

## A Prospective Observational Study to Assess Prescription pattern of Corticosteroids in a Tertiary Care Teaching Hospital

Bincy M\*, K Anil\*, M Azhar\*, P Tejashree\*, Dr. Vinod Naik\*\*

\*Student, \*\*Assistant Professor,

Department of Pharmacy Practice, TVM College of Pharmacy, Ballari, Karnataka, India.

Submitted: 05-01-2023

Accepted: 13-01-2023

### ABSTRACT

**Introduction:** Drug utilization evaluation (DUE) is a study to identify variability of drugs use and to support interventions that will improve patient's therapeutic outcomes. Drug use indicators are intended to measure specific aspects of health providers and drug use in a hospital or health centers. Corticosteroids are a class of steroidal hormones that are produced in the adrenal cortex of vertebrates. Two main classes of corticosteroids are glucocorticoids and mineralocorticoids involved in wide range of physiological processes, including stress response, immune response and regulation of inflammation, carbohydrate metabolism, protein metabolism, blood electrolyte levels and behavior.<sup>1</sup> These highly efficacious drugs are mostly used for the treatment of various autoimmune, respiratory and dermatological conditions.<sup>7</sup> They also have many Interactions with drugs when used in daily practice for a long duration.

**Objective:** The main objective is to assess the prescription pattern of corticosteroid in Department of General Medicine and Dermatology.

**Method:** It is a prospective observational study conducted during six months period in which 160 sample size were included of age groups from 18 to 75 of both genders prescribed with corticosteroids.

**Result:** Out of 160 patients, 57.5% were males and 42.5% were females. The most commonly prescribed corticosteroid was Hydrocortisone (29.5%), followed Budesonide (28.25%), Dexamethasone (22.9%), Prednisolone (12.8%) and so on. Most of the Steroidal prescriptions were for respiratory diseases like COPD (35), Pneumonia (13); followed by Dermatological conditions (25) and other allergic reactions (35).

**Conclusion:** It may be concluded that clinical pharmacist can play an important role in the prescription audit and safety assessment of steroid medications in hospital settings, including corticosteroids. The commonly used corticosteroids were Hydrocortisone and frequently used in

respiratory diseases like COPD and pneumonia, followed by Dermatological conditions.

**Keywords:** Corticosteroids, Drug utilization evaluation, Drug interactions, ADR, Hydrocortisone, Budesonide.

### I. INTRODUCTION

The WHO in 1997 defined drug utilization as the marketing, distribution, prescription and use of drugs in a society with special emphasis on the resulting medical, social and economic consequences.<sup>1</sup>

Most of the health care systems use drug utilization studies as a potential tool for their evaluation. These drug utilization studies (DUS) are otherwise called as drug utilization review or medical utilization evaluation (MUE).<sup>3</sup>

Drug utilization research (DUR) is an essential part of Pharmacoepidemiology and Pharmacoeconomics as it describes the extent, nature and determinants of drug exposure. Drug utilization evaluation (DUE) allows the pharmacist to document and substantiate the benefit of pharmacy intervention in improving therapeutic and economic outcomes.<sup>2</sup>

DUR always targets improved appropriate drug utility and gaining better health outcome by knowing how and why drugs are utilized. DUE can also be applied to a drug, therapeutic class, disease state or a condition, a drug use process or specific outcome.<sup>11</sup>

Drug utilization research contributes to rational drug use by describing the drug use pattern and interventions.<sup>3</sup>

DUE is an ongoing systematic process designed to maintain the appropriate and effective use of drugs. A comprehensive review of patient's prescription and medication data before, during and after dispensing in order to assure appropriate therapeutic decision making and positive patient outcome is also involved. Pharmacists participating in DUE programs can directly improve the quality of care for patients, individually and as

populations, by preventing the use of inappropriate or unnecessary drug therapy and by preventing adverse drug reactions.<sup>1</sup>

DUE can be used for the description of drug use pattern; early signals of irrational use of drugs; interventions to improve drug use; quality control cycle; continuous quality improvement.<sup>5</sup>

Corticosteroids play a vital role in the treatment of many diseases including skin. The ultimate goal in dermatological practice is to use the safest and least number of drugs to obtain the best possible effect in the shortest period at a reasonable cost. Before the commencement of steroid therapy, its objectives and limitations should always be clearly defined.<sup>15</sup>

As early as in the 1930s, the hormone cortisone was isolated from the adrenal glands, and its efficacy for treatment of rheumatoid arthritis was empirically demonstrated in patients suffering from this debilitating disease.<sup>2</sup>

Introduction to corticosteroids in 1950's is a milestone in dermatology. Corticosteroids (both topical & systemic) introduced in late 1950s had shown a dramatical improvement in dermatological diseases and till now remains a largest and commonly used measures in the management of various dermatological conditions.<sup>8</sup>

Corticosteroids being widely used powerful anti-inflammatory & immunosuppressive agents and have become cornerstone of therapy in acute and chronic inflammatory diseases. To achieve better patient care, there is need to monitor, evaluate and therapeutically analyze the utilization pattern of corticosteroids. Such analysis will not only improve the standards of medical treatment at all levels in health system, but will also help in the identification of problems related to drug use such as polypharmacy and Drug-Drug interactions.<sup>5</sup>

So, our aim of the study is to monitor the utilization pattern of corticosteroids in health care center to analyze the rationality of drug usage and feedback to the prescribers so that they must be able to modify the pattern of prescription so as to increase the therapeutic benefits and reduce the adverse effects related to the previously prescribed pattern of drug prescription.<sup>8</sup>

The significance of the study is to improve the patient safety on long term use of steroid therapy by observing the prescribing pattern as irrational use of steroids can increase the risk of adverse effects. Moreover, the lack of medical education from the health care professionals to the patients enforces the conduction of the study.<sup>7</sup>

The main aim of the study is to analyze the DUR of corticosteroids among the patients from general medicine and dermatology department of Vijayanagra Institute of Medical Science, Ballari, Karnataka. The long-term use of steroids can increase the risk of adverse effects hence, the significance of the study is to improve patient safety by observing the prescribing pattern.

## II. MATERIALS AND METHODS

**STUDY SITE:** Vijayanagara Institute of Medical Sciences, Ballari, Karnataka.

**DURATION OF STUDY:** Six months.

**STUDY DESIGN:** Prospective Observational Study

**PROPOSED SAMPLE SIZE:** 160 Patients

**STUDY SUBJECTS:** The inpatients of age 18-75, both male and female who were prescribed with corticosteroid.

**STUDY CRITERIA:**

**Inclusion Criteria:**

- Patient of either gender of age between 18-75 years
- Patient diagnosed with any respiratory or autoimmune disorder and dermatological conditions and prescribed with corticosteroids.
- Patient with co-morbidities
- General Medicine and Dermatology Department

**Exclusion Criteria:**

- Patients who are not willing to sign informed consent form
- Patients diagnosed with any respiratory or autoimmune disorders and dermatological conditions but not treated with corticosteroids
- Paediatric patients
- Patients with psychiatric illness
- Pregnant and lactating women
- Patients with critical illness

**MATERIALS USED:**

- Patient Data Collection Form
- Informed Consent Form

**METHOD OF DATA COLLECTION:**

The data was collected from the case files of the inpatients who were prescribed with Corticosteroids.

## III. RESULTS

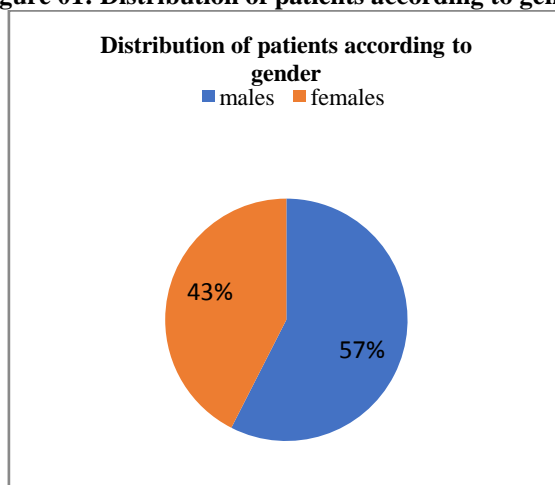
A prospective observational study was conducted for 6 months among the inpatients of Vijayanagara Institute of Medical Sciences, Ballari, Karnataka. A total number of 160 patients have

participated during the study period. Out of 160 subjects, 92 were males and 68 were females.

**Table 01: Distribution of patients according to gender**

Gender	Total number (n=160)	Percentage
Males	92	57.5%
Females	68	42.5%

**Figure 01: Distribution of patients according to gender**



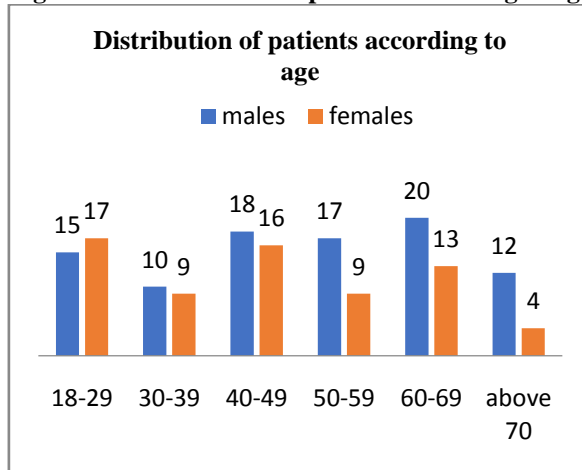
Among 160 patients, corticosteroids were prescribed more in age group of 40-49 years (n=34). In males corticosteroids were prescribed

more in age group of 60-69 years (n=20), where as in females it was more common in age group of 18-29 years (n=17).

**Table 02: Distribution of patients according to age**

Age groups (In years)	Males (n=92)	Females (n=68)	Total (n=160)
18-29	15	17	32
30-39	10	9	19
40-49	18	16	34
50-59	17	9	26
60-69	20	13	33
Above 70	12	4	16

**Figure 02: Distribution of patients according to age**



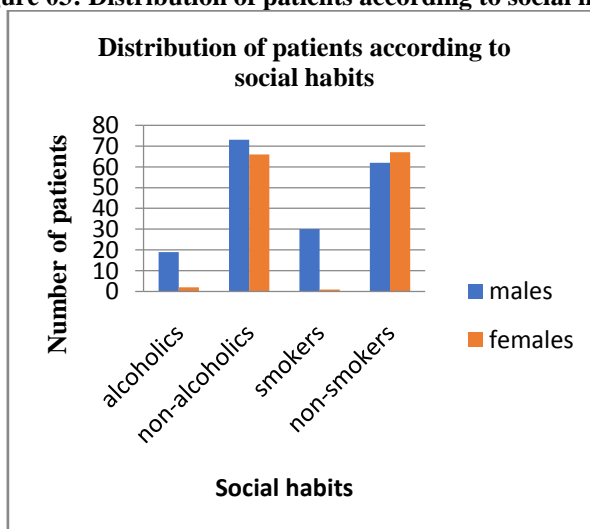
In 160 subjects, 20 patients were found to be alcoholics and 130 were found to be non-alcoholics, and 31 patients were smokers and 129

patients were non-smokers, in which non-alcoholics and non-smoker patients were more observed.

**Table 03: Distribution of subjects according to social habits**

Category	Total number	Percentage
Alcoholics	21	13.1%
Non-alcoholics	139	86.9%
Smokers	31	19.4%
Non-smokers	129	80.6%

**Figure 03: Distribution of patients according to social habits**



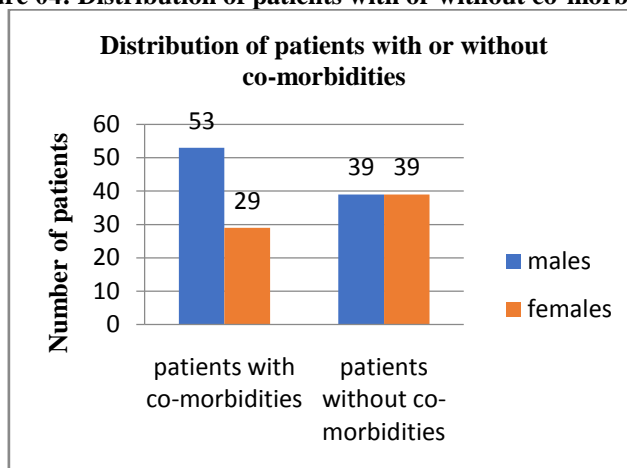
In comparison for co-morbidities among 160 patients, nearly 82 patients were admitted with co-morbidities, in which 53 were males and 29

were females. Nearly 78 patients have been admitted without any co-morbidities, in which 39 were males and 39 were found to be females.

**Table 04: Distribution of subjects according to co-morbidities**

Category	Gender	Total number	Percentage
Patients with Co-morbidities(n=82)	Males	53	64.6%
	Females	29	35.4%
Patients without co-morbidities(n=78)	Males	39	50%
	Females	39	50%

**Figure 04: Distribution of patients with or without co-morbidities**



In 160 patients, the analysis of the social habits of the recruited patients revealed that 19 patients were smokers, 9 patients were alcoholic and 12 patients were both.

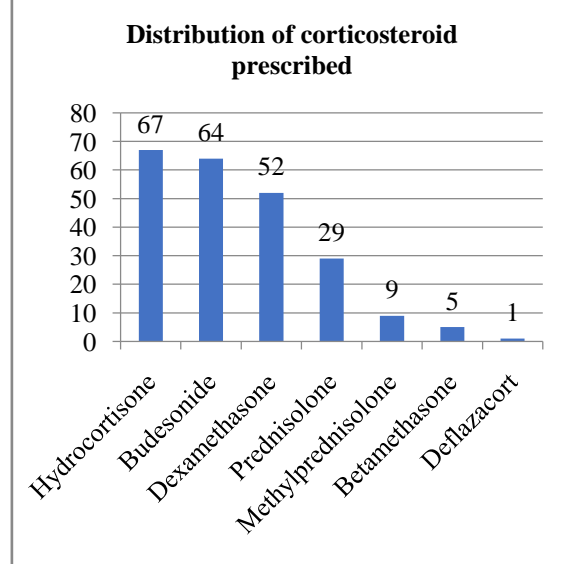
The analysis of the results of steroidal prescription revealed that 227 corticosteroids were utilized among 160 patients belonging to 7 types of

steroids. The pattern of drugs prescribed for treating several disorders showed that Hydrocortisone was the most prescribed steroidal drug for 67(29.5%) patients, followed by Budesonide 64(28.2%), Dexamethasone 52(22.9%) and Prednisolone 29(12.8%).

**Table 05: Pattern of corticosteroid prescription**

Steroidal drug	Num	Percentage
Hydrocortisone	67	29.5%
Budesonide	64	28.2%
Dexamethasone	52	22.9%
Prednisolone	29	12.8%
Methylprednisolone	9	4.0%
Betamethasone	5	2.2%
Deflazacort	1	0.4%

**Figure 05: Distribution of corticosteroid prescribed**

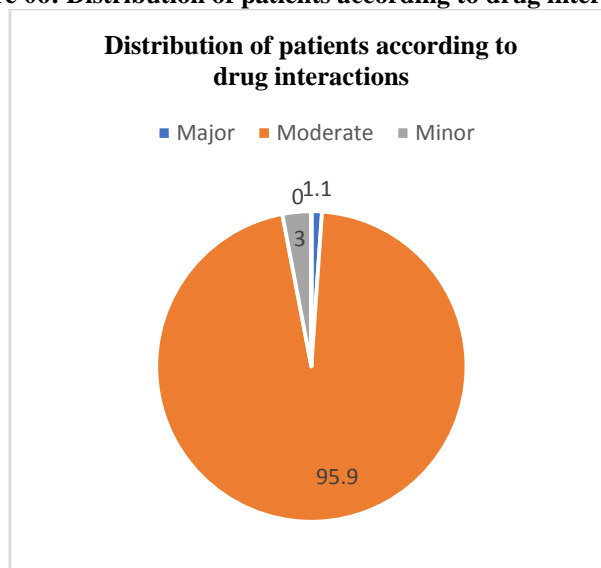


Among 160 subjects, we encountered with 198 drug interactions among which moderate interactions (95.9%) were found to be more.

**Table 06: Distribution of patients according to drug interaction**

TYPES	INTERACTION FOUND (n=198)	PERCENTAGE
Major	2	1.1%
Moderate	190	95.9%
Minor	6	3.0%

**Figure 06: Distribution of patients according to drug interactions**



#### IV. DISCUSSION

Drug utilization studies are the organized quality enhancement processes which are designed to review drug usage and prescribing patterns of which current recommendations or guidelines used for the treatment of a certain disease. Evaluation of drug use are done at a population level, according to age, sex and social class. Prescriptions need to be audited periodically to enhance the therapeutic effectiveness, minimize the adverse effects, provide critical feedback to prescribers and analyze the execution of medical treatment standards.

Corticosteroids are today among the most commonly prescribed medications in hospitals due to their wide indications and high potency. The clinical effects are mediated by their anti-inflammatory, vasoconstrictive, anti-proliferative and immune-suppressive properties. They are easily available as over-the-counter at a low price. Although steroids are considered as life-saving, careful monitoring of the prescription is necessary to minimize numerous side effects associated with them and to avoid drug-drug interactions that lead to increased patient's morbidity and mortality. This study was undertaken to assess the prescription pattern of corticosteroids in a tertiary care teaching hospital.

The study was conducted for a period of 6 months and data was collected in prospective series of in-patients in general medicine, and dermatology department who were prescribed with corticosteroids. A total of 160 prescriptions were collected in which all basic demographic data of the patient like past medication history and social history were gathered. In contrast, a higher number of 324 prescriptions were analyzed in the study conducted by Vishwanath, et al. In contrast a total number of 109 prescriptions were analyzed in the study conducted by Pradeep et al. The present prospective study of corticosteroids was more prescribed for males (92) than in females (68). In correlation, a study conducted by Madhurilatha et al. showed that prevalence of corticosteroids in males (59%) is more than in females (41%).

The study included subject who are aged more than 18 years and majority of patients were in the age group of 60-69 in males and 18-29 in females. This was incompatible with the study conducted by Vishwanath, et al. where the majority of patients were in the age group of 61-70 in both males and females.

In our study 21 patients were alcoholics and 31 were smokers. Alcohol and smoking are the contributory risk factors in patients having

respiratory diseases which in turn increase the use of corticosteroids. A total of 35 patients were admitted in the hospital for COPD. Out of these 35 patients 13 were smokers and 6 were both alcoholic and smoker, these findings were in liaison with the study conducted by Vishwanath. et al. where in a total of 113 patients 32% were smokers and 55.75% were alcoholics.

Comorbidity means the patient is simultaneously suffering from a number of diseases. In our study 82 cases were comorbid and rest all cases observed as morbid, or single disease.

In our study, 34 patients of group 40-49 constituted the largest group receiving steroids followed by 33 patients of age group 60-69. Among these 35 patients of both COPD and others found to be the largest group in the study. In contrast, the study conducted by Vishwanath et al. 107 patients of age group of 61-70 were the largest group receiving the steroids followed by 65 patients of age group 51-60. Among these 34.9% of patients with COPD were the largest group who received corticosteroids.

Steroidal drugs are of great value in treating wide spectrum of inflammatory conditions as they provide rapid symptomatic relief, especially in short term. Out of 160 patients who were recruited in the study, steroids prescribed more in COPD and others. And among these 160, 60 patients received multiple steroidal therapy in which 53 patients received 2 corticosteroids and 7 patients received 3 corticosteroids which is similar to study of Shatavisa et al.

In our study 227 corticosteroids were prescribed for 160 patients during the study period. Out of this hydrocortisone was the most prescribed steroidal drug for 67 patients followed by budesonide 64, dexamethasone 52 and prednisolone 29. In contrast, a total of 299 steroids were prescribed in the study conducted by Arjan et al. out of these, budesonide (43.45%) was the most prescribed steroidal drug followed by prednisolone (15.25%).

Corticosteroids play a vital role in treatment of many dermatological diseases due to their strong immunosuppressive, anti-inflammatory, vasoconstrictive and antiproliferative actions. Out of 25 prescriptions from dermatology department all prescription contains at least 1 steroid drug for topical application.

In our study we encountered with 198 drug interactions among which moderate interactions (95.9%) were found to be more. In



contrast, 617 interactions were found in the study conducted by Mani Pandey et al. in which significant interactions (60.12%) were more

## V. CONCLUSION

In this unicentric study related to prescription pattern of corticosteroids had shown that males were found to be more than that of females. In male's corticosteroids were prescribed more in age group of 60-69 years, where as in females it was more common in age group of 18-29 years.

Despite the advice to stop smoking and intake of alcohol, a small proportion of patients were still alcoholics and smokers. In our study smokers were more than alcoholics.

Steroidal drugs are of great value in treating wide spectrum of inflammatory conditions as they provide rapid symptomatic relief, especially in short term. In our study the total number of corticosteroids prescribed were 227 (7 types) where hydrocortisone was the most prescribed drug and the most common side effects observed was irritation followed by dryness. Most of the COPD patients were treated with corticosteroids because of their anti-inflammatory action.

Most of the drug interactions associated with corticosteroids were found to be moderate which can be managed by changing the frequency of respective drugs

The irrational use of drugs may lead to failure of therapy or drug interactions or adverse reactions, which may lead to dependence on drugs used to treat these adverse effects which in turn increases the cost of therapy and hospital stay.

Periodic monitoring of the drug utilization pattern is one of the methods to analyze the rationality of the drug and has been an effective tool to constitute guidelines for improving the utilization pattern, which can be done by the involvement of clinical pharmacist in clinical round by promoting rational drug use and drug adherence may improve the quality of health care.

## STRENGTHS AND LIMITATIONS

### STRENGTHS:

- The study generated a baseline data for prescription and utilization pattern for corticosteroids.
- This may provide information to physician and other health care professionals about prescription pattern of corticosteroids.

- The treatment review in the study shows that most of the drugs were prescribed according to GOLD and WHO guidelines.

- This study provides information to physician, society, and other health care professionals regarding the appropriate and inappropriate use of corticosteroids.

### LIMITATIONS:

- The study conducted for a period of six months, so limited sample size was one of the major limitation due to short duration of the study.

- Very few cases were available in Dermatology Department as most of the patients does not require hospital admission

- It would be better if patients could be followed during their revisit.

- It would be better if cost-based analysis were done.

- It would be better if total duration of drug therapy and potency of the drugs were considered.

## FUTURE DISCUSSIONS

- Creating awareness on appropriate use of corticosteroids among public can be warranted.
- There is an increasing need to strengthen laws regarding the procurement, storing and dispensing of steroidal medicines at retail pharmacies.
- Focus on organizing workshops for pharmacists on a regular interval basis in order to update and improve their knowledge on safety and rational use of steroids.
- Establishing standard guidelines for prescribers for treating diseases where steroids are highly warranted.

## REFERENCES

- [1]. Dr. Priyanka S, et al. Drug Use Evaluation of Corticosteroids by Clinical Pharmacists in Dermatology Department of a Tertiary Care Teaching Hospital. The Pharma Innovation Journal 2019; 8(5): 74-80.
- [2]. Vishwanath Gouda, et al. Study on Steroid Utilization Patterns in General Medicine Department. Research J. Pharm and Tech. October 2019;12(10):1-6.
- [3]. Madhurilatha Thadanki, et al. Drug Utilization Evaluation of Corticosteroids in tertiary care teaching hospital. IJPSR, 2019; VOL. 10(3): 1468 – 1476.
- [4]. V. Reethika, et al. Drug Utilization Evaluation of Corticosteroids Indicated for Psoriasis and Dermatitis by Clinical



- pharmacist at a Tertiary Care Teaching Hospital of Northcostal Andhra Pradesh – A Prospective Observational Case Study. *World Journal of Current Med and Pharm Research*. 2020; Vol-II, Iss-II, 142-147.
- [5]. Sanoj Varkey, et al. Prescribing Patterns of Corticosteroids in Pulmonology Department. *International Journal of Pharmacy Teaching and Practices* 2012, Vol. 3, Issue 3, 334-337.
- [6]. Pradeep Kumar Thakur, et al. A Prospective Study On Drug Evaluation of Corticosteroids among Out- Patients of Teaching Hospital. *International Journal of Pharmacy Teaching and Practices* 2015, Vol. 6, Issue 4, 2630-2634.
- [7]. Arjan Aryal, et al. Study on Steroid Utilization Pattern in a Tertiary Care Teaching Hospital. *Indian Journal of Pharmacy Practice*, Apr-Jun, 2017, Vol 10, Issue 2,96-103.
- [8]. Monalisa Jena, et al. Pattern of Utilization of Corticosteroids in Department of Dermatology at a Tertiary Care Teaching Hospital. *J. Chem. Pharm. Res.*, 2014, 6(8): 86-91.
- [9]. Purushotham K, et al. Prescription Trend of Topical Corticosteroids in Outpatient of Dermatology in tertiary care Hospital in Tumakuru, Karnataka. *Int J Pharmacol and Clin Sci*. 2016; 5(3): 77-82.
- [10]. Shatavisa Mukherjee, et al. Assessment of corticosteroid utilization pattern among dermatology outpatients in a tertiary care teaching hospital in Eastern India. *International Journal of Green Pharmacy*. Oct-Dec 2016 (Suppl) 10(4) | S178-S182.
- [11]. C. Dhandapani, et al. Drug Utilization Evaluation of Corticosteroids Based on Safety: A Prospective Observational Study. *IJPTP*, 2015, 6(1), 1591-1597.
- [12]. V. V. Rajesham, et al. A Prospective Study on Usage Pattern of Corticosteroids in a Tertiary Care Hospital. *Int. J. Pharm. Sci. Drug Res*. 2019; 11(5): 152-156.
- [13]. Merin Susan Abraham, et al. Drug Utilization of Corticosteroids in Dermatology Department of a Tertiary Care Teaching Hospital at Palakkad, Kerala. *Int. J. Health Sci Res* 2016;6(6):130-136.
- [14]. Mani Pandey, et al. Drug Utilization Review on Corticosteroids Use in a Tertiary Care Teaching Hospital. *International Journal of Scientific Research in Knowledge*, 2015, 3(12), pp. 0305-313.
- [15]. Rohini Gupta, et al. Prescribing pattern of corticosteroids among the dermatology inpatients in a tertiary care teaching hospital of north India - A retrospective, observational study. *Natl J Physiol Pharm Pharmacol*, 2018;8(2):158-162.
- [16]. R J Hancox, et al. Randomised trial of an inhaled beta2 agonist, inhaled corticosteroid and their combination in the treatment of asthma. *Thorax* 1999; 54: 482-487.
- [17]. Brian E. Grunau, et al. Emergency Department Corticosteroid Use for Allergy or Anaphylaxis Is Not Associated with Decreased Relapses. *Annals of Emergency Medicine*. October 2015, Volume 66, no. 4:381-389.
- [18]. Asawari R, et al. Assessment of Appropriateness in Glucocorticoid Prescribing in Medicine In-patients: A Prospective Observational Study. *Indian Journal of Pharmacy Practice* Jan - Mar, 2013,Volume 6; Issue 1:13-18.
- [19]. Mahendra Kumar Jaiswal, et al. Prescription audit of Corticosteroids in Dermatology OPD of a tertiary care teaching hospital of tribal region of Central-South India. *IJBR* (2017);08(01).
- [20]. Colin J. Greaves, et al. Patterns of corticosteroid medication use: non-adherence can be effective in milder asthma. *Primary Care Respiratory Journal* (2005) 14, 99-105.
- [21]. Mirshad PV, et al. Prescription audit of corticosteroid usage in the department of dermatology at a tertiary care teaching hospital. *Int J Basic Clin Pharmacol* 2013; 2: 411-413.
- [22]. James L. Zazzali, et al. Risk of corticosteroid-related adverse events in asthma patients with high oral corticosteroid use. *Allergy Asthma Proc* 2015, 36:268-274.
- [23]. Kimberly G. Harmon, et al. Physician Prescribing Patterns of Oral Corticosteroids for Musculoskeletal Injuries. *J Am Board Fam Pract* 2003; 16:209-12.
- [24]. Trung N. Tran, et al. Oral Corticosteroid Treatment Patterns of Patients in the United States with Persistent Asthma. *J*



- Allergy Clin Immunol Pract 2021; 9:338-346.
- [25]. Yohannes Tsegyie Wondmkun, et al. Assessment of Prescription Pattern of Systemic Steroidal Drugs in the Outpatient Department of Menelik II Referral Hospital, Addis Ababa, Ethiopia, 2019. Patient Preference and Adherence 2021;15: 9–14.
- [26]. Bhuvana Kolar Bylappa, et al. Drug prescribing pattern of topical corticosteroids in dermatology unit of a tertiary-care hospital. Int J Med Sci Public Health 2015; 4:1-6.
- [27]. Santwana Mahar, et al. Topical Corticosteroid Misuse: The Scenario in Patients Attending a Tertiary Care Hospital in New Delhi. Journal of Clinical and Diagnostic Research. 2016 Dec, Vol-10(12):16-20.
- [28]. A Simon Carney, et al. Seasonal patterns of oral antihistamine and intranasal corticosteroid purchases from Australian community pharmacies: a retrospective observational study. Pragmatic and Observational Research 2017;8 157–165.
- [29]. Dennis M Williams, et al. Clinical Pharmacology of Corticosteroids. Respiratory Care • June 2018 Vol 63 No 6:655-670.
- [30]. Dora Liu, et al. A practical guide to the monitoring and management of the complications of systemic corticosteroid therapy. Allergy, Asthma & Clinical Immunology 2013 9:30:1-25.
- [31]. J. Bradford Rice, et al. Long-term Systemic Corticosteroid Exposure: A Systematic Literature Review. Clinical Therapeutics/2017, Volume 39, Number 11,2216-2229.