technique (Probabilistic sampling) was used; screening every third patient encounter in the above mentioned target population.

Sample Size

Sample size (n) = $Z^2 \times p \times q/e^2$

= $1.96^2 \times 21.5 \times 78.5 \div 5^2$

n = 259.2

With a confidence Interval of 95%, where

Z = 1.96 (Constant),

p = expected prevalence of 21.5%,

q = (100 – p) = non-prevalence of 78.5%,

e = allowable error of 5%

Minimum of 260 patient encounters (sample size) containing at least one corticosteroid prescribed was included during the study period from the general medicine and dermatology OPD and IPD. Follow up visit of the same patient weren't included again in the study.

Sources of data and Method of data collection

The data was collected from the case sheets/prescriptions and interviews of the patients coming to the outpatient and inpatient departments in the departments of general medicine and dermatology. Data was collected on a predesigned structured Performa. Data was collected by visiting the hospital Pharmacy / concerned departmental OPD and ward for 2 hours a day, twice every week during the study period of 1 year.

Data Management and Statistical Analysis

All the data was checked and coded for computer entries. After compiling the collected data, it was entered into the Microsoft Office Excel Sheet 2010 version and used for statistical analysis. The results were expressed as frequencies, percentages, and average values.

Outcomes Measured

1. **Socio-demographic characteristics of the participants**
   - Age
   - Gender
2. **Prescription/Drug use related information of corticosteroids**
   - Average number of drugs and corticosteroids prescribed per patient encounter,
   - Prevalence of corticosteroid use,
   - Frequency and percentage of corticosteroids prescribed from NLEM 2022,

- Frequency and percentage of generic corticosteroids prescribed,
- Frequency and percentage of corticosteroids prescribed as FDC,
- Frequency and percentage of corticosteroids prescribed as injectable

3. **Evaluation of patterns of corticosteroid utilization using WHO Prescribing indicators.**

Study Tools

1. **WHO Prescribing indicators** [19] - To evaluate the prescribing pattern of corticosteroids.
2. **Latest National List of Essential Medicine of India (NLEM 2022)** [30] – For estimating the levels of essential medicine prescribing of corticosteroids.

Ethical consideration: Study (EC/OA-49/2022) was started after obtaining ethical clearance from the institutional ethics committee (IEC) of SHKM GMC, Nuh (vide research study approval letter number - SHKM/IEC/2022/87 dated 21/10/2022). Written informed consent was obtained from the study participants.

The study participants were explained about the purpose of study and it was ensured to them regarding anonymity and confidentiality of data. The participation in this study was voluntary and the participants were given the option to withdraw from the study any time in between and were told that there were no administrative consequences to them. The study didn't impose any financial burden on the participants involved.

Results and Observations

A total of 1534 patient encounters were screened out which 260 (160 outpatients and 100 inpatients) were included in the study based on the inclusion and exclusion criteria from the departments of general medicine and dermatology. The results are under 3 categories; which includes participant's socio-demographics, prescription/drug use pattern of corticosteroids, lastly the evaluation of patterns of corticosteroid utilization using WHO prescribing indicators.

a) Socio-demographic characteristics:

In our study of 260 participants, with 66.9% (174) majority of the participants were males while rest 33.1% (86) were females. Study participants had a mean age of 38.5 ± 21.7 years. (Table 1 & Fig. 1)

Table 1: Socio-demographic characteristics of participants (n=260)

Variable	Category	Frequency	Percentage
Gender	**Male**	**174**	**66.9**
	Female	86	33.1

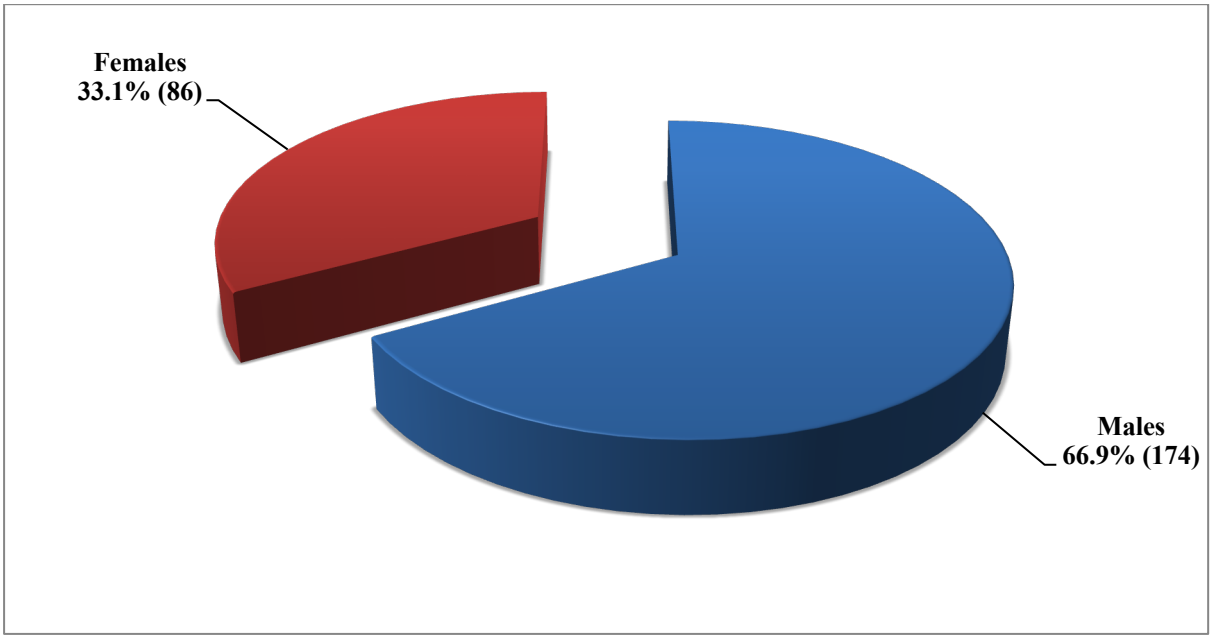

Figure 1: Gender wise distribution of participants (n=260)

b) Prescription/drug use pattern of corticosteroids:

Across the participants from both departments, the overall corticosteroid use prevalence observed was 16.9%. In 260 participants, with an average of 1.3 corticosteroids per patient encounter, a total of 333 corticosteroids were utilized; out of which 191 corticosteroids were utilized in the dermatology

department in 148 patients and 142 corticosteroids were utilized in the general medicine department in 112 patients. Although, upon comparing the corticosteroid use patterns across the participants from the two departments, a higher corticosteroid use prevalence of 28.5% and higher FDCs prescribing of 46.8% (90/191) was observed in the participants from department of dermatology to that of general medicine department with corticosteroid use prevalence of 11% and FDC prescribing of 16.3% (23/142).

However, in participants from general medicine department, a higher injectable prescribing of 44.7% (63/141), generic prescribing of 89.5% (127/141) and prescribing from NLEM of 100% (141/141) was observed when compared to that of dermatology department with an injectable prescribing of 7.8% (15/192), generic prescribing of 42.2% (81/192) and prescribing from NLEM of 29.2% (56/192) only. (Table 2 and fig. 2)

Table 2: Comparing the distribution of corticosteroid use patterns in departments of medicine & dermatology (Frequency & Percentages)

S. N.	Indicators for Estimating Drug Use Patterns of Corticosteroids (n=333)	Medicine Department	Dermatology Department
1	Number of Patient encounters with corticosteroid	112	**148**
2	Percentage of patient encounters with corticosteroid (use Prevalence)	11%	**28.5%**
3	Corticosteroids out of the total drugs prescribed	141 (17.8%)	**192 (28.8%)**
4	Average number of corticosteroids/encounter	**1.3**	**1.3**
5	Corticosteroids prescribed from NLEM	**141 (100%)**	56 (29.2%)
6	Corticosteroids prescribed as Generic	**127 (89.5%)**	81 (42.2%)
7	Corticosteroids prescribed as Injectable	**63 (44.7%)**	15 (7.8%)
8	Corticosteroids prescribed as FDC	23 (16.3%)	**90 (46.8%)**

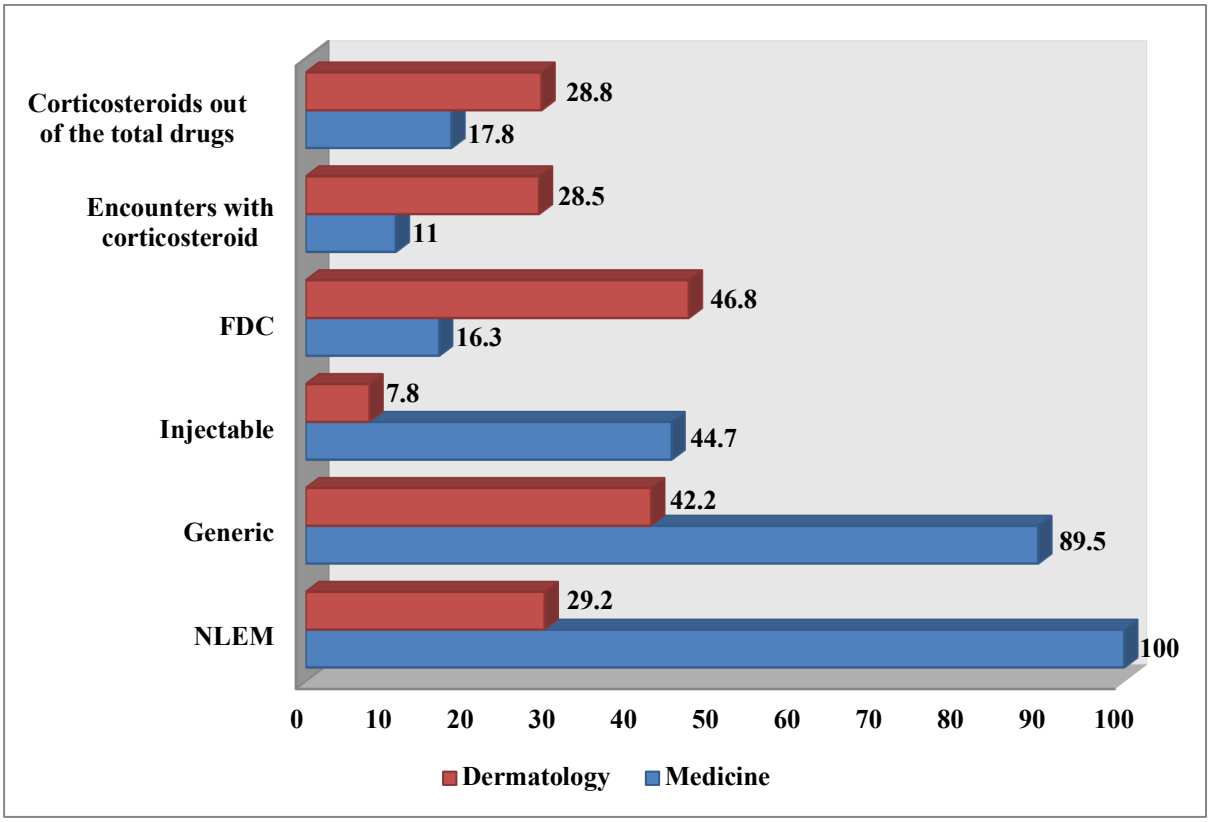

Figure 2: Comparing the distribution of corticosteroid use patterns in departments of medicine & dermatology (Percentages)

c) Evaluation of corticosteroid use patterns using WHO Prescribing indicators: For evaluation of corticosteroid use patterns in 160 outpatient participants, WHO prescribing indicators were used. It was observed that a total of 197 corticosteroids were prescribed in outpatient participants, out of

which 49.7% (98/197) corticosteroids had generic prescribing and 41.1% (81/197) corticosteroids were prescribed from NLEM, which was not ideal when compared to WHO standards of 100% for both of these indicators. Prescriptions with antibiotics were 65% (20-26.8%) and prescriptions with injectable were 4% (13.4-24.1%). Average number of drugs prescribed per outpatient encounter was found to be 4.4 (1.6 - 1.8). (Table 3 and fig. 3a-d).

Table 3: Evaluating the patterns of corticosteroid use in outpatients using WHO Prescribing Indicators (Frequency & Percentages)

S. N.	WHO Prescribing Indicators (n=160)	Observed Values	WHO Ideal Values
1	Average number of drugs/encounters	**4.4**	1.6 - 1.8
2	Percentage of corticosteroids prescribed as Generic	**49.7%**	100%
3	Percentage of corticosteroids prescribed from NLEM	**41.1%**	100%
4	Percentage of patient encounters with Injectable	4%	13.4 – 24.1%
5	Percentage of patient encounters with Antibiotics	**65%**	20 – 26.8%
6	Percentage of corticosteroids prescribed as FDCs	45.7%	….
7	Average number of corticosteroids/encounter	1.2	….
8	Percentage of patient encounters with corticosteroid	15.6%	….

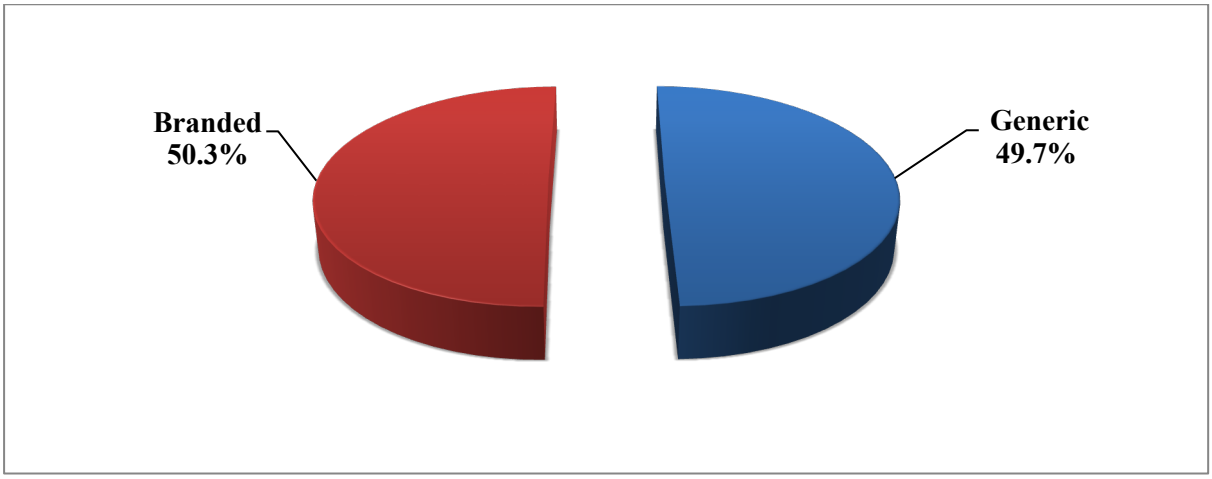

Figure 3 (A): Evaluating the generic prescribing of corticosteroid in outpatients

Fig. 3 (A): Out of 197 corticosteroids prescribed in outpatients, with 49.7% (98) nearly half of the corticosteroids were prescribed as generics.

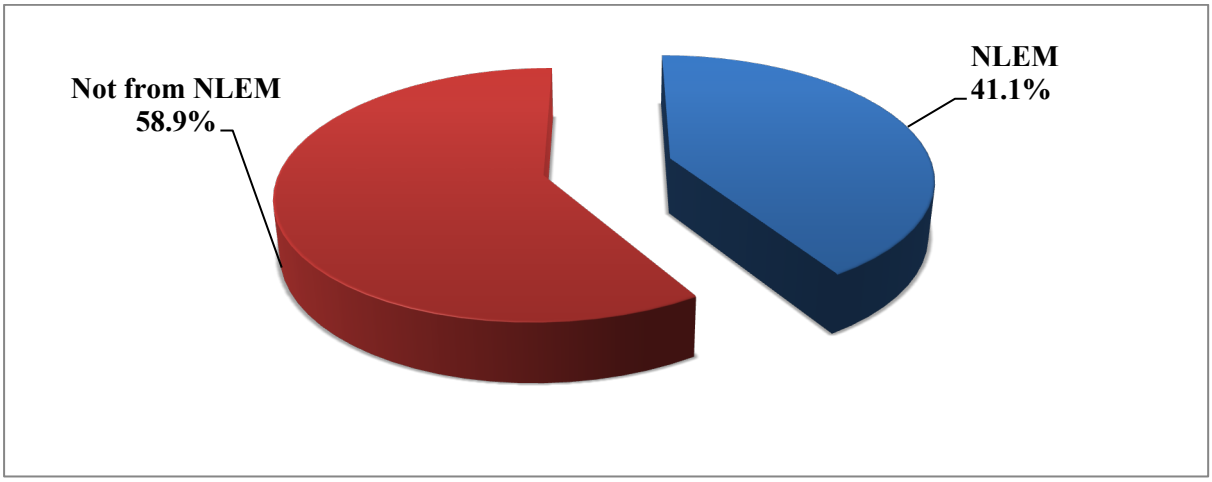

Figure 3 (B): Evaluating the corticosteroid prescribing in outpatients with respect to National List of Essential Medicine (NLEM)

Fig. 3 (B): Out of 197 corticosteroids prescribed in outpatients, 41.1% (81) corticosteroids were prescribed from the NLEM.

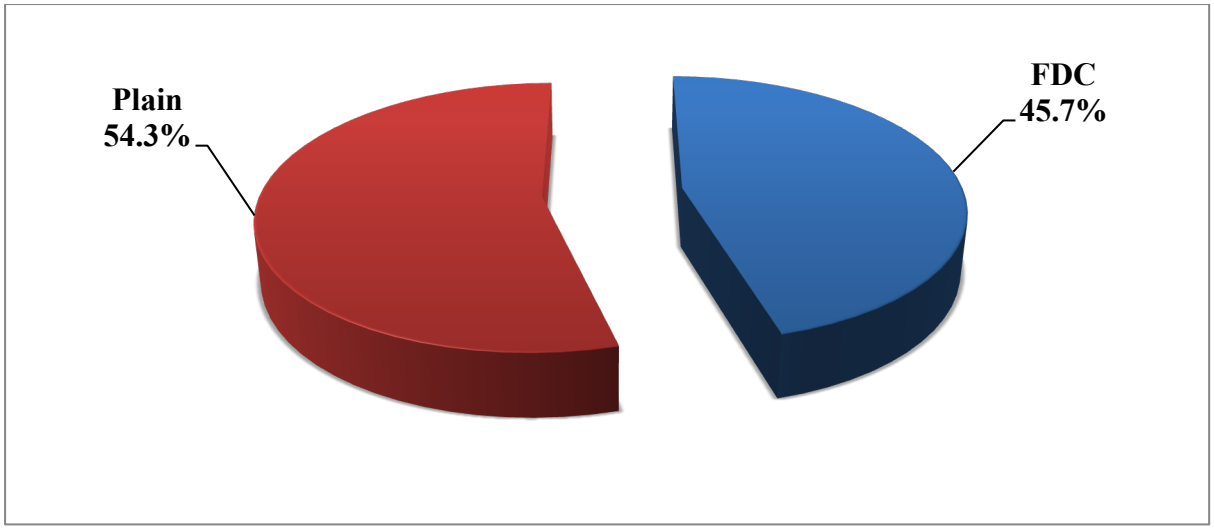

Figure 3 (C): Evaluating the corticosteroid prescribing with respect to Fixed Dose Combination (FDC) corticosteroids in outpatients

Fig. 3 (C): Out of 197 corticosteroids prescribed in outpatients, 45.7% (90) corticosteroids were prescribed as FDCs.

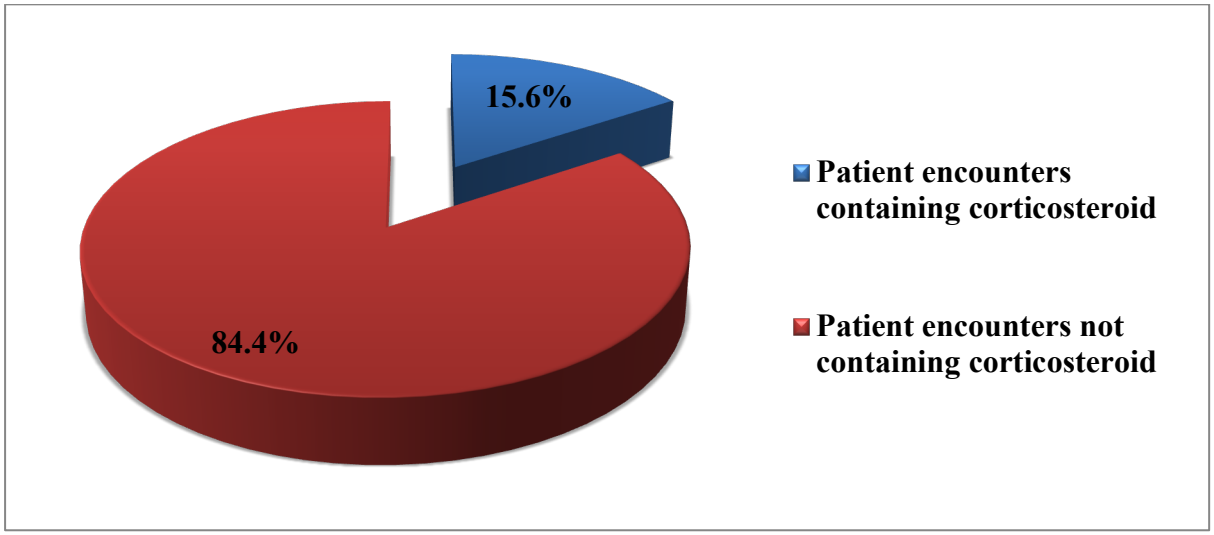

Figure 3 (D): Evaluating the prevalence of corticosteroid prescribing in outpatients

Fig. 3 (D): Out of 1025 outpatient encounters screened, 15.6% (160) outpatient encounters contained corticosteroid.

Discussion

Corticosteroids are used for various diseases ranging from respiratory diseases such as asthma, COPD, to autoimmune diseases such as inflammatory bowel disease, RA, lupus, to dermatological diseases such as eczema, urticarial (hives), psoriasis etc. They are lifesaving when used appropriately; however, their inappropriate (irrational) use can lead to serious adverse effects. Thus, it is important to keep regularly evaluating the pattern of corticosteroid utilization to maintain and regulate the quality of drug use of corticosteroids at various healthcare levels. Due to this reason, many drug utilization evaluation (DUE) studies for corticosteroids are conducted nationally and internationally, so that the patterns of corticosteroid utilization patterns can be known and compared. However, despite the fact, the number DUE studies for corticosteroids remains scarce in this region of Northern India (Mewat, Haryana); keeping the data available on patterns of corticosteroid utilization really limited. Therefore, by conducting our study, we have addressed the problem of not having enough data available on corticosteroid utilization patterns in the population of Mewat and also made the gateway for future studies for comparative analysis on the corticosteroid utilization pattern evaluation.

In our study, estimating the corticosteroid utilization patterns revealed that there was more than 2.5 times corticosteroid utilization in the department of dermatology (28.5% use prevalence) when

compared to that of general medicine department (11% use prevalence) at SHKM GMC, Nalhar (Mewat, Haryana). However, the overall combined corticosteroid use prevalence observed at SHKM GMC was 16.9%; which was lower than the prevalence reported by Barakat M et al [28] (a multi-national study conducted across 8 middle-east countries with a sample size of 2354 participants) and Deepalakshmi M et al [22] (at a public hospital in Tamilnadu, Southern India with 269 patients) of 31.2% and 27% respectively.

In this study of 260 participants, it was observed that (66.9%) nearly two third participants were male; this might be due to the fact that males in general have poorer immunity and comorbidities were more prevalent in male population, thereby having the poorer overall health in comparison to the female counterparts. [29] Our findings were similar to the findings of the studies conducted by Syeda Masarrath Unissa et al [21] and Vishwanath Gouda et al [23]. However, in a study conducted in Ethiopia by Yohannes Tsegyie et al [24] contrasting findings were observed as the percentage of female participants were predominantly higher than the male counterparts with 61.2%. In this study, the mean age for these 260 participants was found to be 38.5 ± 21.7 years. Our findings was similar to the findings of the study conducted by Sheth H. et al 25 and was in contrast to the findings of study conducted by Mirshad PV et al [27] which showed a slightly higher mean age of 47.07 years.

In our study, upon comparing the corticosteroid use patterns, participants from dermatology department had 42.2% generic prescribing which is lesser and FDC prescribing of 46.8% which is higher than that of participants from medicine department as they had 89.5% generic prescribing and 16.3% FDC prescribing; a possible reason for this observation might be that most of dermatological preparations of corticosteroid are available in FDC forms and for a patient also the FDCs are much more convenient to use. In our study, an ideal prescribing of 100% from NLEM was also observed in the participants from medicine department; reason for this observation was that 100% of corticosteroids utilized in the general medicine department were systemic preparations and all of them were the part of NLEM 2022. [30] However, participants from dermatology department had only 29.2% prescribing from NLEM because betamethasone valerate was the only topical corticosteroid that was a part of NLEM 2022 and which might not be enough to treat some of the serious dermatological indications as they might require more potent topical corticosteroid like beclomethasone and even clobetasol. In our study, a higher use of injectable corticosteroids in the participants from medicine department (44.7%) than that of dermatology department (7.8%) was observed; a possible reason for this can be that in patients with dermatological indication topical agents are used more than systemic agents (such as injectable corticosteroid).

For 160 outpatients, prescribing indicators were used for corticosteroid utilization evaluation and it was observed that 41.1% corticosteroids were prescribed from NLEM 2022 (WHO standards - 100%) which was higher than the values reported by Reuben P. Syiem et al [20] and Shatavisa Mukherjee et al 26 of 2% and 39% respectively and were lower than the values reported by Sheth H. et al [25] of 64.7% corticosteroid prescribing from NLEM/EDL. 49.7% corticosteroids had generic prescribing (WHO standards - 100%) which was higher than the value reported by Shatavisa Mukherjee et al [26] of 1.36% and was lower than the values reported by Reuben P. Syiem et al [20] and Sheth H. et al [25] of 100% and 50.3% respectively. Average number of corticosteroid per patient encounter and average number of drugs per patient encounter was 1.2 and 4.4 (WHO standards – 1.6-1.8) respectively which were higher than the values reported by Reuben P. Syiem et al [20] and Sheth H. et al [25] of 1 and <3.6 respectively. Percentage of patient encounter with antibiotics was 65% (WHO standards – 20-26.8%) which was higher than the values reported by Reuben P. Syiem et al [20] and J. Sheth H. et al [25] of 8% and 46.2% respectively. Percentage of patient encounter with injectable was 4% which was higher than the value reported by Reuben P. Syiem et al [20] of zero and was lower than the value reported by J. Sheth H. et al [25] of 10.8%. Percentage of FDCs was 45.7% which was lower than the value reported by Reuben P. Syiem et al [20] of 67%.

Conclusion

Although, the corticosteroid use prevalence observed in this study was lower than the prevalence reported by some previous studies conducted in different parts of India as well as internationally, however, it can be concluded that the use of corticosteroids in the departments of general medicine and dermatology at SHKM GMC, the only tertiary healthcare facility catering to the healthcare needs of population of Mewat region (Haryana, Northern India) needs to further enhance the appropriateness of corticosteroid prescribing. Improvement is needed in terms of decreasing the average number of drugs per prescription as well as a slight reduction in the average number of corticosteroids per prescription, while putting more emphasis on generic prescribing and prescribing from the essential medicines list for corticosteroids. Therefore, it is evident that in order to improve and maintain the quality of corticosteroid use, regular estimation and evaluation of the drug use pattern of corticosteroids at any healthcare facility or region becomes essential.

Strengths and Limitations

Strengths of the study: Adequate study duration (12 months) and sample size (n=260) of this study aided in decreasing the confounding (effect of seasonal variation of diseases), and overestimation of use prevalence thereby preventing the misleading correlations and conclusions. Unlike majority of the previously conducted similar studies, we estimated the prevalence of corticosteroid use; as it is an important indicator required for the estimation of corticosteroid usage in any healthcare facility or geographical region. Generally DUE studies use non-probabilistic sampling techniques like surveys, census, purposive and convenience sampling; they have a poor probability of participants included in the study to be an accurate representation of the population, instead we used probabilistic sampling (systematic random sampling) technique. It was observed that several previously conducted studies were only focused on estimating the pattern of corticosteroid use; however corticosteroid use pattern were not evaluated, hence, we used a reliable and objective tool such as WHO Prescribing indicators for estimation and evaluation of corticosteroid use patterns. In this study, we included participants of all ages. The majority of the previously conducted studies only included the adult population, leaving out the vulnerable population, such as the elderly. Because of their overall poorer health due to advancing age and comorbidities, among all populations, they might be the ones that require corticosteroid therapy the most. Lastly we also included participants from both inpatients as well as outpatient departments. The majority of previously conducted studies only included either of the population.

Limitations of the study: Among the main limitations of this study was its cross-sectional study design instead of a prospective design, as both variables (exposure and outcome) existed in the same instant; temporal correlation between the two variables cannot be established.

Other limitation was that except for the two, other clinical departments were not included in the study. Therefore, patterns of corticosteroid utilization for the entire facility could not be estimated.

Future Recommendations

DUE studies forms a part of ‘continuous evaluation system’ for the purpose of identifying the problems related to drug use and prescribing and providing means of correcting these problems; we make the following recommendations to the policy makers, clinicians, and future researchers conducting similar studies on drug utilization evaluation of corticosteroids: as we know that varying socio-demographics can drastically change the drug use pattern in a region, therefore to keep conducting such DUE studies in different populations in different regions becomes very important. Over time the pattern of any drug utilization changes, hence, periodic estimation of drug use patterns is required to generate meaningful data and understand the current trends in corticosteroid use pattern. Evaluation of these prescribing/use patterns using a standardized, objective and reliable tool or indicators should be done to ensure quality of drug usage. Comparative evaluation of these drug patterns should also be performed; which can be done either by comparing the drug prescribing patterns of corticosteroids with current national/regional guidelines at their respective institutions or comparing an individual or group of prescriber's prescriptions to the average prescriptions in any given area, region, or country, as well as to some sort of "gold standard" or best practice.

Implementation of the knowledge and information generated through such a ‘continuous evaluation system’ will help policymakers in developing better drug policies and proper protocols for corticosteroid use at individual facilities or for that particular region, and will also help in smarter allocation of healthcare budgets for that particular region or facility. Additionally, we would like to suggest our fellow future researchers while conducting such DUE studies, to keep adequate study duration (to avoid confounding due to the effect of seasonal variation of diseases and overestimation of use prevalence), an adequate sample size (to avoid misleading correlations and conclusions), and to use a probabilistic sampling technique (for a better representation of the population).

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