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A Psychological Study on Adverse Drug Reaction and Pharmacoeconomics Burden of Patient in Surgery Department of Tertiary Care Teaching Hospital

Deepanshu Kumar (Corresponding Author), [1]Priya Nagar, [2]Anjali Kumari, [3]Dr. Piyush Mittal

Department of Pharmacy Practice, Teerthanker Mahaveer Hospital & Research Centre, Moradabad, Uttar Pradesh, India
Dkdeepanshu.890@gmail.com
[1]Department of Pharmacy Practice, Teerthanker Mahaveer Hospital & Research Centre, Moradabad, Uttar Pradesh, India
Priyanagar764@gmail.com
[2]Department of Pharmacy Practice, Teerthanker Mahaveer Hospital & Research Centre, Moradabad, Uttar Pradesh, India
Anjaliim1414@gmail.com
[3]Department of Pharmacy Practice, Teerthanker Mahaveer Hospital & Research Centre, Moradabad, Uttar Pradesh, India
Piyush.pharmacy@tmu.ac.in

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Abstract

Background: Adverse drug reactions (ADRs) are frequently underreported. Adverse drug reactions (ADRs) are a severe health hazard that led to avoidable patient burden and hospital admissions; hence pharmacovigilance education is critical. Only a few educational initiatives have long-term benefits on healthcare personnel' understanding of pharmacovigilance and adverse event reporting. Our healthcare practitioners of the future should develop a sufficient set of pharmacovigilance skills in order to rationally prescribe, distribute, and monitor medications.

Aim: The aim of the present study is to evaluate, analyse and reporting of possible drug reaction in surgery department and its Pharmacoeconomics burden at tertiary care teaching hospital.

Methodology: This is prospective, observational study, which will be carried out in Teerthanker Mahaveer Hospital, Bagarpur, Delhi Road, Moradabad. This study is carried out by using pharmacoeconomic questionnaire, suspected adverse drug reaction reporting form issued by IPC and pharmacovigilance programme of India (PvPi) and adverse drug reaction questionnaire. In this study patients above 18yrs of surgical department tertiary care teaching hospital of western Uttar Pradesh are being taken. The period of study will be from December 2021 to May 2022.

Result: Out of 94 patients, 63 were male and 31 were female. The results were found to be significant.

Discussion: Our present study shows that, 44% of the study group had more ADRs as compared to other age groups. This study stated that female ward has less frequency of adverse drug reactions 32.97% as compared to males. The severity, treatment, action taken after an adverse drug reaction, and Naranjo casualty evaluation were used to determine the outcomes of adverse drug reactions by organ system. Post-operative patients had a larger cost distribution than pre-operative patients, according to our findings.

Conclusion: In our research group, the prevalence of ADRs is similar to that described in the literature. In comparison, the total rate of adverse drug reactions (ADRs) in our research appears to be lower. It is exceedingly difficult to establish, quantify, and compute the total cost of ADRs. Post-operative patients had a larger cost distribution than pre-operative patients, according to our findings.

Keywords: ADRs, Pharmacoeconomics, Risk benefit burden, Surgery, Adverse Event

Introduction

An adverse drug reaction (ADR) is expressed by the WHO as "A response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease, or for the modifications of physiological function".[1] ADR are utmost source of co-morbidity and impermanency across world, posing a large and growing health and financial burden. Adverse drug reaction antiquated accepted as "a significant noxious or vexatious reaction, outcome along with interfere associated facing the use of a drug, normally forecast risk is associated to following control risk and justify prevention on particular therapy, in other words changes in dosage regimen, either removal of the product".[2]

Adverse drug reactions have long been upraise a serious community health related problem. The number of ADR turned to be reported. The percentage ranges from 3.7 percent to 30 percent.[3]

Based on research a sum of 5,118 children out of 6,601 admissions was covered in the study, with 17.7 percent experiencing minimal one ADR. More than half of all medicines implicated in ADR were opioids pain reliever and pharmaceuticals product use in general anaesthesia. 0.9 percent of these ADR resulted in lasting damage or needed intensive care. Children who had general anaesthesia are more prone to likely to develop an ADR than children who did not have GA. 95% confidence interval (CI). Other risk variables for ADR were growing age, increased drug use, and oncological therapy.[6]

In terms of the resources required to handle ADR, health care systems around the world face a considerable burden. ADR have both direct and indirect expenses. ADR cost analysis involves critical questions, such as which perspective to use when studying ADR. In a pharmacoeconomic evaluation, a social approach is chosen because it considers all relevant factors. Hospital costs, particularly those resulting from a prolonged stay in hospital, are included in the cost of ADR. Typically, the cost of prolonged stay in hospital to utilised the determine the additional costs.[4]

Pharmacoeconomics is express as the explanation and study of drug therapy value to health wellness program and the community it defines, assesses, with contrasts the costs and effects of pharmaceutical product and assistance.[8]

The idea of efficiency is central to Pharmacoeconomics, and several techniques are proposed for obtaining the largest number of benefits for a given resource utilisation. Pharmacoeconomic evidence can be used to assist choices on pharmaceutical licencing, price, reimbursement, and formulary maintenance. For insurance firms to provide better services at a lower cost, India must build a Pharmacoeconomics platform among authenticate methodology and proper education.[8]

The importance of pharmacovigilance in ADR identification is underlined by the fact that improper medication usage is a primary cause of ADR. However, medications are used in RCTs according to stringent procedures, typically in patients who are not fragile, and in a highly controlled setting considerably different from the drug usage witnessed in the more dynamic clinical contexts in which the manner and effects of medication administration are studied drug use might be more complicated.[10]

ADR are clearly a source of significant cost burden for patients, caregivers, and the healthcare systems. It is obvious that RCTs alone are insufficient for detecting and assessing the frequency of ADR. Post marketing pharmacovigilance initiatives that supplement RCT data include immediate reporting, monitoring cohort database and previous database research deliver more therapeutically useful data over a longer period of time durations and bigger population numbers required for a more precise and ongoing assessment of the risk-benefit ratio for medical procedures.[10]

Drug treatment is an essential component of surgery that should not be disregarded. Because of the rapid advancement of pharmacotherapeutics, surgeons must continually refresh their understanding of the drug safety, new medications, therapy course and grow in the occurrence of pharmaceutical tragedies emphasises the importance of caution. ln surgeons' spontaneous reporting of adverse events during outcome to the efficient operation of the pharmacovigilance method in strength such as surgery might be dangerous. Medical mishaps such as medication errors are fairly typical in wards for surgery.[12]

Surgeons administer a wide range of medication classes, the majority of which are antibiotics, and inappropriate antibiotic use is a prevalent problem that leads to antibiotic resistance. Multidrug resistance appears and elevated frequency of adverse responses. Surgeons encounter several drugs have caused serious dermatological responses, but nonetheless, surgeons are the specialists with the lowest pay ADR are likely to be reported.[12]

Underreporting has been reported in studies when ADR documentation is based on physician voluntary reporting. This was a significant stumbling block in the estimation of ADR are more common than we think. Many studies have looked at the expense of ADR in a variety of contexts, including primary care, tertiary care, general medicine, and emergency medicine, settings for specialised care. The projected cost of ADR is dependent on the country in which the study and the degree of medical care and the academic session. [3]

The noxiousness of adverse drug reaction is directly proportional to the life-threatening behaviour or can express by unpleasant process of medical product that may end in mortality and necessitates acute care hospitalisation. This results as extension of existing hospitalisation, resulting in long-term and substantial inability in inherited irregularity/birth deficit, it can clinical specific occurrence either response.[13]

The fundamental challenge with ADR in health care is determining whether and how to decrease ADR expenditures. To make an informed choice, both costs and advantages must be considered. ADR have two major costs: the expense of treating diseases caused by ADR and the value of prevention. There are two expenses as interconnected as well as increasing cost of preventing ADR. As a result, the cost of treating ill or diseases will most likely be decreased with relation to ADR. The primary concern for health-care decision-taking to strike proper stability among value with welfare of pharmacological therapy.[11]

There are very few reports on the cost of ADR accessible in India and they are need investigate the component of health care comprehend the economic implications. ADR incur a hardship. The current campaign's goal is to investigate the price along with the recorded ADR in a teaching hospital for tertiary care.[3]

The reason for this research to assess ADR in surgery department due to which the stay of patient prolonged which cause the Pharmacoeconomics burden on patients' family. As a result, it will assess Adverse Drug Reaction and pharmacoeconomic burden in the surgical department.

Methodology

This is a prospective observational study with six-month duration; the study was conducted in surgery department at tertiary care teaching hospital. To get the permission of the institutional ethical committee the systemic protocol was follow, in which all the documents were submitted. This study was approved by the institutional ethical committee.

CONSENT

Informed consent was obtained from all patient participating in the study

INCLUSION CRITERIA

- Male and female.
- Patients above 18yrs.
- Patients who are admitted in the surgery department (IPD, OPD, ICU).
- Patients who are prescribed with anti-microbials in surgery department.

EXCLUSION CRITERIA

- Paediatrics patients
- Lactating women
- Pregnant women
- Those patients who refuse to give consent

STUDY DESIGN AND PLACE

- This is prospective, observational study, which will be carried out in Teerthanker Mahaveer Hospital, Bagarpur, Delhi Road, Moradabad,244001.
- This study is carried out by using pharmacoeconomic questionnaire, suspected adverse drug reaction reporting form issued by IPC and pharmacovigilance programme of India (PvPi) and adverse drug reaction questionnaire.

STUDY POPULATION

- Patients above 18yrs of surgical department tertiary care teaching hospital of western Uttar Pradesh.

STUDY PERIOD

- The period of study will be 6 months after the approval from the college research committee and Institutional Ethical Committee (IEC).

SAMPLE SIZE

- All patients in the inclusion criteria admitted in the surgery department for surgical intervention for a period of March 15th, 2021, to May 31st, 2022.

DEVELOPMENT AND VALIDATION OF QUESTIONNAIRE

- Patient demographics details (age, sex, gender, contact no, address, qualification, smoking habit, alcohol habit).
- Description about suspected reaction, severity of reaction, dose, dosage form, route of administration, duration of reaction, when did the reaction start, if stop then when.
- Detail of prescribe medication for suspected medication for ADR reporting.
- Detail of prescription for prescription pattern analysis.

PILOT STUDY

- A small group of patients were observed.
- 10% of the population size were included.

PROCEDURE

1) Patient admitted in surgery outpatient, inpatient or in intensive care unit above 18 years of come with any adverse drug reaction or ADR occur during the hospital stay would be consider in our study.
2) Patient would assist as per study inclusion and exclusion criteria.
3) Collection of any suspected ADR from surgery department and reporting of that ADR in hospital Adverse drug reaction monitoring centre issued by Indian pharmacopeia commission.
4) Question will be asked on basis of prepared questionnaire.
5) Study information sheet must explain to participant and informed consent should be sign by participant.
6) Naranjo causality assessment scale should be done in patient showing ADR.
7) Segregations of questionnaire and prescription data for pharmacoeconomic burden due to ADR is done.
8) Preparation of master chart and preparation of statistical analysis to obtain result.
9) Preparation of data and compounding for finding.

INTERPRETATION OF RESULTS STATISTICAL ANALYSIS

- Data will be entered in Microsoft excel sheet.
- Data will be presented as mean $\pm$ standard deviation.
- Nonparametric & parametric (z-test) will be applied.
- Collected data will be calculated with SPSS 22.0 version.
- $p<0.05$ will be considered significant.

Result

A total of 94 patient in surgery department for study duration of 6 months period in the tertiary care teaching hospital. Among 94 patient 63 (67.02%) were male and 31 (32.97%) where female in this study clearly mention in Fig 2. 23 patient were found to be suffer with severe ADR. In Fig 2. of our study, patient most belong to 41–60-year age group who suffer ADR.

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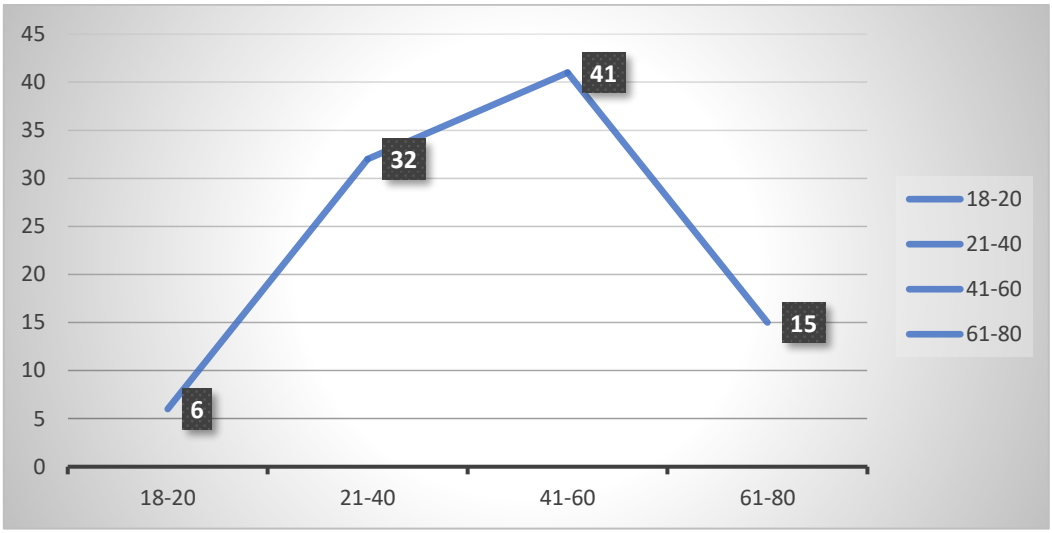

Fig 1. Representation on age group

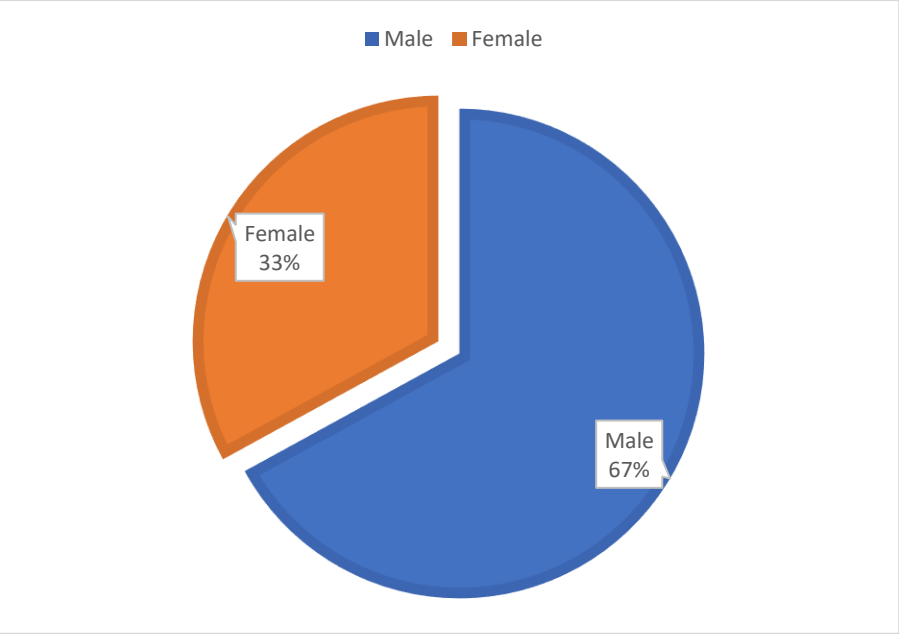

Fig 2. Representation based on gender

Organ system	Number	Percentage
GIT system	34	23.12%
Nervous system	31	21.08%
Cardio vascular system	12	8.16%
Dermatological system	22	14.96%
Respiratory system	5	3.40%

Renal system	10	6.80%
Endocrine system	1	0.68%
Others	32	21.76%

Table 1. Organ system wise distribution of ADR

The distribution of the organ system impact by ADR shown in Table 1 was GIT system (23.12%), neurological system (21.08%), and dermatological system (14.96%). Cardiovascular system (8.16%), Renal system (6.80%), Endocrine system (0.68%), and Other (21.76%) followed.

Spectrums	Number	Percentage
Anti-microbial	51	54.25%
NSAIDs	11	11.70%
CNS acting drug	6	6.38%
Corticosteroids	2	2.12%
Opiate analgesics	8	8.51%
Others	41	43.61%

Table 2. Spectrum causing ADR

From table 2 it was clearly stated that anti microbials (54.25%) were causing majority of the ADR. Followed by NSAIDs (11.70%), Opiate Analgesics (8.51%), CNS Acting Drugs (6.38) %, Corticosteroids (2.12%) and others (43.61%).

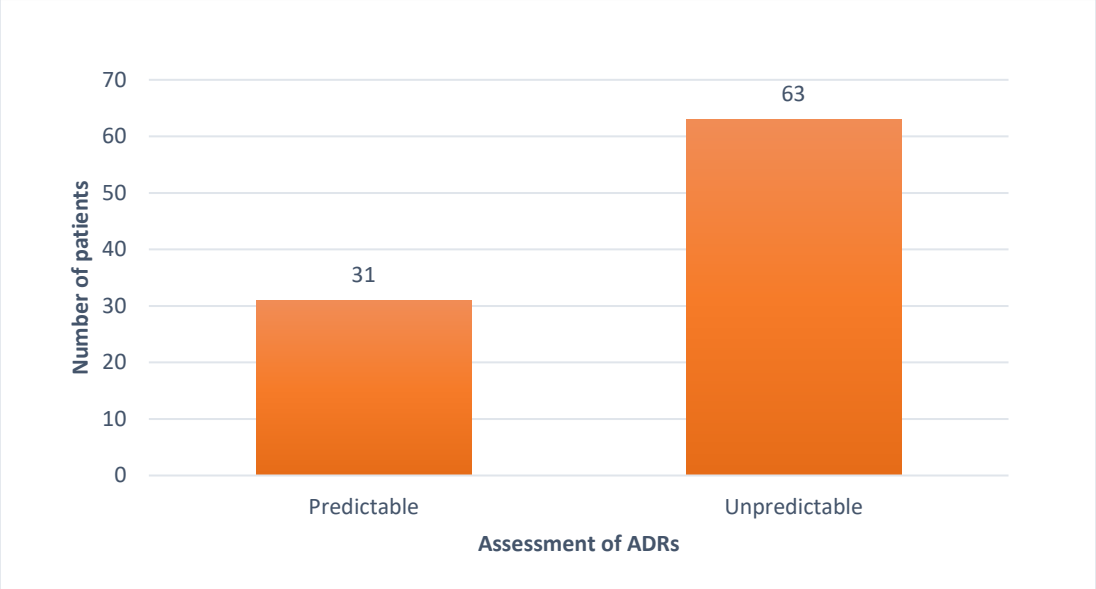

Fig 3. chart of ADR predictability and unpredictability

Out of 94 patients, 31 ADR were found to be predictable and 63 ADR were found to be Non predictable.

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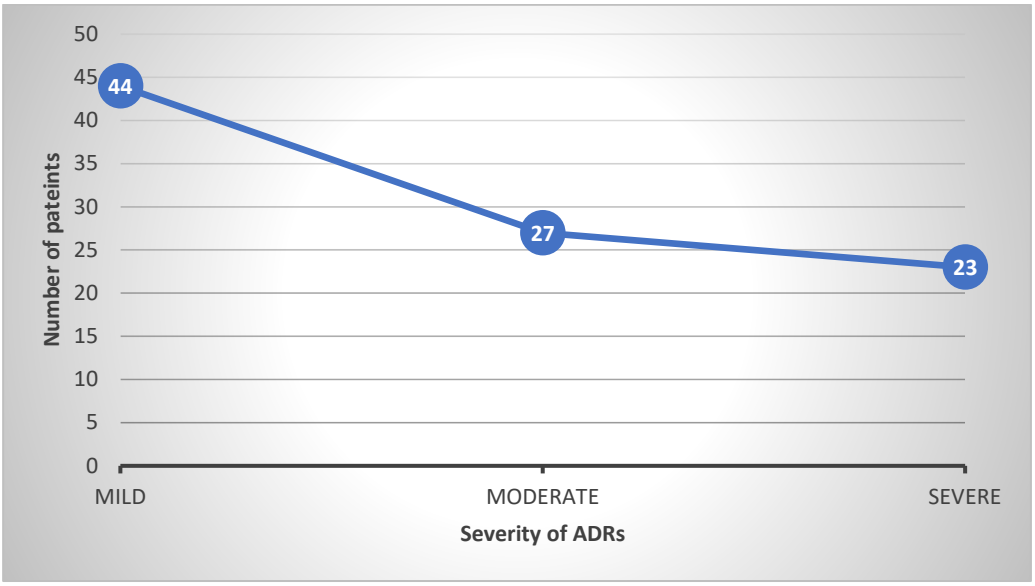

Fig4. Representation of Severity Assessment of ADR.

Out of 94 patients in the study, 44 (46.80%) had mild ADR, 27 (28.72%) had moderate ADR, 23 (24.46%) had severe ADR.

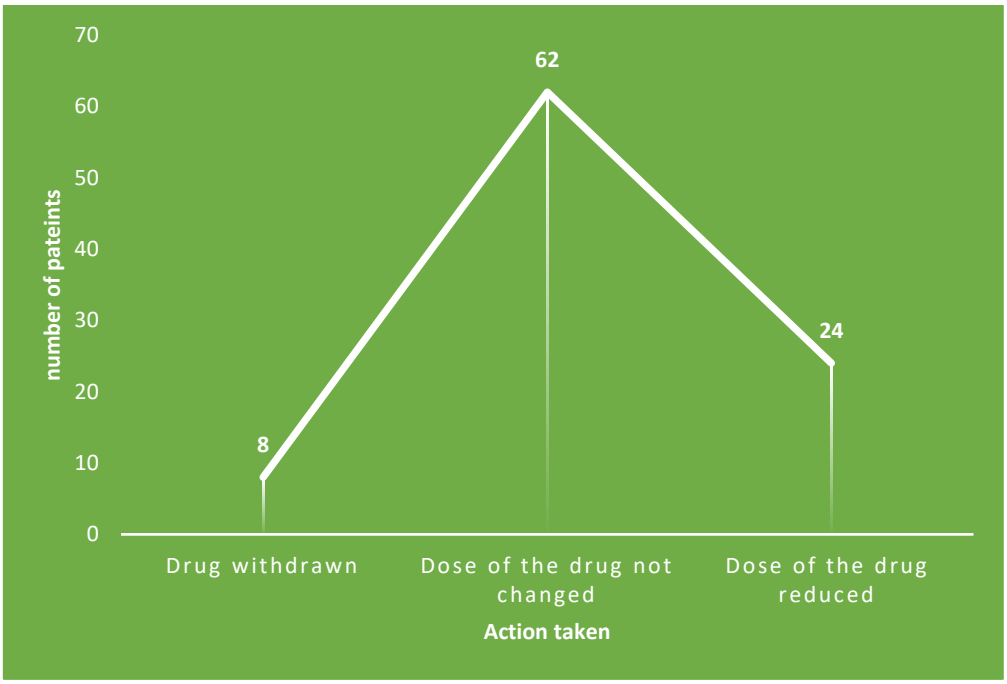

Fig 5. Graphical representation of ADR after action taken

Among 94 patient, 8 (8.51%) patient drug were withdrawn after ADR, 62 (65.95%) patient dose of the drug were not changed after ADR, 24 (25.53%) patient dose of the drug were changed.

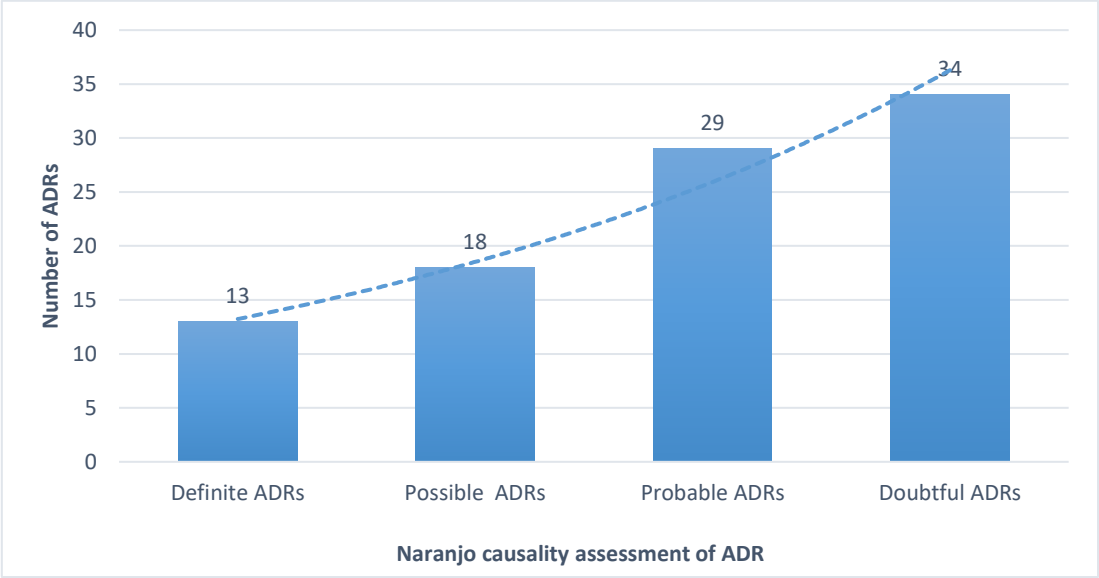

Fig6. Naranjo causality assessment scale of ADR in surgery patient.

Above chart and table shows that 34 ADRs are found to be doubtful, 29 ADRs found to be Probable, 18 ADRs found to be Possbile ADRs, 13 ADRs found to be Definite.

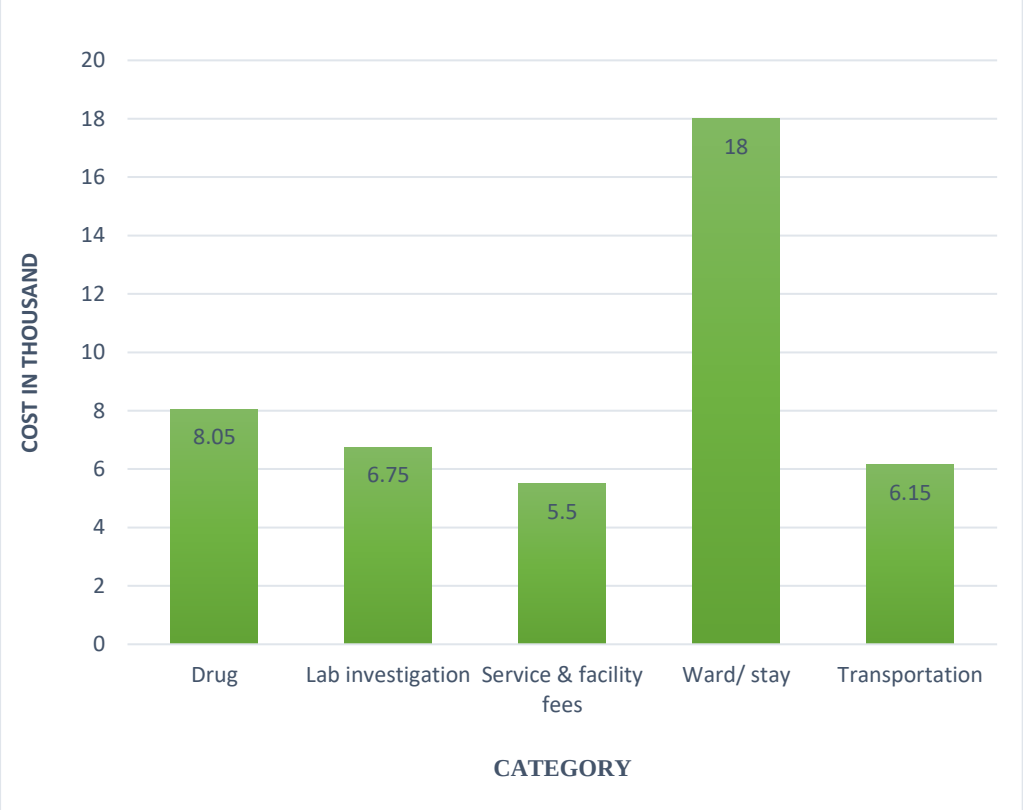

Fig 7. Representation of pharmacoeconomic burden associated to ADR

In our study the pharmacoeconomic burden is mostly due to ADR which causes lengthier stay in hospital, followed by the drug cost, Transportation or travel cost, Lab Investigation Cost, Service & Facility Cost.

Class		Mean	SD	P-value	Association
Anti-microbial	Pre	13.75 ±3.785	3.86	0.001	Significant
	Post	8,335 ±5,224	65.29		
NSAIDs	Pre	52 ±28.448	29.02	0.010	Significant
	Post	500 ±282	64.09		
CNS acting drug	Pre	40 ±16.003	21.60	0.050	Significant
	Post	700 ±299	37.40		
Opiate analgesic	Pre	175 ±63.259	64.54	0.003	Significant
	Post	875 ±316	32.20		
Corticosteroid	Pre	60 ±27.719	31.62	0.012	Significant
	Post	310 ±153.081	78.04		
Other + Surgery cost	Pre	141 ±29.137	33.24	0.045	Significant
	Post	48,000 ±19,204	97.9		

Table 3. Association of pharmacoeconomic burden between pre and post operative patients

Above table show the comparison between all the classes of drug. It shows the distribution of cost among pre-operative and post operative patient. After surgery increase in incidence of ADRs therefore cost is increasing significantly.

Discussion

ADR detection in hospitals allows for the detection of serious ADR that led to hospitalization as well as ADR that arise in hospitalised patients, i.e., individuals with a higher comorbidity who are administered non-FDA approved medications. Different rates and types of ADR arise because of the various ADR detection methods used, and as a result, different drug classes are responsible for these ADR.[2]

This was the first research of its kind to look into the future and see what may happen evaluation, analysis and reporting of possible adverse drug reaction in surgery department and its pharmacoeconomic burden at tertiary care teaching hospital. The main outcome measures the distribution of ADR on the basis of age group, gender, ward, organ system wise, spectrum of drugs causing ADR, assessment of predictable and unpredictable ADR, severity assessment, management, Naranjo causality assessment scale, and the pharmacoeconomic burden associated with ADR and the surgical pre and post operative cost.[7]

Adverse medication responses have long been seen as a major public health concern. The total number of recorded adverse medication reactions varies between 3.7 and 30 percent.[3]

Health-care systems throughout the world are under a lot of pressure when it comes to the resources needed to deal with ADR. ADR incurs both direct and indirect costs.[4]

A social approach is utilized in a pharmacoeconomic review because it incorporates all important elements. The cost of ADR includes hospital charges, particularly those resulting from an increase in duration of stay. In most cases, the cost of extended hospital stays is used to calculate the additional charges.[4]

The average age of the study population in the present study is 43.6% years (data summarized in figure 1). The patients in the present study were in the age group 41-60 years having more frequency of ADR. To guarantee homogeneity in the research group, the patients were chosen from a smaller age group. During the research period, no patient deaths were observed.

As the (Fig 1) represents that 44% of the study group had more ADR rather than as compared to other age groups. ADR rates rose with age in the same research as well done by M.I. Geer et al., notably in persons aged 60 and more, except for children under the age of four. These findings are particularly concerning for people over the age of 65, who are far less likely to receive new medications in general conformity with previously announced overall consultancy fees based on common practice.[60]

Another study done by D Formica et al. found also confirm that the additional cost owing to avoidable ADEs rose by 8.6% for adults over 65 years old (€3097) against patients under 65 years old (€2851).[1]

Figure 2. shows distribution of study group as per sex. Adverse drug reactions are more common seen in male patients although this distribution is found to be statistically non-significant.

The frequency of males having ADR is 67.02%.

A study explained by Drici MD et al. shows that ADRs are thought to be more common in women than in males. Gender-related disparities in medication exposure, the number of prescriptions given (polypharmacy), drug pharmacology, and probable differences in the way the adverse event is perceived may all contribute to this predisposition. [61]

Female patients used to have a 1.5- to 1.7-fold increased likelihood of developing an ADR, such as unpleasant skin responses, as compared to the male patients, according to research by Rademaker M. et al. The reasons for this increased risk are unknown, although they might include gender-related differences in pharmacokinetics, immunological, and hormonal effects, as well as differences in how women and men ingest medications.[62]

The outcomes of adverse drug reactions were based on organ system wise, predictable, and unpredictable ADR, severity, management, action taken after ADR, Naranjo causality assessment. In present study it had reported from (table 4) that gastrointestinal and nervous system had greater frequency ADR i.e., adverse drug reactions are occurring more from GIT and nervous system. GIT system includes severe diarrhoea, bloating, vomiting, esophagitis, ulcers, constipation whereas nervous system includes confusion, anxiety, short term memory loss, tremors, obsessive symptoms, short term memory loss, dizziness, etc. GIT system (23.12%) is affected more as compared to nervous system (21.08%). A cross sectional study by kourorian.Z. stated that the most prevalent organ systems implicated in ADRs were gastrointestinal (47.5%), liver (29.5%), and skin (29.5%). (14.1 percent). During the study period, the most common clinical manifestations of ADRs were diarrhoea and distention (48 patients), nausea with or without vomiting (48 patients), and increased alanine transaminase and aspartate aminotransferase levels (30 patients), which caused mild symptoms like malaise, nausea, and anorexia. There was no jaundice or bilirubin increase in any of the subjects. In 15 instances, there were 34 skin symptoms (mostly in the form of rashes).[64]

Another similar study reported that the dermatological system had the highest frequency (48.4%) of adverse responses, which manifested as formication, skin rashes, flushing, and parched skin. Eleven responses were merely recorded as allergic reactions, with no further information about the associated reaction manifestation in the records, jeopardizing the validity of the records and the notification procedure.[65]

A total of 28.72% were moderate and 24.46% were severe ADR. In present study all the mild, moderate, and severe ADRs were reported

Among 94 patients, 22 (23.40%) of them were provided with no treatment. In present study, no patient was harmed due to any severe ADR.

Figure 5. shows distribution of action taken on ADR. From around 62 (65.95%) number of patients from study group the drug was not changed.

According to a study, careful, safe prescribing is the key to avoiding errors that might lead to ADRs. Treatment regimens should take into account and reduce any potential unwanted effects.[14]

Co-prescribing folic acid with methotrexate when treating with renal acted pharmaceuticals or diuretics, for example, minimises the risk of folate deficiency-related adverse effects; and evaluating electrolytes and renal function while treating with renal performed drugs and diuretics. These examples can all help lessen treatment-related side effects, however their usefulness may be limited due to insufficient or ambiguous monitoring criteria.[14]

In present study, the action taken for ADR for withdrawing a drug in around 8 patients and their frequency was around 8.51%.

In Figure 6 the assessment of ADRs were based on Naranjo algorithm. After applying Naranjo algorithm thoroughly in present study, 36.17% were found to be doubtful, 30.85% were found to be probable.

A study by Bajracharya et al. had done the similar Naranjo assessment for ADR it reported that using the Naranjo method, the bulk of ADRs are classified as "possible" (n=29, or 82.86 percent), followed by "likely" (n=6) (17.14 percent). There were no ADRs that were both questionable and certain. It's possible that this is due to the tiny

sample size. The Naranjo algorithm can assist the treating physician in determining if a certain medicine has produced an ADR and guiding therapy to decrease ADR.[67]

Another comparison study between Naranjo algorithm and WHO-UMC concluded that in the Naranjo methodology, the most commonly assigned causation category was "likely" (75.05 percent), but in the WHO-UMC scale, it was "certain" (63.33 percent). The second most prevalent category on the WHO-UMC scale was probable (with 20.4 percent), followed by possible (13.6 percent), and unlikely (with 13.6 percent) (in 2.61 percent). The second most prevalent group in the Naranjo algorithm was possible (24.82 percent), followed by definite (0.11%), and there was no patient in the uncertain category.[68]

Possible ADRs (from table 10) are very less in frequency (19.14%) followed by definite ADRs (13.82%).

From table 2 it was clearly stated that anti microbials (54.25%) were causing majority of the ADR.

A prospective hospital-based study stated like our study. It was by Sharma VK, and it shows that the trial recruited a total of 500 participants with cutaneous ADR. Maculopapular rash (34.6 %), fixed drug eruption (FDE) (30 %), and urticaria were the most prevalent cutaneous ADR patterns (14 %). Antimicrobials (42.6%), anticonvulsants (22.2%), and nonsteroidal anti-inflammatory medications (NSAIDs) were the pharmaceuticals most often implicated in diverse cutaneous ADRs (18 %). Anticonvulsants were shown to be responsible for 41.6 % of maculopapular rashes. Sulphonamides accounted for 43.3 % of FDE, whereas NSAIDs accounted for 30.7%. NSAIDs (24.3 %) and penicillins were the most common causes of urticaria (20 %). Anticonvulsants were linked to 43.8 % of fatal toxic epidermal necrolysis and Stevens Johnson syndrome cases.[69]

Another study results shows that during the research period, 38 ADRs were observed, with a male preponderance (58%). The majority of ADRs (42%) were seen in individuals between the ages of 19 and 39. Medicine departments had the most ADRs (29 %), followed by Surgery (16 %) and OG (16 %). The skin was the most usually afflicted organ system (45 %), followed by the gastrointestinal tract (GIT) (24 %). Antibiotics, particularly Cephalosporins, accounted for most of the medications (55 %) (33 %). [70]

In others category drugs like PPI, antiemetics, other miscellaneous dugs will come. Other categories take up to around 43.61% from (table 1) which is followed by NSAIDs (11.70%). Corticosteroids causes the least adverse drug reactions (2.12%).

Pharmacoeconomic evidence can be used to assist choices on pharmaceutical licensing, price, reimbursement, and formulary maintenance. For insurance firms to provide better services at a lower cost, India must build a Pharmacoeconomics platform among authenticate methodology and proper education.[8]

The cost per avoidable ADR was expected to be greater than the cost per non-preventable ADR for incident ADRs that resulted in hospitalization. According to another research done by Sultana J. et al in an inpatient environment, the cost per ADR is $US 2262. The cost of ADRs in an inpatient context varies by hospital ward, with non-intensive care unit (ICU) ADRs costing $US 13,994 and ICU ADRs costing $US 19,685.[10]

The increased time of hospitalization can be used to quantify the cost of ADRs or events during hospitalization. Three distinct studies have estimated this cost to be 33 037 FF, US$2262, and US$2595 per instance. Another research project investigated the expenses of medications-related issues can be identified by analysing the patient's medical records. ADRs have been reported in patients. There was a total of 1911 during 1994, medication-related issues were explored, and the overall cost of these issues was assessed to around US$1.5 million. [11]

The burden of service and facility fee were found to be less (Rs 5500) as shown in (Figure 7) which is followed by transportation fee.

Hospital expenses were much higher than DRG payments, resulting in a $17,803 revenue loss per patient. Patients with sepsis as their primary diagnosis lost the most money, with an average loss of $54,738. One hundred patients resulted in a loss of revenue. The total duration of stay in the hospital was statistically longer than the length of stay predicted by the DRG.[73]

Our study shows that (table 5) post operative burden is more, comparison was found to be significant. According to a recent assessment, many studies aimed at completing a "economic evaluation of pharmacy services" had serious methodological flaws. According to the authors, those studies aren't complete economic analyses, and they don't follow the established norms for doing and reporting economic research. The following are some of the most prevalent restrictions in establishing the cost-effectiveness of pharmacist interventions: 1) neglecting to undertake an incremental analysis (i.e., no comparator) or failing to analyse both costs and outcomes; 2) erroneously

evaluating the costs of the pharmacy service itself or failing to incorporate other expenses in addition to the pharmacy benefit in the study.[74]

Our present study concluded that post-operative patients have a higher cost distribution than pre-operative patients.

Conclusion

In many aspects, the prevalence of ADRs in our study group is similar to that reported in the literature. The total rate of adverse drug reactions (ADRs) in comparison to that, our study appears to be lower. In another research, it has been referenced. This might be the case mostly due to the short duration of our research as well as a new ADR reporting and monitoring system in the works established.

ADRs were more prevalent in geriatric and adult patients, with a female gender preponderance. It was discovered that when the severity of ADRs grew, so did the expense of managing them increased as well. As a result, it is critical to as soon as these responses occur, recognize them, and take steps to avoid them. Patient pain is worsened, and there is a larger risk of complications.

In the control of health-care costs well-trained pharmacists who work with patients on a daily basis are a valuable tool in the early identification and prevention of cancer preventing ADRs, ensuring safe medication usage, and delivering superior patient care.

In our analysis, the most of ADRs were judged as possibly or definitely avoidable, which would be consistent with literature's broad series of values (30–80%). There is an argument to be made, given the considerable burden of ADRs. Preventative measures must be put in place. Given the enormous number of ADRs found, and the wide range of alternatives and drugs involved. Prevention is an excellent concept since it impacts practically every organ in the body, but it may demand several, complicated intervention options.

In this study, we emphasized how difficult it is to make the right judgments in order to reduce the societal costs of ADRs. Some expenses can be estimated, but not all. The entire cost of ADRs is extremely difficult to determine, quantify, and calculate value. From an economic standpoint, the issue of ADRs is an issue of optimization rather than minimization to strike the correct balance between costs and benefits. This problem has not been thoroughly researched, yet it is critical to make the best regulatory judgments possible in the pharma market.

Given the low prevalence of ADR reporting among HCPs in Western Uttar Pradesh, educational interventions to increase their knowledge and attitude should be highlighted. Interventions to solve other hurdles (for example, the availability and complexity of reporting forms, as well as a lack of resources). To enhance both quantity and quality, time should be addressed. ADR reporting is an important part of the process.

Our present study concluded that post operative patients have a higher cost distribution than pre operative patients.

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