Hospital-Based Prospective Study on Patient Perceived Concomitant Effect's with Corticosteroid Drug Therapy: Patient Counselling

*Sushrutha Kanaparthi, Bera Anoosha

Department of clinical pharmacy, Vaageswari College of pharmacy, Karimnagar, Telangana – 505001. India.

www.ijppr.humanjournals.com

ABSTRACT

Corticosteroids [CS] are used to treat inflammatory diseases including allergic diseases and hypersensitivity reactions. Long-term corticosteroid use leads to hormonal changes within the body which can cause a wide range of side effects. Hence it is vital to study and provide information about corticosteroids to patients. It is a prospective study conducted among In and Outpatient departments for 6 months. Subjects who met inclusion criteria were evaluated and monitored. The results were analyzed using Pearson's correlation coefficient and chi-square test in Graph pad prism version 8.0.1 (244). In the study of 160 subjects, the mean age of the study population was found to be 42.8 years. Males were predominant (86) compared to females (74). We observed that patients were prescribed corticosteroids mostly in the general medicine department (67). Among the various route of administration of corticosteroids systemic route (72 patients) was most preferred. Pearson's correlation revealed a significant positive correlation between drug exposure and side effects with a P-value <0.1 (r = 0.136). Comparison of side effects in current and previous use of corticosteroids by performing fisher's exact test with P value 0.0001*** which is significant. Clinical pharmacist activities were performed for the individual patients such as patient education. Although most of the drugs were prescribed rationally, the involvement of a clinical pharmacist in inpatient care may help to prevent adverse effects. By monitoring, evaluating causative factors for concomitant effects with steroids, and providing knowledge on drug use by a clinical pharmacist can benefit the patient.

INTRODUCTION

Corticosteroids are synthetic analogs of the natural steroid hormones produced by the adrenal cortex. Corticosteroids are a class of biological mediators produced within the adrenal gland and synthesized from cholesterol [1]. Which are potent anti-inflammatory and immune modulator agents used in the treatment of various inflammatory diseases including allergic diseases in some cases they produce immediate or delayed hypersensitivity reactions [2]. They are used as replacement therapy in adrenal insufficiency (at physiologic doses) as well as in supraphysiologic doses for the management of various dermatologic, ophthalmologic, rheumatologic, pulmonary, hematologic, and gastrointestinal (GI) disorders [3]. Glucocorticoids have also proven to be beneficial in controlling tumor-associated pain, limiting nausea, vomiting and improving appetite in cancer patients [4].

During the 1950s it was discovered that hydrocortisone, a natural glucocorticoid hormone, could reduce inflammation and proliferation in some skin disorders [2]. Since the first isolation of cortisol in 1950, corticosteroids have proved to be extremely effective in the treatment of acute inflammation and chronic inflammatory diseases [5]. The mechanisms of action of corticosteroids include anti-inflammatory, antiproliferative, immunosuppressive, and vasoconstrictive effects. The anti-inflammatory effects of corticosteroids cannot be separated from their metabolic effects as all cells use the same glucocorticoid receptor; therefore when corticosteroids are prescribed measures should be taken to minimize their side effects. The chance of significant side effects increases with the dose and duration of treatment and so the minimum dose necessary to control the disease should be given. A full discussion with the patient is necessary to explain the benefits and risks of corticosteroid treatment. The value of corticosteroids has been increased in recent years. Corticosteroids are available in different forms (topical, systematic, and oral). Self-medication and erratic use of corticosteroids by the patient can increase the risk of unwanted effects. There is limited research available on the overall effects of corticosteroids. There is a need to monitor, evaluate and counsel on the causation of concomitant effects with corticosteroid drug therapy.

MATERIALS AND METHODS

Study Designs, Site, and Duration: Hospital-based prospective observational study conducted among In and Out-patient department. This study was carried out in Chalmeda Ananda Rao Institute of Medical Sciences, Karimnagar India over six months.

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

341

Method of collection of data: Patients who were undergoing corticosteroid drug therapy of any age and both genders were included. Patients who were undergoing chemotherapy, pregnant women, and lactating were excluded. Following ethical clearance from the Institutional Ethics Committee and after obtaining informed consent from patients, information was collected in a specially designed proforma by communicating patients and their representatives, patient data records (Inpatient and Outpatient).

Statistical analysis: The data were analyzed using Graph Pad Prism 8.0.1 (244) by Pearson's correlation coefficient and Chi-square test.

RESULTS

A total of 160 patients were included in the study, in which 39 patients are of age group > 60 years, 31 patients are from 51-60 years age group, 25 patients in the age group between 31-40 years, 22 are from 11-20years, 15 patients are of age group 41-50 years and 0-10 years and 14 patients were between 21-30 years.

Table 1: Age-wise categorization of patients consuming steroids N=160 (%)

Age in years	Number of patients	Percent
0-10	15	9.37%
11-20	21	13.1%
21-30	14	8.75%
31-40	25	15.6%
41-50	15	9.37%
51-60	31	19.37%
>60	39	24.37%

Table 2: Gender of patients taking corticosteroids (n%)

Gender	Number of patients
Male	86 (54.7%)
Female	74 (45.2%)

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

342

This study includes 86 males and 74 females. So, we found that the majority of males were prescribed corticosteroids when compared to females.

Table 3: Co-morbidities in the present study population using corticosteroids (n%)

Comorbidities	Frequency
Diabetes	10 (10.2%)
Hypertension	34 (34.69%)
Heart diseases	3 (3.06%)
Bronchial asthma	27 (27.5%)
COPD	4 (4.08%)
Skin disorders	20 (20.4%)
TOTAL	98 (100%)

We found that the majority of comorbidity in most of the cases are hypertension (34 patients) and COPD in 4 patients.

Table 4: Distribution of patients in various departments (n %)

Department	Number of patients
Dermatology	47 (29.3%)
Pulmonology	23 (14.3%)
General medicine	67 (41.8%)
General surgery	14 (8.75%)
Paediatrics	9 (5.6%)

Among 160 patients, corticosteroids are mostly prescribed in the general medicine department (67 patients) and least in the pediatrics department (9 patients).

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

343

Table 5: Adverse effects of corticosteroids based on their route of administration (n%)

Route of administration	Number of patients	Patients with adverse effects	Patients without adverse effects
Systemic route	72 (100%)	31 (43.05%)	41 (56.9%)
Oral route	40 (100%)	23 (57.5%)	17 (42.5%)
Inhalation/Nebuliser	57 (100%)	44 (77.1%)	13 (22.8%)
Topical route	36 (100%)	14 (38.8%)	22 (61.1%)

The patients included in the study were categorized based on their route of administration. The most systemic route is preferred in 72 patients. By performing the chi-square test it shows a P-value (<0.001) 0.0002*** which is statistically significant that indicates there is an association between the route of administration and adverse effects.

Table 6: Adverse effects based on corticosteroid use (n %)

Corticosteroid use	Number of patients	Patients with adverse effects	Patients without adverse effects
Current use	109	36(33%)	73(66.9%)
Previous use	51	49(96%)	2(3.9%)

Patients included in the study were divided into current use and previous use of corticosteroids. They are compared with patients with adverse effects by performing fisher's exact test. P-value (< 0.01) 0.0001*** which is statistically significant. Therefore, side effects are dependent on corticosteroid use.

Table 7: Past medication history of corticosteroids (n %)

History of patients	Number of patients (%)
Having corticosteroids	46 (48.9%)
Not having corticosteroids	48 (51.06%)
TOTAL	94 (100%)

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

344

In our study from 160 patients, 94 patients have past medication history. 46 patients were on previous corticosteroid use and 48 patients were not having corticosteroids.

Table 8: Correlation of drug exposure and adverse effects (n%)

Duration	Number of patients	Patients with adverse effects	Patients without adverse effects
1-5 days	116	65 (40.6%)	51 (31.9%)
>5 days	44	20 (12.5%)	24 (15%)

In this study, side effects were categorized based on the duration of corticosteroid use. Pearson's correlation revealed a significant positive correlation between drug exposure and side effects with P-value <0.1 "r" value 0.136 was observed.

Table 9: Drugs and their adverse effects (n %)

Drugs	Number of patients	Patients with adverse effects	Patients without adverse effects
Dexamethasone	35 (100%)	12 (34.2%)	23 (65.7%)
Hydrocortisone	37 (100%)	20 (54.05%)	17 (45.9%)
Prednisolone	36 (100%)	20 (55.5%)	16 (44.4%)
Methylprednisolone	7 (100%)	3 (42.8%))	4 (57.1%)
Budesonide	56 (100%)	43 (76.7%)	13 (23.2%)
Mometasone	23 (100%)	9 (39.1%)	14 (60.8%)
Fluticasone	10 (100%)	3 (30%)	7 (70%)
Others	10 (100%)	5 (50%)	5 (50%)

In this study, various corticosteroids were obtained. Mostly budesonide was prescribed for 56 patients and methylprednisolone was prescribed in the lowest number (7 patients).

Patients in this study received corticosteroids and were compared by side effects and a chi-square test was performed which is significant P value (<0.01) 0.0026*** was found. It indicates that there is an association between corticosteroids and adverse effects.

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

345

Table 10: Overall adverse effects perceived by patients treated with corticosteroids (n%)

Types of adverse effects	Number of patients who received adverse effects
Voice	12 (6.2%)
Cough	37 (19.2%)
Oropharynx	20 (10.3%)
Mouth	30 (15.5%)
Skin	54 (27.9%)
Others	40 (20.7%)
TOTAL	193(100%)

Patients received side effects due to corticosteroids mostly skin-related side effects are seen in 54 patients and least seen in voice for 12 patients.

Table 11: Adverse effects shown in patients using corticosteroids

Perceived side effect	Number of patients (n)
Cough	20
Wheeze	14
Redness of skin	10
Shortness of breath	10
Taste disturbances	1
Dry skin	7
Loss of appetite	17
Oral thrush	2
Hair loss	2
Tremors	5
Itchy throat	16
Edema	16
Itchy skin	7

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

346

Feeling thirsty	3
Sore throat	3
Sweating	2
Weakness	5
Thinning of skin	3
Facial puffiness	5
Insomnia	6
Tiredness	4
Hoarsness	2
Hyperpigmentation	2
Scaly plaques	1
Petechia	1
Bruising	1
Nasal irritation	3
Rash	6
Pale skin	3
Weight gain	1

Table 12: Clinical pharmacist activities (n)

Patient counseling for	Number of patients
Improper usage of nebulizer	44
Overdosing	23
Irregular use	39
OTC	4
Improper application/ administration	19
Combination with another drug	49
Information about the usage of corticosteroids	75

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

347

DISCUSSION

Corticosteroids are synthetic analogs of steroid hormones naturally produced by the adrenal cortex. Corticosteroids became one of the most widely used and effective treatments for various inflammatory and autoimmune disorders. They are used as replacement therapy in adrenal insufficiency (at physiologic doses) also in supraphysiologic doses for the management of varied dermatologic, ophthalmologic, rheumatologic, pulmonary, hematologic, and gastrointestinal (GI) disorders [3].

In the given study out of 160 patients 54.3% (n=87) were males and 45.6% (n=73) were females. A higher number of male patients were prescribed corticosteroids due to their occupation, social history, and their lifestyle factors which may affect their health condition. The percentage of males was higher when compared to females. This is found to be consistent according to the study of Rajan P *et al.* where they include 300 patients, 74.33 % (n = 223) were males and 25.66% (n = 77) were females [6].

In the current study, about 39 patients were more than 60 years, 31 patients were 51-60 years, 25 patients were between 31-40 years, 21 patients among 11-20 years, 15 patients of age group <1-10 years, 15 patients were in 41-50 years and 14 patients belong to 21-30 years. The mean age of the study subjects was found to be 42.8 years. Patients who are administered with corticosteroids are >60 years because elder patients are more prone to infections and inflammatory conditions that may be due to their comorbid conditions or side effects of other drugs. In another study by Madhurilatha Thadanki *et al.* among the 310 patients, they found that 84 patients are from the age group of >60 years of age, and 51 patients are from the age group of 51-60 years, and 48 patients are from 41-50 years of age group [7]. This is consistent with our study by having a similar average age of patients.

Hypertension and Diabetes prevalence is high in socio-demographic groups in India. They lead to further complications in patients using Corticosteroids. Madhurilatha Thadanki *et al.* published a study in 2019 that evaluated that out of 310 cases using steroids 124 have Hypertension [7]. It is consistent with our study with comorbid conditions were obtained and 34 patients have hypertension. The reason was due to improper dietary habits and a sedentary lifestyle (excessive salt intake, higher saturated fats, lack of physical activity, consumption of alcohol, tobacco smoking, and obesity).

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

348

In the given data corticosteroids were categorized into different groups based on their action/potency. Short-acting corticosteroids which contain hydrocortisone (37.3%), Intermediate-acting corticosteroids include prednisolone (36.3%), and long-acting corticosteroids that are dexamethasone (35.3%). This is consistent with Arjan Aryal *et al.* study evaluated that out of 119 glucocorticoids prescribed Short-Acting Corticosteroid that includes Hydrocortisone, Intermediate Acting Corticosteroid contains Prednisolone and Methyl Prednisolone was commonly prescribed. Long-Acting Corticosteroid includes Dexamethasone and Betamethasone were prescribed for conditions that required a longer duration of action [8]. In both studies, short-acting corticosteroids are mostly used which may be due to their rapid onset of action.

Corticosteroids are today among the most commonly prescribed medications due to their wide indications and high potency. The patients of this study were categorized into various departments includes 29.3 % of patients were admitted in Dermatology, Pulmonology 14.3 % of patients, General medicine 41.8 % of patients, General surgery 8.75 % of patients, and 5.6 % of patients were admitted to the pediatrics department. This is in contrast with the study of Pradeep Kumar Thakur *et al.* where they included 109 patients, they found that 60.5% of patients were admitted in Dermatology, 17.4% in general medicine, 16.5% in ophthalmology, and 5.5% in orthopedics [9]. In our study corticosteroids are mostly prescribed in the general medicine department the reason might be primary diagnosis with various diseased conditions was done in the general medicine department.

In the present study, corticosteroids are prescribed in various departments. Among 160 prescriptions with corticosteroids, we found that 57 patients are from the dermatology department, 37 patients are from the pulmonology department, 81 patients are from the general medicine department, 13 patients are from the general surgery department, 12 patients are from the pediatric department. By using chi-square analysis significance was found between corticosteroids and departments (p = 0.0001) which is in resemblance with a study performed by Madhurilatha Thadanki *et al.* found the association between diagnosis and steroid treatment by performing Pearson chi-square statistical method in SPSS version 16 software [7].

Corticosteroids are administered through various routes of administration for the right indications. Madhurilatha Thadanki *et al.* in a study published in 2019 state that the majority of steroids were given through systemic route – 133 patients, followed by inhalational route –

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

349

122 patients, oral – 52 patients, and topical found in 3 patients [7]. This is consistent with our study where 72 patients were taking steroids through the systemic route, 40 patients using corticosteroids by oral route, 57 patients through inhalational route, and 36 patients on the topical route of administration. The most systemic route is preferred that may be due to the advantage of high bioavailability.

Various corticosteroids were identified. About 21.8% of patients Dexamethasone was selected, 23.1 percent of Hydrocortisone, 22.5 percent of Prednisolone, 4.37 percent of Methylprednisolone, 35 percent of Budesonide, 15.6 percent of Mometasone, 6.25 percent of Fluticasone, 6.25 percent of other corticosteroids such as deflazacort, clobetasol, desonide, and betamethasone. It is consistent with the study of Vishwanath Gouda *et al.* Out of 324 patients Budesonide was the most prescribed steroidal drug for 214 (66%) patients followed by hydrocortisone 56 (17.30%), prednisolone 29 (9%), and so on. Bronchopneumonia and allergic conditions were treated with six different steroids by different practitioners. Overall budesonide is mostly the preferred steroid for the treatment of most ailments except dermatological diseases and septic shock [10]. Patients have complaints of cough and shortness of breath. So probably budesonide is mostly preferred through the inhalation route.

In this study among 160 patients, 94 patients have past medication history among them 48.9% of patients had received corticosteroids earlier and 51.06% were newly treated with corticosteroids. Which is in resemblance with a study performed by Vishwanath Gouda *et al.* in which 53.7 % of the study population had received the corticosteroid treatment earlier [10] which is almost similar to our study.

Hariharasubramony Ambika *et al.* in a study published in 2014 evaluated the duration of application of topical corticosteroid for <6 months in the majority, longest being 8 years [11]. This is in contrast with our study which indicated duration of application was >1 year is in majority. Side effects are mostly seen in long-term duration use of corticosteroids.

Juliet M. Foster *et al.* in a study published in 2006 evaluated that the cross-sectional study is the first to explore the range and extent of patients' experiences of inhaled corticosteroids associated side effects. Their results show that perception scores for 31 side effects including dysphonia, oral thrush, affected vision, difficulty sleeping, and symptoms of skin atrophy, were significantly different between the four daily dosage groups [12]. In our study Patients received side effects due to corticosteroids mostly skin-related side effects are seen about 33.75 percent and followed by oral thrush, insomnia and so on which is consistent to Juliet

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

350

M. Foster *et al.* stated physicians should be vigilant for glucocorticoid-related adverse effects and patient counseling should be done about possible risks, even among low-dose long-term users [13].

Side effects associated with corticosteroids may not be detected during routine clinical practice and patients are unlikely to discuss their concerns about corticosteroids medication with their physician. This is important because side effects may influence treatment adherence. We identified side effects perception in this study. Our results showed cough, wheeze, redness of the skin, loss of appetite, itchy throat, insomnia, pale skin, etc. It is consistent with the study Juliet M. Foster *et al.* evaluated the experiences of inhaled corticosteroids associated side effects. Results show that perception scores for 31 side effects including dysphonia, oral thrush, affected vision, difficulty sleeping, symptoms of skin atrophy, and 24 showed a rising overall prevalence of side effect perception with increasing dose.

It was found that the right steroids were prescribed for the right indication to the right patients. This assures that rationality is genuinely followed while prescribing medication. In this study, patient counseling is done for the patients with corticosteroid abuse which is consistent with to study by Hariharasubramony Ambika *et al.* in which include topical steroids are misused both by prescribing doctor and patient themselves, as it gives instant relief to signs and symptoms. Steroids are misused by patients on their own or by doctors for various reasons. Hence the awareness about their correct usage is essential [11].

Arjan Aryal *et al.* in a study evaluated that out of 226 cases, the improper recording was done for very few cases and does omission and wrong administration time was were present for negligible cases, 42 patients were found to have a past medication history of steroids. Out of 42 patients, 15 patients were identified with abusing steroids and 27 were not on abuse [8]. This is in resemblance with our study improper usage was present in 44 patients and improper administration was present in 19 patients and drug abuse was observed in their study. We also included patient counseling and patient education for patients using corticosteroids. Most of the drugs were prescribed for the right indication to the right patient, however, some factors such as inappropriate drug history, improper mentioning of dose & frequency, administration at the wrong time, dose omission, improper tapering of dose, etc. were found to be deviating away from the rationality.

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

351

CONCLUSION

In general, side effects are more frequent in patients who are treated with corticosteroids. The involvement of a clinical pharmacist in patient care may help to prevent adverse effects. Patients with corticosteroid-induced side effects should be treated by dose adjustment. By monitoring, evaluating causative factors for concomitant effects with steroids, and providing knowledge on drug use by a clinical pharmacist can benefit the patient.

ACKNOWLEDGEMENT

REFERENCES

1. Roth P, Happold C, Weller M. Corticosteroid use in neuro-oncology: an update. Neuro-oncology practice. 2015 Mar 1;2(1):6-12.

2. Baeck M, Marot L, Nicolas JF, Pilette C, Tennstedt D, Goossens A. Allergic hypersensitivity to topical and systemic corticosteroids: a review. Allergy. 2009 Jul;64(7):978-94.

3. Liu D, Ahmet A, Ward L, Krishnamoorthy P, Mandelcorn ED, Leigh R, Brown JP, Cohen A, Kim H. A practical guide to the monitoring and management of the complications of systemic corticosteroid therapy. Allergy, Asthma & Clinical Immunology. 2013 Dec 1;9(1):30.

4. Dietrich J, Rao K, Pastorino S, Kesari S. Corticosteroids in brain cancer patients: benefits and pitfalls. Expert review of clinical pharmacology. 2011 Mar 1;4(2):233-42.

5. Manson SC, Brown RE, Cerulli A, Vidaurre CF. The cumulative burden of oral corticosteroid side effects and the economic implications of steroid use. Respiratory medicine. 2009 Jul 1;103(7):975-94.

6. Nerurkar RP, Kokane MR, Mehta MN. Study of prescribing pattern of topical corticosteroids in dermatology out patients department in a tertiary care hospital in India. International Journal of Basic and Clinical Pharmacology. 2016 Sep;5(5):2194-8.

7. Thadanki M, Kumar CP, Tejaswi M, Baburao R, Charitha K. Drug utilisation evaluation of corticosteroids in tertiary care theaching hospital. IJPSR. 2019;10(3):1468-76.

8. Aryal A, Kunwar K, Shadvar S, Kharel S, Ramasamy R, Shashidhar G, Aneesh S, Nazeem T. Study on steroid utilization pattern in a tertiary care teaching hospital. Indian Journal of Pharmacy Practice. 2017 Apr;10(2):96-103.

9. Thakur PK, Majid A, Shramik M, Kumar S. A Prospective Study on Drug Utilization Evaluation of Corticosteroids among Out-Patients of Teaching Hospital. International Journal of Pharmacy Teaching & Practices. 2015 Dec 7;6(4):1-5.

10. Gouda V, Shastry CS, Mateti UV, Subrahmanya C, Chand S. Study on Steroid Utilization Patterns in General Medicine Department. Research Journal of Pharmacy and Technology. 2019;12(10):4771-6.

11. Ambika H, Vinod CS, Yadalla H, Nithya R, Babu AR. Topical corticosteroid abuse on the face: a prospective, study on outpatients of dermatology. Our Dermatol Online. 2014 Jan 1;5(1):5-8.

12. Foster JM, Aucott L, van der Werf RH, van der Meijden MJ, Schraa G, Postma DS, van der Molen T. Higher patient perceived side effects related to higher daily doses of inhaled corticosteroids in the community: a cross-sectional analysis. Respiratory medicine. 2006 Aug 1;100(8):1318-36.

13. Curtis JR, Westfall AO, Allison J, Bijlsma JW, Freeman A, George V, Kovac SH, Spettell CM, Saag KG. Population-based assessment of adverse events associated with long-term glucocorticoid use. Arthritis Care & Research. 2006 Jun 15;55(3):420-6.

Citation: Sushrutha Kanaparthi et al. Ijppr.Human, 2021; Vol. 22 (2): 340-352.

352