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A SURVEY ON ASSESSING THE KNOWLEDGE, ATTITUDE AND PRACTICE AMONG PHARMACISTS TOADVERSE DRUG REACTION RELATED ASPECTS IN SOUTHERN PART OF KERALA

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ABSTRACT

Many hospitalizations in India are due to Adverse Drug Reactions (ADR) and resulting in morbidity and mortality in majority cases in addition to the huge economic burden. A surveywas conducted to assess the knowledge, attitude and behavior of community pharmacists towards ADR related aspects. A very few studies into the reasons that impact the knowledge, attitude, and practice of pharmacist with regard to ADR reporting. This study was conducted to analyse the knowledge, attitude, practice (KAP) related to ADR reporting among the pharmacist in southern part of Kerala. Our study explores the views of pharmacist about KAPof ADR reporting.

INTRODUCTION

The World Health Organization (WHO) defines an ADR as 'a response to a drug that is noxious and unintended and occurs at doses normally used in man for the prophylaxis, diagnosis or therapy of disease, or for modification of physiological function'.[1] Pharmacist can play an important role in ADR monitoring and reporting.It would be worth to assess their knowledge and behaviour in drug safety related aspects.[2]

All medicines with the ability to produce a desired therapeutic effect also have the potential

to cause unwanted adverse effects.[1] There is no need to prove a pharmacological mechanism for any noxious response. Adverse drug reactions (ADRs)are a significant cause of morbidity and mortality worldwide. Spontaneous (yellow card) reporting of ADRs remains the most widely used and cost-effective surveillance system and is the cornerstone of safety monitoring of drugs in clinical practice. It detects previously unrecognized adverse reactions and identifies risk factors that pre- dispose to drug toxicity and investigates causality. In addition to identifying drug safetyproblems, it helps to facilitate risk-benefit judgments and comparisons within therapeutic categories.[3,4] Intrinsic factors such as knowledge, attitude and practice can help in understanding the relationship of pharmacists with patients and other healthcare professionals and formulating strategies to encourage pharmacists to report ADRs.

A few studies carried out in India have shown poor knowledge, attitude, and deficient practices involving ADR reporting among prescribers and healthcare professionals, mainly physicians.[5,6,7] A very few studies into the reasons that impact the knowledge, attitude, and practice of pharmacist with regard to ADR reporting. Thisstudy was conducted to analyse the knowledge, attitude, practice (KAP) related to ADR reporting among the pharmacist in southern part of Kerala. Our study explores the views of pharmacist about KAP of ADR reporting.

Medicinal substances are used because of their ability to affect biological processes in the body. Using such substances always carries a certain risk of unwanted or unintended effects. The readiness of the patient and healthcare provider to use a medication depends on the extent of the expected benefit. Accordingly, patients and health professionals who advice patients need to know as precisely as possible the frequency and magnitude of the risks involved in medical treatment, as well as the magnitude and duration of the expected beneficial effects. Every occasion that a patient is exposed to a new medicinal product is a unique situation, and we can never be certain exactly what will happen. We can learn from previous experience when patients undersimilar conditions have been exposed to the same or a similar medicine.

Figure 1: Adverse Drug Reaction.

During the development phase of new medicines, both beneficial and unwanted effects are recorded in clinical trials. In this way, knowledge is accumulated which allows health professionals to make a reasoned prediction of the benefits and harm toall patients taking the medicine. Observation and recording of treatment outcomesshould never stop. By observing the positive as well as negative effects of medicines as they are routinely used, and by reporting our observations to colleagues and specific monitoring centres, we can contribute to better knowledge and better medical treatmentof future patients. This is part of the professional duty of every healthcare professional. Pharmacovigilance is, according to the WHO, the science and activities relating to the detection, assessment, understanding and prevention of adverse effects and other possible drug related problems.[1]

CLASSIFICATION OF ADVERSE DRUG REATION

Traditionally, ADRs are classified into two categories: type A and type Breactions. Type A (augmented) reactions are usually the exacerbation of the pharmacological effects of a drug and are thus dose-dependent. An example is insulininduced hypoglycaemia. These reactions are usually predictable due to the known pharmacology of a drug and are thus preventable. Although the incidence oftype A reactions is high, they are generally associated with less morbidity andmortality.

Because of their high incidence, the public health impact is large.

Type B (bizarre) reactions are hypersensitivity reactions and are not dosedependent. An example is a penicillin induced hypersensitivity reaction. These reactions are often not predictable and preventable in the individual case (unless the patient has a known history of this type of reaction). This type is associated with high morbidity and mortality but its occurrence in the clinical setting is low.

Type C (continuing) reactions are diseases that occur at a higher frequencyamong exposed patients than those unexposed, although the exact mechanism isunknown. One example is the higher frequency of cardiovascular events among patients exposed to the COX- 2 inhibitor rofecoxib compared with an unexposed control group.[8]

Type D (delayed) reactions, become apparent sometime after the use of a medicine. The timing of these may make them more difficult to detect. An example is leucopoenia, which can occur up to six weeks after a dose of lomustine.

Type E (end of use) reactions are associated with the withdrawal of a medicine. An example is insomnia, anxiety and perceptual disturbances following the withdrawalof benzodiazepines.

Type F (failure) reactions occur when the expected responds to treatment is notachieved.

MECHANISMS OF TYPE A ADRs

A drug suspected to have caused an ADR in one patient may not necessarily cause a similar adverse reaction in another patient. This is due to interindividual variability, which may predispose an individual to an ADR. Any type A reaction, which occurs in an individual, may be attributed to any one or more of the following mechanisms:

Pharmaceutical causes

The possible pharmaceutical causes which may be attributed to the occurrence of a type A ADR include changes in the drug quantity present in a particular product and changes in its drug release properties. A classic example concerns two brands of the poorly soluble antifungal agent griseofulvin having widely different particle size in the final dosage form. By switching patients stabilised on the brand with bigger particle sizes to the brand with the smaller size, the peak concentration of griseofulvinincreased dramatically, leading to toxicity. Another example of a formulation factor being important for the risk of adverse reaction is doxycycline. Brands containing the hydrochloride salt have been associated with high frequency of oesophageal stricture and ulcers in patients lying down or who do not take the medicine with an adequate amount of water. The problem was avoided when the manufacturer introduced a formulation containing doxycycline carrageenate resin instead of the corrosive hydrochloride.

Pharmacokinetic causes

Alterations in the absorption, distribution, metabolism and elimination of drugsmay alter drug effects by changing the concentration of drug present at the site of action. The change in drug effect due to alterations in pharmacokinetic parameters may be experienced as therapeutic

failure or as toxicity.

Absorption: Alterations in the rate and extent of drug absorption may result in adverse drug effects. The plasma concentration of a drug is partly determined by the rate at which the drug is absorbed after ingestion or injection. The plasma concentration of an orally administered drug in turn depends greatly on the gastric emptying rate. The extent of drug absorption (the total amount of drug reaching general circulation) also plays an important role in altered response. During oral administration, many factors may influence the extent of drug absorption including drug formulation, gastrointestinal motility, first pass metabolism, concomitant administration of other drugs and the absorptive capacity of gastrointestinal mucosa. Any alteration in the rate or extent of drug absorption may result in either therapeutic failure or toxicity.

Distribution: Several factors determine the extent of distribution of a drug, including regional blood flow, membrane permeability and protein/tissue binding. Changes in drug distribution may predispose to ADRs, although the clinical significance of such mechanisms is yet to be proved.

Metabolism: The drug handling capacity of an individual can greatly affect the drug effect. In an individual who has a reduced metabolic rate, accumulation of the drug in the body may be higher leading to increased risk of ADRs (especially type A reactions), while therapeutic failure may occur in an individual who has an enhanced metabolic rate. These changes are due to interindividual variations in drug metabolising capacity, which in turn is greatly influenced by genetic, environmental and other factors. For example, the oxidising enzyme, CYP3A4, responsible for the metabolism of a great variety of medicines (like nifedipine, erythromycin and cyclosporine) shows a genetically determined ten-fold difference in activity between individuals. This enzyme is irreversibly inhibited by grapefruit juice. Drinking a glass of grapefruit juice will dramatically increase the bioavailability of medicines metabolised by CYP3A4.

Elimination: The main routes of excretion for many drugs are the kidneys (excretion through urine) and liver (yields metabolites which are then excreted by the kidneys). One of the most important causes of type A ADRs is a change in the drug elimination rate. Drug accumulation due to reduced elimination may predispose to ADRs as a result of increased drug concentration in plasma and tissue. Conversely, reduced concentration of the drug in plasma and tissue due

to enhanced drug elimination may lead to therapeutic failure.

Pharmacodynamic causes

Increased sensitivity of target tissues or organs may predispose a person to ADRs. Although the reasons why different individuals react differently to drugs are still notclear, evidence is accumulating to suggest that target tissue or organ sensitivity is influenced by the drug receptors themselves, by homeostatic mechanisms and by disease.

Drug receptors: Most drugs elicit their response by combining with receptors. These receptors are either protein molecules or enzymes. The amount and sensitivity of receptors of one individual may differ from those of another individual. Some individuals may have fewer specific drug receptors while others may have a higher number of less active receptors. This intervariability between different individuals can greatly affect the drug effect when the drug acts through these specific receptors.

Homeostatic mechanisms: Many physiological factors may determine the extent of a drug's effect in an individual as drug effects occur within the environment of the body's physiological mechanisms. For example, intravenous atropine produces a variable increase in heart rate and some individuals develop tachycardia of 160 beats per minute at a dose which is almost ineffective in others. The magnitude of theobserved effect is dependent on the balance between parasympathetic and sympathetic cardiac tone, which appears to be under genetic control. **Disease:** The pharmacological effects of a drug which are not apparent in a healthy individual may be unmasked by inter current diseases. An example is an asthmatic patient who develops bronchoconstriction while taking nonselective beta blockers such as propranolol.

MECHANISMS OF TYPE B ADRs

Type B reactions are aberrant in terms of the normal pharmacology of the drug, and they are a heterogeneous group of unpredictable adverse effects. The causes of type B reactions may be pharmaceutical or pharmacokinetic, or may be determined bytarget tissue or organ response.

Pharmaceutical causes

The main sources for the pharmaceutical causes of type B reactions includedecomposition of the active ingredient, effects of the nondrug excipients (additives, preservatives, colouring and solubilising agents) and synthetic by-products of activeconstituents. In most

cases, the use of decomposed drug products may result in therapeutic failure. In some instances, though not all, the decomposed product may behighly toxic and lethal. Deaths have been reported due to decomposition of paraldehyde to acetaldehyde and its subsequent oxidation to acetic acid. There is clear recognition of ADRs caused by excipients. Many additives including propylene glycol and carboxymethylcellulose may cause hypersensitivity reactions. The eosinophilia–myalgia syndrome associated with L-tryptophan may be related to the use of preparations containing a contaminant, although a genetic factor may also be involved. Many modern medicines are peptides or proteins produced in biological systems ofgreat complexity, for example, colony stimulating factor and monoclonal antibodies. As the original products are getting old enough to lose their patent protection, competitor products, the so called biosimilars, are entering the market. It is important to recognise that the competitor products will not be identical to the original since production conditions are inevitably different. It is well-established that patients are atrisk of acquiring hypersensitivity reactions if they switch from one product to another. Patients prescribed a particular brand of a biological product should be kept on thesame brand throughout their treatment.

Pharmacokinetic causes

Although changes in pharmacokinetic parameters such as absorption, distribution, metabolism and excretion may theoretically lead to type B reactions, there are no documented type B reactions that can be attributed to changes in absorption and distribution. However, the metabolism of a drug to unusual reactive metabolites may give rise to type B reactions either by a direct or by an immune-mediated mechanism. Examples of such reactions include phenacetin-induced methemoglobinemia and carbamazepine induced hypersensitivity reactions. Individuals whose specific bioinactivation pathways are either more active or less active and with immunological characteristics which render them highly responsive to immunogens/ haptogens are more susceptible. However, the reasons for the occurrence of type B reactions in a particular individual are not clear.

Pharmacodynamic causes

Many factors including age, sex, body weight, medical condition and drug therapy influence the end response of a patient to an administered drug. As a result, individual patients may vary in their response to drug therapy. The qualitative differences in the target tissues or organ response to drugs may be due to genetic, immunological, neoplastic or teratogenic causes.

Genetic causes for abnormal responses: Until recently, many type B reactions were assumed to be due to some qualitative abnormality in patients and were labelled as an 'idiosyncrasy'. However, more recently, it has become clear that the mechanisms of many of these reactions may have a genetic basis. A well-known example is G6PD deficiency which affects over 100 million people worldwide. The deficiency of G6PD results in haemolysis, accompanied by a fall in haemoglobin level, fever and the formation of dark urine. It is postulated that deficiency of G6PD results in a corresponding deficiency in reduced glutathione, and under these conditions oxidising agents may denature the intracellular proteins including the globin part of haemoglobin.

Several drugs with oxidant properties are known to cause haemolysis inpatients with G6PD deficiency, and these include primaquine, sulphones, sulphonamides, chloramphenicol, quinine and quinidine. Other genetically determined ADRs include methemoglobinemia (nitrates), porphyria (sulphonamides and barbiturates) malignant hyperthermia (halothane and suxamethonium), osteogenesis imperfect (halothane) and familial dysautonomia (general anaesthetics andparasympathomimetic).

Immunological reasons for abnormal response: The primary cause of the most important group of qualitatively abnormal responses to drugs is immunological. If adrug is immunogenic in its own right (peptides of foreign origin such as streptokinase),the reaction is obviously a type A effect. Most allergic drug reactions are responses to immunologically mediated mechanisms. These reactions may vary from rash and serum sickness to life threatening reactions such as anaphylaxis. Several factors (drug, patient and disease) influence the development of allergic reactions during therapy. However, patients with atopic or allergic disorders are at high risk of developingallergic drug reactions. Some of the important features of allergic drug reactions aregiven below:

- Symptoms are not correlated with the known pharmacological effects of thedrug.
- There is usually a delay between first exposure to the drug and the development of a subsequent reaction.
- If an allergy is established, very small doses of the drug may elicit the reaction
- The reaction disappears on cessation of therapy and reappears after reexposureto the drug even with a small dose.
- The illness is often recognisable and may include a rash, angioedema (angioneurotic oedema), serum sickness or anaphylaxis.

- They usually occur in a very few patients receiving the drug There is apossibility of desensitisation.

Teratological and neoplastic reasons for abnormal response: It is well known thatthere is a possibility that drugs can cause neoplastic or teratological changes. Also, it is important to consider the possibility of occurrence of qualitatively abnormal response to a drug in the presence of some potentially neoplastic and teratological tissues in the body. Administration of certain drugs such as oestrogen or an androgen may transform the pre-neoplastic condition into a frankly neoplastic state.[8]

PREDISPOSING FACTORS

Many factors can predispose a patient to the occurrence of ADRs. Patients who have one or more of the following predisposing factors are at high risk of developing an ADR: **Polypharmacy:** Patients on multiple drug therapy are more prone to develop an ADR either due to alteration of drug effect through an interaction mechanism or bysynergistic effect. The amount of risk associated with multiple drug therapy increaseswith an increase in the number of drugs administered.

Multiple and intercurrent diseases: Patients with multiple diseases are at increased risk of developing an ADR due to multiple drug use for their diseases. Similarly, patients with impaired hepatic or renal status are also at high risk of developing an ADR to drugs which are eliminated by these organs. For example, a patient with decreased renal function who is treated with aminoglycosides is at increased risk of developing nephrotoxicity unless appropriate dose adjustments are made.

Age: Elderly and paediatric patients are more vulnerable to ADRs. Elderly patients are more susceptible to ADRs due to the physiological changes (pharmacokinetic and pharmacodynamic) which accompany ageing, and also because they often take many drugs for chronic and multiple diseases. Nitrate or an angiotensin converting enzyme inhibitor–induced postural hypotension in an elderly patient is an example, where the reaction may be exacerbated by age-related impaired baroreceptor response to a change in posture. Paediatric patients may develop serious ADRs to some drugs since all children, especially neonates, differ in their drug handling capacity compared to adults.

An example of such a serious reaction is the grey baby syndrome with chloramphenicol.

Drug characteristics: Some drugs are highly toxic in nature and patients who are treated with these agents are at an increased risk of ADRs. For example, nausea and vomiting is a common ADR seen in patients treated with cytotoxic anti-cancer drugs.Also, patients who are treated with drugs which have a narrow therapeutic range suchas digoxin and gentamicin are more susceptible, as a slight increase in the serum concentration of these drugs may result in toxicity.

Gender: Women are reported to be more susceptible to ADRs than men, for a number of reasons: physiological, pharmacokinetic, pharmacodynamic and hormonal.
Chloramphenicolinduced aplastic anaemia and phenylbutazone-induced agranulocytosis are twice and thrice as common in women as in men, respectively.

Race and genetic factors: It are evident that ADRs are more common in genetically predisposed individuals. For example, patients who are deficient in glucose- 6phosphate dehydrogenase (G6PD) are at higher risk of developing haemolysis due to primaquine than those who are not. Race and genetic polymorphism may account for alterations in handling of drugs and their end organ effects.[8]

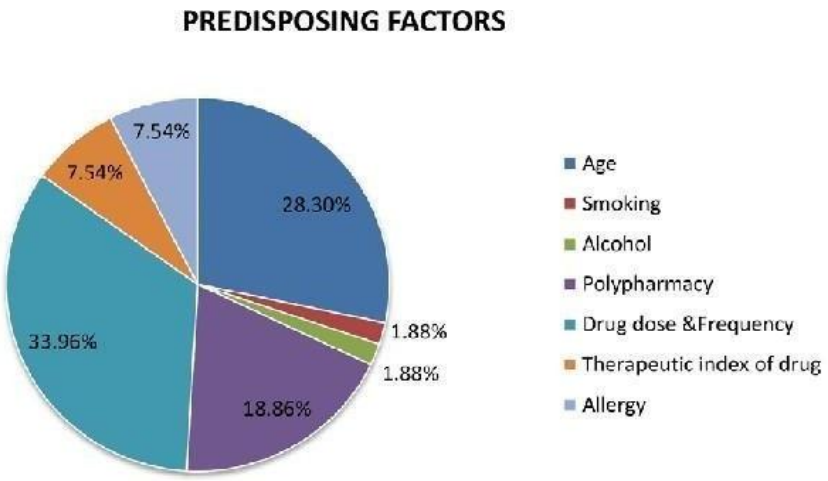

Figure 2: Predisposing factors.

PHARMACOVIGILANCE AND EPIDEMOLOGICAL METHODS IN ADR DETECTION

The inherent weaknesses of pre-marketing studies mean that post-marketing surveillance of medicines is essential to detect previously unnoticed adverse effects oftreatment. The science of this process is called pharmacovigilance and has been defined as 'the study of the safety of marketed drugs under the practical conditions of clinical use in large communities.

Pharmacovigilance is concerned with the detection, assessment and prevention of adverse effects or any other possible drug-related problems, with the ultimate goal of achieving rational and safe therapeutic decisions in clinical practice.

Figure 3: Pharmacovigilance and ADR detection.

SPONTANEOUS REPORTING

Pharmacovigilance uses multiple methods, but the following will focus on spontaneous reporting systems. Spontaneous reporting systems collect data about suspected ADRs in a central database. Cases are not collected in a systematic manner, but accumulate through reports submitted spontaneously by people who make a connection between a drug and a suspected drug-induced event. In the UK, the spontaneous reporting scheme is the Yellow Card scheme. In some countries reportingis a voluntary activity, in others reporting is a legal requirement. There is no evidence that such a requirement increases reporting rates. Spontaneous reporting has a number of advantages. It is relatively cheap to administer, can follow a product throughout its life and can also accept reports to over-the-counter medication and herbal treatments. Such schemes are, however, passive surveillance systems, which rely on the ability ofhealth professionals to recognise possible ADRs and to distinguish these from symptoms related to underlying disease. It is important to emphasise that only a suspicion of a causal link between a drug and an adverse event is required, not confirmation of the association. One disadvantage of spontaneous reporting systems is their inability to quantify the risk. Such systems supply a numerator (the number of reports), but estimates of the incidence of reactions cannot be made because the population exposed to the drug cannot be ascertained accurately. Furthermore, only a minority of reactions are reported. Spontaneous reports are, however, an important form of evidence leading to drug withdrawals and are crucial for hypothesis generation. **Signal detection:** A signal can be described as a

possible causal relationship between an adverse event and a drug, which was previously unknown. One useful analogy for signal detection in a spontaneous reporting database is to think of a radio signal, whichis disguised by the background radio 'noise'.

Statistical methods of signal generation can be thought of as methods of tuningin to capture the radio signal from the background noise. Statistical approaches scan the data accumulated through spontaneous reports for 'drug–adverse event pairs' that are disproportionately present within the database as a whole. Such calculations can be run automatically by modern computer systems, providing the opportunity to scan large databases for potential signals of new ADRs. Only rarely will a signal provide such strong evidence that a restriction on use of the drug or its withdrawal is immediately required.

However, while these mathematical approaches do develop hypotheses andgive the illusion of an objective estimate of risk, they are not conclusive in themselves. A signal could be due to causes other than the drug. Confounding factors such as particular groups of patients being 'channelled' into receiving a drug can influence reporting. Similarly, reports may be received and analysed by a varied set of people with differing levels of understanding, competence, training, experience and awareness. There is also a tendency for reporting rates to be higher with newly introduced drugs, while articles in the media, regulatory action and even legal cases can provoke reporting of particular reactions. For that reason, the strength of the signalalso depends on the quality of the individual spontaneous reports.

Causality assessment: The assessment of whether a drug is responsible for a suspected ADR is of great importance in both the regulatory environment and within the pharmaceutical industry. Reporters to spontaneous reporting schemes are requestedto submit suspected ADRs and such reports contain variable levels of information. Forexample, since re-challenge with the suspected drug is often ethically unacceptable, very few reports contain such information.

As already noted, while a safety signal can arise from the accumulation of reported cases of the event in a database, causality assessment of individual cases mayinfluence the subsequent decision-making process. However, often causality is difficult to prove in pharmacovigilance and a high degree of suspicion may be all thatis necessary for regulatory action.

One of the most common methods of causality assessment in use is unstructured clinical assessment, also known as global introspection. Expert review of clinical information is

undertaken and a judgement is made about the likelihood of the reaction being due to drug exposure. The assessment of complex situations, often with missing information, is open to variation between different assessors and studies have shown marked disagreement between experts. The WHO international monitoring centre uses global introspection for case assessment, assigning standardised causalitycategories to suspected ADRs.

A number of alternative methods of assessing causality have been developed using standardised decision algorithms in an attempt to increase objectivity and reduceassessor bias.

One of those most commonly used to assess causality is the Naranjo algorithm. This uses a questionnaire and points are added or taken away based on the responses to each question, such as 'Did the adverse reaction reappear when the drug was readministered?' The total score is then used to place the assessed reaction on the following scale: definite, probable, possible or doubtful. Algorithms may be less open to the effects of confounding variables, such as underlying disease states or concomitant drugs, but variation in assessor judgements still occur.

YELLOW CARD SYSTEM

The UK's Yellow Card Scheme was established in 1964 following the thalidomide tragedy. The Scheme is operated by the Medicines and Health care Products Regulatory Authority (MHRA). Health care professionals and coroners can submit reports of suspected ADRs using a Yellow Card (found in the British National Formulary) or using an on-line form (http:// www.yellowcard.gov.uk). An associationbetween the medicine and the event does not have to be confirmed. A suspicion is sufficient for a report to be submitted. The MHRA request that all serious suspected ADRs are reported by health care professionals concerning established medicines (drugs and vaccines). For newer drugs and vaccines, all suspected ADRs should be reported, even if minor events. Newer medicines under intensive surveillance are identified with an inverted black triangle symbol in product information and standard prescribing texts. Black triangle status is generally maintained for at least 2 years, but the period varies, depending on how much information is obtained about a product's continued safety. All suspected ADRs occurring in children should be reported even if the medicine has been used off-label.

Information from Yellow Card reports is entered into a database, suspected reactions are categorised using the internationally accepted Medical Dictionary for Regulatory Affairs

(MedDRA) and the resultant signals generated by the combined reports are then assessed for causality. Where there is a valid signal which may be an ADR, further work may be required to assess the association further. This could involve requesting further details from reporters, contacting manufacturers, reviewing the literature or conducting pharmacoepidemiological studies. The MHRA estimates that about 40% of the safety signals investigated by the Agency are generated from spontaneous reports.

When new ADRs are identified and an association confirmed, the MHRA maytake action in the form of changes to the Summary of Product Characteristics (SmPC) and/ or the patient information leaflet (PIL), restricting usage or withdrawing marketing authorisation for the medicine. Withdrawal of marketing authorisation or change in use requires that prescribers and suppliers be informed immediately, but such information is also usually publicised in the media; hence, patients are often aware of these actions and may present with requests for information and advice.

Unfortunately, spontaneous reporting systems, including the Yellow Card Scheme, suffer from severe under-reporting. A systematic review estimated this to bebetween 82% and 98% (Hazell and Shakir, 2006). There are a variety of reasons for this, including lack of certainty that the medicine caused the symptom, but it is important to emphasise that such certainty is not required. There is also no requirementto provide the patient's name or contact details, only those of the actual reporter; hence,confidentiality, also cited as a reason for underreporting, is no longer an issue. Furthermore, the MHRA have systems in place to check for duplicate reports coveringthe same incident, thereby eliminating concern about two people submitting reports about the same event in a given patient.

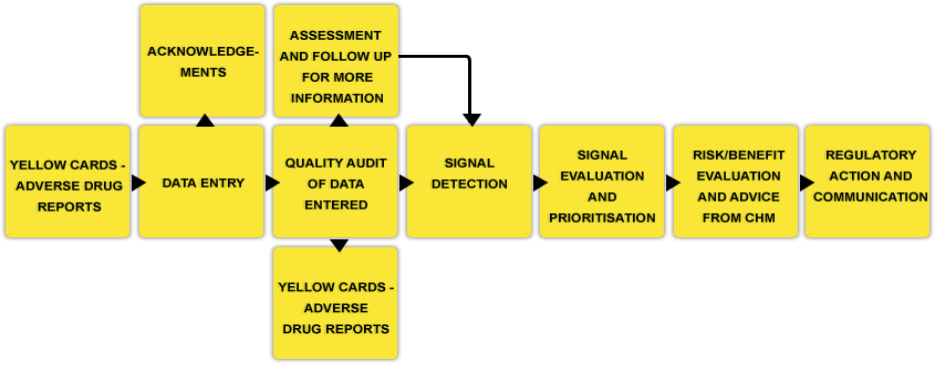

Figure 4: Yellow card system.

COHORT STUDIES

Cohort studies are prospective pharmacoepidemiologic studies that monitor a large group of patients taking a particular drug over a period of time. Ideally such studies compare the incidence of a particular adverse event in two groups of patients, those taking the drug of interest and, another group, matched for all important characteristics except the use of the drug. These studies can indicate the relative risks associated with the adverse event in people exposed to the drug being studied.

CASE- CONTROL STUDIES

Case–control studies compare the extent of drug usage in a group of patients who have experienced the adverse event with the extent of usage among a matched control group who are similar in potentially confounding factors, but have not experienced the event. By comparing the prevalence of drug taking between the groups, it may be possible to identify whether significantly more people who experienced the event also took a particular drug. Examples of associations which have been established by case–control studies are Reye's syndrome and aspirin and the relationship between maternal diethylstilboestrol ingestion and vaginal adenocarcinoma in female offspring. Case–control studies are an effective method of confirming whether or not a drug causes a given reaction once a suspicion has been raised. Being retrospective, they rely on good record-keeping about drug use and are not capable of detecting previously unsuspected adverse reactions.[1]

LITERATURE REVIEW

- **Mahendra Kumar BJ. *et.al.*[9]** conducted a survey on Assessing the Knowledge, Attitude and Behaviour of Community Pharmacists to Adverse Drug Reaction Related Aspects **2012**. A survey was conducted to assess the knowledge, attitude and behaviour of community pharmacists towards ADR related aspects. One hundred and twenty-eight pharmacists from various community pharmacies in two districts of South India were consented in this survey. A questionnaire was prepared to investigate the knowledge, attitude and behaviour of pharmacists regarding ADR reporting and distributed to the identified pharmacies. The results of the present study showed that the majority of community pharmacists have insufficient knowledge about ADR and pharmacovigilance program.

- **Easwaran Vigneshwaran. *et.al.*[10]** conducted a study on Knowledge, Attitude and Practice of Community Pharmacists towards Adverse Drug Reactions Reporting **2020**. This study

was conducted to evaluate the impact of clinical pharmacists' educational intervention on ADRs and pharmacovigilance program of India (PvPI) among community pharmacists in Southern part of India. A questionnaire regarding ADRs in accordance with the PvPI was prepared and validated by experts. Based on the results of this study, it is necessary to offer continuous educational programs and hands-on training for spontaneous reporting of ADRs until we reach the point that voluntary reporting of ADRs becomes accessible and habitual among the community pharmacists.

- **M. Deepalakshmi. *et.al.*[11]** conducted a study on Impact of Continuing Pharmacy Education on the Knowledge, Attitude and Practice of Community Pharmacists about ADR Monitoring and Reporting **2019**. This study was aimed to train the community pharmacists in pharmacovigilance and implement adverse drug reaction monitoring and reporting program in their practice. Continuing pharmacy education programs about adverse drug reaction monitoring and reporting were conducted periodically to the community pharmacists both in the study centre and respective pharmacies and their knowledge, attitude, practice was assessed both prior and post education program through a self-administered questionnaire.

- **K. T. Mohammed Salim. *et.al.*[12]** conducted a study on a cross-sectional study on the knowledge, attitude and behaviour of community pharmacists to adverse drug reactions related aspects **2016**. This study was conducted to assess the attitude, knowledge and behaviour of community pharmacists to ADR related aspects. A prospective study carried out over six months; self-prepared validated questionnaire was used. Awareness programme was conducted and a feedback questionnaire was provided. In this study few pharmacists had recognised the importance of ADR reporting and the urgent need of making it mandatory, however the responsiveness was greater in abroad. Proper training needs to be provided to the community pharmacist to get updated knowledge regarding the ADRs.

- **Umi Athiyah. *et.al.*[13]** conducted a study on assessment of pharmacists' knowledge, attitude and practice in chain community pharmacies towards their current function and performance in Indonesia **2019**. The study aimed to assess the knowledge, attitude and practice (KAP) of pharmacist working in chain community pharmacy towards their current function and performance in delivering pharmacy services. A cross-sectional study using questionnaires was conducted between January and March 2017 in KF, one of the

largest chain community pharmacies in Indonesia. The total sampling method was used in the recruitment process. The data were analysed using descriptive statistics, independent t-Test and one-way ANOVA. The KAP scores were assessed and categorized as "poor", "moderate" and "good" based on the standardized scoring system.

- **Lavina Prashar. *et.al.*[14]** conducted a study on inadequate Knowledge and Practice of Pharmacovigilance affecting Adverse Drug Reaction Reporting by Health Professionals in Private Healthcare Facilities in Lusaka, Zambia **2020**. The study examined knowledge, attitude and reporting practices among medical doctors, pharmacists and nurses in private healthcare facilities in Lusaka, Zambia. A descriptive cross-sectional study was undertaken. Data was collected using a self-administered questionnaire assessing general knowledge,attitudes and practice of ADR reporting.

The study concluded that the majority of pharmacists have insufficient knowledge about ADR and pharmacovigilance program.

- **Pramod Kumar Manjhi. *et.al.*[15]** conducted a survey on knowledge, attitudeand practice of pharmacovigilance and adverse drug reaction reporting amonghealthcare professionals in a tertiary care hospital of Bihar, India **2016**. This study was conducted to assess the knowledge, attitude and practice of pharmacovigilance (PV) and adverse drug reaction (ADR) reporting amonghealthcare professionals in a tertiary care hospital of Bihar. It was a questionnaire based cross- sectional study carried out for a period of 3 months by a preformed structured questionnaire consisting of 19 questions (11questions on knowledge, 5 on attitude and 3 on practices) in various departments of I.G.I.M.S., Patna. The results of the present study showed thatthe majority of pharmacists have insufficient knowledge about ADR andpharmacovigilance program.

- **Stella Folajole Usifoh. *et.al.*[16]** conducted a study on Community PharmacistsKnowledge, Behaviours and Practice of Adverse Drug Reactions Reporting in Lagos State, Nigeria **2018**. To assess community pharmacists' knowledge, behaviours and practice of ADR reporting in Lagos State. This was a crosssectional survey using selfadministered questionnaire distributed to randomly selected pharmacists in retail community pharmacies in Lagos State. The instrument is a 62- item structured questionnaire in four sections; the demographics, knowledge about ADR reporting system, assessment of practice and attitude on ADR reporting; and the behaviour and practice of patients

counselling about ADR by community pharmacists. The results of the present study showed that the majority of community pharmacists have insufficient knowledge about ADR and pharmacovigilance program.

- **Sandeep A. *et.al.*[17]** conducted a study on adverse Drug Reaction: Community Pharmacist Knowledge Attitude and Behaviour **2012**. Many hospitalizations in India are due to Adverse Drug Reactions (ADR) and resulting in morbidity and mortality in majority cases in addition to the huge economic burden. A survey was conducted to assess the knowledge, attitude and behaviour of community pharmacists towards ADR related aspects. One hundred and twenty-eight pharmacists from various Community pharmacies in two Districts of South India were consented in this survey. A questionnaire was prepared to investigate the knowledge, attitude and behaviour of pharmacists regarding ADR reporting and distributed to the identified pharmacies. Out of 342 community pharmacies approached, 128 community pharmacists consented to be part of the survey and the questionnaire given was filled and returned by them. The main reason for not reporting any ADR 'they did not know how to report' and 'did not feel it beneficial'. This study proved that the community pharmacists in India have scored least score towards knowledge, attitude and behaviour on ADR.

- **Wen Hu.*et.al.*[18]** conducted a study on Knowledge, Attitude and Practice of Hospital Pharmacists in Central China towards Adverse Drug Reaction Reporting: A Multicentre Cross-Sectional Study **2022**. This study aims to investigate the gap between knowledge and practice in ADR reporting among hospital pharmacists. This study is a multi-centre, cross-sectional study based on a questionnaire survey. A semi-structured questionnaire was developed including knowledge, attitudes, and practices (KAP) towards ADR reporting. Although the hospital pharmacist had showed a positive attitude towards ADR reporting but their knowledge and practice were insufficient.

Their knowledge and attitude are associated with their practice towards ADR reporting. The training had a significant impact on the pharmacist's knowledge, attitude and practice.

- **Jimmy Jose.*et.al.*[19]** conducted a study on a cross sectional pilot study on assessing the knowledge, attitude and behaviour of community pharmacists to adverse drug reaction related aspects in the Sultanate of Oman **2013**. The present pilot study was conducted to assess the knowledge, attitude and behaviour of community pharmacists to ADR related aspects in the Sultanate of Oman. A self-administered questionnaire comprising of

21 questions weredistributed to a random sample of pharmacists in two Governorates in the Sultanate of Oman. It assessed the knowledge of pharmacists on some of the selected basic aspects of drug safety. Further, the knowledge and attitude ofcommunity pharmacists toward ADR reporting and their behaviour on ADR related aspects were assessed. The results of the present study showed that the majority of community pharmacists have insufficient knowledge about ADRand pharmacovigilance program.

- **Muhammad Anwar.*et.al.*[20]** conducted a study on assessment of Knowledge,attitude and practice of pharmacist regarding Adverse Drug Reaction Reporting in Pakistan **2017**. Assessment of knowledge, attitude and practice (KAP) of Pharmacist regarding adverse drug reaction (ADRs) and pharmacovigilance inpublic hospitals Quetta. Methods: A cross sectional and questionnaire- based study design was used among the professional pharmacists in seven public hospitals of Quetta city, who were performing their duties in hospital as pharmacist and chief pharmacist. A total of 26 questionnaires were present in survey comprised of (knowledge 7, Attitude 10, practice 9) for the assessment of pharmacists (KAP). A total of 140 questionnaires were distributed to the pharmacists. This study indicates that the pharmacists had an inadequate knowledge and positive attitude towards ADR reporting, pharmacovigilance and poor ADR reporting practices. Efforts are required to enhance knowledgeand attitude towards pharmacovigilance and ADR reporting

- **Sundos Qassim.*et.al.*[21]** conducted a study on reporting Adverse Drug Reactions: Evaluation of Knowledge, Attitude and Practice among Community Pharmacists in UAE **2014**. This study aimed to evaluate the knowledge, attitudes and practice (KAP) toward adverse drug reactions (ADRs) reporting among community pharmacists (CPs) in Ajman and Sh1arjah, UAE.Evaluating the baseline KAP of the CPs regarding ADRs reporting can be useful in providing information for the progress of a PV program in UAE. An interview questionnaire was delivered to 300 CPs in Ajman and Sharjah cities. The result was that there were lack of appropriate knowledge and practice toimplement ADR's reporting successfully. The results also emphasized the critical need for interventions to support ADR's reporting activity and tomaintain CP's positive attitude.

- **Husna Fatima.*et.al.*[22]** conducted a study on questionnaire-based studyassessment of knowledge, attitude and practice of pharmacovigilance among health care professionals, pre and post educational intervention **2021**. This study was conducted to assess the level of knowledge, awareness and practice of PV among health care professionals and to

assess subsequent change in these after PV training session. A cross sectional questionnaire-based study was conducted among health care professionals of a tertiary health care and teaching institute. Participants were given a questionnaire.

They completed it before and after undergoing training programme in PV. Impact of effectiveness of educational intervention (continuing medical education-CME (pharmacovigilance workshop) was evaluated by paired t-test. This study indicates that the pharmacists had an inadequate knowledge and positive attitude towards ADR reporting, pharmacovigilance and poor ADR reporting practices. Efforts are required to enhance knowledge and attitudetowards pharmacovigilance and ADR reporting.

- **Mansoura Adam Mahmoud*.et.al.*[23]** conducted a study on community pharmacists' knowledge, behaviours and experiences about adverse drug reaction reporting in Saudi Arabia **2013**. To assess community pharmacists' knowledge, behaviours and experiences relating to Adverse Drug Reaction (ADR) reporting in Saudi Arabia. A cross-sectional study was conducted using a validated self-administered questionnaire. Convenience sample of 147 community pharmacists working in community pharmacies in Riyadh, Saudi Arabia. The study concluded that the majority of community pharmacists in Riyadh have poor knowledge of the ADR reporting process.Pharmacovigilance authorities should take necessary steps to urgently design interventional programs in order to increase the knowledge and awareness of pharmacists regarding the ADR reporting.

AIM AND OBJECTIVES

AIM

To assess the knowledge, attitude and practice among pharmacists to adverse drug reaction related aspects.

OBJECTIVES

- To assess the Knowledge, Attitude and Practice among Pharmacists to Adverse drug reaction.

METHODOLOGY

STUDY DURATION

The study was conducted for a period of 6 months.

STUDY SITE

The study was conducted in Sree Krishna College of Pharmacy and Research Centre, Parassala.

STUDY SETTING

Study was conducted among pharmacist at southern part of Kerala.

STUDY DESIGN

A prospective observational study of ADR will be conducted among pharmacistin southern part of Kerala.

SAMPLE SIZE

The proportion of knowledge. Practice and attitude among pharmacists to the adverse drug reaction is assumed to be 70% with a precision of 15% of the assumed proportion. The significant level is 5% and the power of the test is 80%. The Cochran'sformulae for the sample size.

$$\frac{Z^{2}_{\alpha * P * q}}{d^2}$$

P- Assumed proportion =.70 d-Precision=15% ofthe assumed proportion70%=0.10

$Z\alpha$ -5% level of significance -1.96

$$\textbf{Sample Size} = \frac{(1.96)^2 * .70 * .30}{(0.10)^2} = 81$$

A total of 81 sample is requires for the study.

STUDY PROCEDURE

It is a prospective study of ADR conducted for a period of 6 months among pharmacist in southern part of Kerala. A written informed consent is taken from pharmacist about ADR reporting. All information relevant to the study was collected from direct interview with pharmacist. The Pharmacists was divided in to Hospital Pharmacists, Community Pharmacists and Clinical Pharmacists. The demographic characters, knowledge, attitude and practice of pharmacist is documented in the proforma.

A structured interview with pharmacist was conducted by using Questionnaire to elicit information about ADR. In this study a survey was conducted to assess the knowledge,attitude and practice among pharmacist to ADR related aspects.

The knowledge, attitude and practice were assessed by using suitably designed questionnaire prior to survey. The questionnaire that contains total 29 questions, 10 from knowledge part and 10 from attitude part, 4 from practice part and 5 questions from barriers of adverse drug reaction. The knowledge, attitude, practice and barrier part contain YES/NO questions.

DATA COLLECTION TOOLS

Questionnaire to collect information about Knowledge, Attitude and practice about Pharmacists to ADR related aspects.

DATA ENTRY AND ANALYSIS

After getting the data will be analysed and suitably tabulated, formulated and presented.

Chi-Square test is used for the analysis of data.

OBSERVATION AND RESULT

As per the study criteria 81 pharmacists such as Hospital pharmacist, Community pharmacist, and Clinical pharmacist were enrolled in the study. This studyaimed to assess the Knowledge, Attitude and Practice among pharmacist to Adverse Drug Reaction related aspects in southern part of Kerala.

Distribution of Gender

Out of 81 Pharmacists, 32% are male and 68% are female. Distribution of gender of pharmacists based on number is shown in Table No.1:

Table1: Distribution of gender.

Gender	Number	Percentage (%)
Male	26	32
Female	55	68
Total	81	100

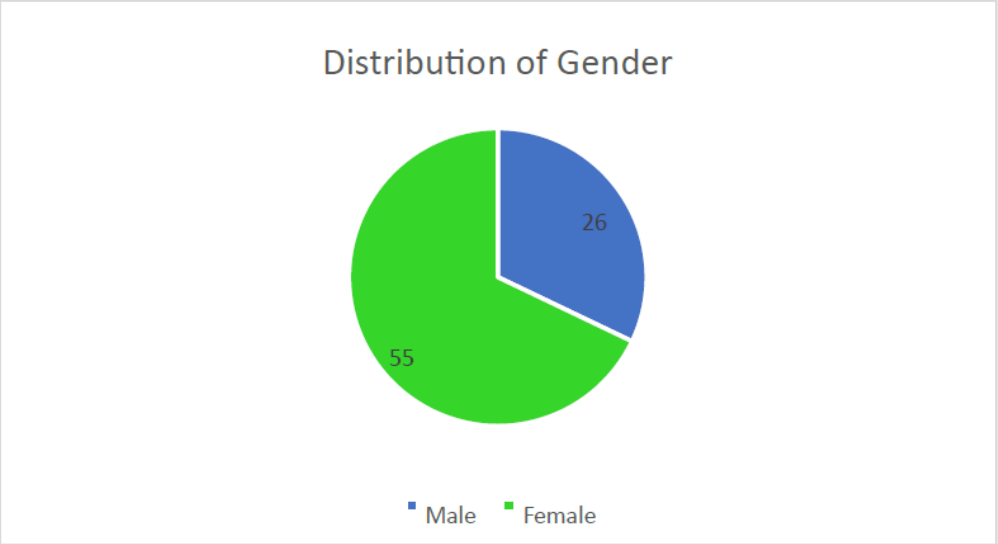

Figure 5: Distribution of Gender.

Comparison of Gender with Group

Comparison of Gender with Group of Pharmacists was shown in Table No.2:

Table 2: Comparison of gender with group.

Gender	Clinical Pharmacist N N (%)	Community Pharmacist N N (%)	Hospital pharmacist N (%)	Total N N(%)
Female	16 (59)	17 (63)	22 (82)	55(68)
Male	11 (41)	10 (37)	5 (18)	26(32)
Total	27 (100)	27 (100)	27 (100)	81(100)

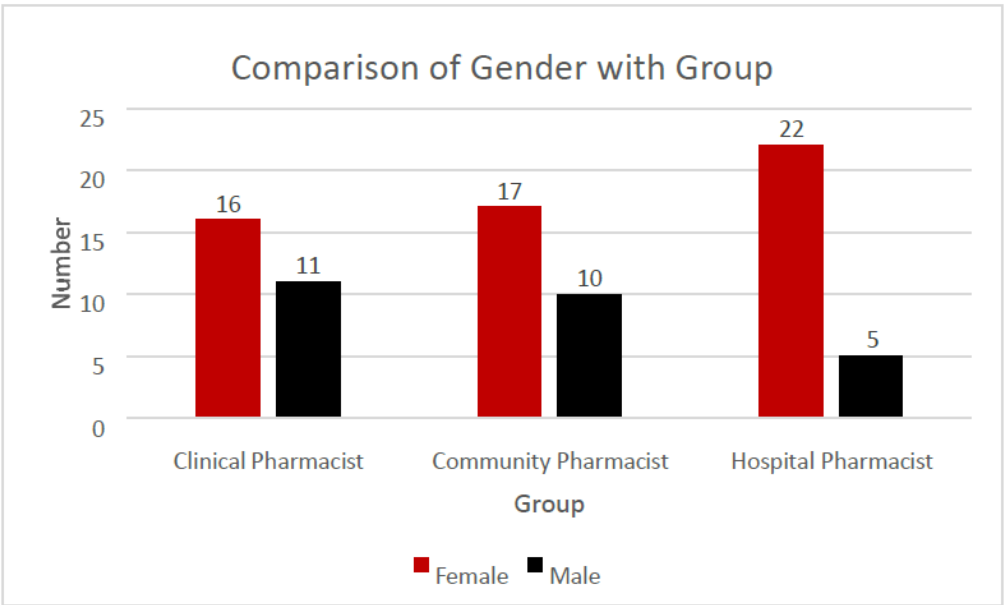

Figure 6: Comparison of Gender with Group.

Distribution of Age

The mean age is 30.89 years with a standard deviation 7.9 years. The minimumage is 20 years and the maximum age is 60 years. 57% of the people are lying in the age group of 2030 years, and 22% are in the age group of 31-40 years and only 9% arelying in the age group of >40 years. Distribution of Age of pharmacists based on number is shown in Table No.3:

Table 3: Distribution of age.

Age	Number	Percentage (%)
20-30	54	67
31-40	18	22
>40	9	11
Total	81	100

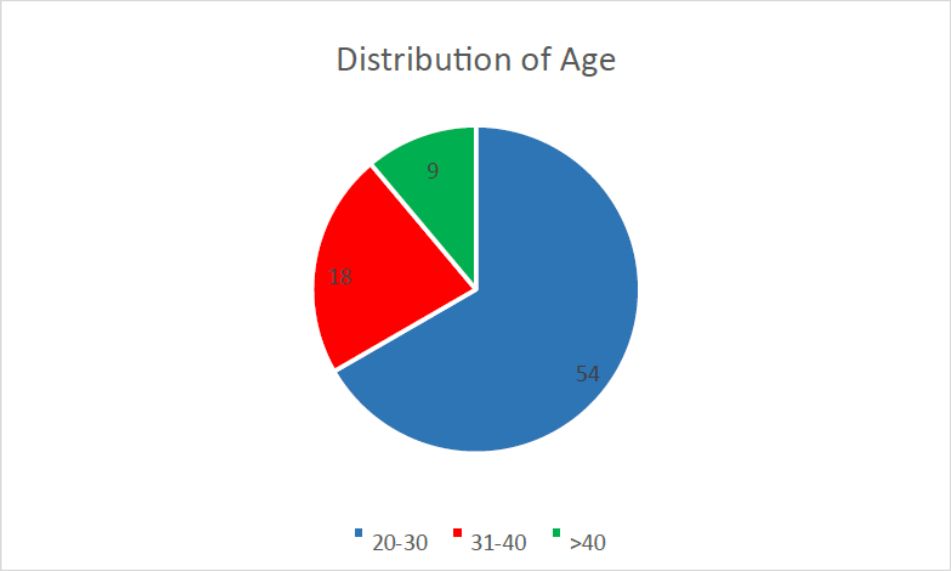

Figure 7: Distribution of Age.

Comparison of Age with Group

Comparison of Age with Group of Pharmacists was shown in Table No.4:

Table 4: Comparison of age with group.

Age	Clinical Pharmacist N (%)	Community Pharmacist N (%)	Hospital Pharmacist N (%)	Total N (%)
20-30	20(74)	18(67)	16(59)	54(67)
31-40	4(15)	8(30)	6(22)	18(22)
>40	3(11)	1(4)	5(19)	9(11)
Total	27(100)	27(100)	27(100)	81(100)

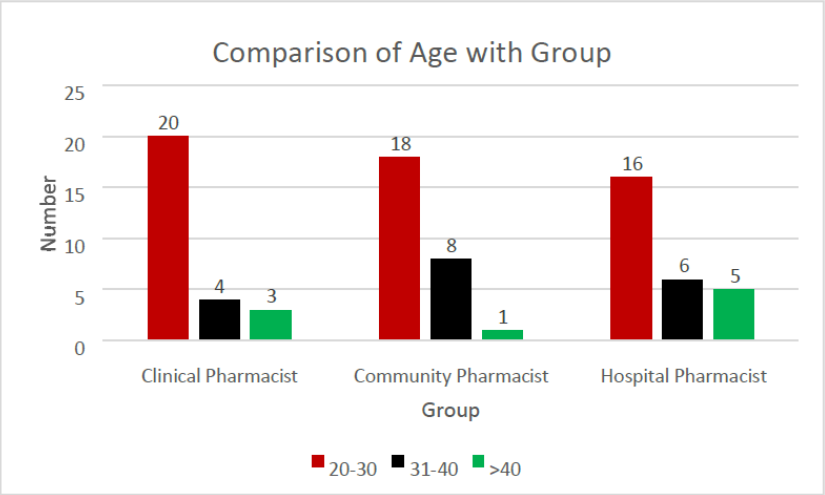

Figure 8: Comparison of Age with Group.

Distribution of Qualification

Out of 81 pharmacists, 16% are B Pharm, 47% are D Pharm, 11% are M Pharm and 26% are pharm D. Distribution of qualification of pharmacists based on number is shown in Table No.5:

Table 5: Comparison of qualification with group.

Qualification	Clinical Pharmacist N (%)	Community Pharmacist N (%)	Hospital pharmacist N (%)	Total N(%)
BPHARM	0(0)	4(15)	9(33)	13(16)
DPHARM	0(0)	23(85)	15(56)	38(47)
MPHARM	6(22)	0(0)	3(11)	9(11)
PHARM D	21(78)	0(0)	0(0)	21(26)
Total	27(100)	27(100)	27(100)	81(100)

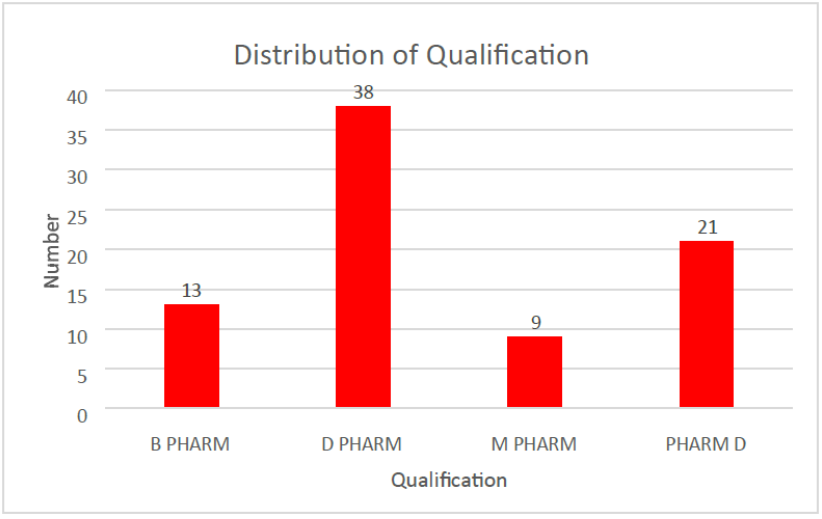

Figure 9: Distribution of Qualification.

Comparison of Qualification with Group

Comparison of Qualification with Group of Pharmacists was shown in Table No.6:

Table 6: Comparison of qualification with group.

Qualification	Clinical Pharmacist N (%)	Community Pharmacist N (%)	Hospital pharmacist N (%)	Total N(%)
BPHARM	0(0)	4(15)	9(33)	13(16)
DPHARM	0(0)	23(85)	15(56)	38(47)
MPHARM	6(22)	0(0)	3(11)	9(11)
PHARM D	21(78)	0(0)	0(0)	21(26)
Total	27(100)	27(100)	27(100)	81(100)

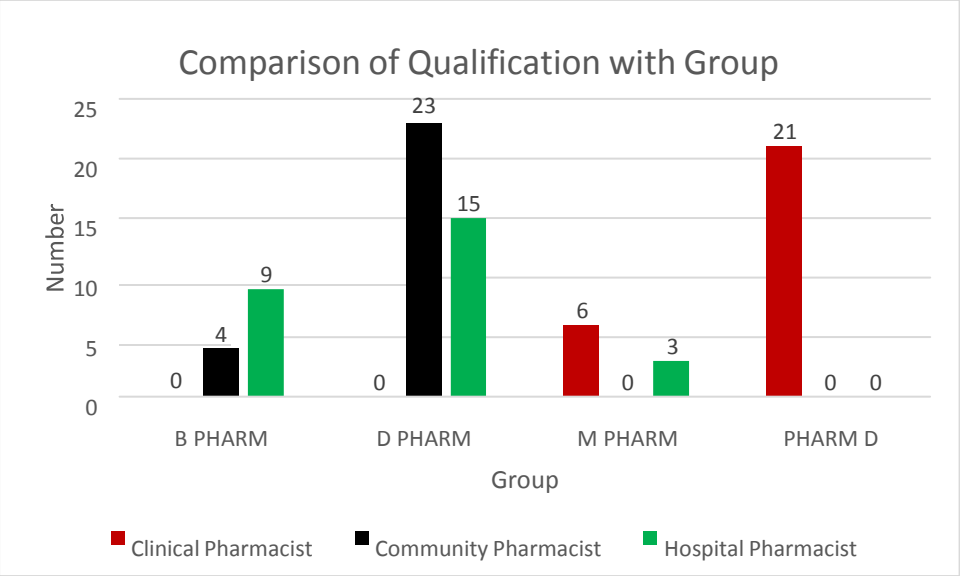

Figure 10: Comparison of Qualification with Group.

Distribution of Profession

Distribution of Profession of pharmacists was shown in Table No.7:

Table 7: Distribution of Profession.

Profession	Number	Percentage(%)
CLINICAL PHARMACIST	27	33
HOSPITAL PHARMACIST	27	33
COMMUNITYPHARMACIST	27	33
TOTAL	81	100

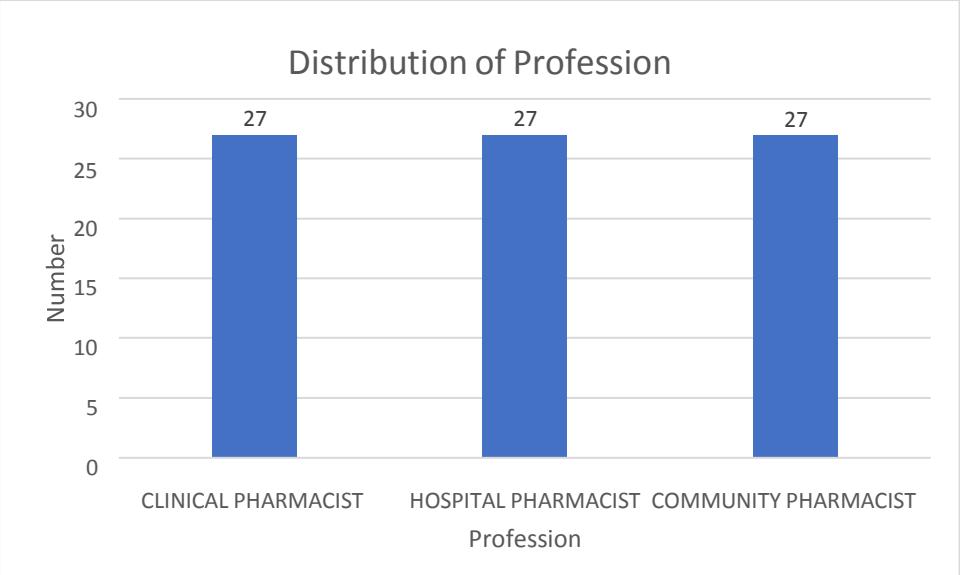

Figure 11: Distribution of Profession.

Distribution of Response in knowledge

Distribution of Response in Knowledge of Pharmacists was shown in Table No.8:

Table 8: Distribution of response in knowledge.

Sl.No	KNOWLEDGE	Yes(%)	No (%)	Total (%)
1	Do you know what are ADRs?	81 (100)	0 (0)	81
2	Are you aware about the national pharmacovigilance programme?	63(78)	18(22)	81(100)
3	Do you know the nearest pharmacovigilance centre locatedfrom your working place?	38(47)	43(53)	81(100)
4	Do you believe all drugs available in market are safe?	11(14)	70(86)	81(100)
5	Do you know which organisation is responsible for collecting and monitoring ADR in India?	28(35)	53(65)	81(100)
6	Do you know which type of ADRs are usually reported?	52(64)	29(36)	81(100)
7	Do you know when ADRs should be reported?	62(77)	19(23)	81(100)
8	Do you worry about legal problems while thinking aboutADR reporting?	47(58)	34(42)	81(100)
9	Are you conscious about the drug that can harm the pregnant women?	61(75)	20(25)	81(100)
10	Do you feel that patient confidentiality should be maintained while reporting ADR?	61(75)	20(25)	81(100)

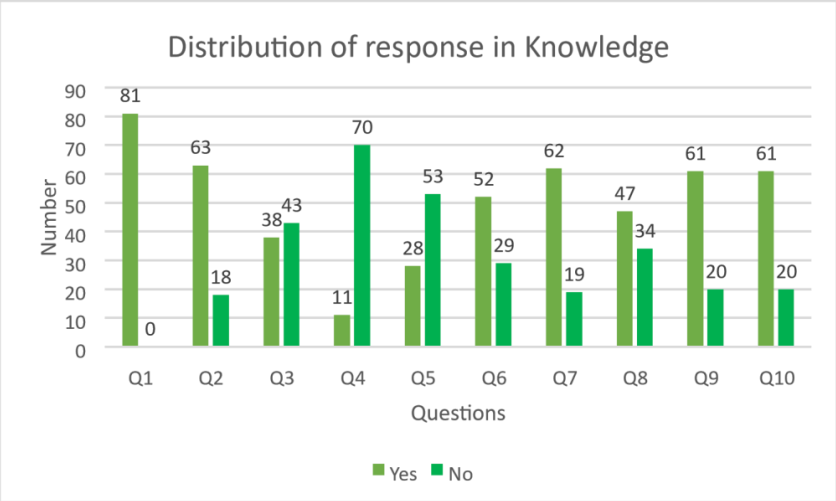

Figure 12: Distribution of response in Knowledge.

Comparison of Knowledge within the Pharmacists Group

For comparing the Knowledge among the pharmacist group, the 10 question regarding the knowledge scale is converted to the categorical knowledge scale by considering the 10 points as in favour of agreeing the statement and 20 points as disagreeing the domain. The weighted average score is considered as the cut point forthe knowledge scale.

Comparison of Knowledge with the Pharmacist Group is shown in Table No.9:

Table 9: Comparison of Knowledge with the pharmacist group.

Knowledge	Clinical Pharmacist	Community Pharmacist	Hospital pharmacist	Total	Chi-square	p-value
Yes	27	16	21	64		
No	0	11	6	17	13.55	0.001*
Total	27	27	27	81		

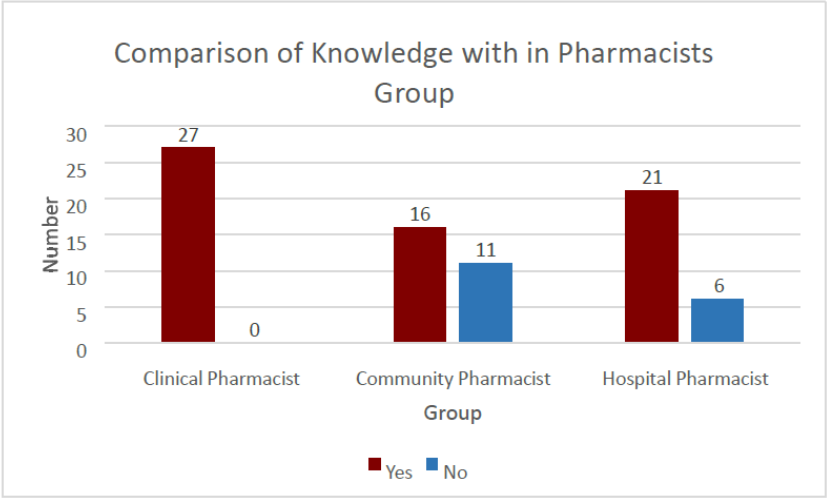

Figure 13: Comparison of Knowledge within the Pharmacists Group.

Distribution of response in Attitude

Distribution of response in attitude of Pharmacists was shown in Table No.10:

Table 10: Distribution of response in attitude.

Sl. No	ATTITUDE	Yes (%)	No (%)	Total (%)
1	Do you think reporting ADR is a pharmacist's duty?	63(78)	18(22)	81(100)
2	Have you ever noticed /experienced of an ADR in patient?	62(77)	19(23)	81(100)
3	Do you think proper ADR reporting and monitoring willbenefit the patient?	77(95)	4(5)	81(100)
4	Do you support ADR reporting by patients instead ofpharmacist?	54(67)`	27(33)	81(100)
5	Do you think pharmacist is the right person to assistphysician in reducing ADR?	58(72)	23(28)	81(100)
6	Do you think serious ADRs encourage pharmacists toreport it to the relevant authorities?	64(79)	17(21)	81(100)
7	Do you feel that you need assistance in the area of ADR?	56(69)	25(31)	81(100)
8	Are you trained to report ADRs?	35(43)	46(57)	81(100)
9	Do you have free access to ADR reporting form?	41(51)	40(49)	81(100)
10	Did you receive feedback from ADR monitoring centres:	46(57)	35(43)	81(100)

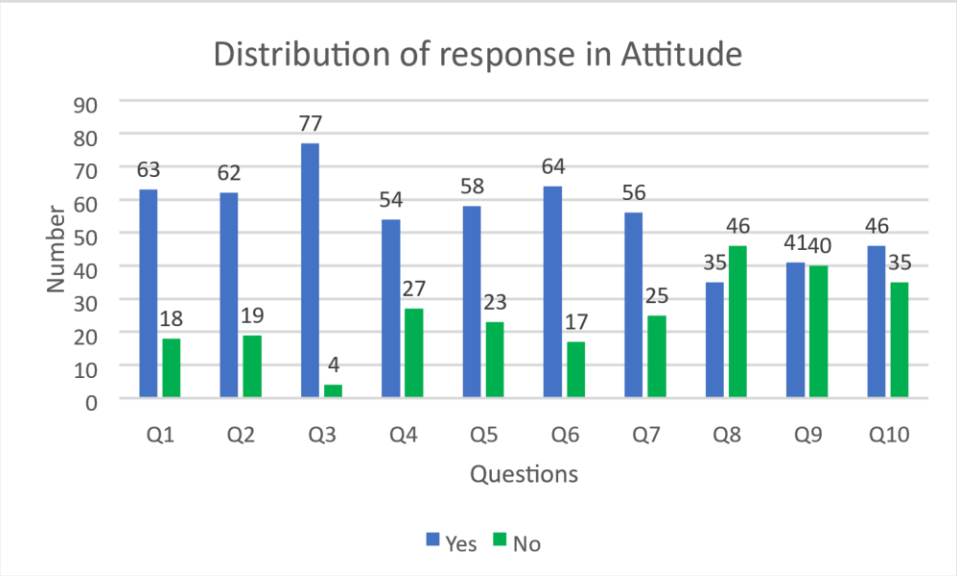

Figure 14: Distribution of response in Attitude.

Comparison of attitude within the pharmacists group

For comparing the attitude among the pharmacist group, the 10 questionregarding the attitude scale is converted to the categorical attitude scale by consideringthe 10 points as in favour of agreeing the statement and 20 points as disagreeing the domain. The weighted average score

is considered as the cut point for the knowledge scale.

Comparison of attitude with the pharmacist group is shown in Table No.11:

Table 11: Comparison of attitude with the pharmacist group.

Attitude	Clinical Pharmacist	Community Pharmacist	Hospital pharmacist	Total	Chi-square	p-value
Yes	27	24	20	71	8.44	0.015*
No	0	3	7	10		
Total	27	27	27	81		

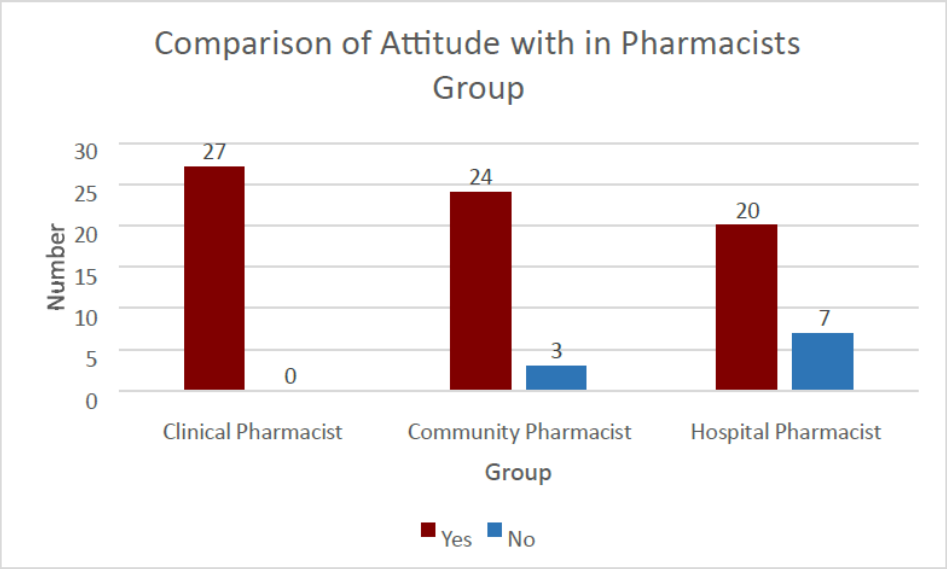

Figure 15: Comparison of Attitude within the Pharmacists Group.

Distribution of response in Practice

Distribution of response in Practice of Pharmacists was shown in Table No.12:

Table 12: Distribution of response in practice.

Sl.No	PRACTICE	Yes(%)	No (%)	Total(%)
1	Do you know how to report ADR?	49(61)	32(39)	81(100)
2	Do you know where to obtain the ADR forms?	38(47)	43(53)	81(100)
3	Have you ever observed a suspected adverse drug reaction?	47(58)	34(42)	81(100)
4	Have you reported any suspected ADR to any of the reporting and monitoring centres?	32(39)	49(61)	81(100)

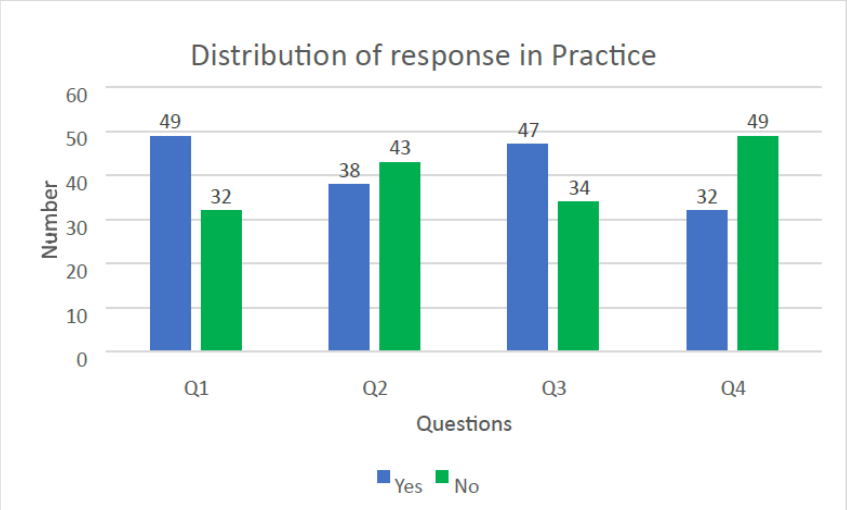

Figure 16: Distribution of response in Practice.

Comparison of practice within the pharmacists group

For comparin practice among the pharmacist group, the 4 question regarding the attitude scale is converted to the categorical practice scale by considering the total 4 point as in favour of agreeing the statement and 8 points as disagreeing the domain. The weighted average score is considered as the cut point for the practicescale.

Comparison of Practice with the pharmacist group is shown in Table No.13:

Table 13: Comparison of Practice with the pharmacist group.

Practice	Clinical Pharmacist	Community Pharmacist	Hospital pharmacist	Total	Chi-square	p-value
Yes	26	15	13	54	16.33	0.001*
No	1	12	14	27		
Total	27	27	27	81		

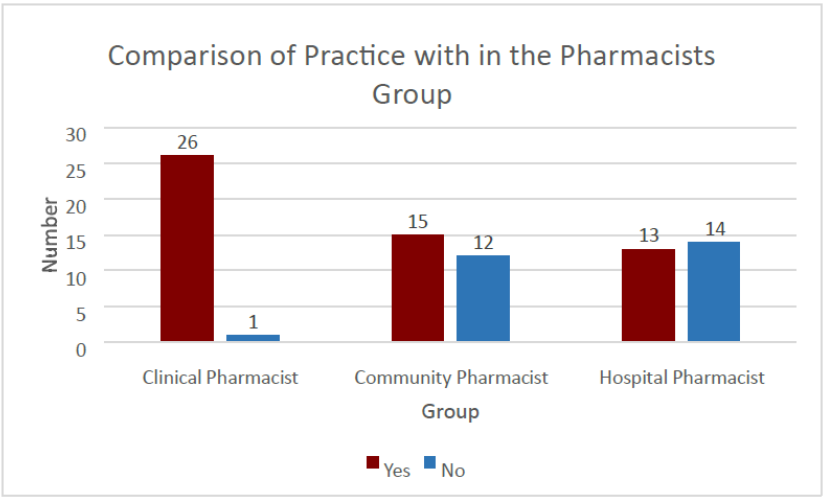

Figure 17: Comparison of Practice within the Pharmacists Group.

Distribution of response in Barriers of Adverse Drug Reaction

Distribution of response in Barriers of Adverse Drug Reaction of Pharmacists was shown in Table No.14:

Table 14: Distribution of response in barriers of adverse drug reaction.

Sl. No	Adverse Drug Reaction	Yes (%)	No (%)	Total (%)
1	Did not know that ADRs needs to be reported?	32(39)	49(61)	81(100)
2	Did not know pharmacists can report?	42(52)	39(48)	81(100)
3	Did not know how to report?	33(41)	48(59)	81(100)
4	Did not know how to get the reporting forms?	29(36)	52(64)	81(100)
5	Did not feel that ADR reporting would benefit?	35(43)	46(57)	81(100)

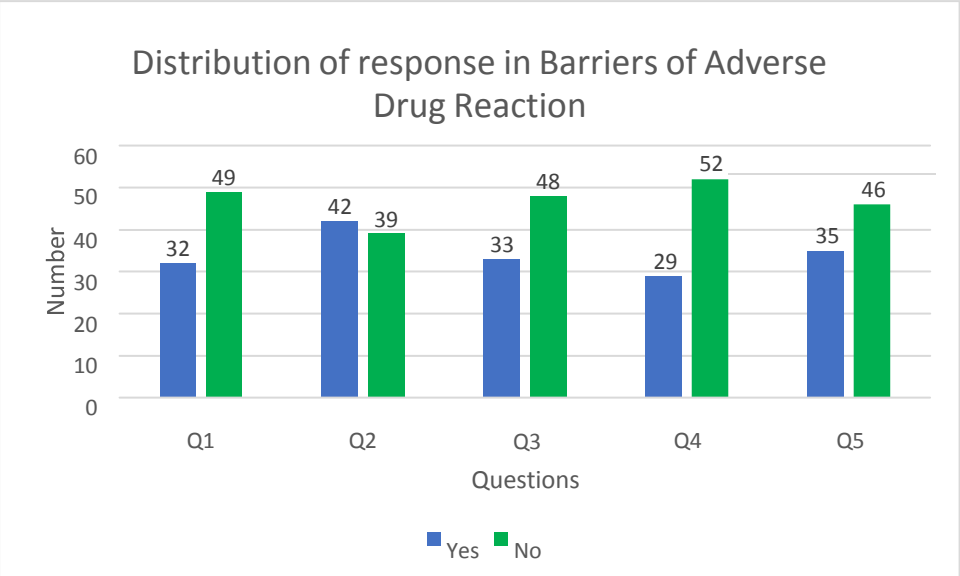

Figure 18: Distribution of response in Barriers of Adverse Drug Reaction.

Comparison of Barriers of adverse drug reaction within the pharmacists group

For comparing the Barriers of adverse drug reaction among the pharmacist group, the 5 question regarding the Barriers of adverse drug reaction scale is converted to the categorical practice scale by considering the total 5 point as in favour of agreeing the statement and 10 points as disagreeing the domain. The weighted average score is considered as the cut point for the barriers of adverse drug reaction scale.

Comparison of Barriers of adverse drug reaction with the pharmacist Group is shown in Table No.15:

Table 15: Comparison of Barriers of ADR with the pharmacist group.

Barriers ofadverse drug reaction	Clinical Pharmacist	Community Pharmacist	Hospital pharmacist	Total	Chi-square	p-value
Yes	12	15	24	51		
No	15	12	3	30	12.39	0.002*
Total	27	27	27	81		

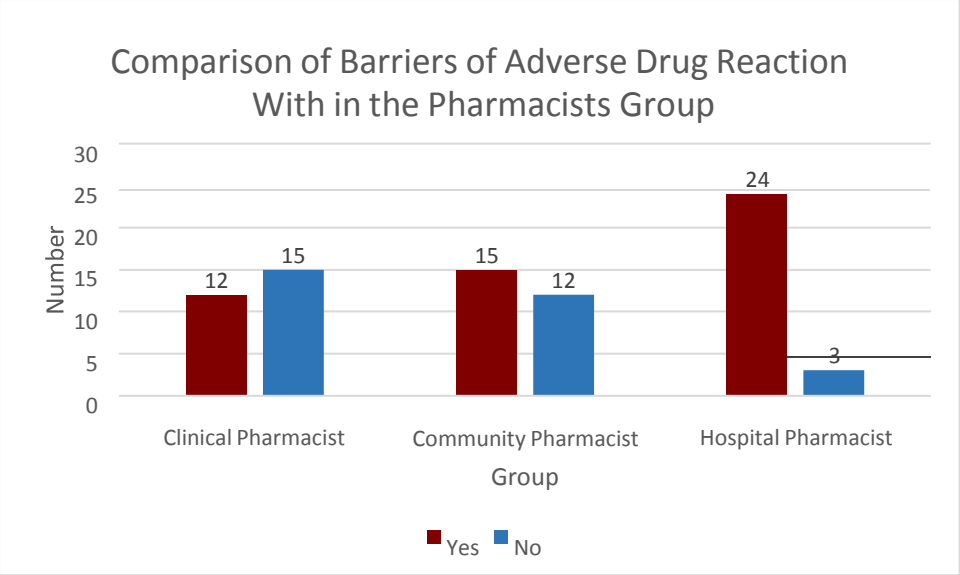

Figure 19: Comparison of Barriers of adverse drug reaction within the pharmacist's group.

DISCUSSION

The present study was a questionnaire-based study which included Pharmacists from southern part of Kerala. The survey questionnaire was designed and prepared by referring previous study conducted in abroad.[24,25] This is the first study in southern part of Kerala that evaluated the Knowledge, Attitude and Practice (KAP) of Pharmacists regarding ADR related aspects.

This study aims to assess the Knowledge, Attitude and Practice among Pharmacists to ADR related aspects. In this study, 81 Pharmacists such as hospital Pharmacists, community Pharmacists and clinical Pharmacists were included. KAP was assessed byusing questionnaire method. Overall, the KAP scores of Hospital Pharmacists and Community pharmacists were low when compared to Clinical Pharmacists.

Pharmacovigilance deals with detection, assessment, understanding and prevention of adverse effects or any other drug related problems. The ultimate aim of pharmacovigilance is to ensure patient safety and rational use of medicines once a newmedicine is released for general

use in the society. The most notable outcome of pharmacovigilance is the prevention of patients being affected unnecessarily due to the negative consequences of the pharmacotherapy.[26]

Pharmacovigilance programs have played a crucial role in detection of ADRs and banning of several drugs from the market. However, under-reporting of ADRs is one of the main problems associated with pharmacovigilance programs.[27]

This study shows that the entire pharmacist has good knowledge but the Clinical pharmacist have more knowledge as compared to Hospital Pharmacists and Community Pharmacists. The entire pharmacist has good Attitude but the Clinical pharmacist have more knowledge as compared to Hospital Pharmacists and Community Pharmacists. The entire pharmacist has good Practice the Clinical pharmacist have more knowledge as compared to Hospital Pharmacists and Community Pharmacists.

Mahendra Kumar BJ.*et.al*. conducted a survey on Assessing the Knowledge, Attitude and Behaviour of Community Pharmacists to Adverse Drug Reaction Related Aspects 2012. A survey was conducted to assess the knowledge, attitude and behaviour of community pharmacists towards ADR related aspects. One hundred and twenty-eight pharmacists from various community pharmacies in two districts of South India wereconsented in this survey. A questionnaire was prepared to investigate the knowledge, attitude and behaviour of pharmacists regarding ADR reporting and distributed to theidentified pharmacies. The results of the present study showed that the majority of community pharmacists have insufficient knowledge about ADR and pharmacovigilance program.[9]

Husna Fatima.*et.al*. conducted a study on questionnaire-based study-assessment of knowledge, attitude and practice of pharmacovigilance among health care professionals, pre and post educational intervention 2021. This study was conducted to assess the level of knowledge, awareness and practice of PV among health care professionals and to assess subsequent change in these after PV training session. Across sectional questionnaire-based study was conducted among health care professionals of a tertiary health care and teaching institute. Participants were given a questionnaire. They completed it before and after undergoing training programme inPV. Impact of effectiveness of educational intervention (continuing medical educationCME (pharmacovigilance workshop) was evaluated by paired t-test. This study indicates that the pharmacists had an inadequate knowledge and

positive attitudetowards ADR reporting, pharmacovigilance and poor ADR reporting practices. Effortsare required to enhance knowledge and attitude towards pharmacovigilance and ADR reporting.[28]

Mansoura Adam Mahmoud.*et.al.*) conducted a study on community pharmacists' knowledge, behaviours and experiences about adverse drug reaction reporting in Saudi Arabia 2013. To assess community pharmacists' knowledge, behaviours and experiences relating to Adverse Drug Reaction (ADR) reporting in Saudi Arabia. A cross-sectional study was conducted using a validated self-administered questionnaire. Convenience sample of 147 community pharmacists working in community pharmacies in Riyadh, Saudi Arabia. The study concluded that the majority ofcommunity pharmacists in Riyadh have poor knowledge of the ADR reporting process. Pharmacovigilance authorities should take necessary steps to urgently design interventional programs in order to increase the knowledge and awareness of pharmacists regarding the ADR reporting.[29]

Muhammad Anwar.*et.al***.** conducted a study on assessment of Knowledge, attitude andpractice of pharmacist regarding Adverse Drug Reaction Reporting in Pakistan 2017. Assessment of knowledge, attitude and practice (KAP) of Pharmacist regarding adverse drug reaction (ADRs) and pharmacovigilance in public hospitals Quetta. Methods: A cross sectional and questionnaire- based study design was used among theprofessional pharmacists in seven public hospitals of Quetta city, who were performingtheir duties in hospital as pharmacist and chief pharmacist. A total of 26 questionnaireswere present in survey comprised of (knowledge 7, Attitude 10, practice 9) for the assessment of pharmacists (KAP). A total of 140 questionnaires were distributed to the pharmacists. This study indicates that the pharmacists had an inadequate knowledge and positive attitude towards ADR reporting, pharmacovigilance and poor ADR reporting practices. Efforts are required to enhance knowledge and attitude towards pharmacovigilance and ADR reporting.[30]

Easwaran Vigneshwaran.*et.al.* conducted a study on Knowledge, Attitude and Practice of Community Pharmacists towards Adverse Drug Reactions Reporting 2020. Thisstudy was conducted to evaluate the impact of clinical pharmacists' educational intervention on ADRs and pharmacovigilance program of India (PvPI) among community pharmacists in Southern part of India. A questionnaire regarding ADRs inaccordance with the PvPI was prepared and validated by experts. Based on the resultsof this study, it is necessary to offer continuous educational programs and hands-ontraining for spontaneous reporting of ADRs until we reach

the point that voluntary reporting of ADRs becomes accessible and habitual among the community pharmacists.[31]

CONCLUSION

This study shows that the entire pharmacist has good knowledge about ADRrelated aspects, but the Clinical pharmacist have more knowledge, Attitude and Practice as compared to Hospital Pharmacists and Community Pharmacists. Since there is a need of Pharmacovigilance program in the Community pharmacy and Hospital pharmacy. Educational Programs about ADR reporting and pharmacovigilance practice need to be included in the curriculum to improve ADR reporting. This study reveals that creating awareness about ADRs among the pharmacists, made a very huge impact on level on understanding, attitude towardsADR reporting.

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