# Cutaneous Adverse Drug Reaction In A Tertiary Care Hospital-A Prospective Observational Study

**[1]Dr.Cybelda Alicia Chadichal[*], [2] Dr.Pranjal Pal, [3]Dr.Balakeshawa Ramaiah,[4] Dr.Carol Fernandes**

[1],[2]Pharm.D, [3]HOD Pharmacy Practice, [4]HOD Dermatology
[123]Department of Pharmacy Practice, [123]Karnataka College of Pharmacy, [4]Department of Dermatology, [4]Bangalore Baptist Hospital, Bengaluru, Karnataka, India

**ABSTRACT: "An adverse drug reaction may be defined as an untoward clinical manifestation resulting from administration of a particular drug". The most common target organ for adverse drug reaction is the skin. Monitoring the CADR will help the health care professionals in better patient care and better use of drugs. The aim of this study was to assess the type of cutaneous adverse drug reaction. It is a prospective observational study carried out in a tertiary care hospital and data on CADR was collected from the day-to-day ward rounds. Primary ends points of this study included the type of reaction, the time of onset, drugs causing the CADRs and treatment was studied. The study included 60 cases ,most of the reaction took one day for onset and the commonest cutaneous reaction was EME(43.3%) treatment given was Inj.Chlorpheniramine(40%) and Urticaria (13.3%) treatment given was Inj.Chlorpheniramine(50%) , the common causative drug class were antibiotics(43.3%), corticosteroids (8.3%) and NSAIDs (8.3%). Common route of administration was oral (50%) and IV (45%). The most common risk factor was age (38.3%) and intercurrent disease (33.3%). CADR which required intervention to prevent permanent impairment/damage 53 (83.3%) cases, life threatening 5 (3.3%) cases, and caused disability was seen in 2 (3.3%) cases.**
**Monitoring of drug reactions should be prioritized in every health care institution to improve the quality of life of patient.**

**KEYWORDS: Cutaneous Adverse Drug Reaction (CADR), Adverse Drug Reaction, Stevens Johnson Syndrome (SJS), Exantamateous Maculopapular Eruption (EME), Assessment, Treatment**

## INTRODUCTION

The World Health Organization (WHO) defines an adverse drug reaction (ADR) as a response to a drug that is noxious and unintended and that occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease, or for the modification of physiological function [1]

The two mechanisms for mechanisms for cutaneous reactions to drug are Pharmacologic and Immunoallergic. The Pharmacological reactions can be predictable like overdose, toxicity, adverse effects or the can be unpredictable like idiosyncratic, intolerance or anaphylactic reaction. The immunological mechanisms can be IgE mediated or mediated by lymphocytes. When the reaction is immunological then the chronological sequence of events can be used to identify the drug which is responsible can be identified according to the data present in literatures[2]. Drugs, no matter how effective and safe always comes with the risk of adverse reactions. ADRs have significant morbidity and mortality rate in patients. The severity and incidence of ADRs can be affected by various patient- related factors like age, gender, co morbidities, genetic influence of the patient, and many other drug related factors like type of drug used, dosage, route of administration, duration of therapy. Another important risk factor associated with adverse drug reactions are increased number of drug exposures also advanced age, length of hospitalization of the patient and function of excreting organs[3]

**Classification of Adverse Drug Reactions**

The modern pharmacological classification of adverse drug reactions differentiates dose related and non-dose-related reactions, which were initially called type A and type B, respectively and later on for mnemonic purposes, they were labelled "Augmented" and "Bizarre" afterwards two further types of reaction were added: reactions which were related to both dose and time, and delayed reactions, later labelled types C and D. Lastly these categories can be split into two: time-related reactions and withdrawal effects. Of late, a sixth category has been proposed: unexpected failure of therapy. This classification is shown in table 1 with examples of adverse drug reactions in each category and notes on their management [4]

| TYPE OF REACTION | MNEMONIC | FEATURES | EXAMPLE | MANAGEMENT |
|---|---|---|---|---|
| A:DOSE-RELATED | Augmented | Common<br>Related to a pharmacological action of the drug<br>Predictable<br>Low mortality | Toxic effect: digitoxin toxicity; serotonin syndrome with SSRIs | Reduce dose or with<br>Consider effects of concomitant therapy |

| | | | | |
|---|---|---|---|---|
| B:NONDOSE-RELATED | Bizarre | Uncommon<br>Not related to pharmacological action of the drug<br>Unpredictable<br>High mortality | Immunological reactions: Penicillin hypersensitivity<br>Idiosyncratic reactions: Acute porphyria<br>Malignant hyperthermia<br>Pseudo allergy (eg, ampicillin) | Withhold and avoid in future |
| C:DOSE-RELATED AND TIME-RELATED | Chronic | Uncommon<br>Related to cumulate dose | Hypothalamic-pituitary-adrenal axis suppression by corticosteroids | Reduce dose or withhold; withdrawal may have to be prolonged |
| D:TIME-RELATED | Delayed | Uncommon<br>Usually dose-related<br>Occurs or becomes apparent in sometime after the use of the drug | Teratogenesis<br>Carcinogenesis<br>Tardivedyskinesia | Often intractable |
| E:WITHDRAWAL | End of use | Uncommon<br>Occurs as soon as the drug is withdrawn | Opiate withdrawal syndrome<br>Beta -blocker withdrawal | Reintroduce and withdraw slowly |
| F:UNEXPECTED FAILURE OF THERAPY | Failure | Common<br>Dose-related<br>Often caused by drug interactions | Inadequate dosage of an oral contraceptive, particularly when used with specific enzyme inducers | Increase dosage<br>Consider effects of concomitant therapy |

**TYPES OF CUTANEOUS REACTIONS**

- **Maculopapular Eruptions – MPE (Synonyms: Morbilliform, Exanthematous)**
  A symmetric distribution of polymorphous pink-to-red macules distribution is seen that may coalesce to form plaques[7] , after the beginning of a new medication eruptions begin between 4 and 14 days[6]
- **Drug Induced Vasculitis(DIV)**
  The antibodies which are formed against the drugs, act on the vascular endothelium and also the vascular wall which leads to vasculitis[7]
- **Urticaria and Angioedema**
  Urticaria clinically presents as itchy erythematous wheals, in different number and size. The single wheals appear anywhere on the body and which last less than 24 hour the skin appears normally later. Edema in subcutaneous tissue, it is known as angioedema [8] .
- **Drug Induced Erythroderma**
  The interaction between cytokines and cellular adhesion molecules is a complex process which results in highly increased epidermal turnover which leads to decreased transit time of keratinocytes through epidermis which cause a loss of cellular material from the surface of the skin[7]
- **Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS)**
  Having characteristics of maculopapular eruptions or erythroderma, lymphadenopathy, eosinophilia, atypical lymphocytes, and visceral involvement and high fever .[6]
- **Serum Sickness-Like Reaction (SSLR)**
  Erythema that progresses to urticarial lesions is the most frequent skin finding in SSLR[3]
- **SJS Stevens-Johnson Syndrome (SJS) and Toxic Epidermal Necrolysis (TEN)**
  These are rare, acute and life-threatening adverse cutaneous drug reactions, extensive death of keratinocytes leads to the separation of areas of skin in the dermal-epidermal junction causing SJS, the skin appears scaly.[7]

**MANAGEMENT**

The important step in the management of a cutaneous ADR is identifying and discontinuing the causative drug. Symptomatic treatment like antipruritic agents and potent topical glucocorticoids may be helpful in the management.
H1-receptor blockers are the choice of treatment for patients with only cutaneous symptoms. A short course of oral corticosteroids may be given to patients with severe symptoms. Occasionally emergency treatment and withdrawal of all medicines is essential, in which case care should be taken while reintroducing essential medicines. [13]

## OBJECTIVES

### PRIMARY OBJECTIVE:

1) To assess the type of the Cutaneous Adverse Drug Reaction in the tertiary care hospital.

### SECONDARY OBJECTIVE:

1) To document the time required for the onset of reaction and route of administration of the drug.
2) To study the class of drug causing cutaneous adverse drug reactions.
3) To study the risk factors, seriousness of the reaction
4) To document the treatment of the reaction

### METHOD

The present study is a prospective observational study carried out at tertiary care hospital from February to July 2021.

**Inclusion Criteria:**

- Inpatient and outpatient presenting with cutaneous lesions
- Patient referred from all departments presenting with cutaneous lesions
- Patient of all age groups presenting with cutaneous lesions following intake of drug are included in the study

**Exclusion Criteria:**

- The patients who developed ADR without the cutaneous lesions are excluded from the study.
- The patients who developed cutaneous lesions due to conditions other than the administered drug.
- Pregnant and lactatingwomen

According to the inclusion criteria, different data on cutaneous adverse drug reaction has been collected from the day to day ward rounds, as well as from dermatology OPD. The data collected were noted in the ADR reporting form which includes subject's detail like demographic details, clinical history, pre-existing medical condition, family history, past history because of drug allergies and other relevant lab data if required.
After the diagnosis of the cutaneous ADRs was done, the necessary information like the causative drugs behind the reaction, the time of onset of the reaction, as well as patient's information regarding the risk factors, seriousness of the reaction was noted in a data collection form. In case of more than one drug suspected the most likely causative drug has been noted down and this impression has been confirmed by the subsidence of clinical feature after withdrawal of drugs.

- The exact diagnosis is done by the senior dermatologist on duty and patients were given information about the study and following data had been noted down from the patient medication history interview after taking the consent from the patients

**Ethical considerations:**

Written Informed consent was taken from the participants before enrollment and stated that privacy and confidentiality of the research participants will be protected.

**Result:**

In this study which was carried out on cutaneous ADR, the total number of subjects involved were 60 out of which 25(41.6%) were male and 35(58.3%) were female patients. Female patients were predominant when compared to male patients.

**Figure 1: AGE WISE DISTRIBUTION OF CASES**

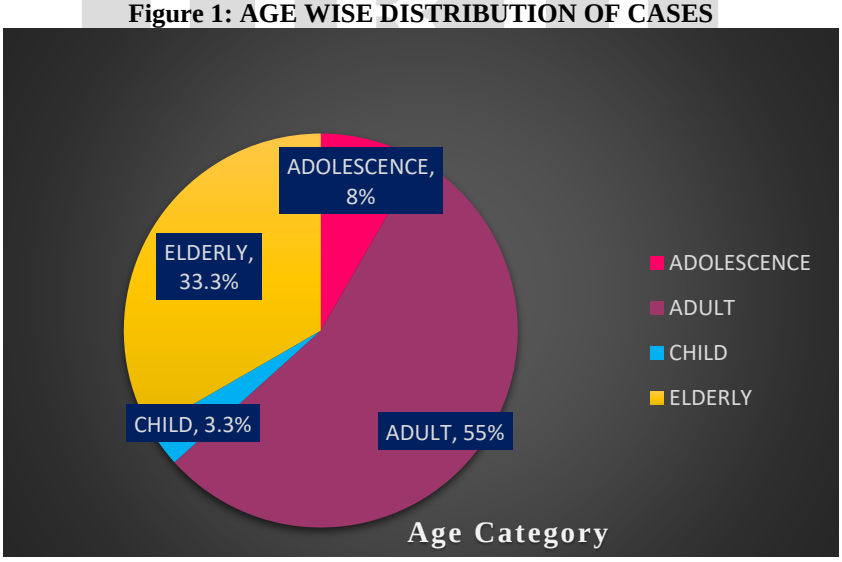



**Table 1: CAUSATIVE DRUG FOR SUSPECTED CADR**

| Type Of CADR's | CADR (%) | Name of the drug | No of cases (%) | Time of onset Min/Hrs/Days |
|---|---|---|---|---|
| Acute Generalized Exanthamatous Pustoloisis | 5 | Amoxicillin | 1(1.6) | 1Day |
| | | Ceftriaxone | 1(1.6) | 1Day |

| | | | | |
|---|---|---|---|---|
| | | Thiocolchicoside | 1(1.6) | 2Days |
| **Fixed Drug Eruptions** | 8.3 | Ibuprofen | 1(1.6) | 1Hour |
| | | Fluvoxamine | 1(1.6) | 40Mins |
| | | Norfloxacin | 1(1.6) | 40Mins |
| | | Mefenamic acid | 1(1.6) | 7Days |
| | | Ceftriaxone | 1(1.6) | 12Hours |
| **Anigoedema** | 1.6 | Paracetamol | 1(1.6) | 1Day |
| **Urticaria** | 13.3 | Prednisolone | 1(1.6) | 2Mins |
| | | | 1(1.6) | 20Mins |
| | | Amoxicillin | 1(1.6) | 10Mins |
| | | Ranitidine | 1(1.6) | 15-20Mins |
| | | Metronidazole | 1(1.6) | 15Mins |
| | | Piperacillin/Tazobactam | 2(3.3) | 20Mins |
| | | Ceftriaxone | 1(1.6) | 15Mins |
| **Lichenoid Eruption** | 1.6 | Bisoprolol | 1(1.6) | 1Days |
| **Erythema Multiforme** | 1.6 | Piperacillin/Tazobactam | 1(1.6) | 1Hour |
| **Dress** | 1.6 | Piperacillin/Tazobactam | 1(1.6) | 15Days |
| **Photodermatitis** | 1.6 | Terbinafine | 1(1.6) | 6Hours |
| | | Pirfenidone | 1(1.6) | 12Hours |
| **Dermatitis** | 5 | Ranitidine | 1(1.6) | 30Mins |
| | | Dexamethasone | 1(1.6) | 12Hours |
| | | Betamethasone | 1(1.6) | 24Hours |
| **Localized Lesions** | 11.7 | Piperacillin/Tazobactam | 1(1.6) | 20Mins |
| | | Metronidazole | 1(1.6) | 15Mins |
| | | Ciprofloxacin | 1(1.6) | 30Mins |
| | | Cefotaxime | 1(1.6) | 10Mins |
| | | Ceftriaxone | 1(1.6) | 10Mins |
| | | Fondaperinox | 1(1.6) | 15Mins |
| | | Doxycycline | 1(1.6) | 30Mins |
| **Steven Johnson's Syndrome** | 1.6 | Phenytoin | 1(1.6) | 7Days |
| **Vasculitis** | 1.6 | Ranitidine | 1(1.6) | 7Days |
| **Exanthematous Maculopapular Eruption** | 43.3 | Acyclovir | 2(3.3) | 4Days |
| | | Ibuprofen | 1(1.6) | 4Days |
| | | Diclofenac | 1(1.6) | 6Days |
| | | Lamivudine | 1(1.6) | 5Days |
| | | Thrombophob | 1(1.6) | 14Days |
| | | Furosemide | 1(1.6) | 4Days |
| | | Amoxicillin/Clavulanic acid | 1(1.6) | 4Days |
| | | | 1(1.6) | 5Days |
| | | Phenytoin | 1(1.6) | 15Days |
| | | Cyclophodphamide | 1(1.6) | 6Days |
| | | Ciprofloxacin | 3(5) | 5 -6Days |
| | | Pantoprazole | 1(1.6) | 5Days |
| | | Tramadol | 1(1.6) | 6Days |
| | | Sodium valporate | 1(1.6) | 4Days |
| | | Dapsone | 1(1.6) | 4Days |
| | | Nimusulide | 1(1.6) | 5Days |
| | | Vancomycin | 1(1.6) | 5Days |
| | | Amoxicillin | 1(1.6) | 4Days |
| | | Morphine | 1(1.6) | 5Days |

| | | | | |
|---|---|---|---|---|
| | | Cefoperazone/Sulbactam | 1(1.6) | 6Days |
| | | Clobetasol propionate | 1(1.6) | 7Days |
| | | Atorvasatin | 1(1.6) | 4Days |
| | | Paracetamol | 1(1.6) | 5Days |

**Table 2: CLASS OF DRUGS FOR SUSPECTED CADR**

| Dosage form | No of cases (N=60) | Percentage% |
|---|---|---|
| **Capsule** | 1 | 1.6% |
| **Cream** | 2 | 3.3% |
| **Injection** | 27 | 45% |
| **Ointment** | 1 | 1.6% |
| **Tablet** | 29 | 48.3% |

| Class Of Drug | No Of Cases N=60 | Frequency (%) |
|---|---|---|
| **Antibiotic** | 26 | 43.3 |
| **Alkylating Agent** | 1 | 1.6 |
| **Analgesics and Antipyretic** | 2 | 3.3 |
| **Antiviral** | 2 | 3.3 |
| **Anticoagulant** | 2 | 3.3 |
| **Anticonvalsant** | 1 | 1.6 |
| **Antiepileptic** | 2 | 3.3 |
| | | |
| **Antifungal** | 1 | 1.6 |
| **Beta Blocker** | 1 | 1.6 |
| **Corticosteroid** | 5 | 8.3 |
| **Diuretic** | 1 | 1.6 |
| **H2 Blocker** | 3 | 5 |
| **Hmg-Coa Reductase Inhibitor** | 1 | 1.6 |
| **Muscle Relaxant** | 1 | 1.6 |
| **NRTI** | 1 | 1.6 |
| **NSAID** | 5 | 8.3 |
| **Opiate Analgesic** | 2 | 3.3 |
| **PPI** | 1 | 1.6 |
| **Pyridone** | 1 | 1.6 |
| **SSRI** | 1 | 1.6 |

**Table 3: DOSAGE FORM OF THE DRUG INVOLVED IN CAUSING CAD**

**Figure 2: ROUTE OF ADMINISTRATION OF THE DRUGS**

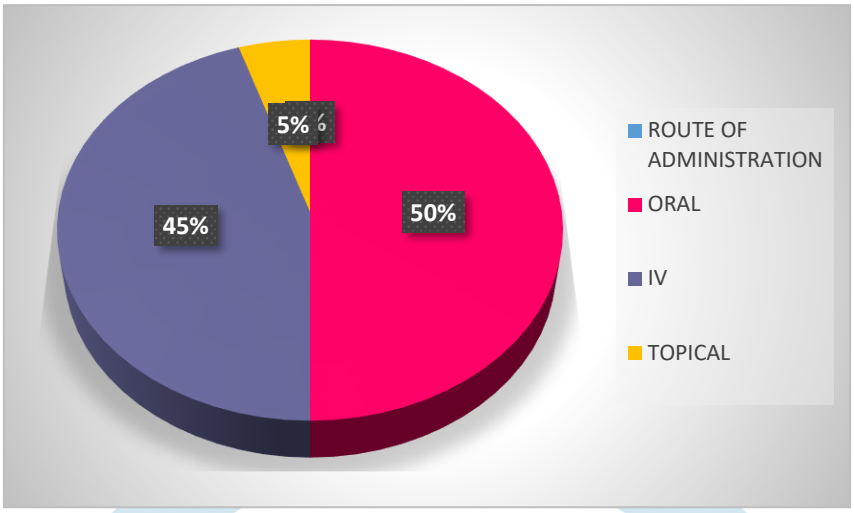



**Table 4: PREDISPOSING FACTORS OF THE CASES IN THE STUDY**

| Predisposing factors | Frequency | Percentage |
|---|---|---|
| **Age** | 23 | 38.3% |
| **Intercurrent disease** | 20 | 33.3% |
| **Multiple drug therapy** | 13 | 21.6% |
| **Genetic** | 1 | 1.6% |
| **Gender** | 15 | 25% |
| **Allergic** | 2 | 3.3% |

**Table 5: TREATMENT OF THE CADR**

| Type of reaction | Treatment | Frequency |
|---|---|---|
| AGEP | Inj.Chlorpheneramine | 1 |
| | T. Levocetrizine | 1 |
| FDE | Luliconazole ointment | 1 |
| | Tacrolimus ointment | 1 |
| | Inj.Chlorpheneramine | 1 |
| Angioedema | Inj. Chlorpheneramine | 1 |
| Urticaria | Luliconazole ointment | 1 |
| | T. Levocetrizine | 1 |
| | Inj.Chlorpheneramine | 2 |
| Lichenoid Eruptions | Clobestasol Ointment | 1 |
| DRESS | T.Levocitrizine | 1 |
| Photodermatitis | T.Levocetrizine | 1 |
| | Luliconazole ointment | 1 |
| Dermatitis | Clotrimazole mouth paint | 1 |
| | Adapalene and Clindamycin gel | 1 |
| | T.Levocetrizine | 1 |
| Localized lesions | Inj.Chlorpheneramine | 2 |
| SJS | Hydrocortisone ointment | 1 |
| Vasculitis | Inj.Chlorpheneramine | 1 |
| EME | Inj. Chlorpheneramine | 6 |
| | Calamine lotion | 3 |
| | Inj. Hydrocortisone | 1 |

| | | |
|---|---|---|
| | Mometasone+Fusidin cream | 1 |
| | T.Fexpfenadine | 1 |
| | White soft parafin | 2 |

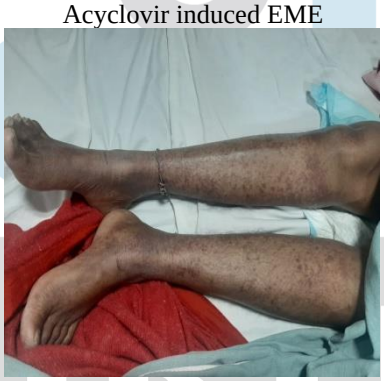
**Table 6:SERIOUSNESS OF THE CADR**

| Seriouness of the CADR | No of cases N=60 | Percentage |
|---|---|---|
| **Disability** | 2 | 3.3% |
| **Life threatening** | 5 | 8.3% |
| **Required intervention to prevent permanent impairment/ damage** | 53 | 88.3% |

**CAPTURED CUTANEOUS ADVERSE DRUG REACTION:**

Ceftriaxone induced Acute Urticaria

Acyclovir induced EME



**Discussion:**

Drugs which are meant to be used for prophylaxis and treatment of numerous disease conditions are said to be safe when used rationally. However sometimes drugs can show ADR in various patient.[12]. The development of cutaneous reaction is frequently mentioned for discontinuation of the drug therapy without completing the full course of therapy. Moreover prescribing a drug in previously sensitized patients and patient with cross reactivity with related medication are the common musicological hazards and should be considered sincerely[24.]

The study was conducted over a 6 month period and 60 patients were included keeping focus on pattern of cutaneous ADRs of drug class in the post marketing surveillance study to detect the effect in a huge and diverse population. Exanthematous maculopapular rash was most commonly reported cutaneous ADR and most of the reactions were reported within the 24 hours of drug administration. The most common drug was antibiotics followed by NSAIDS and corticosteroids given by IV route. Most of these reactions were moderate level and was preventable because either the patient had a past history of the reaction or the treatment of the reaction was well known.

In this study female patient were more affected (58.3%) in compared with male patients, like the studies conducted by Ruchika Nanda et.al, Shweta Sharma et.al and Raja Amrinder [12,22,16] .This may be because of the fact that females are more concerned and aware in compared with male about the minor reaction that might occur to their body. Whereas some studies like Tejashwani et.al, Anal Modi et.al shows male predominance [17,15,25]

In this study cutaneous ADRs were most commonly found in adult patients (55%) followed by elderly patients (33.3%) and adolescence (8.3%) which is similar to the study conducted by Padmavati et.al,Rohini Sharma et.al and M Shusma et.al this may be because of the fact that adult patients are more aware and elderly patients trend to be in polypharmacy because of multiple disease condition. Although occurrence of reactions in various age group cannot be predicted because of variable pharmacokinetics, it has hit both the extremities of the age group , as the reaction was seen in 5 month old patient as well as 84 year old patient[21,19].

The study conducted by Ruchika Nnanda et.al and Tejashwini et.al shows that most common cutaneous reaction is exanthematous maculopapular eruption (42.8% and 16.6% respectively) similarly our study also shows that most common cutaneous reaction was

exanthematous maculopapular eruption (43.3%) followed by urticaria (13.3%) and treatment was given and localized lesions (11.6%) and most common treatment for these reactions was inj. Chlorpheneramine [17,23]

Similar to the study conducted by Shweta Sharma et.al our study shows that maximum of the reaction took 1 day for onset and this is again contradictory to the studies like Raja Amrinderet.al,BJanardhan et.al, and Ankita Agarwal which shows the onset of CADRs is 2-14 days,1-7 days, 2-5 days respectively[22,16,20,24] .The reason for this may be the early diagnosis of the reaction.

In this study the most common causative drug class for CADRs was found to be antibiotics (43.3%) followed by corticosteroids (8.3%) and NSAIDs (8.3%) similar to the study conducted by the Raja Amrinder et al. which shows that Antibiotics(37.5%) and NSAIDs(25%) are the most common causative drugs for CADRs.

In this study t most common risk factor for CADRs is the age (38.3%) followed by intercurrent disease (33.3%) and gender (25%) whereas the studies like Padmavati S et.al and Anal Modi et.al tells that polypharmacy is the most common risk factor for the CADRs. This may be due to inclusion of outpatient and they are seems to take less medication[10,15]

Similar to the studies like Anal Modi et.al, Shweta Sharma et.al and Murshida Pravin et.al our study also tells that maximum of the cutaneous reaction were needed Intervention (88.3%) followed by life threatening (8.3%) and caused disability(3.3%)[16,14,23] ,the reason behind this may be the need of hospitalization following CADRs[15,22,24].

**Conclusion:**

CADRs can be of different morphology and can occur at different time in different patients according to the individual's susceptibility comorbidities and polypharmacy. Physicians should carefully evaluate the signs and symptoms of all ADRs thought to be due to drugs and immediately discontinue all drugs that are not essential. Whenever an ADR occurs the physician or clinical pharmacist should give the relevant information to the patient. As it is said prevention is better than cure, the monitoring and reporting of the drug reactions should be prioritized in every health institution to improve the quality of life of patient.

**Bibliography:**


1. Zambernardi A, Label M. Cutaneous Adverse Drug Reactions: How to Identify the Trigger. Actas Dermosifiliogr. 2018;109(8):699–707.
2. Vaillant L. [Mechanisms of cutaneous drug reactions]. Rev Prat. 2000 Jun;50(12):1294–9.
3. Ghosh S, Acharya L, Rao P. Study and evaluation of the various cutaneous adverse drug reactions in Kasturba Hospital, Manipal. Indian J Pharm Sci. 2006;68(2):212–5.
4. Edwards IR, Aronson JK. Adverse drug reactions: Definitions, diagnosis, and management. Lancet. 2000;356(9237):1255–9.
5. Gaspari AA, Tyring SK, Kaplan DH. Clinical and basic immunodermatology: Second edition. Clin Basic Immunodermatology Second Ed. 2017;1–895.
6. Marzano A V., Borghi A, Cugno M. Adverse drug reactions and organ damage: The skin. Eur J Intern Med [Internet]. 2016;28:17–24. Available from: http://dx.doi.org/10.1016/j.ejim.2015.11.017
7. Verma R, Vasudevan B, Pragasam V. Severe cutaneous adverse drug reactions. Med J Armed Forces India. 2013;69(4):375–83.
8. Lin YF, Yang CH, Sindy H, Lin JY, Hui CYR, Tsai YC, et al. Severe cutaneous adverse reactions related to systemic antibiotics. Clin Infect Dis. 2014;58(10):1377–85.
9. Roujeau JC, Ghislain PD, Valleyrie-Allanore L. Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis. Evidence-Based Dermatology Third Ed. 2014;62(5):578–85.
10. Padmavathi S, Manimekalai K, Ambujam S. Causality, severity and preventability assessment of adverse cutaneous drug reaction: A prospective observational study in a tertiary care hospital. J Clin Diagnostic Res. 2013;7(12):2765–7.
11. Marante KB. The Challenges of Adverse Drug Reaction Evaluation. J Pharmacovigil. 2018;06(03).
12. Singh N, Singh J, Bhandari V, Kumar R, Gupta M, Tikko D, et al. Dermatological Adverse Drug Reactions in a Tertiary Care Teaching Hospital of Punjab-A Pharmacovigilance Study. AMEI's Curr Trends Diagnosis Treat. 2018;2(2):71–6.
13. Charfi R, El Aïdli S, Zaïem A, Kastalli S, Sraïri S, Daghfous R, et al. Effets indesirables medicamenteux chez les sujets ages: Etude retrospective en pharmacovigilance. Therapie. 2012;67(5):471–6.
14. Frossard N, Strolin-Benedetti M, Purohit A, Pauli G. Inhibition of allergen-induced wheal and flare reactions by levocetirizine and desloratadine. Br J Clin Pharmacol. 2008;65(2):172–9.
15. Modi A, Desai M, Shah S, Shah B. Analysis of cutaneous adverse drug reactions reported at the regional ADR monitoring center. Indian J Dermatol. 2019;64(3):250.
16. Sebastian J, Ramesh M, Mahin C, Jose L, Sirasgi V, Raveendran A. Assessment of cutaneous adverse drug reactions in a tertiary care hospital. Indian J Drugs Dermatology. 2019;5(2):88.
17. T, Patel D, Bhuptani N. An observational study of cutaneous adverse drug reactions in tertiary hospital. Int J Res Dermatology. 2018;4(2):254.
18. Parvin M, Mateti U, Noronha T. Evaluation of adverse drug reactions in dermatology department of a charitable hospital in India. Libyan J Med Sci. 2019;3(3):77.
19. Noel M V., Sushma M, Guido S. Cutaneous adverse drug reactions in hospitalized patients in a tertiary care center. Indian J Pharmacol. 2004;36(5):292–5.
20. Janardhan B, Shailendra D. Prevalence and pattern of adverse cutaneous drug reactions presenting to a tertiary care hospital. Int J Res Dermatology. 2017;3(1):74.
21. Sharma R, Dogra N, Dogra D. A clinical study of severe cutaneous adverse drug reactions and role of corticosteroids in their

management. Indian J Drugs Dermatology. 2017;3(1):20.
22. An I, Harman M, Ibiloglu I. Topical Ciclopirox Olamine 1%: Revisiting a Unique Antifungal. Indian Dermatol Online J. 2017;10(4):481–5.
23. Nandha R, Gupta A, Hashmi A. Cutaneous adverse drug reactions in a tertiary care teaching hospital: A North Indian perspective. Int J Appl Basic Med Res. 2011;1(1):50
24. Agrawal A, Ghate S, Gupta A, Dhurat R. Clinical spectrum of cutaneous adverse drug reactions. Indian J Drugs Dermatology. 2018;4(2):61.
25. Manchanda Y, Das S, Sarda A, Biswas P. Controversies in the Management of Cutaneous Adverse Drug Reactions Systemic Corticosteroids in the Management of SJS / TEN : Is it Still. Indian J Dermatol [Internet]. 2018;63(2):125–30. Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85045467996&doi=10.4103%2Fijd.IJD_585_17&partnerID=40&md5=24ac1ecf391acb36c5e83a65633c1c90