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RESEARCH ARTICLE

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A Prospective Study on Usage Pattern of Corticosteroids in a Tertiary Care Hospital

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ABSTRACT

Rational use of corticosteroids is very essential for improving patient safety on long term use. The present study aimed to study the prescribing usage pattern of corticosteroids in a tertiary care hospital. A prospective observational study was conducted in the department of dermatology, gynecology and general medicine in a tertiary care teaching hospital for the period of 6 months (August-February). All patients receiving any category of Steroid therapy were included and the prescribing and tapering pattern of steroids were reviewed. Prescribing pattern was observed and analysed in 132 participants during the study period. Cases were collected from the departments of Dermatology, General Medicine, Pediatrics and Gynecology in Gandhi Hospital, Secunderabad. All the prescriptions containing steroids were included in this study and the parameters evaluated were gender distribution, age of the patients, types of steroids according to the route of administration, number of prescribed daily dose (PDD) where compared with defined daily dose (DDD). In the collected 132 cases, 162 times corticosteroids were prescribed. The steroid utilization was found to be more in female patients, the maximum number of cases with corticosteroids was found in Dermatology department (39.4%). Particularly Injection Dexamethasone (24.7%) and Tablet Prednisolone (24.7%) are mostly prescribed. Most drugs were prescribed rationally although some factors like improper history, drug administration time and tapering were deviating away from rationality. Although most of the drugs were prescribed rationally, involvement of a Clinical pharmacist in patient care can help in more rational prescribing along with prevention and early detection of ADRs which can directly promote drug safety and better patient outcomes.

Keywords: Corticosteroids, Tertiary care hospital, Dermatology, General Medicine, Pediatrics, Gynecology.

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INTRODUCTION

Corticosteroids are a class of steroid hormones that are produced in the adrenal cortex of vertebrates, as well as the synthetic analogues of these hormones. Two main classes of corticosteroids, glucocorticoids and mineralocorticoids, are involved in a wide range of physiologic processes, including stress response, immune response, and regulation of inflammation, carbohydrate metabolism, protein catabolism, blood electrolyte levels and behavior. [1] Some common

naturally occurring steroid hormones are cortisol, corticosterone, cortisone and aldosterone. The main corticosteroids produced by the adrenal cortex are cortisol and aldosterone. [2]

Corticosteroids have multiple mechanisms of action including anti-inflammatory, immunosuppressive and anti-proliferative activity, anti-inflammatory effects result from decreased formation, release and activity of the inflammatory mediators. These effects reduce the initial manifestations of the inflammatory process. [3] Corticosteroids inhibit margination and cell migration to area of injury, also reverse dilation and increased vessel permeability in the area, resulting in decreased access of cells to the sites of injury. This vasoconstrictive action decreases serum extravagation, swelling and discomfort the immunosuppressive properties decrease the response to delayed and immediate hypersensitivity reactions (e.g., type III and type IV). This results from inhibition of the toxic effect from antigen and antibody complexes that precipitate in vessel walls creating cutaneous allergic vasculitis, and by inhibiting the action of lymphokines, target cells, and macrophages which together produce allergic contact dermatitis reactions. Additionally, the access of sensitized T lymphocytes and macrophages to target cells may also be prevented by corticosteroids. The anti-proliferative effects reduce hyperplastic tissue formation characteristic of psoriasis.

Tertiary Care Hospitals are the specialized consultative care centers providing the facilities of special investigations and treatment by the specialists. These are on the referral of primary and secondary care personnels. [4]

Corticosteroids are generally used for suppression of inflammation, replacement therapy and immune suppression. They are used either systemically or topically. [5] These are effective in treating multiple respiratory illnesses in children. [6] Both systemic and topical steroids are for acute and chronic bullous disorders, connective tissue diseases, control of inflammation and others. [7] In orthopedics, these are effectively used for muscle and joint inflammatory reactions such as arthritis, tendonitis and postoperative pain relief. [8] In General medicine mostly used for GIT diseases and respiratory tract infections and for Preoperative pain in General surgery. [9]

MATERIALS AND METHODS

Study Site: In-patient Department of General Medicine, Pediatrics, Dermatology in Gandhi Hospital, Secunderabad, 500003, Telangana State.

Study Period: August 2017-January 2018

Study Duration: 6 months

Study Design: Prospective case analysis study.

Study Approval: Study protocol was approved by Institutional Ethical Committee, CMR College of Pharmacy and Hyderabad.

Study Method

- Preparation of structured documentation form for documentation purpose.
- Visit all the departments on regular basis.
- Review and collection of cases according to inclusion and exclusion criteria on regular basis.
- Up-date previous day case/update up to discharge.
- Interpretation of data to generate result.
- Analysis of result to find the final report.

Inclusion Criteria

- Cases with Corticosteroid prescription.
- Cases with non-specific diagnosis but with Corticosteroid prescription.

Exclusion Criteria

- Cases without Corticosteroid prescription.
- HIV positive and MLC cases.

Drop Out

- If patient absconded.
- If patient die.

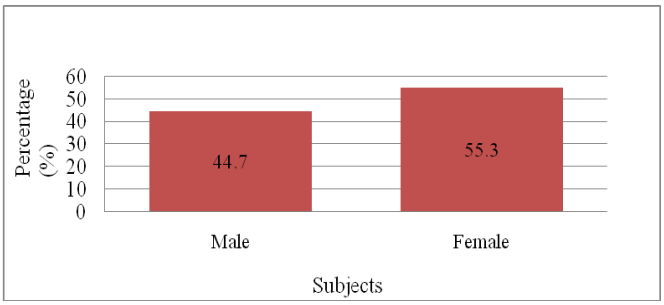

Fig. 1: Gender wise distribution

Table 1: Age wise distribution

Age	No. of patients	Percentage (%)
1 -10	14	10.61
11- 20	18	13.63
21 - 30	35	26.52
31 - 40	24	18.18
41 - 50	13	09.85
51- 60	13	09.85
> 60	15	11.36
Total	132	100

RESULTS AND DISCUSSION

Total numbers of cases collected are 132 (N=132). Departments included were Dermatology, General Medicine, Gynecology and Pediatrics.

As per the demographic details of 132 In-patients obtained, 59 (44.7%) were male and 73 (55.3%) were female. The data showed that female were more with the prescription of corticosteroids. Results were showed in Figure 1.

The age groups between 21-30 (26.52%), are highly prescribed with corticosteroids compared to other age groups, followed by 31-40 (18.18%) and then 11-20 (13.63%). Results were showed in Table 1.

Among the 132 cases collected, majority of corticosteroids were prescribed in Dermatology followed by General Medicine, Gynecology and Pediatrics Results were showed in Figure 2.

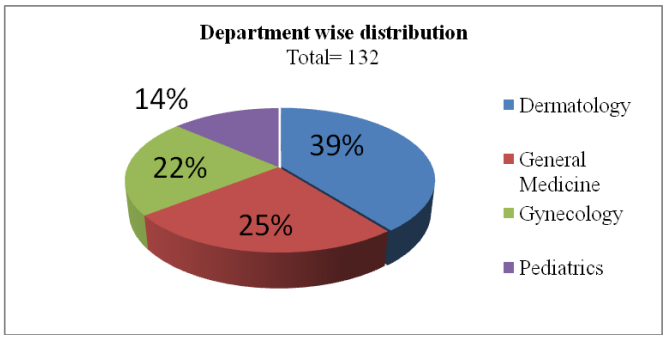

Fig. 2: Department wise distribution

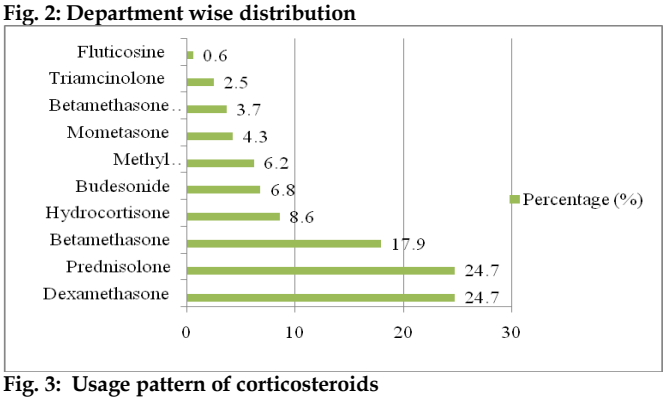

Fig. 3: Usage pattern of corticosteroids

Out of 162 Corticosteroids/Prescription, Dexamethasone (24.7%) and Prednisolone (24.7%) was found to be widely prescribed followed by Betamethasone (17.9%) and the least was prescribed is Fluticosone (0.6%). Results were showed in Figure 3.

In Dermatology, the most commonly prescribed corticosteroid was Injection Dexamethasone (44.7%) followed by Tablet Prednisolone (31.6%). Results were showed in Figure 4.

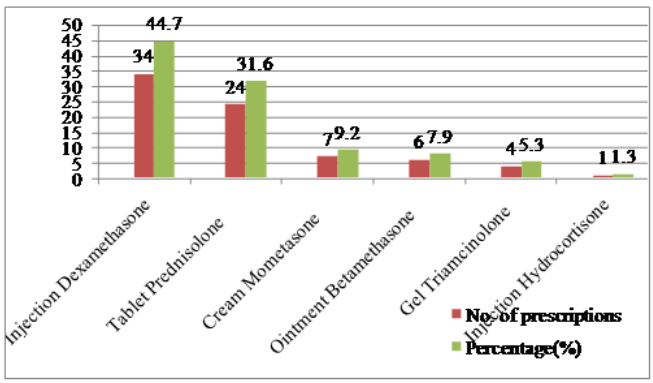

Fig. 4: Department wise distribution of corticosteroids in Dermatology

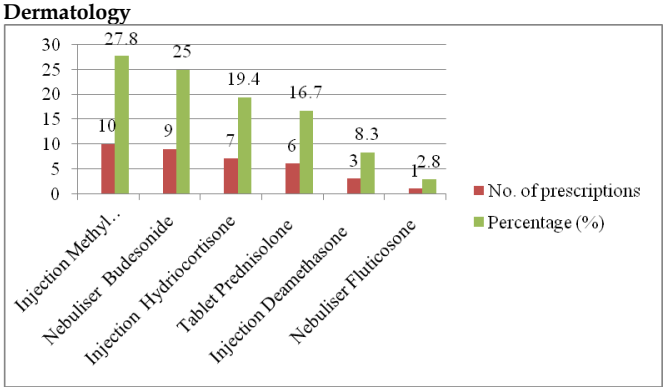

Fig. 5: Department wise distribution of corticosteroids in General medicine

In General Medicine, the most commonly prescribed corticosteroid was Injection Methyl Prednisolone (27.8%). Results were showed in Figure 5.

Injection Betamethasone (100%) was the only corticosteroid prescribed in 29 cases of Gynecology. Results were showed in Table 2.

Table 2: Department wise distribution of corticosteroids in Gynecology

S. No	Dosage form	Corticosteroid	Corticosteroid/ Prescription	Percentage (%)
1	Injection	Betamethasone	29	100

Tablet Prednisolone (47.6%) was the most commonly prescribed corticosteroid in Pediatrics. Results were showed in Figure 6.

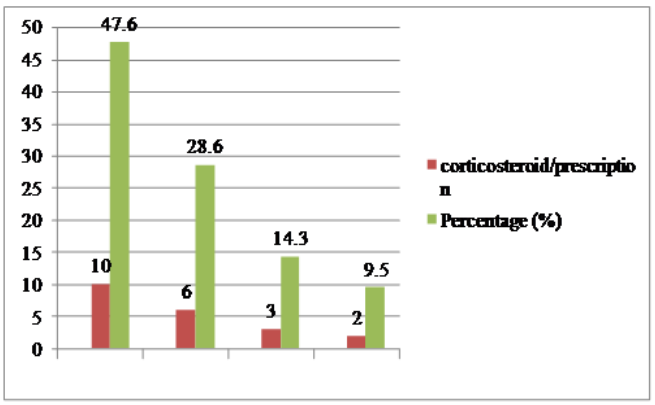

Fig. 6: Department wise distribution of corticosteroids in Pediatrics

Table 3: Disease wise distribution in Dermatology

S. No	Clinical conditions	No. of cases	Corticosteroid	Corticosteroid/Prescription	Percentage (%)
1	Hansens disease	15	Dexamethasone	13	17.1
			Prednisolone	07	9.21
2	Pemphigus	13	Dexamethasone	09	11.84
			Prednisolone	08	10.53
			Mometasone	05	06.6
			Triamcinolone	04	05.3
3	Drug reactions	10	Dexamethasone	07	09.2
			Prednisolone	07	09.2
			Betamethasone ointment	02	02.6
4	Psoriasis	06	Dexamethasone	03	03.9
			Betamethasone ointment	02	02.6
5	Dermatitis	03	Mometasone	01	01.3
			Betamethasone	02	02.6
			Dexametasone	01	01.3
6	Eczema	02	Dexamethasone	01	01.3
			Prednisolone	01	01.3
7	SLE	02	Prednisolone	01	01.3
			Hydrocortisone	01	01.3
8	Vitiligo	01	Mometasone	01	01.3
	Total		52	76	100

The PDD/DDD ratio for Methyl Prednisolone (38.37) was found to be higher and the least was Prednisolone (2.7). Results were showed in Table 6.

Among various routes of administration of steroid use, Parenteral was most frequently used (57.4%) followed

by Tablet (24.7%), Topical (10.5%) and Nasal (7.4%). Results were showed in Figure 7.

Table 4: Disease wise distribution in General Medicine

S. No	Clinical conditions	No. of cases	Corticosteroids	Corticosteroid/Prescription	Percentage (%)
1	COPD	05	Hydrocortisone	02	05.6
			Budesonide	03	08.3
2	Arthritis	05	Methyl prednisolone	03	08.3
			Prednisolone	03	08.3
3	Myelopathy	04	Methyl Prednisolone	03	08.3
4	SLE	03	Hydrocortisone	02	05.6
			Prednisolone	02	05.6
5	Acute febrile illness	03	Dexamethsone	01	02.8
			Budesonide	01	02.8
			Methyl Prednisolone	01	02.8
6	Thrombo-cytopenia	03	Methyl Prednisolone	03	08.2
7	Sepsis	02	Budesonide	02	05.5
			Hydrocortisone	02	05.5
8	Meningitis	02	Prednisolone	01	02.8
			Dexamethasone	01	02.8
9	Cerebral Edema	02	Dexamethasone	01	02.8
			Budesonide	01	02.8
10	CVA	01	Budesonide	01	02.8
11	Tuberculosis	01	Hydrocortisone	01	02.8
12	Sinusitis	01	Fluticosone	01	02.8
13	Anemia	01	Budesonide	01	02.8
		33	Total	36	100

Table 5: Disease wise distribution in Pediatrics

S. No	Clinical conditions	No. of cases	Corticosteroid	Corticosteroid/ Prescription	Percentage (%)
1	Seizures	04	Dexamethsone	03	14.28
			Prednisolone	01	04.77
2	LRTI	04	Hydrocortisone	03	14.28
			Prednisolone	02	09.52
			Budesonide	02	09.52
3	Nephrotic syndrome	03	Prednisolone	03	14.28
4	Asthma	02	Hydrocotisone	02	09.52
5	Tuberculosis	02	Prednisolone	02	09.52
6	Rheumatoid arthritis	01	Prednisolone	01	04.77
7	Bronchopneumonia	01	Hydrocortisone	01	04.77
8	HSP	01	Prednisolone	01	04.77
		18	Total	21	100

Table 6: Prescribed daily dose for individual corticosteroids and their PDD/DDD ratios

S. No	Corticosteroid	PDD (mg)	DDD (mg)	PDD/DDD
1	Methyl prednisolone	767.5	20	38.37
2	Betamethasone	13.88	1.5	09.25
3	Dexamethasone	12.94	1.5	08.62
4	Budesonide	1.34	0.2	06.7
5	Hydrocortisone	275.10	30	05.61
6	Prednisolone	27.01	10	02.7

Among In-patients, the total number drug-drug interactions with corticosteroids were observed in 50 prescriptions. Among those 50, 47 are moderate and 3 are major and most of them seen in General Medicine (42%) followed by Dermatology (40%), Gynecology (12%), Pediatrics (6%).

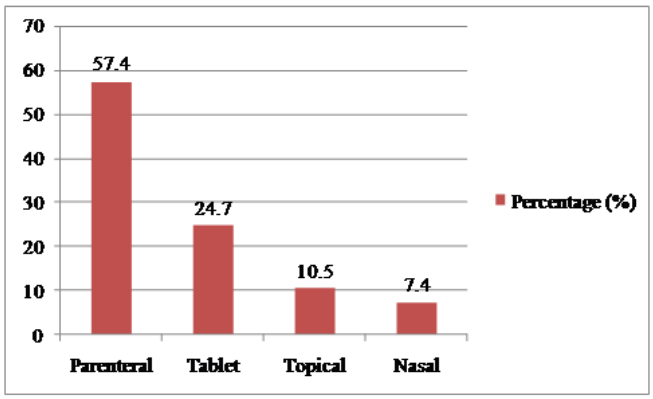

Fig. 7: Different route of administration (ROA) of corticosteroids prescribed

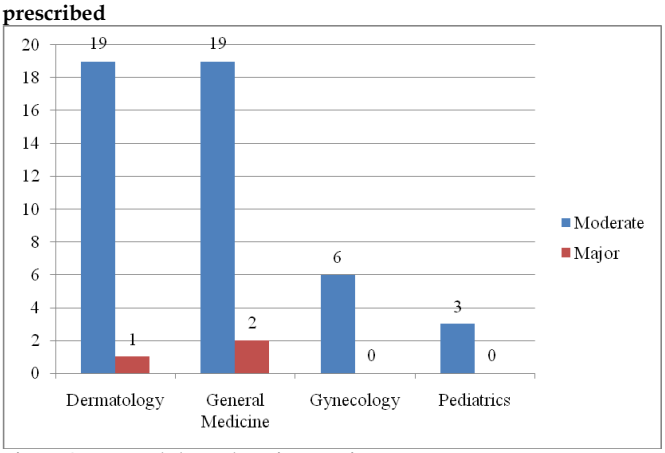

Fig. 8: Suspected drug-drug interactions

The major interactions suspected were Ciproloxacin with Dexamethasone, Norfloxacin with Methyl Prednisolone and Ciprofloxacin with Prednisolone. Results were showed in Figure 8.

Corticosteroids are commonly used for the treatment of many inflammatory and autoimmune conditions. An assessment of their usage pattern is recommended to optimize the benefits, limit the adverse effects and obtain rational utilization.

A total of 132 cases were collected and analyzed for the study. Cases were collected from the departments of Dermatology, General Medicine, Pediatrics and Gynecology in Gandhi Hospital, Secunderabad. In the collected 132 cases, 162 times corticosteroids were prescribed. We have evaluated the pattern of prescription in all the cases.

From our study it was observed that female (55.3%) are predominant with age group of 21-30 yrs (26.52%) and the maximum number of cases with corticosteroids were found in Dermatology department (39.4%) which was previously reported in the study conducted by Pradeep kumar T (2015). [10] In which he concluded that female has the more predominance.

10 different types of corticosteroids are included in our study, out of which Injection Dexamethasone (24.7%) and Tablet Prednisolone (24.7%) are mostly prescribed.

In Dermatology, cases of Hansen's disease and Pemphigus were found to be maximum which were treated with Injection Dexamethasone and Tablet Prednisolone. Topical corticosteroids like Mometasone and Triamcinolone were used to treat Pemphigus, Psoriasis and Vitiligo. This study correlates with the study conducted by Pravinkumar A W (2015). [11] In which he evaluated the corticosteroid usage pattern in dermatology and reported that Prednisolone is the most widely used.

The major clinical complaints of the patients admitted in general medicine were related to COPD and Arthritis which were treated with Injection Methyl prednisolone and Nebuliser Budesonide and this study is supported by Woods JA (2014) [12] in which he concluded that systemic corticosteroids are efficacious in the treatment of COPD.

We observed that Injection Betamethosone was the only prescribed corticosteroid for prevention of Respiratory distress syndrome (RDS) during pregnancy.

In Pediatrics, Seizures and Lower respiratory tract infection cases were maximum which were treated with Injection Dexamethasone and Injection Hydrocortisone. The similar study was conducted by Gupta R (2005) [13] for about the management of seizures with corticosteroids and Woodhead M (2011) [14] explained the guidelines for the usage of steroids for LRTI.

In our study, we found Methyl Prednisolone with the higher PDD/DDD ratio and Prednisolone with least. This states that Asian population require higher dose of corticosteroids because of the factors such as bioavailability, receptor sensitivity, metabolic enzymes, etc.

There are 3 major suspected drug-drug interactions: Ciprofloxacin with Dexamethasone, Norfloxacin with Methyl Prednisolone and Ciprofloxacin with Prednisolone.

The major mechanism responsible for drug interactions in the study relates to the co-administration with the inhibitors of CYP450 3A4 that may increase the plasma concentrations and pharmacological effects of corticosteroids which are primarily metabolized by the isoenzyme and may lead to Tendinitis hypertension. So we must be cautious with the co-administration of corticosteroids with flouroquinolones.

We observed that right corticosteroid was prescribed for right indication to right patients. This assures that rationality is genuinely followed while prescribing. However we found some factors deviating from rationality due to some factors like inappropriate drug history, wrong administration, and lack of dose tapering.

We observed that corticosteroids were not only useful for the management of autoimmune and inflammatory conditions but it's vasoconstriction action is beneficial for the treatment of conditions like thrombocytopenia, sepsis, cerebrovascular accident and acute febrile illness.

In this study, the prescription of corticosteroids is found to be rational except for drug interactions. Periodic reviewing of prescriptions is essential to increase the therapeutic efficacy, decrease adverse effects. Therefore, the involvement of clinical pharmacists in clinical practice helps to increase the proper usage of corticosteroids and to obtain optimum outcome.

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