A Study on Prescribing Pattern of Antibiotics in Gastroenterology Department of a Tertiary Care Hospital.

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ABSTRACT:-BACKGROUND: This study investigates antibiotic prescribing patterns within the Gastroenterology department of a tertiary care hospital to gain insights into the utilization of antibiotics in the treatment of gastrointestinal conditions, with potential implications for patient care and antimicrobial stewardship.

METHODS: A cross-sectional study was carried out among 281 inpatients in a tertiary care hospital in Bangalore.

RESULTS: Most patients fall within the 20-30 age group, with males being more prevalent. The 20-30 age group accounts for 22.06% of patients, while the 90-100 age group has the lowest representation at 0.71%. Acute gastroenteritis is the most common diagnosis, representing 30.25% of cases, followed by acute pancreatitis at 8.19%, other diagnoses including peptic ulcer 7.83% and GERD 15.30%. Comorbidities are common, with Hypertension, Diabetes, and other conditions affecting 31.32% of patients. A substantial portion (33.10%) has no recorded comorbidities. Intravenous administration is the most preferred route, accounting for 82.49% of cases. Metronidazole is the most frequently prescribed antibiotic (31.16%). Among patients above 50 years, 63.6% are taking five or more drugs, while 36.4% are taking fewer than five drugs. Notable drug interactions include Ciprofloxacin and Metronidazole, categorized as having a "moderate" level of interaction. Adverse drug reaction(ADR) instances are classified into Definitive, Probable, and Unlikely categories, with "Unlikely" ADRs having the highest frequency. The most common action taken in response to ADRs is "Drug Withdrawn" (63%), followed by "Dose Altered" (26%).

CONCLUSION: Analysis reveals high patient prevalence in the 20-30 age group, with a male majority, prominent diagnosis of acute gastroenteritis, and common comorbidities. Intravenous administration and metronidazole prescription dominate. Polypharmacy is significant in patients over 50, with specific drug interactions noted, primarily involving Ciprofloxacin and Metronidazole, and the main approach to adverse drug reaction management is drug withdrawal. This comprehensive analysis informs patient care and treatment strategies in the Gastroenterology department.

KEYWORDS: Antibiotics, Gastroenterology, Prescribing Pattern, Who Indicators, Adverse Drug Reaction.

I. INTRODUCTION

Prescription pattern monitoring studies are drug use studies that are primarily concerned with rational drug use in populations. “Patients receiving drugs that meet their clinical needs, at doses appropriate to their individual needs, and for appropriate durations at the lowest cost to the patient and their community,” the definition states. The World Health Organization (WHO) core indicators contribute to improved prescribing patterns and thus to the rational use of medicines in health facilities. It is necessary to assess the reasonable prescribing skills of physicians, and this can be achieved through periodic prescribing reviews. The purpose of this study was to describe drug prescribing patterns in a tertiary care center.[1]

The goals of pharmacotherapy in cases of gastroenteritis is to reduce morbidity and to prevent complications. The following is a list of standard antimicrobial therapies for bacterial gastroenteritis (although, as previously stated, many conditions are self-limited and require no therapy):

Aeromonas species – Use of cefixime and most third-generation and fourth-generation cephalosporins

Bacillus species - No antibiotics are necessary for self-limited gastroenteritis, but vancomycin and clindamycin are first-line drugs for severe disease

Campylobacter species - Erythromycin may shorten the illness duration and shedding; delaying therapy beyond 4 days from the onset of symptoms appears to produce no clinical benefit

C difficile – Discontinuing the potential causative antibiotics; if antibiotics cannot be stopped or this does not resolve the diarrhea, use oral metronidazole or vancomycin (vancomycin is reserved for seriously ill patients whose condition does not respond to metronidazole)
Listeria species - No antibiotics are needed unless invasive disease occurs; ampicillin and Bactrim are first-line drugs for invasive disease
Plesiomonas species - Use trimethoprim-sulfamethoxazole or any cephalosporin
V cholerae - Tetracycline is the usual antibiotic of choice, but resistance to it is increasing; other antibiotics that are effective when V cholerae is sensitive to tetracycline include cotrimoxazole, erythromycin, doxycycline, chloramphenicol, and furazolidone
Yersinia species - Treatment that is , trimethoprim-sulfamethoxazole, fluoroquinolones, aminoglycosides) does not shorten the disease duration and should be reserved for complicated cases In the case of fluoroquinolone resistance in Salmonella is increasingly being reported worldwide, with several molecular mechanisms described.

E coli- Antibiotic treatment appears to increase the likelihood of developing HUS. Consider antibiotics if diarrhea is moderate or severe. Trimethoprim-sulfamethoxazole is a first-line drug, but a parenteral second-generation or third-generation cephalosporin for systemic complications should be used.

Salmonella species- Antibiotic treatment prolongs the carrier state and causes relapse. Therefore, treatment is not indicated for nontyphoidal, uncomplicated diarrhea. Ampicillin is recommended for drug-susceptible strains. Trimethoprim sulfamethoxazole, a fluoroquinolone, or a third-generation cephalosporin (fluoroquinolones are not recommended for use in children) are also acceptable alternatives. Salmonella typhimurium T104 is a multidrug-resistant bacterium. The sensitivity of cultured samples is important for therapeutic management. In July 2018, the FDA ordered label changes for fluoroquinolones to strengthen warnings about the risk of antibiotics' psychological side effects and serious blood sugar disorders.[2]

Antibiotics has major important role in the treatment of various infections. Thus over utilisation of antibiotics it has been major concern. According to the report of World Health Organization Report in 2014, report on global surveillance of antimicrobial use in the antibiotic resistance as a public health concern putting at major risk to the ability to treat common infections in the field of medicine .

Thus in the development of antibiotic resistance is a natural process ,a certain physician indicates its emergence and dissemination. The misuse of an antibiotics constitutes the primary cause of increased antibiotic resistance. Irrational use of antibiotics not only results in the steady increase in resistance but also increases the incidence of adverse drug reactions (ADRs), cost of therapy, duration of hospital stay as well as drug interactions, all of which ultimately lead to the failure of therapeutic regimens. Antibiotic policies are a realistic and crucial way to limit antibiotic usage, given the recent global increase in antibiotic resistance and irrational use of medicines. In gastrointestinal (GI) disorders such as cholangitis, cholecystitis, gastroenteritis, pancreatitis, spontaneous bacterial peritonitis (SBP), and urinary tract infections (UTIs) associated with GI disorders, antibiotics are frequently used as a prophylactic and treatment measure. Therefore, it would be beneficial to evaluate the appropriateness, pattern of resistance, and incidence of adverse drug reactions (ADRs) of antibiotic treatment in these GI illnesses

Gastroenterology is the study of the normal functions and diseases of the esophagus, stomach, small intestine, colon, rectum, pancreas, gallbladder, bile ducts, and liver. This includes a detailed understanding of the movement of substances through the stomach and intestines (motility), the digestion and absorption of nutrients into the body, the removal of waste products from the system and the normal functioning of the digestive system.[3] The common disorders of Gastrointestinal system include common conditions such as colon polyps and cancer, hepatitis, gastroesophageal reflux disease (heartburn), stomach ulcers, colitis, gallbladder and biliary tract disorders, nutritional problems, irritable bowel syndrome (IBS), and pancreatitis. [4]
The most common symptoms gastroenterologists treat are : Irritable Bowel syndrome (IBS), Inflammatory Bowel disease (IBD), Celiac disease, ,Small intestinal bacterial overgrowth (SIBO), Food allergies and intolerances, Stomach ulcer, Diverticulitis, Appendicitis, Intestinal polyps, Hemorrhoids. [5]

Symptoms include: Stomach pain, swollen stomach, Indigestion, Bloating and flatulence, Nausea and

vomiting, Rectal bleeding, Diarrhea, Constipation or difficulty defecating, Unexplained weight loss or gain, Heartburn, Jaundice.

Consulting a gastroenterologist has becoming important role in complications of digestive system it includes the signs of Chronic diarrhea can be a sign of a variety of digestive disorders, including irritable bowel syndrome, IBD, and small bacterial overgrowth (SIBO)," in the case of "Irritable bowel syndrome is the most common cause of chronic diarrhea. Fortunately, there are many treatments available to manage symptoms and the patients having Constipation issues. Although the frequency of bowel movements ultimately varies from person to person, less than three times a week is usually considered constipated, they may also suffer from constipation if your stools are very small, very hard, or difficult to pass.

Constipation has many causes and can be difficult. A gastroenterologist can identify possible causes of your constipation and recommend lifestyle changes and medications to help make your bowel movements more regular.[6]. Chronic acid reflux does not go away on its own, so it's important to see a specialist, the damage can cause difficulty swallowing, cause painful ulcers, and even increase the risk of developing esophageal cancer. [7]In the case of Bloating, which feels like bloating in the stomach, is often caused by excessive gas production, gas sensitivity, or problems that cause gas to build up in the colon. Constipation can cause bloating, because the longer waste products remain in the colon, the more likely they are to be fermented by resident bacteria and produce gas. "But bloating can also be a sign of irritable bowel syndrome, food intolerances such as lactose intolerance, SIBO (small intestine bacterial overgrowth), or gastroparesis (partial paralysis of the stomach). [8]

The bacterial flora of the gastrointestinal (GI) tract is critical for maintaining enterocyte integrity, influencing metabolic and immunologic processes, and protecting against pathogen colonisation. Antibiotics, infection, chemotherapy, or radiation can all disrupt this finely tuned and stable gut flora, resulting in pathogen overgrowth, toxin invasion and transfer, and potentially fatal diseases. Antibiotic use encourages the growth of resistant organisms, and multi-antibiotic resistance has become a major public health concern. Preservation of protective species or recolonisation with non pathogenic yeasts or lactobacilli during stressful periods (illnesses, medications) has shown promise in the management of patients taking several antibiotics, notably in hospital-acquired infections.[9]

An infection of the stomach and intestines is referred to as gastroenteritis, and the majority of cases of acute gastroenteritis manifest as diarrhoea with an abrupt start. The standard definition of diarrhoea is the passing of unusually liquid or irregularly shaped faeces more frequently and in greater quantities. Infectious diarrhoea is the term used to describe diarrhoea that is brought on by an infection and is accompanied by vomiting, nausea, and stomach pain. But in most cases, the infection-causing microbe is not identified in a clinical setting. Since most infectious diarrhoea clears up in 14 days or less, it is classified as acute diarrhoea.[10]

Drug interactions happen when the concurrent administration of items like foods, drinks, or other medications alters the way a drug works. Its an important cause of preventable disease. As more drugs become available to treat human diseases and more patients take many drugs, the risk of clinically significant drug interactions increases. This review describes some examples of common drug interactions in gastroenterology. The underlying mechanisms are discussed and strategies to avoid drug interactions in clinical practice are proposed.[11]

An adverse drug reaction (ADR) refers to an untoward reaction to a medication. ADRs are common and constitute a significant healthcare burden. The most robust database of ADRs available is the U.S. Food and Drug Administration's Adverse Event Reporting System (FAERS).[12]

II. RESEARCH METHODOLOGY

SOURCES OF DATA AND MATERIALS

1. Patient case sheet.
2. Drug-drug interaction forms.
3. Adverse drug reaction forms.
4. Patient counseling forms.
5. Prescribing indicator form.

METHOD OF COLLECTING DATA

This is a cross-sectional study in which patients who met the inclusion criteria were enrolled using a patient consent form. Every patient admitted to the ward was evaluated on a daily basis. Patients with

known symptoms were interviewed and enrolled if they matched the research requirements, which included open-ended questions about their past medical history. Name, age, gender, education level, lifestyle, economic position, occupation, date of admission, reasons for admission, history of previous illness, and social history were collected from patients.

Vital signs (blood pressure, temperature, pulse rate, and respiratory rate), laboratory data (hematological tests, blood sugar tests, liver function tests, urine analysis, renal function tests such as serum creatinine, blood urea, and so on), final diagnosis, current treatment drug regimen, and other relevant data were also collected from patient case sheets. The patient data collecting form will be filled out with the information stated above. Interviews with patients or those who are responsible for their care will be conducted to get demographic information. The outcomes of the data collection will be examined using descriptive inferential statistics, and frequencies, percentages, and mean values will be computed.

STATISTICAL ANALYSIS

The data was collected and entered in Microsoft Excel software 2019 and interpreted by descriptive statistics that were presented to analyze and express the report as counts and percentages in the form of tables, charts, and graphs.

The statistical analysis of the collected data was performed using IBM SPSS version 26 statistical software.

ETHICAL CONSIDERATION

Confidentiality was maintained throughout the study with Written informed consent was obtained from all the participants. And There is no physical harm to the participants, as there is no intervention.

ETHICAL CLEARANCE

The study was submitted for ethical clearance to the ethical committee of the Sapthagiri Institute of Medical Sciences and Research Center. This study was based on the analysis of approved surveillance data

III. RESULTS

In the given data, the highest age group in terms of patient count is the 20-30 age group, with 62 patients, representing 22.06% of the total. On the other hand, the lowest age group in terms of patient count is the 90-100 age group, with only 2 patients, accounting for just 0.71% of the total population. Their co-morbid disease conditions are listed The data reveals the gender distribution of a group of 281 patients. Among them, 163 were male, representing 58.01% of the total, while 118 were female, making up 41.99% of the patient population. This data highlights a higher male representation in this patient group. In this study of 281 cases, Acute Gastroenteritis was most common (30.25%), often caused by infections. Acute appendicitis followed (14.59%), a surgical emergency involving appendix inflammation. GERD (15.30%) causes chronic acid reflux. Acute pancreatitis, Peptic ulcer, and Cholelithiasis each accounted for 7.83-8.19%. Inflammatory Bowel Disease (IBD) represented 10.68%, covering conditions like Crohn's disease. An "Others" category included less common gastrointestinal disorders (5.34%). This concise breakdown highlights the prevalence of different gastrointestinal diagnoses in the study.

The data presents the distribution of comorbidities among a group of patients. The most common comorbidity is a combination of Hypertension (HTN), Diabetes mellitus (DM), and other conditions, affecting 31.32% of the patients. Diabetes (DM) on its own is prevalent in 18.86% of cases, while Hypertension (HTN) is present in 12.46%. Other comorbidities like Hyperthyroidism, Cerebrovascular thrombosis (CVT), Ischemic heart disease (IHD), Tuberculosis (TB), Hypothyroidism, and Rheumatoid arthritis (RA) have lower frequencies, ranging from 0.36% to 1.42%. A substantial portion, 33.10%, of the patients have no recorded comorbidities. This data offers insights into the comorbidity patterns within the patient population.

In the Gastroenterology department, IV antibiotics were administered 278 times, with Metronidazole being the most common (110 instances), followed by Amoxicillin (43) and Cefixime (36). PO antibiotics were prescribed 59 times, with Amoxicillin (20) and Metronidazole (12) being the most prevalent. Additionally, Tinidazole (5), cefixime (10), and Piperacillin and Tazobactam (25) were also given orally. The data illustrates the route of administration (ROA) for medical treatment. Intravenous (IV) administration is the most common, accounting for 82.49% of the total cases, while oral administration (PO) is used for the remaining 17.51%.

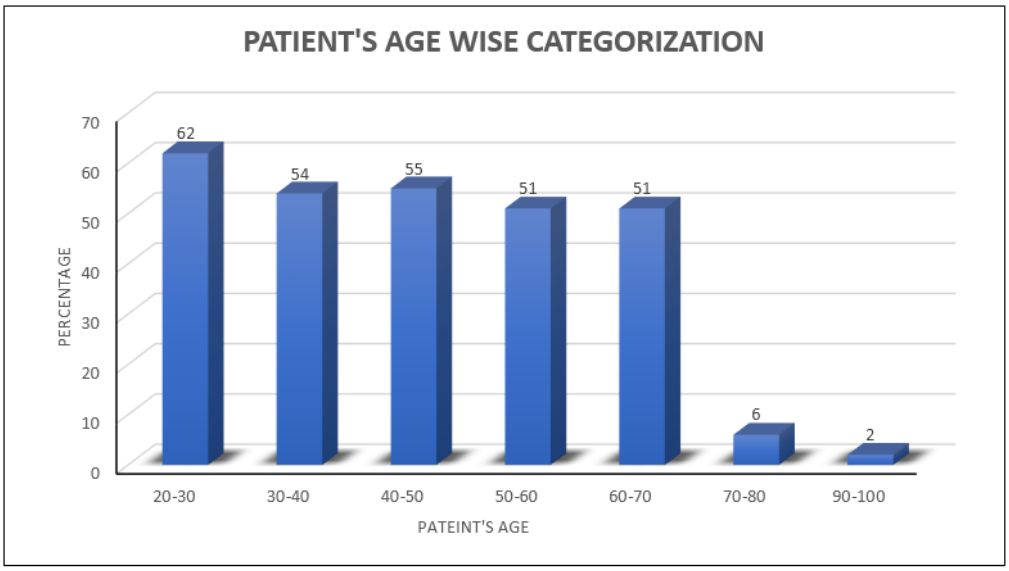

Figure 1: Age distribution of patie

Table 1: Final Diagnosis

DIAGNOSIS	FREQUENCY	PERCENAGE (%)
ACUTE APPENDICITIS	41	14.59
ACUTE GASTROENTERITIS	85	30.25
ACUTE PANCREATITIS	23	8.19
GERD	43	15.30
PEPTIC ULCER	22	7.83
CHOLELITHIASIS	22	7.83
IBD	30	10.68
OTHERS	15	5.34
TOTAL	281	100.00

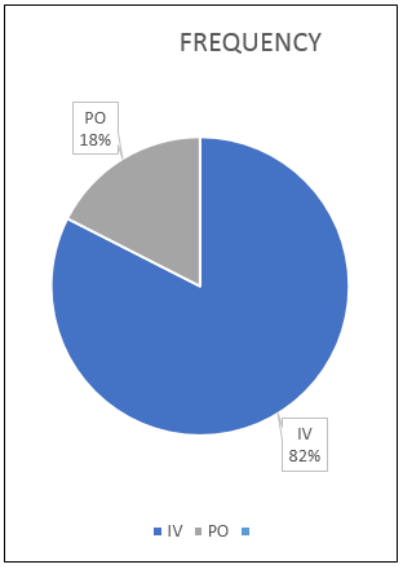

Figure 2: Count of Route of administration

TOTAL NUMBER OF CO MORBIDITIES

The data categorizes patients based on their comorbidity status. Among the total patient count, 188 patients (66%) have co-morbidities, while 93 patients (33%) do not have any recorded comorbidities. This information provides an overview of the comorbidity distribution within the patient population, highlighting most patients with underlying health conditions.

ROA WITH ENUMERATION OF DRUGS

In the Gastroenterology department, IV antibiotics were administered 278 times, with Metronidazole being the most common (110 instances), followed by Amoxicillin (43) and Cefixime (36). PO antibiotics were prescribed 59 times, with Amoxicillin (20) and Metronidazole (12) being the most prevalent. Additionally, Tinidazole (5), cefixime (10), and Piperacillin and Tazobactum (25) were also given orally.

Table 2: Total of patients with and without co-morbidities.

PATIENT'S CATEGORY	ENUMERATION	PERCENAGE (%)
Patients with co-morbidity	188	66
Patients without co-morbidity	93	33

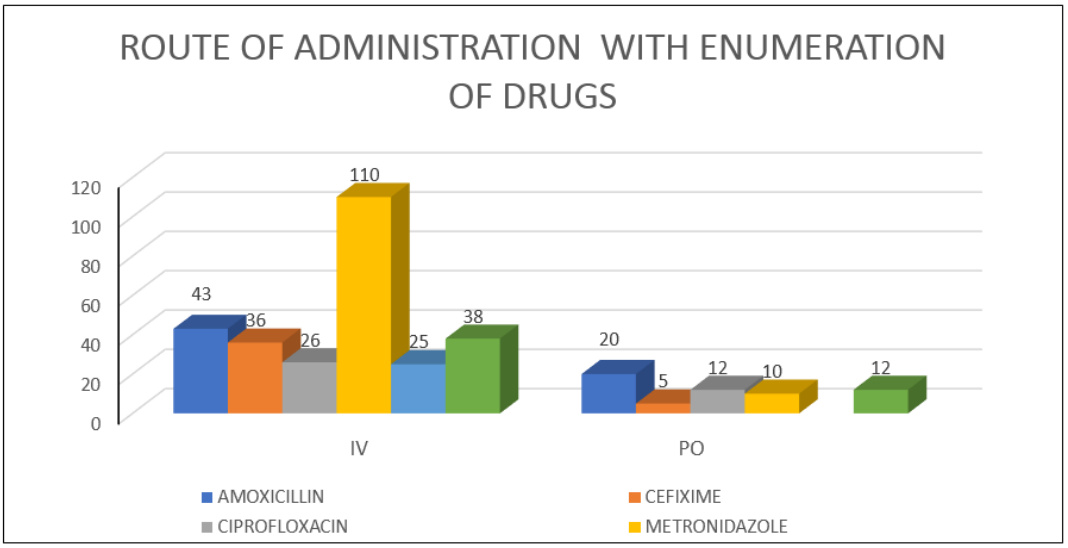

Figure 3 :- Route of Administration(ROA) with enumeration of drugs

DRUGS ACCORDING TO WORLD HEALTH ORGANIZATION INDICATOR

The data categorizes cases into two groups based on whether they align with the World Health Organization's (WHO) guidelines. The majority of cases, 241 (85.77%), adhere to the WHO guidelines, while 40 cases (14.23%) do not confirm to WHO recommendations.

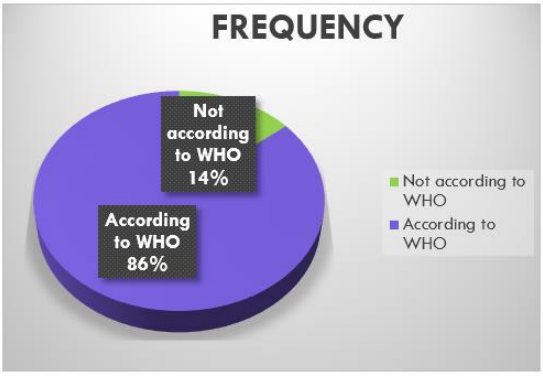

Figure: 4 Drugs according to WHO indicator

DRUG INTERACTION AND ADVERSE DRUG REACTION

The data provides information on antibiotic combinations and their associated drug interactions. Among a total of 23 interactions, the combination of Ciprofloxacin and Metronidazole has 20 instances, and they are categorized as having a "moderate" level of drug interaction. Additionally, there is one interaction each for Gentamicin and Pantoprazole and Metronidazole and Ondansetron, both also classified as "moderate" interactions. This dataset contains a total of 281 adverse drug reaction (ADR) instances classified into three categories: Definitive (2), Probable (5), and Unlikely (10). The "Unlikely" category has the highest frequency, suggesting lower risk, while the "Probable" category indicates a moderate risk, and the "Definitive" category has the lowest count, signifying a higher level of certainty or risk. This data is valuable for assessing and managing ADRs in its specific context.

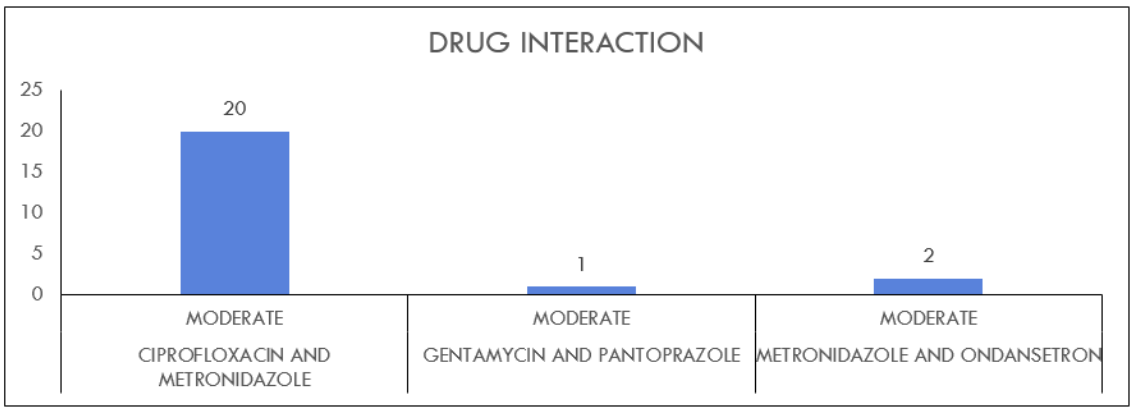

Figure 5: Moderate Drug-Drug interactions.

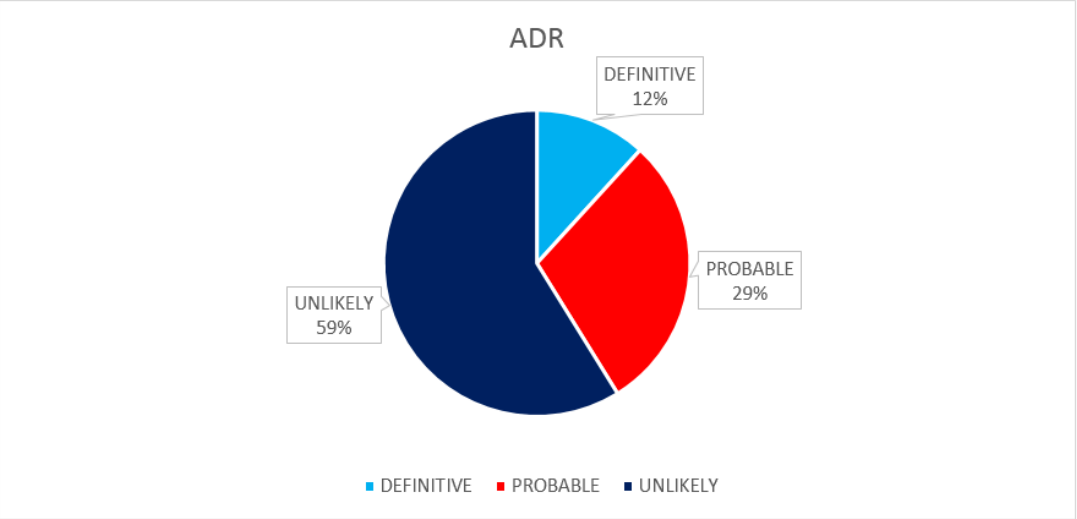

Figure 6: Percentage of Adverse Drug Reactions.

ADVERSE DRUG REACTION MANAGEMENT

In this management breakdown, the data shows various actions taken in response to a situation, possibly related to medication. Among these actions, the most common is "Drug Withdrawn," accounting for a significant 63% of cases. "Dose Altered" is another strategy, employed in 26% of instances. Additionally, a combination of "Dose Altered and Drug Withdrawn" was implemented in 11% of cases.

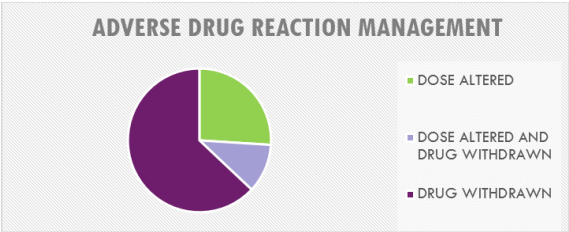

Figure 7 :- Adverse Drug Reaction Management along with dose alteration.

CONCLUSION

In our study, among 281 patients the highest age group in terms of patient count is the 20-30 age group, with 62 patients, representing 22.06% of the total. On the other hand, the lowest age group in terms of patient count is the 90-100 age group, with only 2 patients, accounting for just 0.71% of the total population and the study was referred by Ryan Ungaro *et al* ; conducted a study on “Antibiotics associated with increased risk of new-onset Crohn's disease but not ulcerative colitis: a meta-analysis”

Among 281 patients, 58.01% were male and 41.99% were female, indicating a male predominance.

Among 281 cases, acute gastroenteritis was most prevalent (30.25%), followed by acute appendicitis (14.59%) and GERD (15.30%). Other diagnoses, including acute pancreatitis, peptic ulcer, and cholelithiasis, each constituted approximately 7.83%, while Inflammatory Bowel Disease (IBD) represented 10.68%. "Others" accounted for 5.34% of cases, reflecting less common gastrointestinal disorders.

66% of the patients have comorbidities, while 33% do not, indicating a higher prevalence of underlying health conditions within the patient population.

IV administration is employed in 82.49% of cases, with the remaining 17.51% utilizing oral administration (PO).

In the Gastroenterology department, IV antibiotics were administered 278 times, with Metronidazole being the most common (110 instances), followed by Amoxicillin (43) and Cefixime (36). PO antibiotics were prescribed 59 times, with Amoxicillin (20) and Metronidazole (12) being the most prevalent. Additionally, Tinidazole (5), cefixime (10), and Piperacillin and Tazobactam (25) were also given orally.

Among 281 cases, metronidazole is the most prescribed drug (31.16%), followed by ceftriaxone (24.04%), amoxicillin (15.73%), and ciprofloxacin (10.68%).

In the analysis of 337 prescribed medications, the descending order of frequency reveals that Nitroimidazole drugs held the highest share at 36.5%, followed by beta-lactam antibiotics (25.2%)

and cephalosporins (22.0%). Quinolones were prescribed in 10.7% of cases, aminoglycosides in 3.0%, macrolides in 1.8%, and tetracycline had the lowest percentage at 0.9%. This concise breakdown provides a clear hierarchy of the prevalence of different drug classes in the analyzed prescriptions.

About 14.23% of the cases do not conform to the WHO guidelines, while 85.77% adhere to the recommended standards. (Table 5.9)281 patients in the study are above 50 years old, with 63.6% of them taking five or more drugs, and 36.4% taking fewer than five drugs.

Out of 23 interactions, the combination of Ciprofloxacin and Metronidazole constitutes 20 instances with a "moderate" level of drug interaction. Additionally, there is one interaction each for Gentamicin and Pantoprazole and Metronidazole and Ondansetron, both also classified as "moderate" interactions.

Among 17 adverse drug reaction (ADR) instances, they are classified into three categories: Definitive (2), Probable (5), and Unlikely (10). The highest frequency is in the "Unlikely" category, suggesting a lower risk, while the "Probable" category indicates a moderate risk, and the "Definitive" category has the lowest count, signifying a higher level of certainty or risk.

Among the various management actions taken, "Drug Withdrawn" was the most common, accounting for 63% of the cases. "Dose Altered" was employed in 26% of instances, and a combination of "Dose Altered and Drug Withdrawn" was implemented in 11% of cases.

The data from the Gastroenterology department of a tertiary care hospital provides valuable insights into various aspects of patient care and treatment. Patient demographics show a prevalence of individuals aged 20-30, with a higher representation of males. The most common diagnosis is acute gastroenteritis, followed by acute pancreatitis, peptic ulcer, and GERD. Comorbidities are present in a significant portion of patients, with hypertension, diabetes, and combined conditions being the most common. Intravenous administration is the primary route for treatment, with metronidazole as the most frequently prescribed drug. The data also reveals notable polypharmacy in patients above 50, with a majority taking five or more drugs. Drug interactions, categorized as "moderate," are observed, primarily involving Ciprofloxacin and Metronidazole. Adverse drug reactions vary in risk, with the "Unlikely" category having the highest frequency. Common management strategies for adverse reactions include altering doses and withdrawing drugs. This comprehensive data aids in understanding patient demographics, diagnoses, treatment patterns, and the management of adverse drug reactions in the context of gastroenterology care.

The analysis of the data from the Gastroenterology department of a tertiary care hospital provides valuable insights. It reveals that the majority of patients fall within the 20-30 age group, with males being more prevalent. Acute gastroenteritis is the most common diagnosis, and comorbidities, including hypertension and diabetes, are widespread among patients. Intravenous administration is the preferred route, with metronidazole being the most prescribed antibiotic. Polypharmacy is notable in patients above 50 years of age, with a significant number taking five or more drugs. Specific drug interactions, particularly involving Ciprofloxacin and Metronidazole, are identified. The management of adverse drug reactions primarily involves drug withdrawal. This comprehensive analysis offers valuable insights into patient demographics, diagnoses, and treatment patterns in the Gastroenterology department, aiding in the optimization of patient care and treatment strategies.

ACKNOWLEDGMENT :- None

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