

Review Article

## Strategies and current scenario of Pharmacovigilance in India

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### ABSTRACT

Present article focuses on strategies and current scenario of pharmacovigilance sector in India. It comprises main extract from such sector is adverse drug reactions which describes harm associated with the use of given medications at normal dose. It also includes ICH regulatory guidelines, good clinical practices (GCP) which is considered as an important pre-aspects in the way of transformation from practicing clinical trials to the objective of pharmacovigilance. India is the fourth largest producer of pharmaceuticals in the world. It is emerging as an important Clinical trial hub in the world. Many new drugs are being introduced in our country. Hence present article gives explanation about need for a vibrant pharmacovigilance system in the country to protect the population from the potential harm that may be caused by some of new drugs. Now a days in India, pharmacovigilance situation has been progressing step by step as what it was in the past. The office of the Drugs Controller General of India has been attempted to implement a pharmacovigilance program in India along with its training modules. Most of pharmaceutical companies stab to regulate and implement an effective system of reporting adverse events of drugs introduced in the Indian market with newly beginning of dedicated pharmacovigilance department. This review is aimed to offer a study about necessity of implementation of pharmacovigilance for solving current problems and strategies for upliftment in standards up to the level of developed countries.

**Keywords:** Pharmacovigilance, adverse drug reactions, regulatory, clinical, World Health Organization

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### INTRODUCTION

A very broad definition of a drug would include "all chemicals other than food that affect living processes." If the affect helps the body, the drug is a medicine. However,

if a drug causes a harmful effect on the body, the drug is a poison. The same chemical can be a medicine and a poison depending on conditions of use, dose and the person using it.

Adverse drug reactions, or ADRs, which are officially described as: "A response to a drug which is noxious and unintended, and which occurs at doses normally used for the prophylaxis, diagnosis or therapy of disease, or for the modification of physiological function. The word pharmacovigilance has derived from the Greek word *pharmakon* means 'drug' and the Latin word *vigilare* means 'to keep awake or alert, to keep watch.' Pharmacovigilance is the pharmacological science relating to the detection, assessment, understanding and prevention of adverse effects, particularly long term and short term side effects of medicines. Recently, the concerns of pharmacovigilance have been widened to include herbal, traditional and complementary medicines, blood products, biological, medical devices and vaccines.

Generally speaking, pharmacovigilance is the science of collecting, monitoring, researching, assessing and evaluating information from healthcare providers and patients on the adverse effects of medications, biological products, herbalism and traditional medicines with a view to identifying new information about hazards associated with medicines and preventing harm to patients. Therefore pharmacovigilance deals with not only adverse effect of drug but also it deals with polypharmacy, iatrogenesis, paradoxical reaction and serious adverse event of a drug. Substandard medicines, medication errors, lack of efficacy, use of medicines for indication that are not approved and for which there is inadequate scientific basis, case reports of acute and chronic poisoning, assessment of medicine related mortality

abuse and misuse of medicines, and adverse interaction of medicines with chemicals, other medicines and foods and drinks. Pharmacovigilance is an important and integral part of clinical research. Both clinical trials safety and post marketing pharmacovigilance are critical throughout the product life cycle. With a number of recent high-profile drug withdrawals, the pharmaceutical industry and regulatory agencies have raised the bar. The review will give insight on this important issue to the decision maker for marketing of new drug in India i.e. post marketing surveillance studies and proper precautions for that, and as well as it might be used for the educational material to the teacher and student who would like to know details about this important topic<sup>1</sup>.

## **GLOSSARY**

### **Adverse drug reaction (ADR)**

A response which is noxious and unintended, and which occurs at doses normally used in humans for the prophylaxis, diagnosis, or therapy of disease, or for the modification of physiological function. (WHO, 1972). An adverse drug reaction, contrary to an adverse event, is characterized by the suspicion of a causal relationship between the drug and the occurrence, i.e. judged as being at least possibly related to treatment by the reporting or are viewing health professional.

### **Allopathy**

Non-traditional, western scientific therapy, unusually using synthesized ingredients, but may also contain a purified active ingredient extracted from a plant or other natural source; usually in opposition to the disease.

**Attributable risk**

Difference between the risk in an exposed population (*absolute risk*) and the risk in an unexposed population (*reference risk*). Also referred to as Excess risk. Attributable risk is the result of an absolute comparison between outcome frequency measurements, such as incidence.

**Clinical trial**

A systematic study on pharmaceutical products in human subjects (including patients and other volunteers) in order to discover or verify the effects of and/or identify any adverse reaction to investigational products, and/or to study the absorption, distribution, metabolism and excretion of the products with the objective of ascertaining their efficacy and safety.

**Compliance**

Faithful adherence by the patient to the prescriber's instructions.

**National pharmacovigilance centers**

Organizations recognised by governments to represent their country in the WHO Programme (usually the drug regulatory agency). A single, governmentally recognized centre (or integrated system) within a country with the clinical and scientific expertise to collect, collate, analyse and give advice on all information related to drugs safety.

**Pharmacoepidemiology**

Study of the uses and effects of drugs in large populations.

**Pharmacology**

Study of the uses, effects and modes of action of drugs.

**Pharmacovigilance**

The science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug related problem.

**Side effect**

Any unintended effect of a pharmaceutical product occurring at normal dosage which is related to the pharmacological properties of the drug.

**Polypharmacy**

The concomitant use of more than one drug, sometimes prescribed by different practitioners<sup>2</sup>.

**Adverse drug reaction**

An **adverse drug reaction** (abbreviated **ADR**) is an expression that describes harm associated with the use of given medications at normal dose. The meaning of this expression differs from the meaning of "side effect", as this last expression might also imply that the effects can be beneficial. Adverse effects may be local, due to abnormal pharmacokinetics such as Comorbid disease states, Genetic factors, Phase I reactions, Phase II reactions. Interaction with other drugs are increased with polypharmacy, Protein binding and Cytochrome P450.

**Examples of adverse effects associated with specific medications**

1. Abortion, miscarriage or uterine hemorrhage associated with misoprostol (Cytotec), a Labor-inducing drug (this is a case where the adverse effect has been used legally and illegally for performing abortions).
2. Addiction with many sedatives and analgesics such as diazepam, morphine, etc.
3. Birth defects associated with Thalidomide and Accutane.

4. Bleeding of the intestine associated with aspirin therapy.
5. Cardiovascular disease associated with COX-2 inhibitors (i.e. Vioxx).
6. Deafness and kidney failure associated with gentamicin (an antibiotic).
7. Death, following sedation in children using propofol (Diprivan).
8. Dementia associated with heart bypass surgery.
9. Depression or hepatic injury caused by interferon.
10. Diabetes caused by atypical antipsychotic medications (neuroleptic psychiatric drugs)
11. Diarrhoea caused by the use of orlistat (Xenical).
12. Erectile dysfunction associated with many drugs, such as antidepressants.
13. Fever associated with vaccination (in the past, imperfectly manufactured vaccines, such as BCG and poliomyelitis, have caused the very disease they intended to fight).
14. Glaucoma associated with corticosteroid based eye drops.
15. Hair loss and anemia may be caused by chemotherapy against cancer, leukemia, etc.
16. Headache following spinal anesthesia.
17. Hypertension in ephedrine users, which prompted FDA to remove the status of dietary supplement of ephedra extracts<sup>1</sup>.

## **REGULATORY GUIDELINES**

### **PHARMACOLOGICAL GUIDELINES**

#### **Objectives**

This guideline is intended to aid in planning pharmacovigilance activities, especially in preparation for the early post marketing period of a new drug (in this guideline, the

term “drug” denotes chemical entities, biotechnology-derived products, and vaccines). The main focus of this guideline is on a Safety Specification and Pharmacovigilance Plan that might be submitted at the time of licence application. The guideline can be used by sponsors to develop a stand-alone document for regions that prefer this approach or to provide guidance on incorporation of elements of the Safety Specification and Pharmacovigilance Plan into the Common Technical Document (CTD).

The guideline describes a method for summarizing the important identified risks of a drug, important potential risks, and important missing information, including the potentially at-risk populations and situations where the product is likely to be used that have not been studied pre-approval. It proposes a structure for a Pharmacovigilance Plan and sets out principles of good practice for the design and conduct of observational studies. It does not describe other methods to reduce risks from drugs, such as risk communication. The guideline takes into consideration ongoing work in the three regions and beyond on these issues.

It uses the WHO definition of the term ‘pharmacovigilance’ as “the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug related problems.” This definition encompasses the use of pharmacoepidemiological studies.

#### **Background**

The decision to approve a drug is based on its having a satisfactory balance of benefits and risks within the conditions specified in

the product labeling. This decision is based on the information available at the time of approval. The knowledge related to the safety profile of the product can change over time through expanded use in terms of patient characteristics and the number of patients exposed. In particular, during the early post marketing period the product might be used in settings different from clinical trials and a much larger population might be exposed in a relatively short timeframe.

Industry and regulators have identified the need for better and earlier planning of pharmacovigilance activities before a product is approved or a license is granted. This ICH guideline has been developed to encourage harmonization and consistency, to prevent duplication of effort, and could be of benefit to public health programs throughout the world as they consider new drugs in their countries.

### **Scope**

The guideline could be most useful for new chemical entities, biotechnology-derived products, and vaccines, as well as for significant changes in established products (e.g., new dosage form, new route of administration, or new manufacturing process for a biotechnologically-derived product) and for established products that are to be introduced to new populations or in significant new indications or where a new major safety concern has arisen.

The purpose of this guideline is to propose a structure for a Pharmacovigilance Plan, and a Safety Specification that summarizes the identified and potential risks of the product

to be addressed in the Plan. The guideline is divided into the following sections:

- Safety specification
- Pharmacovigilance Plan
- Annex – Pharmacovigilance methods

### **Structure of the Pharmacovigilance Plan**

Outlined below is a suggested structure for the Pharmacovigilance Plan. The structure can be varied depending on the product in question and the issues identified in the Safety Specification.

#### ***Summary of Ongoing Safety Issues***

At the beginning of the Pharmacovigilance Plan a summary should be provided of the:

1. Important identified risks;
2. Important potential risks;
3. Important missing information.

This is important if the Pharmacovigilance Plan is a separate document from the Safety Specification.

#### ***Routine Pharmacovigilance Practices***

Routine pharmacovigilance should be conducted for all medicinal products, regardless of whether or not additional actions are appropriate as part of a Pharmacovigilance Plan.

#### ***Action Plan for Safety Issues***

The Plan for each important safety issue should be presented and justified according to the following structure:

1. Safety issue;
2. Objective of proposed action(s);
3. Action(s) proposed;
4. Rationale for proposed action(s);
5. Monitoring by the sponsor for safety issue and proposed action(s);
6. Milestones for evaluation and reporting

### **Pharmacovigilance Methods**

The best method to address a specific situation can vary depending on the product, the indication, the population being treated and the issue to be addressed. The method chosen can also depend on whether an identified risk, potential risk or missing information is the issue and whether signal detection, evaluation or safety demonstration is the main objective of further study. When choosing a method to address a safety concern, sponsors should employ the most appropriate design. The Annex provides a summary of the key methods used in pharmacovigilance. This is provided to aid sponsors considering possible methods to address specific issues identified by the Safety Specification. This list is not all-inclusive, and sponsors should use the most up-to-date methods that are relevant and applicable.

### ***Design and Conduct of Observational Studies***

Carefully designed and conducted pharmacoepidemiological studies, specifically observational (non-interventional, non-experimental) studies, are important tools in pharmacovigilance. In observational studies, the investigator “observes and evaluates results of ongoing medical care without 'controlling' the therapy beyond normal medical practice”<sup>3</sup>.

### **GCP GUIDELINES**

#### **The Principles of ICH GCP**

➤ Clinical trials should be conducted in accordance with the ethical principles that have their origin in the Declaration of

Helsinki, and that are consistent with GCP and the applicable regulatory requirement(s).

- Before a trial is initiated, foreseeable risks and inconveniences should be weighed against the anticipated benefit for the individual trial subject and society. A trial should be initiated and continued only if the anticipated benefits justify the risks.
- The rights, safety, and well-being of the trial subjects are the most important considerations and should prevail over interests of science and society.
- The available nonclinical and clinical information on an investigational product should be adequate to support the proposed clinical trial.
- Clinical trials should be scientifically sound, and described in a clear, detailed protocol.
- A trial should be conducted in compliance with the protocol that has received prior institutional review board (IRB)/independent ethics committee (IEC) approval/favourable opinion.
- The medical care given to, and medical decisions made on behalf of, subjects should always be the responsibility of a qualified physician or, when appropriate, of a qualified dentist.
- Each individual involved in conducting a trial should be qualified by education, training, and experience to perform his or her respective task(s).
- Freely given informed consent should be obtained from every subject prior to clinical trial
- Individual participation.
- All clinical trial information should be recorded, handled, and stored in a way

that allows its accurate reporting, interpretation and verification.

- The confidentiality of records that could identify subjects should be protected, respecting the privacy and confidentiality rules in accordance with the applicable regulatory requirement(s).
- Investigational products should be manufactured, handled, and stored in accordance with applicable good manufacturing practice (GMP). They should be used in accordance with the approved protocol.
- Systems with procedures that assure the quality of every aspect of the trial should be implemented<sup>4,5</sup>.

## **PRESENT SCENARIO OF PHARMACOVIGILANCE**

### **Oversea**

The position of the pharmacist within the health care system has continually been subject to discussion and change. The pharmacist's primary mission traditionally has been to dispense drugs as prescribed by a physician and to ensure that these drugs meet the required standards.

Nowadays the pharmacist also frequently acts as a consultant on pharmacotherapy. In the United Kingdom and United States, pharmacists are, to a degree, also authorized to write out prescriptions, which incidentally has been a long-standing practice in many countries where doctors are in short supply<sup>6,7</sup>. Whereas initially the pharmacist's role focused on the chemical aspects and raw materials of drugs, the local production of medicines, and the dispensing role, today it has shifted more toward reducing the prevalence of ADRs and drug-drug

interactions, and providing information and instruction about appropriate drug use. The pharmacist has become a consultant on drug therapy, both for physicians and patients. In the Netherland a legislative bill is being prepared to award the pharmacist the official status of co-consultant, thus making him jointly responsible for pharmacotherapy. The term pharmaceutical care is often used to describe the more comprehensive interpretation of the occupation, although the term is given different meanings and often thought to be too vague<sup>8,9</sup>. The role pharmacists play or are given to play also depends on the circumstances in which they exercise their profession<sup>6</sup>. Nevertheless, the fundamental role of the pharmacist will always be to ensure that medicines are used safely<sup>10</sup>.

The literature mentions several other ways pharmacists can contribute to the safe use of drugs. In addition to their responsibilities relating to drug dispensing and compliance, pharmacists can play a prominent role in areas such as record keeping, education, and monitoring over the counter products and alternative therapies and because computerized dispensing drug systems are becoming more prevalent, the pharmacist's role is becoming more important, both as a user and in his/her capacity of system manager. The reporting of ADRs is one of the roles pharmacists could have<sup>11,12</sup>.

### **Europe**

The divergence of rules in different EU Member States has made it impossible for a pharmaceutical company to have a single pharmacovigilance system throughout Europe. They have tied up resources that

could be better focused on the evaluation of drug safety and risk management to the benefit of public health.

Under current rules, medicines are authorized under different approval procedures (e.g. national, mutual recognition and centralized authorization). This has led to a number of different processes running parallel within the EU framework. For example:

1. There are different labelling requirements. As a result, medicines authorized under a national system might well be labeled in a way that could make it difficult for a physician to understand and compare the risk/benefit profile of that product with a product that is centrally authorized. This cannot be in the best interests of public health.

2. There are different expedited reporting requirements depending on approval procedure and country of origin of the reports. For example *all* serious ADRs from within the EU but only serious *unexpected* reactions from outside the EU need be reported. Pharmacovigilance should not be affected by national borders.

3. Pharmaceutical companies are required to submit all serious unexpected drug reactions to each individual Member State. This amounts to an unnecessary duplication of work. It would be far more efficient and logical to report all serious cases to a single point in the EU (or better still, to report all cases to a single point).

The new EU Pharmacovigilance Regulation and Directive (respectively covering products licensed through the Centralized Procedure and those managed by Mutual Recognition) approved by the European

Council and published in the Official Journal on 31 Dec 2010 aim to address many of these issues. They due for implementation in July 2012.

The main priorities defined by EFPIA (and supported by GSK) when the legislative proposals were issued have been addressed. In particular GSK, welcomes all measures contributing to rationalization and simplification of pharmacovigilance activities in the EU specifically clarification of roles and responsibilities; submission of all ADRs to a single database managed by a single data processing network; and adoption of a pharmacovigilance master file system.

The statement in the Directive that - '*no additional national requirements will be allowed unless justifiable for pharmacovigilance reasons*' - is particularly important. Our hope is that it will be strictly adhered to.

We also welcome clearer definition of the scope and streamlining of the procedure that may involve a public hearing and that issues raised in relation to the objective of strengthening communication and transparency have been addressed.

### **Pharmacovigilance in the United States**

In recent years, Federal lawmakers have responded to public concerns regarding product safety with several oversight hearings and legislative proposals. The most prominent proposals have been to require greater clinical data transparency and to expand the FDA's post-market surveillance powers.

In September 2007, in conjunction with the reauthorization of the Prescription Drug User Fee Act (PDUFA), the US Government

enacted significant new laws relating to drug safety. This legislation, entitled the FDA Amendments Act (FDAAA) includes provisions in the areas of: 1.Expanded post-marketing authorities for FDA, particularly in the area of requiring post-marketing studies and clinical trials.

2.Establishment of a Risk Evaluation and Mitigation Strategy (REMS) infrastructure that will allow FDA to require additional communication and reporting around drug safety, as well as possible restrictions on distribution and use.

3. Clinical Trial Registration and Results Database.

4. Active Safety Surveillance, using anonymized data from large health care databases.

FDAAA also authorizes significant new user fee funding to be directed toward drug safety efforts.

GSK recognizes and shares the FDA's goal of creating a more effective pharmacovigilance framework through its ongoing efforts, as well as through the implementation of the provisions within FDAAA, and we will continue to work with the Agency toward that goal<sup>5</sup>.

Table 1 Percentage of professional ADR reports originating from pharmacists by country<sup>2</sup>

Country	%	pharmacists(b)	pharmacists(a)
Canada	88.3	+	–
USA	68	+	–
Australia	40.3	+	+–
Netherlands	40.2	–	+
Japan	39	?	+
Spain	25.9	+	+

“+” Indicates that it is primarily pharmacists from this setting who originate the reports;

“–” indicates that pharmacists do not typically originate the reports; “±” indicates that some

But infrequent reports originate from pharmacists practicing in this setting; “?” indicates unknown data.

### PRESENT SCENARIO STRATEGIES AND FUTURE ASPECTS OF PHARMACOVIGILANCE

Drug product named as Vioxx, which created serious adverse events in patients taking this drug. This popular painkiller went on the market in 1999, the same year as Avandia. The same scientist, Nissen,

raised some of the earliest concerns that tied Vioxx to higher rates of heart attack and stroke. After Merck finally pulled Vioxx off the market in 2004, an FDA whistleblower testified that the agency had failed to heed ample warnings. These examples show that after FDA certifies new drugs as safe and effective based on clinical trials, adverse effects can show up when millions use them. Vioxx caused such problems. So, perhaps, has Avandia. This further testifies the urgent need of a pharmacovigilance program in

India for even Generic drugs which are already marketed elsewhere in the world<sup>1</sup>.

### **Pharmacovigilance in India**

India has more than half a million qualified Doctors and 15,000 hospitals having bed strength of 6,24,000. It is the fourth largest producer of pharmaceuticals in the world. It is emerging as an important Clinical trial hub in the world. Many new drugs are being introduced in our country. Therefore, there is a need for a vibrant pharmacovigilance system in the country to protect the population from the potential harm that may be caused by some of these new drugs. Clearly aware of the enormity of task the Central Drugs Standard Control Organization (CDSCO) has initiated a well structured and highly participative National Pharmacovigilance Program. It is largely based on the recommendations made in the WHO document titled "Safety Monitoring of Medicinal Products – Guidelines for Setting up and Running a Pharmacovigilance Centre".

The National Pharmacovigilance Program was officially inaugurated by the Honorable Health Minister Dr. Anbumani Ramadoss on 23 November, 2004 at New Delhi.

### **The specific aims of the Pharmacovigilance Programmers are to**

1. Contribute to the regulatory assessment of benefit, harm, effectiveness and risk of medicines, encouraging their safe, rational and more effective (including cost effective) use.
2. Improve patient care and safety in relation to use of medicines and all medical and paramedical interventions.

3. Improve public health and safety in relation to use of medicines.
4. Promote understanding, education and clinical training in pharmacovigilance and its effective communication to the public.

The Programme aims to foster the culture of ADR notification in its first year of operation and subsequently aims to generate broad based ADR data on the Indian population and share the information with global health-care community through WHO-UMC.

Under the program 26 peripheral centers, 5 Regional Centers and 2 Zonal Centers were established. The Peripheral centers will record the Adverse Events (AE) and send to the Regional Centers. They in turn collate and scrutinize the data received from the Peripheral Centers and submit to the Zonal Centers. The Zonal Centers will analyze the data and submit consolidated information to the National Pharmacovigilance Centre. The Zonal Centre will also provide training, general support and coordinate the functioning of the Regional Centers. Pharmacovigilance is still in its infancy in India and there exists very limited knowledge about the discipline. While major advancements of the discipline of pharmacovigilance have taken place in the Western countries, not much has been achieved in India.

Next in 1997, India joined the World Health Organization (WHO) Adverse Drug Reaction Monitoring Program based in Uppsala, Sweden. Three centers mainly based in teaching hospitals were identified for ADR monitoring a national

Pharmacovigilance centre located in the Department of Pharmacology, All India Institute of Medical Sciences (AIIMS), New Delhi and two special centers of WHO in Mumbai (KEM Hospital) and Aligarh (JLN) Hospital, Aligarh Muslim University) the major role of these centre were to monitor ADRS to medicines marketed in India. But this attempt was unsuccessful and hence, again from the 1<sup>st</sup> January, 2009, the WHO sponsored and world's Bank funded National Pharmacovigilance Program (NPP) for India was made operational. The objectives of NPP were to involve a large number of health care professionals in the process, inculcate the culture of reporting ADR Sand to be a land mark for global drug monitoring.

### **Causes of failure of implementation of pharmacovigilance in India**

However, what needs to be more important along with the funding is a focused vision and effective strategy for developing the pharmacovigilance systems, especially in the DCGI Office, which is lacking. Traditionally, pharmacovigilance was never done in India in Pharmaceutical companies, be it Indian or MNCs, so there is an immense shortage of knowledgeable people who will be able to advice the DCGI on this matter, as pharmacovigilance is a very complex subject, intertwined with regulations and complex systems.

### **CURRENT PROBLEMS IN PHARMACOVIGILANCE**

1. Topical tacrolimus (Protopic) and pimecrolimus (Elidel): potential cancer risk.
2. Duloxetine (Yentreve, Cymbalta): need for monitoring.

3. Tenofovir (Viread): interactions and renal adverse effects.
4. Linezolid (Zyvox): severe optic neuropathy.
5. CosmoFer and high risk of anaphylactoid reactions.
6. Drotrecoginalfa (activated) (Xigris): risk benefit in the management of sepsis.
7. Rosuvastatin (Crestor): introduction of 5 mg starting dose.
8. Osteonecrosis of the jaw with bisphosphonates.
9. High dose inhaled steroids: new advice on supply of steroid treatment cards.
10. Local reactions associated with pre-school d/DTap-IPV boosters.
11. Salmeterol (Serevent) and formoterol (Oxis, Foradil) in asthma management.
12. Risk of QT interval prolongation with methadone.

### **Future aspect of pharmacovigilance in India**

With more and more clinical trials and other clinical research activities being conducted in India, there is an immense need to understand the importance of pharmacovigilance and how it impacts the lifecycle of the product. Given this situation at present, the DCGI should act quickly to improve pharmacovigilance so as to integrate Good Pharmacovigilance Practice into the processes and procedures to help ensure regulatory compliance and enhance clinical trial safety and post marketing surveillance. A properly working pharmacovigilance system is essential if medicines are to be used safely. It will benefit all parties including healthcare professionals, regulatory authorities,

pharmaceutical companies and the consumers. It helps pharmaceutical companies to monitor their medicines for risk and to devise and implement effective risk management plans to save their drugs in difficult circumstances. Having considered the problems and challenges facing the development of a robust pharmacovigilance system for India, the following proposals<sup>15</sup> might be follows:

1. Building and maintaining a robust pharmacovigilance system.
2. Making pharmacovigilance reporting mandatory and introducing pharmacovigilance inspections.
3. High-level discussions with various stake holders.
4. Strengthen the DCGI office with trained scientific and medical assessors for pharmacovigilance.
5. Creating a single country-specific adverse event reporting form to be used by all.
6. Creating a clinical trial and post marketing database for SAEs / SUSARs and ADRs for signal detection and access to all relevant data from various stakeholders.
7. List all new drugs / indications by maintaining a standard database for every pharmaceutical company.
8. Education and training of medical students, pharmacists and nurses in the area of pharmacovigilance.
9. Collaborating with pharmacovigilance organizations in enhancing drug safety with advancements in information technology, there has been the emergence of new opportunities for national and international collaborations that can enhance postmarketing surveillance programs and increase drug

safety. The Uppsala Monitoring Center (UMC) is an example for an international collaboration to establish a harmonized post marketing surveillance database.

10. Building a network of pharmacovigilance and pharmacoepidemiologists in India<sup>11,13</sup>.

## CONCLUSION

India has more than half a million qualified Doctors and 15,000 hospitals having bed strength of 6,24,000. It is the fourth largest producer of pharmaceuticals in the world. It is emerging as an important Clinical trial hub in the world. Many new drugs are being introduced in our country. Therefore, there is a need for a vibrant pharmacovigilance system in the country to protect the population from the potential harm that may be caused by some of these new drugs. The recent USFDA safety warning on rosiglitazone, a drug approved to treat Type 2 diabetes. On 23rd May, The New England Journal of Medicine rushed out an analysis by prominent cardiologist Steven Nissen, of data about patients taking Avandia (rosiglitazone manufactured by GSK). It suggests they have a 43% higher chance of suffering a heart attack.

Pharmacovigilance has not picked up well in India and the subject is in its infancy. India rates below 1% in pharmacovigilance as against the world rate of 5%. This is due to ignorance of the subject and also lack of training. Now a days in India, pharmacovigilance situation has been progressing step by step as what it was in the past. The office of the Drugs Controller General of India has been attempted to implement a pharmacovigilance program in India along with its training modules. A

regulation is required to implement the system of reporting adverse events of drugs introduced in the Indian market by pharmaceutical companies. The government has to play an important role in ensuring the availability of safe medicines to the public. Most of pharmaceutical companies stab to regulate and implement an effective system of reporting adverse events of drugs introduced in the Indian market with newly beginning of dedicated pharmacovigilance department.

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