



## Review Article

### PHARMACOVIGILANCE: AN INEVITABLE PATH TOWARDS DRUG SAFETY IN INDIA

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#### ABSTRACT

Thalidomide disaster is one of the overturn jolt in the field of allopathic medicine that attracted the attention of practitioner all over the world towards adverse effects of drugs, then only the actual concept of monitoring of adverse drug reactions came into limelight. Pharmacovigilance is the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other possible drug-related problems. Pharmacovigilance not only allopathic drugs; but also include herbals, traditional medicines, blood products (Haemovigilance), biological (biovigilance), medical devices (materiovigilance) & vaccines. United Kingdom firstly introduced the yellow card for adverse drug reaction reporting. In India pharmacovigilance came into existence in 2010. Indian pharmacopoeia commission (IPC) is the national coordinating centre for pharmacovigilance program of India, responsible for collection, assessment of reported ADRs from the various adverse drug reaction monitoring centers & pharmaceutical companies, also consulting central drug standard control organization (CDSCO) in generation of signal. IPC is also collaborating with World health organization (WHO) drug safety program. Main source of data collection of ADRs is spontaneous reporting method & mainly from healthcare professionals. For drugs, IPC-suspected ADRs reporting form for healthcare Professionals is used for reporting ADRs by doctors. IPC- has currently availed the ADRs reporting form for patient in english & local languages. National institute of biologicals - has availed the form for Haemovigilance. Pharmacovigilance target towards signal detection, creating warning, restricting drug use, sometimes withdrawal of drug from market & finally decreasing mortality & risk of ADRs in patients.

**Keywords:** Pharmacovigilance, Adverse drug reactions, Spontaneous reporting, Signal

#### INTRODUCTION

##### Adverse drugs reaction monitoring: Need & significance

The development of a new drug is a challenging & time consuming process along with huge investment with focused attention on drug quality, efficacy & safety. In concern to Safety, a reliable summary of the possible adverse drug reactions (ADRs) associated with the new drug is very crucial. Some of the ADRs can be predicted on the basis of experiences with pharmacologically related drugs. Others will be detected in the clinical trials conducted before marketing authorization. Clinical trials, however, are primarily designed for and more specifically aimed at the efficacy assessments of new drugs. For the detection of ADRs, clinical trials have certain limitations.<sup>1</sup> As some ADRs are rare or have a long latency period and others only occur after prolonged use of the drug or are restricted to specific patient groups, they are generally difficult to detect or predict at this stage<sup>2</sup> Consequently, many ADRs only become manifest after the drug has been marketed. ADRs monitoring is essential to detect, evaluate & develop mechanisms to prevent ADRs & their associated morbidity & mortality<sup>3</sup>. The international conference on harmonization (ICH) guidelines for Good Clinical Practice (GCP) defines ADRs as a response to a drug that is noxious and unintended and that occurs at doses normally used in man for prophylaxis, diagnosis, or therapy of diseases or for modification of physiological function<sup>4</sup>

##### 1. Pharmacovigilance

When a novel drug's safety is under process, it is being constantly supervised by pharmacovigilance centres for the identification of adverse effects of the drug, if any<sup>5</sup>. According to WHO Pharmacovigilance is the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other possible drug-related problems<sup>6</sup>. Recently, its concerns have been widened to include:<sup>7</sup>

- Herbals
- Traditional and complementary medicines
- Blood products (Haemovigilance)
- Biological (Biovigilance)
- Medical devices (Materiovigilance)
- Vaccines (AEFI Surveillance)

Pharmacovigilance starts from the pre-marketing of new drugs and continues through the post-marketing phase of drugs till it's in market<sup>8</sup>. The main objective of ADR monitoring is to disclose the quality and frequency of ADRs and to identify the risk factors that can cause the adverse reactions<sup>9</sup>.

##### 2. Significance of ADR monitoring

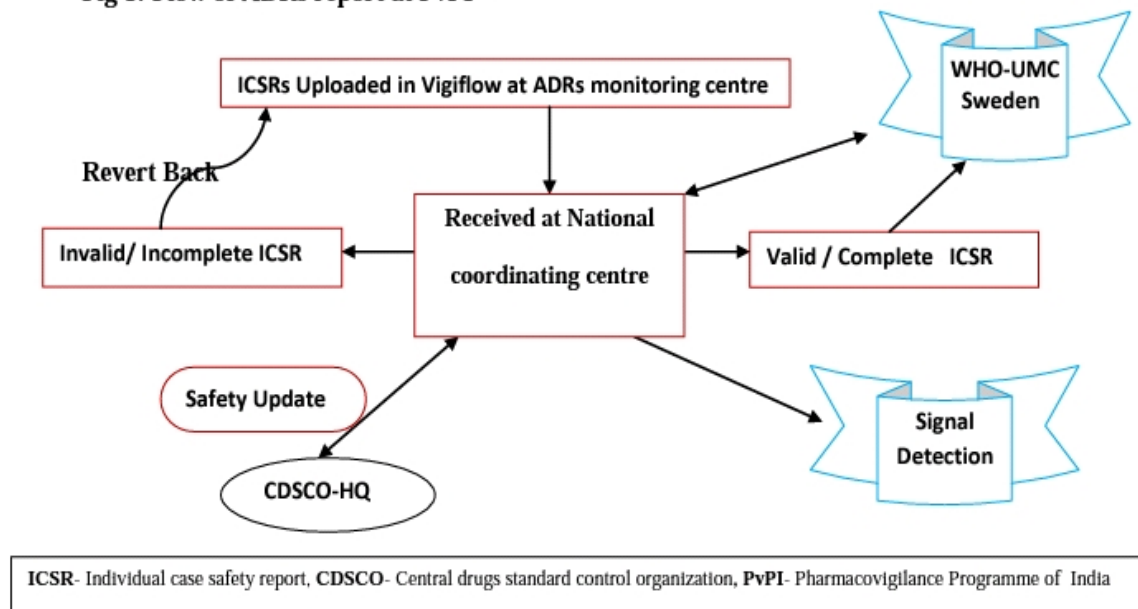
ADR monitoring and reporting can give following benefits:

1. It prevents the predictable adverse effects and helps in measuring ADR incidence.
2. It provide satisfactory information about quality and safety of pharmaceutical products.
3. It help to initiates a controlled risk-management plans.
4. It create awareness about ADRs among healthcare professionals & in patients
5. It prevents patients non-compliance

Table 1: Various types of studies, study design & methods in Pharmacovigilance<sup>10</sup>

Studies in Pharmacovigilance	Methods in Pharmacovigilance	Study design
1. Case reports	1.Active reporting method	1.Descriptive study design
2. Case control studies (retrospective)	2.Passive reporting method (spontaneous reporting)	2. Analytical study design (ecological, cross-sectional, case-control and cohort )
3. Case cohort studies	3.Stimulated reporting method	3. Observational study design
4. Intensive monitoring studies	4.Comparative observational studies (cross-sectional studies, case-control studies and cohort Studies)	
5. Impulsive reporting studies	5. Earmarked clinical examinations	
6. Anecdotal reporting studies		
7. Contingent studies		
8. Record linkage studies		
9. Meta-analysis studies		

Fig 1: Flow of ADRs report at PvPI<sup>3</sup>



### 3. Spontaneous reporting methodology

The spontaneous reporting systems were developed after the thalidomide incident. The aim of this spontaneous reporting system is to regulate and control the safety of drugs. This system is applied in the collection of post-marketing information on safety of drugs and identification of safety signals. Consequently, this system is used in the identification of signals of new, rare and serious ADRs of drugs. This system makes it easier for physicians, patients and pharmacists to report suspected ADRs to the pharmacovigilance centre. Individual Case Study Report (ICSR) is an adverse event report for an individual patient.

### 4. Challenges in Pharmacovigilance<sup>11</sup>

- Under-reporting of adverse events
- Inadequate infrastructure
- Absence of well framed guidelines and laws & its implementation procedure
- Absence of Pharmacovigilance regulatory inspections
- Lack of adequate funding in the field of pharmacovigilance as compared to other sectors

### 5. Signal detection in Pharmacovigilance

The WHO definition of pharmacovigilance signal is ‘reported information on a possible causal association between an adverse event and a drug, the relationship being unclear or incompletely documented previously’. Signal detection is one of the most important objectives of pharmacovigilance; the whole process risk/benefit evaluation depends on effective detection of signals. Classical signal detection is driven by incidence counts of adverse events and is retrospective and not truly predictive. The vision is to utilize the vast sets of medical data to proactively identify and manage emerging safety signals. Automated signal generation based upon comparison with reported safety profile of other products is an emerging method for signal detection. Proportional reporting ratio, Bayesian combination propagation neural network is used by the WHO Uppsala monitoring centre and the modified gamma poisson shrinker method is used by FDA<sup>12</sup>. Signal is a new safety finding within safety data that requires further investigation. There are three categories of signals: Confirmed signals where the data indicate that there is a causal relationship between the drug and the AE; refuted (or false) signals where after investigation the data indicate that no causal relationship exists; and unconfirmed signals which require further investigation (more data) such as the conducting of a postmarketing trial to study the issue. Ideally, the goal of

signal detection is to identify ADRs that were previously considered unexpected and to be able to provide guidance in the product's labeling as to how to minimize the risk of using the drug in a given patient population.<sup>13</sup>

**6. ADRs evaluation: Preferable Scales**

- A. Causality- WHO scale & Naranjo's scale
- B. Predictability –Council for international organization of medical sciences(CIOMS)
- C. Preventability-Schumock & Thornton
- D. Seriousness –WHO scale
- E. System Organ class (SOC)- WHO-adverse reaction terminology (ART)

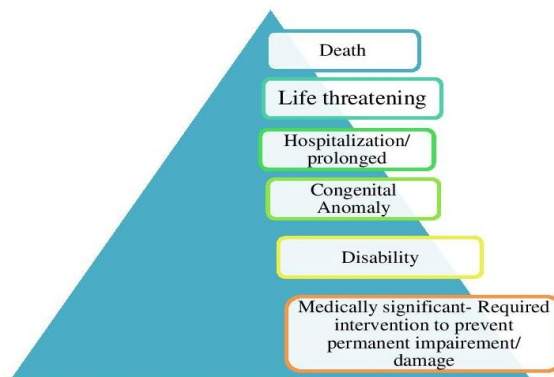
- F. Type of ADRs- Rawlin & Thompson's Scale
- G. Severity –Hartwing's scale

**7. Causality and seriousness of adverse drug reactions**

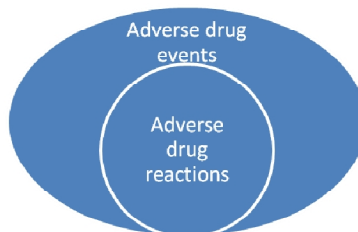
Causality describes about the time relation & pattern between the use of the drug and the occurrence of the reaction. It help in predicting whether an ADR has occurred with the use of drug or it may occurred due to other conditions including diseased state, drug interactions, overdose etc .One of the known method for assessing causality & seriousness is given by WHO, that classified-causality as certain, probable, possible etc. and seriousness criteria as death, life threatening, congenital anomaly etc.

**Table 2: Causality scale as per WHO-UMC**

Causality term	Assessment criteria
1. <b>Certain</b>	Event or laboratory test abnormality, with plausible time relationship to drug intake Cannot be explained by disease or other drugs Response to withdrawal plausible (pharmacologically, pathologically) Event definitive pharmacologically or phenomenologically (i.e. an objective and specific medical disorder or a recognized pharmacological phenomenon) Rechallenge satisfactory, if necessary
2. <b>Probable</b>	Event or laboratory test abnormality, with reasonable time relationship to drug intake Unlikely to be attributed to disease or other drugs Response to withdrawal clinically reasonable Rechallenge not required
3. <b>Possible</b>	Event or laboratory test abnormality, with reasonable time relationship to drug intake Could also be explained by disease or other drugs Information on drug withdrawal may be lacking or unclear
4. <b>Unlikely</b>	Event or laboratory test abnormality, with a time to drug intake that makes a relationship improbable (but not impossible) Disease or other drugs provide plausible explanations
5. <b>Conditional/ Unclassified</b>	Event or laboratory test abnormality More data for proper assessment needed, or Additional data under examination
6. <b>Unclassifiable/ Unassessable</b>	Report suggesting an adverse reaction Cannot be judged because information is insufficient or contradictory Data cannot be supplemented or verified



**Figure 2: Seriousness criteria as per WHO-UMC**



**Figure 3: Relationship between adverse drug events (ADEs) and adverse drug reactions (ADRs)**

Table 3: List of Countries with their ADRs reporting agency /authority

SN	Country	ADRs Reporting Agency
1.	Australia	Therapeutic Goods Administration (TGA)
2.	Bangladesh	Directorate General Of Drug Administration (DGDA)
3.	Brazil	Brazilian National Drug Monitoring Centre (Ndmc)
4.	China	State Food And Drug Administration (SFDA)
5.	Denmark	Danish Medicines Agency (DMA)
6.	Egypt	Egyptian Pharmaceutical Vigilance Center (EPVC)
7.	Germany	Federal Institute For Drugs & Medical Devices (FIDMD)
8.	Hungary	National Institute Of Pharmacy (NIP)
9.	India	Indian Pharmacopoeia Commission (IPC)
10.	Japan	Pharmaceuticals & Medical Device Agency (PMDA)
11.	Jordan	Jordan Food & Drug Administration (JFDA)
12.	Kenya	Pharmacy & Poison Board (PPB)
13.	Malaysia	Drug Control Authority (DCA)- Malaysian Adverse Drug Reaction Adverse Committee (MADRAC)
14.	Newzealand	Medicines & Medical Devices Safety Authority (Medsafe)
15.	Oman	Directorate General Of Pharmaceutical Affairs & Drug Control (DGPADC)
16.	Republic of Korea	Korean Institute Of Drug Safety (KIDS)
17.	Saudi	Saudi Food & Drug Authority (SFDA)
18.	Singapore	Health Sciences Authority (HSA)
19.	South Africa	Medicines Control Council (MCC)
20.	Spain	Spanish Medicines & Health Product Agency (SMHA)
21.	Thailand	Thai Food & Drug Administration (TFDA)
22.	United Kingdom (U.K)	Medicines & Healthcare Product Regulatory Agency (MHRA) - Yellow Card
23.	United States of America (U.S.A)	Food And Drug Administration (FDA)
24.	Vietnam	Drug Administration Of Vietnam (DAV)
25.	Zimbabwe	Medicines Control Authority Of Zimbabwe (MCAZ)

## 8. Literature reviews

**Ghosh S, Leelavathi DA, Padma GM.** (2006) conducted a prospective study for evaluation of various cutaneous adverse drug reactions in dermatology department of kasturba hospital, Manipal. Adverse drug reaction attributes to 77% of the hospital visit. Incidence of reported cutaneous adverse drug reactions, were 2.85%. Majority of the adverse drug reactions (96%) were of type B. Antibiotics (30%), were the common class of drugs, causing cutaneous adverse drug reactions. Maximum numbers of adverse drug reactions were due to acetaminophen, amoxicillin, antitubercular drugs, and Phenytoin.<sup>14</sup>

**Chhetri AK et al.** (2008) conducted a study of adverse drug reactions caused by first line anti-tubercular drugs used in Directly Observed Treatment, Short course (DOTS) therapy in western Nepal, Pokhara. A total 137 patients were studied & Patients and/or patient party were interviewed to detect occurrence of any ADRs during their visit to the DOTS center, among whom 54.74% (n=75) reported occurrence of ADRs. Isoniazid accounted for 49.3% of the ADRs. The most commonly reported ADR were tingling and burning sensation in hands and feet experienced by 32 (11.03%) patients.<sup>15</sup>

**Padmaja U et al.** (2009) conducted a prospective analysis of adverse drug reactions in a south Indian hospital to record and analyze adverse reactions among all patients admitted to the medical wards over one year. Among 1250 patients admitted during the study period, 250 adverse events were observed. Majority (76.8%) were of mild type, 66% were severe requiring intensive care and 3 patients died. Antimicrobials were responsible for maximum (42.4%) ADRs followed by drugs acting on CNS (20%).<sup>16</sup>

**Poddar S et al.** (2009).conducted a prospective hospital based study over a period of six month in the Department of oncology, Bangabandhu Sheikh Mujib Medical University and Dhaka Medical College Hospital. A 50 patients having ADRs due to cancer chemotherapy were randomly selected , Alkylating agents and antimetabolites are drugs class most commonly

associated with maximum ADRs & most common ADRs observed were nausea, stomatitis, alopecia, myelosuppression.<sup>17</sup>

**Kristina SG et al.** (2011) conducted an exploratory study using VigiBase for suspected adverse drug reactions reported for children worldwide to characterize and contrast child reports against adult reports in an overall drug and adverse reaction review of internationally compiled individual case safety reports. 3472183 reports were included in the study, of which 7.7% (268145) were reports for children (0–17 years). Skin reactions were most commonly reported for the children; these were recorded in 35% of all reports for children. Reactions reported in suspected connection to medicines used for attention-deficit hyperactivity disorders (ADHD) completely dominated the 2- to 11-year age group and were also common for the adolescents.<sup>18</sup>

**Gupta P et. al.** (2011) conducted a cross sectional, questionnaire based study was conducted to assess the knowledge, attitudes and practices regarding adverse drug reaction reporting amongst resident (trainee) doctors. It involved 407 post graduate resident doctors, knowledge of the resident doctors regarding reporting responsibilities, type of event and product to be reported and the reporting mechanisms, was found to be deficient.<sup>19</sup>

**Shrivastava M et.al.** (2011) conducted an observational, prospective study based on ADRs for one year, in ADR reporting unit of the hospital IGGMC&H, Nagpur. Total 2639 ADRs were reported. Antimicrobial agents (AMA) were the drug class most commonly involved and non steroidal anti-inflammatory drugs (NSAIDs) were next to AMA & majority of the reports were rated as probable (55.89%).<sup>20</sup>

**Rajesh R, Vidyasagar S, Nandakumar K** (2011) conducted the active pharmacovigilance (intensive monitoring by active follow-up ) study at the medicine department, Kasturba Hospital, Manipal, India. In monitoring of 130 retrospective patients identified 74 ADRs from 57 patients. Anemia and

hepatotoxicity were the most commonly observed ADRs. The organ system commonly affected by ADR was red blood cell (21.4%). The ADRs were moderate in 77% of cases.<sup>21</sup>

**Smyth RMD et al.** (2012) conducted observational study in children in three settings: causing admission to hospital, occurring during hospital stay and occurring in the community. Searched nineteen electronic databases, Seventy one percent (72/102) of studies assessed causality, and thirty four percent (34/102) performed a severity assessment. Only nineteen studies (19%) assessed avoidability. Incidence rates for ADRs causing hospital admission ranged from 0.4% to 10.3% of all children (pooled estimate of 2.9% (2.6%, 3.1%)) and from 0.6% to 16.8% of all children exposed to a drug during hospital stay. Anti-infectives and anti-epileptics were the most frequently reported therapeutic class associated with ADRs in children admitted to hospital (17 studies; 12 studies respectively) and children in hospital (24 studies; 14 studies respectively), while anti-infective and non-steroidal anti-inflammatory drugs (NSAIDs) were frequently reported as associated with ADRs in outpatient children (13 studies; 6 studies respectively). Fourteen studies reported rates ranging from 7%–98% of ADRs being either definitely/possibly avoidable.<sup>22</sup>

**Rishi RK et al.** (2012) conducted a pilot survey to know the opinion of physicians towards adverse drug reporting using self administered questionnaire. A total of 100 physician included, majority of respondent feel that ADRs reporting should be made mandatory to physician, believe that serious type of ADRs to be reported & proven one be reported. Most common drug associated with ADRs is NSAIDs then antibiotic.<sup>23</sup>

**John IJ et al.** (2012) carried out a cross sectional study among clinicians of a tertiary care centre, UAE irrespective of their gender, specialization and experience. A validated self administered questionnaire was distributed among clinicians to assess the knowledge, practice and factors influencing ADR reporting. The 42 clinicians participated in the study, common factor discouraging reporting of ADR was not knowing how to report ADRs (71%).<sup>24</sup>

**Divakar B et al.** (2012) carried out continuous, longitudinal, prospective follow up study of 400 HIV patients for adverse drug reactions (ADR's) taking highly active antiretroviral therapy in ART Centre, NCH, Surat, India. A total of 107 patients showed adverse drug reactions (ADR) due to antiretroviral therapy. Out of the different ADR's, skin rashes (7.25%), anemia (6.5%) and nausea/vomiting (5.5%) were common as compared to other reactions<sup>25</sup>

**Mishra S et al.** (2013) carried out a longitudinal, observational study in the outpatients department of psychiatry in S.C.B. medical college and hospital to monitor the ADR profile of the antidepressants. A total of 160 cases were studied for ADRs by using a predesigned CDSCO form, among the 160 patients who took antidepressants, 26.87% reported ADRs. Agitation, anxiety and insomnia were the common ADRs.<sup>26</sup>

**Lihite et al.** (2013) carried out a cross-sectional study on adverse drug reactions in HIV infected patients at a art centre of tertiary care hospital in guwahati, India. (13.13%) gastritis, (8.75%) rashes, (8.13%) anemia, (7.5%) maculopapular rashes, (6.87%) giddiness, (6.87%) anorexia and (3.75%) parasthesia of legs were commonly reported ADRs. Out of 160 ADRs, 50 (31.06%) ADRs were belonging to gastrointestinal system. Zidovudine+Lamivudine+Nevirapine (ZDV+3TC+NVP) regimen use reported majority of ADRs.<sup>27</sup>

**Shi QP et al.** (2013) conducted a retrospective review of hospitalized patients during 5 years for adverse drug reactions & pattern use of cephalosporins: This study evaluated ADRs associated with cephalosporins in hospitalized patient in china, out of 3,52,661 patient only 2046 (0.58%) exhibit ADRs. Ceftriaxone & cefalexin were the most frequent drugs involved in development of ADRs & skin reactions were more frequent reported reactions.<sup>28</sup>

**Pingili BS.** (2013) carried out comparative study about the knowledge of adverse drug reaction (ADR) reporting that private practitioners and government doctors gained in a random locality in India". A cross sectional, observational, questionnaire based survey, in this questionnaire was administered to over 220 doctors, selected at random conducted in Warangal for three months. Government doctors exhibited good knowledge of ADRs and current ADR reporting systems established in the nation, while private practitioners had a little knowledge.<sup>29</sup>

**Joshi N et al.** (2013) carried out a prospective study on pattern of adverse events following immunization in an Indian teaching hospital for one year, based on two phase telephone Survey, call after 1 week & call after 30 days of vaccination & reporting ADRs in VAERS Form. Out of 4320 children, 899 children (20.8%) suffered 1003 AEFI. The most frequent types of adverse reactions to vaccines were fever (34.33 per 1000 doses), excessive crying (30.95 per 1000 doses) and injection site swelling (18.57 per 1000 doses).<sup>30</sup>

**Vijayakumar, Dhanaraju** (2013) conducted a prospective study, period of eight months jointly by Departments of KIMS Teaching Hospital, Amalapuram, Andhra Pradesh, India for adverse drug reactions. The dermatological system (29.5%) was the organ system most commonly affected by the ADRs, with skin reactions (15.3%) being the most common individual reaction reported. Antibiotics (33.3%) were the drug class most commonly reported ADRs.<sup>31</sup>

**Lobo et al.** (2013) conducted a prospective study at HGP, Brazil over a period of 8 months. The overall incidence of ADRs in the patient population was 3.1%, and gender was not found to be a risk factor. The highest ADR rate (75.8%) was found in the adult age group 15 to 50 years, and the lowest ADR rate was found in children aged 3 to 13 years (7.4%). Metamizole, tramadol, and vancomycin were responsible for 21, 11.6, and 8.4% of ADRs, respectively.<sup>32</sup>

**Lihite et al.** (2013) conducted a cross-sectional study in nodal ART centre Assam at government hospital in Guwahati. Out of 160 ADRs, 50 (31.06%) ADRs were belonging to gastrointestinal system. Zidovudine+Lamivudine+Nevirapine (ZDV+3TC+NVP) regimen use reported majority of ADRs. Gastritis was the commonly reported ADR from ART.<sup>33</sup>

**Shamna M et al.** (2014) conducted a prospective study on adverse drug reactions of antibiotics in a tertiary care hospital. Spontaneous reporting study by active and passive methods was carried out for a period of one year in different departments of a tertiary care referral hospital, Kerala. A total of 49 ADRs were reported. Mostly affected organ systems were the GIT (38.77%) and the skin (30.61%). The antibiotic classes mostly accounted were cephalosporins (34.69%) followed by fluoroquinolones and others in which type A reactions were more compared to type B and 59.18% of them were predictable. Of the reported reactions, 55.10% were definitely preventable and causality assessment was done which showed that 71.42% of the reactions were probable, possible (18.36%), definite (10.20%).<sup>34</sup>

**Nirojini PS et.al.** (2014) carried out a prospective, observational study for nine month to record and analyze adverse drug reactions among all patients admitted to the neurology department of a south Indian tertiary care hospital. A total of 295 patients, Headache (21.65%), sedation (11.46%), sweating (10.19%) insomnia (8.91%) and dizziness (8.91%) were the most frequent reactions. The highest rate of ADRs was recorded to be induced by anti-platelets (aspirin and clopidogrel) 45 (22.61%) and lowest rate was found with anti-manic drug like lithium carbonate 1 (0.50%). Majority of the ADRs 161 (80.90%) were scored probable, 33 (16.58%) possible, 03 (1.50%) unlikely and 2 (1%) definite, 148 (74.37%) reactions were mild 50 (25.12%) moderate and one (0.50%) were severe.<sup>35</sup>

**Bhuvana KB et.al.** (2014) conducted a prospective observational study of adverse drug reactions to antiretroviral therapy: type and risk factors at ART Center, KR hospital of Mysore medical college & research institute, for 6 months. A total of 158 patients evaluated, most common regimen which caused ADRs was zidovudine + lamivudine + nevirapine. Most common type of ADRs was anemia (55.06%) and rash (25.31%).<sup>36</sup>

**Tadesse et.al.** (2014) carried out a cross sectional study at antiretroviral therapy (ART) clinic of Gondar University Hospital, Brazil. Self-reported adverse drug reactions and their influence on highly active antiretroviral therapy in HIV infected patients were assessed. A total of 384 participants were enrolled. The most frequently reported ADRs were nausea (56.5%) and headache (54.9%)<sup>37</sup>.

**Alam k et.al.** (2014) conducted a prospective study in tertiary care hospital of western Nepal for reporting adverse drug reactions among hospitalized medical Patients. Information related to suspected adverse drug reactions (ADRs) were collected by pharmacists from general medical ward using ADRs reporting form from Manipal teaching hospital (MTH) during ward rounds. Among 1,105 patients, 51 patients experienced ADR (4.61%). Incidents of ADRs were higher with antibiotics (47.06%) and Ceftriaxone was at top of list (15.69 %).<sup>38</sup>

**Roshini A et.al.** (2015) conducted a prospective observational study for a duration of six months in the inpatient departments of Malla Reddy hospital India, a 373 bedded tertiary care teaching hospital. A total of 84 patients were recruited. Skin Rashes (16.66%) was the most common type of ADR observed & Antibiotics (27.38%) were the most common cause of the ADR.<sup>39</sup>

**Sharma A, Kumari MK, Manohar HD, Bairy KL, Thomas J.** (2015) conducted a retrospective, descriptive, case record study to evaluate the pattern of occurrence of ADRs due to cancer chemotherapy in hospitalized patients. Among the 195 patients included in the study, a total of 500 ADRs were identified, most common ADRs were infections (22.4%), nausea/vomiting (21.6%), febrile neutropenia (13%) and anemia (7.2%) & Platinum compounds (24.2%), nitrogen mustards (20.6%), taxanes (17%), antibiotics (6.6%) and 5fluorouracil (5%) were the most common drugs causing ADRs.<sup>40</sup>

## CONCLUSION

Pharmacovigilance play a major role in tackling the challenges offered by the increased variety of medicines. Upon the manifestation of adverse effects and drug toxicities, it is

essential that these should be reported, analyzed and communicated to the common public. Although, a significant amount of information regarding the effective use and adverse reactions has been available, but more information is required in order to offer effective drug use in specific populations like children, pregnant women and the elderly. Moreover, providing the regulatory authority with the necessary information to amend the recommendations on the use of the medicines; improving communication between the health professionals and the public and educating the health professionals to understand the effectiveness and risk of medicines they prescribe, is the need of the moment. Also a need of new step in making pharmacovigilance reporting mandatory, introducing pharmacovigilance inspections, creating a clinical trial and post marketing database for serious adverse events and ADRs for signal detection and access to all relevant data from various stakeholders is highly recommended for building a network of pharmacovigilance and pharmacoepidemiologists in India. So far studies carried out in pharmacovigilance donot provide clear-cut data in relation to drug safety. Adverse drug reactions are one of the drug related issues in the hospital setting and a great challenge for ensuring drug safety. The health department should promote the spontaneous reporting of adverse drug reactions to drugs, proper documentation and periodic reporting to regional pharmacovigilance centers to ensure drug safety. The active involvement of a well trained clinical pharmacist & nursing staff for detecting the adverse drug reactions and delivering the awareness classes for the healthcare professionals regarding the need of reporting the incident could improve the scenario in under-reported hospitals. Hence, there is absolute requirement for developing and strengthening the culture of reporting ADRs for collection of the acceptable drug safety data.

## REFERENCES

- Ioannidis JP, Contopoulos-Ioannidis DG. Reporting of safety data from randomised trials. *Lancet* 1998;352:1752-3
- Stephens MDB. The pre-marketing establishment of the side-effect profile of a new drug. In:Stephens MDB, Talbot JCC, Routledge PA (eds). *Detection of new adverse drug reactions*. New York: Grove's dictionaries inc, 1998:197-253
- Indian Pharmacopoeia Commission- Pharmacovigilance programme of India: Performance report 2014-15:9-13
- World Health Organization. *International Drug Monitoring: The role of National centers*. Technical report series no. 498; 1972 Geneva, Switzerland
- Beard K. Adverse reactions as a cause of hospital admission in the aged. *Ind Jour of Pharmaco* 1992; 2:356-357
- WHO: Importance of Pharmacovigilance, Safety monitoring of medicinal products 2002:7
- Meyboom RHB, Egberts ACG, Gribnau FWJ, Hekster YA. Pharmacovigilance in perspective. *Drug Safety* 1999; 21(6): 429-447
- Lazarou J, Pomeranz BH, Corey PN. Incidence of adverse drug reactions in hospitalized patients-a meta-analysis of prospective studies. *Jour amer medi asso* 1998; 2:1200-1205
- Moore N. The role of the clinical pharmacologist in the management of ADRs. *Drug Saf* ; 2001;24(1):1-7
- Sahu et al. Adverse drug reactions monitoring: prospects and impending challenges for pharmacovigilance. *SpringerPlus* 2014; 3:695
- Pipasha B. Pharmacovigilance in asia. *Journal of pharma pharmacot* 2013;4(4): s7-s19
- Mahmood K T et.al. Pharmacovigilance – A need for best patient care in Pakistan- A review. *J. Pharm. Sci. & Res* 2011;3(11):1566-1584
- <https://en.wikipedia.org/wiki/Pharmacovigilance> (accessed 21 Jan 2016)

14. Ghosh S., Leelavathi D. Acharya , RAO PGM. Study & evaluation of various cutaneous adverse drug reactions in kasturba hospital , Manipal Indian J. Pharm. Sci., 2006, 68 (2): 212-215
15. Chhetri A K et.al. A study of adverse drug reactions caused by first line anti-tubercular drugs used in Directly Observed Treatment, Short course (DOTS) therapy in western Nepal, Pokhara. *J Pak Med Assoc* 2008;58( 10) :531-536
16. Poddar S et.al. Pattern of Adverse Drug Reactions Due to Cancer Chemotherapy in Tertiary Care Teaching Hospital in Bangladesh. *Dhaka Univ. J. Pharm. Sci.*2009. 8(1): 11-16
17. Padmaja U, Adhikari P, Pereira P. A Prospective Analysis of Adverse Drug Reactions in a South Indian Hospital. *Online J Health Allied Scs* 2009;8(3):12
18. Kristina S, Niklas N, Karin N, Edwards I R. Suspected Adverse Drug Reactions Reported For Children Worldwide An Exploratory Study Using VigiBase. *Drug Saf* 2011; 34 (5): 415-428
19. Gupta P et.al. Adverse Drug Reaction Reporting and Pharmacovigilance: Knowledge, Attitudes and Perceptions amongst Resident Doctors. *Jour Pharm. Sci. & Res* 2011;3(2):1064-1069
20. Shrivastava M et.al. Adverse Drug Reactions Reported in Indira Gandhi Government Medical College and Hospital, Nagpur. *JAPI* 2011 :59
21. Rajesh R, Vidyasagar S, Nandakumar K. Highly active antiretroviral therapy induced adverse drug reactions in Indian human immunodeficiency virus positive patients. *Pharmacy Practice (Internet)* 2011 Jan-Mar;9(1):48-55
22. Rebecca M D S et.al. Adverse drug reactions in children—A Systematic Review. *PLoS ONE* 2012;7(3): e24061
23. Rishi R K et.al. Opinion of physicians towards Adverse drug reporting results of pilot study. *Journal of community nutrition & health* 2012; 1 (1): 25-29
24. John L J et.al. Reporting of adverse drug reactions: A study among clinicians. *Journal of applied Pharmac Sci* 2012 ;02 (6):135-139.
25. Divakar B et.al. The study of adverse drug reactions (ADR's) in HIV patients taking highly active antiretroviral therapy in ART centre, NCH, Surat, India. *Int J Med Pharm Sci* 2012; 3 (2):9-18
25. Mishra S et.al. Drug reaction monitoring of antidepressants in the psychiatry outpatients department of a tertiary care teaching hospital journal of clinical and diagnostic research. 2013 ;7(6): 1131-1134
27. Lihite et al. A study on adverse drug reactions in HIV infected patients at a ART centre of tertiary care hospital in guwahati, India. *Asian J Pharm Clin Res*, 2013;6( 2): 100-102
28. Shi QP et.al. Adverse drug reactions & pattern use of cephalosporins: A retrospective review of hospitalized patients during 5 years. *Interna jour of Phaco* 2013;9(1):66-73
29. Pingili, Shanthan B. Pharmacovigilance: A comparative study about the knowledge of adverse drug reaction (ADR) reporting that private practitioners and government doctors gained in a random locality in India. Master's theses and doctoral dissertations 2013:535
30. Joshi N et.al. Pattern of adverse events following immunization in an Indian teaching hospital. *Intern Jour of Medic Scie and Pub Health* 2013 ;2(1):62-68
31. Vijayakumar, Dhanaraju. Description of adverse drug reactions in a multi-specialty teaching hospital . *Int. j. integr. Med* 2013; 1: 26
32. Lobo et.al. Adverse drug reaction monitoring: support for pharmacovigilance at a tertiary care hospital in Northern Brazil. *BMC Pharmac and Toxic* 2013; 14:5
33. Lihite et al. A study on adverse drug reactions in HIV infected patients at a art centre of tertiary care hospital in guwahati, India *asian j pharm clin res*, vol 6, suppl 2, 2013, 100-102
34. Shamna M et.al. A prospective study on Adverse Drug Reactions of antibiotics in a tertiary care hospital. *Sau Pharmaceu Jourl* 2014; 22: 303–308
35. Nirojini PS et.al Monitoring and reporting of adverse drug reactions in a south Indian tertiary care hospital *Int. J. Pharm. Sci.Rev. Res* 2014 ;24(1): 259-262
36. Bhuvana KB et.al. A prospective observational study of adverse drug reactions to antiretroviral therapy: type and risk factors in a tertiary care teaching hospital. *Int J Basic Clin Pharmac* 2014 ;3(2):380-384
37. Tadesse et.al. Self-reported adverse drug reactions and their influence on highly active antiretroviral therapy in HIV infected patients: a cross sectional study. *BMC Pharmac and Toxicology* 2014, 15:32
38. Alam k et.al. Reporting adverse drug reactions among hospitalized medical patients: a prospective study from tertiary care hospital in western Nepal. *Nepal Journ of Epide* 2014; 4(1): 330-36
39. Roshini A et.al. A study on the monitoring of adverse drug reactions in the inpatient departments of a tertiary care teaching hospital, *Intern Jour of Advan in Pharmac Res* 2015; 6(11): 359 – 369
40. Sharma A, Kumari MK, Manohar HD, Bairy KL, Thomas J. Pattern of adverse drug reactions due to cancer chemotherapy in a tertiary care hospital in South India *Perspect Clin Res*. 2015 Apr;Jun; 6(2): 109–115

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