Research Article

A STUDY ON THE ASSESSMENT OF ETIOLOGICAL FACTORS OF LAPAROTOMY AND ITS DRUG UTILIZATION EVALUATION ALONG WITH CEFTRIAXONE RESISTANCE

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ABSTRACT:

Aims and objectives: To study and analyse the prescription pattern of drugs post-laparotomy surgery, etiological factors of laparotomy surgery, and ceftriaxone resistance in the study population.

Materials and method: A prospective observational study of patients who underwent laparotomy surgery was carried out in the surgery department of K R Hospital, Mysuru for a period of six months. All relevant data of the enrolled patients was collected from various data sources and documented in suitably designed data collection forms to evaluate the causes of laparotomy and to understand the pattern and extent of medication by using Drug Utilization and Evaluation(DUE). The reports of blood cultures, wound cultures, or pus cultures of study participants will be evaluated to check for ceftriaxone resistance.

Results: Of 103 patients, 64.1% were male and 35.9% were female. Most patients were in the age group 31-40 years (29.1%). In this study, the most commonly prescribed class of drugs were Analgesics 21.9% (n=158), followed by Electrolytes 16.8% (n=121), Antibiotics 15.9% (n=103), PPI 14.3% (n=103) respectively. The most common etiological factors of laparotomy surgery were acute appendicitis 44.66% (n=46), acute intestinal obstruction 13.58% (n=14), and subacute intestinal obstruction 9.70% (n=10). Out of 103 patients, 12 patients underwent a culture sensitivity test and 58.33% (n=7) were resistant to ceftriaxone.

Conclusion: Gender and age of the study population had a significant association with the study and were majorly considered. The study observed that the strains of organisms that exhibit resistance to ceftriaxone are gram-negative bacteria *Escherichia coli* and gram-negative bacteria *Pseudomonas aeruginosa.* The most commonly used drugs were Analgesics, Electrolytes, Antibiotics, and PPI. Major etiological factors for performing laparotomy surgery were found to be acute appendicitis, acute intestinal obstruction, and sub-acute intestinal obstruction.

Keywords: Emergency Laparotomy, Exploratory Laparotomy, Appendicitis, Resistance, Ceftriaxone, Drug Utilization Evaluation.

INTRODUCTION:

Laparotomy is a surgical procedure performed by producing a significant abdominal incision to acquire access to the peritoneal cavity. Laparotomy is usually performed by making a sagittal, midline incision along the linea Alba. The main types of incision made include midline incision, transverse incision, pfannestial and rooftop incision. Major Causes of laparotomy surgery are acute intestinal obstruction, Intestinal perforation,Acute appendicitis, Peritonitis, and Perforated hollow viscous.

Types of Laparotomies considered for the study Emergency laparotomy, Exploratory laparotomy, Laparoscopic Appendectomy.

Preferable drugs used post laparotomy surgery are monotherapy or dual therapy of antibiotics and analgesics, along with PPI, Ondansetron, and vitamins.

Resistance development on Ceftriaxone:

The World Health Organization (WHO) asserts that "antibiotic resistance is one of the biggest threats to global health, food security, and development today". The frequency of resistant bacteria has increased as a result of the growing usage of antibiotics worldwide.

Each year, 4.95 million individuals worldwide pass away due to multidrug-resistant microorganisms (MDR).

Lack of knowledge of treatment and diagnosis has led to improper drug selection, dosage, resistance and ADRs.

To provide timely information on drug resistance, particularly for broad-spectrum medications like ceftriaxone, periodic drug resistance evaluation is required.

A patient post-operative is said to be resistant to the drug if the surgical site wound is not healed as expected by the treatment provided.

Resistance can be checked by culture and sensitivity tests.

Culture and Sensitivity Test:

For drug susceptibility tests clinical samples of urine, wound blood, body fluid, throat, cerebral fluid, ear discharge, and genital discharge are collected.

Drug Utilization Evaluation:

The World Health Organization (WHO) defines drug utilization evaluation (DUE) as a process that examines the medical, social, and financial effects of pharmaceutical marketing, distribution, prescribing, and use in society.

To assess prescription patterns, which includes keeping track of the prescriber's approach to drug prescription, to justify and reduce the expenses of medical care.

Drugs with a lot of side effects, high costs, or complex dosing schedules have frequently been the focus of DUEs. Drug utilization research is an effective method for obtaining cost-effective healthcare.

MATERIALS AND METHODS:

Study Site: Krishna Rajendra Hospital (KR), Mysore

Study Design: Prospective Observational study

Study Period: This study was conducted over a period of six months from March 2023 to August 2023

Study Population: The sample size of the study was 93 patients. Total number of cases collected for the study was 103.

The department selected for study: The study was conducted at the Department of Surgery.

Ethical approval for the study: The institutional ethics committee of Mysore Medical College And Research Institute approved this research.

Sources of data:

All the relevant and necessary data was collected from:

- Patient case records
- Inpatient case sheet
- Treatment chart
- Interview with the patients and caretaker
- Communicating with concerned clinicians and healthcare professionals
- Data collection form

Study tools:

The study procedure involves the use of some proformas for data collection, documentation, and analysis of the data. This includes the following:

- Patient Profile form
- Data Collection form

Inclusion Criteria:

- Patients above 18 years of age.
- Patients undergoing laparotomies such as emergency laparotomy, exploratory laparotomy, and laparoscopic appendicectomy.
- Patients receiving ceftriaxone and other managing drugs for laparotomy

Exclusion Criteria:

- Patients who are not willing to participate in the study.
- Pregnant and lactating women.

Statistical analysis:

Microsoft Office 2016 was used to conduct a statistical analysis and evaluate the data. To represent the outcomes, descriptive statistics like percentages and graphs were used.

RESULTS:

Demographic details of the study population:

103 participants from the surgery department who met our inclusion criteria and had been through a laparotomy (exploratory laparotomy, emergency laparotomy, laparoscopic appendectomy) were enrolled in the study.

Demographic data	Number of patients	Percentage
Age (in years)		
11-20	7	6.79%
21-30	20	19.4%
31-40	30	29.1%
41-50	9	8.73%
51-60	11	10.6%
61-70	12	11.6%
71-80	14	13.59%

Etiological Factors of Laparotomy Surgery:

Among 103 participants who had undergone laparotomy surgery (exploratory laparotomy, emergency laparotomy, laparoscopic appendectomy) were enrolled in the study. The etiological factors for laparotomy were such as acute appendicitis at 44.66% (n=46), acute intestinal obstruction at 13.58% (n=14), subacute intestinal obstruction at 9.70% (n=10), Hollow viscous perforation at 6.78% (n=7), Appendicular perforation 3.88% (n=4), generalized peritonitis 3.88% (n=4), large bowel obstruction 2.91% (n=3), jejunal perforation 1.94(n=2), generalized peritonitis with hollow viscous perforation 1.94(n=2), abdominal abscess 0.00009(n=1), appendicular abscess 0.00009(n=1), carcinoma head of pancreas 0.00009(n=1), generalized peritonitis 2º to blunt trauma to abdomen 0.00009(n=1), generalized peritonitis with intestinal perforation 0.00009(n=1), generalized peritonitis with jejunal perforation 0.00009(n=1), Inguinal hernia 0.00009(n=1), intestinal perforation 0.00009(n=1), jejunal perforation 0.00009(n=1), obstructed umbilical hernia 0.00009(n=1), obstruction of afferent loop 0.00009(n=1), PSAOS perforation 0.00009(n=1).

Gender		
Male	66	64.1%
Female	37	35.9%
Diet		
Vegetarian	15	14.5%
Mixed	88	85.4%
Marital status		
Single	35	33.9%
Married	68	66.01%
Smoking Status		
Smoker	41	39.80%
Non-Smoker	62	60.19%
Alcoholic Status		
Alcoholic	34	32.03%
Non-alcoholic	69	67.96%
Geographical Area		
Urban	29	28.15%
Rural	74	71.84%

Table 1: Sociodemographic profile of the study population

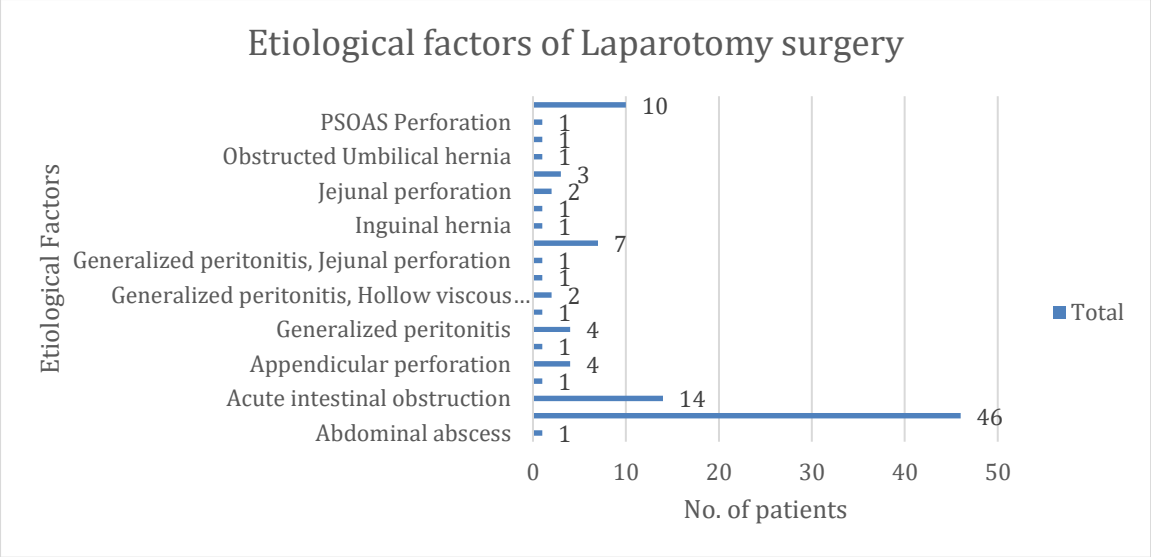

Figure 1: Distribution of patients based on etiological factors

Major Etiological Factors for Laparotomy Distribution according to Age group:

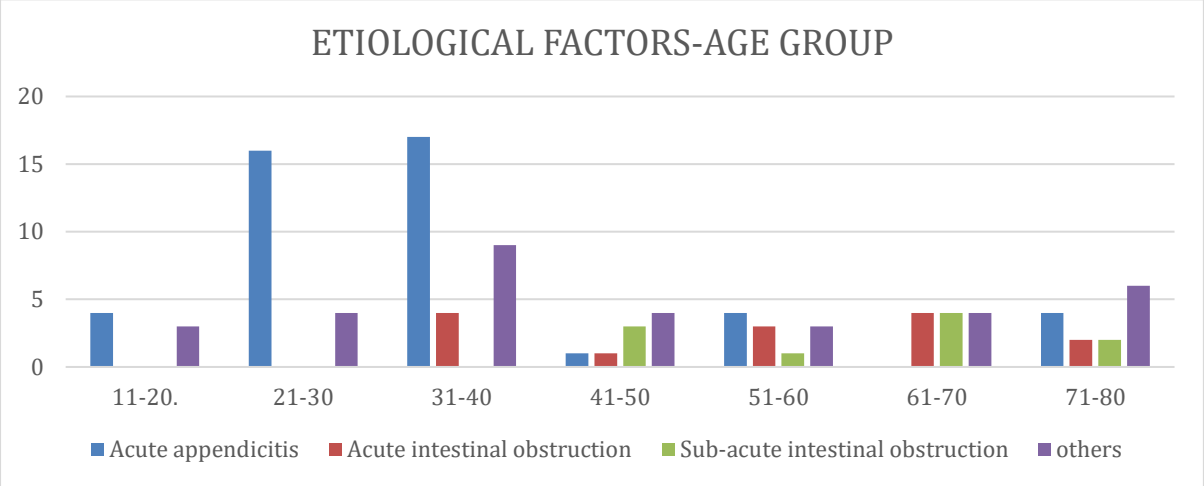

Figure 2: Distribution of patients on major etiological Factors based on Age Group

Major Etiological Factors for Laparotomy Distribution according to gender:

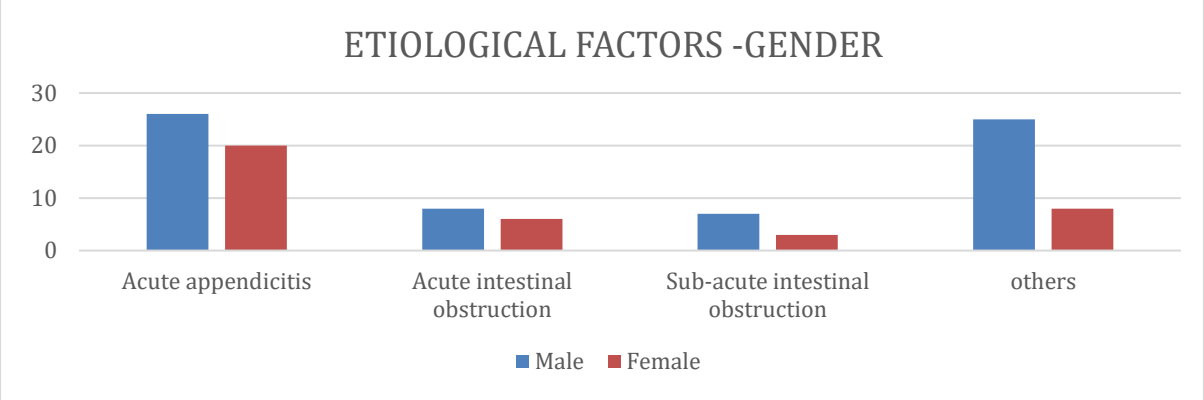

Figure 3: Distribution of patients on major Etiological Factors based on gender

Types of Laparotomy Surgery Conducted:

Among 103 patients, who had undergone three types of laparotomy surgery, exploratory laparotomy, emergency laparotomy, and laparoscopic appendectomy were enrolled in the study. The patients had done with Laparoscopic Appendectomy 49.51% (n=51), exploratory laparotomy 41.74% (n=43), and emergency laparotomy 8.73% (n=9).

Culture sensitivity test	No. of patients	Percentage
Wound culture conducted	12	11.6%
Wound culture not conducted	91	88.3%
Total	103	100%

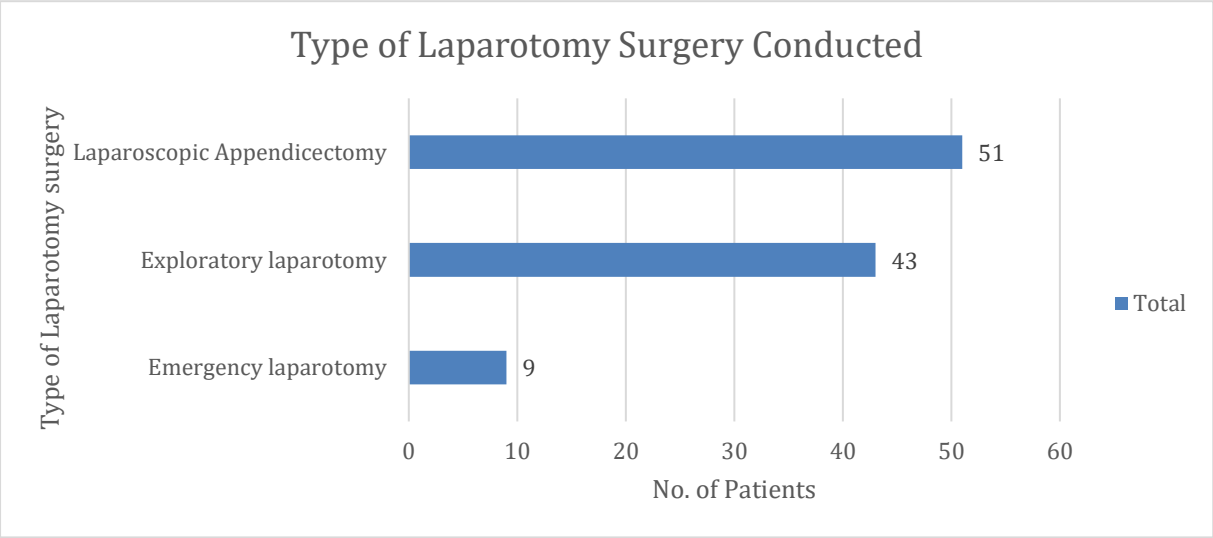

Figure 4: Distribution of patients based on Types of Laparotomy Surgery Conducted

Ceftriaxone treatment:

Ceftriaxone Treatment	No. of patients	Percentage
Prescribed	68	66.01%
Not Prescribed	35	33.9%
Total	103	100%

Table 2: Representation of the total Study population that received Ceftriaxone treatment

Among 103 patients, the antibiotic Ceftriaxone 1g IV was distributed; 66.01% (n=68) were prescribed Ceftriaxone and 33.9% (n=35) patients were not prescribed Ceftriaxone.

Resistance to Ceftriaxone:

From the result, among 103 patients, a culture sensitivity test was done only on 12 patients where 58.33% (n=7) of the population were resistant to the drug ceftriaxone and 5 were not detected as resistant to the drug Ceftriaxone.

Table 3: The study population underwent a Culture sensitivity test-detected to be resistant to Ceftriaxone count

Resistant to the drug Ceftriaxone based on Organism strains:

From the results of the Culture, sensitivity tests the patients who were resistant to the drug Ceftriaxone n=7, were divided based on the strains of organisms that exhibit Ceftriaxone resistance that is gram-negative bacteria *Escherichia coli* (n=4) and gram-negative bacteria *Pseudomonas aeruginosa* (n=3).

Organism	No. of Patients
Escherichia coli	4(57.14%)
Pseudomonas aeruginosa	3(42.8%)

Table 4: Resistant to the drug Ceftriaxone based on Organism strain count

Alternative Antibiotic therapy due to Ceftriaxone resistance development:

Due to the presence of bacterial strains showing resistance to the drug Ceftriaxone in 7 patients, to provide better antibiotic treatment post-surgery, alternative antibiotic drugs such as Piptaz (Piperacillin+ Tazobactam) along with Meropenem (n=5), and Piptaz (Piperacillin+ Tazobactam) along with Amikacin (n=2) were prescribed respectively.

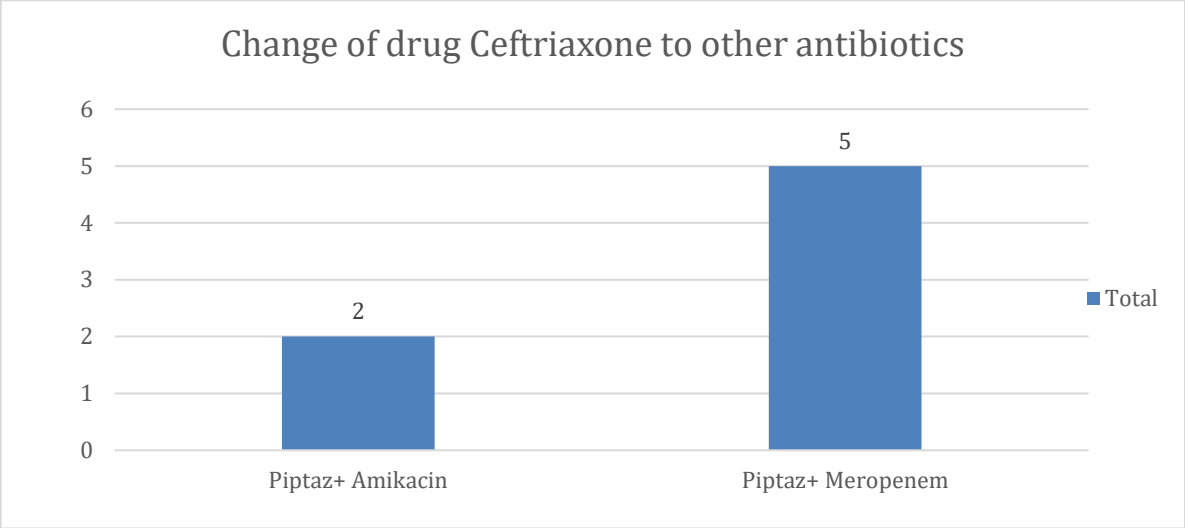

Figure 5: Representation of change of drug Ceftriaxone due to resistance development

Drug Utilisation Pattern

From the study population with a total number of 103 participants total of 720 drugs were prescribed the average number of drugs prescribed per prescription was found to be 6.99. In this study, the most commonly prescribed class of drugs were Analgesics (n=158, 21.9%), followed by Electrolytes (n=121, 16.8%), Antibiotics (n=115, 15.9%), PPI (n=103, 14.3%), Antiparasitic (n=84, 11.6%), Antiemetic (n=81, 11.2%), Vitamin (n=58, 8.05%) respectively.

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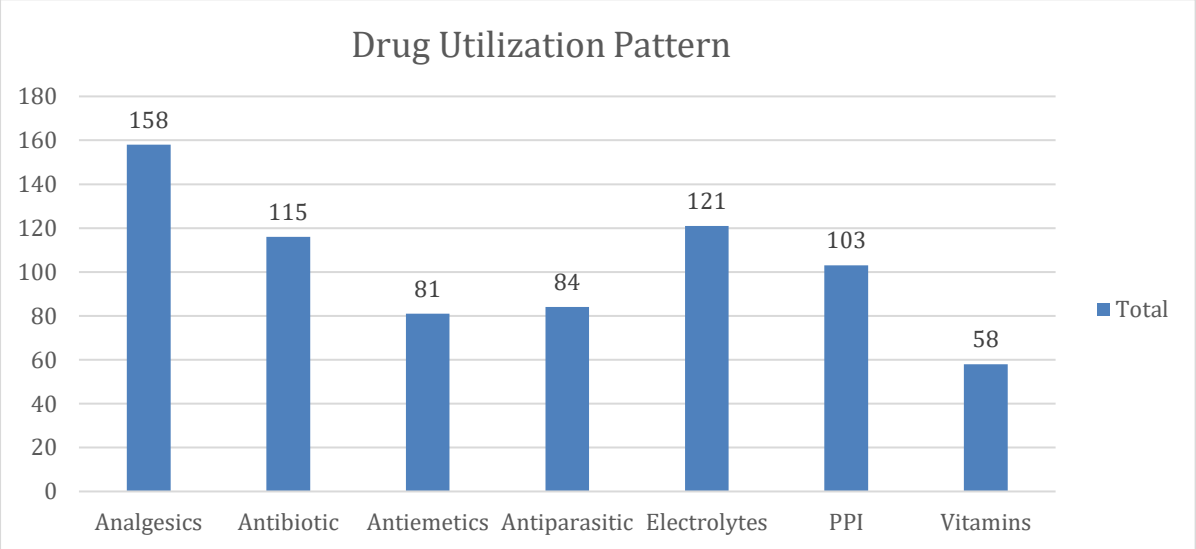

CONCLUSION:

The most commonly used drugs were Analgesics, Electrolytes, Antibiotics, and Proton pump inhibitors. Post laparotomy surgery, to avoid SSI (Surgical Site Infection) antibiotics were used and to relieve pain Analgesics were used. An average number of drugs prescribed per prescription showed polypharmacy. The percentage of drugs prescribed using the essential drug list was found to be moderate. The study was also conducted to observe ceftriaxone resistance in the study population. In this study, resistance to ceftriaxone was found to be less. Also, the study observed that the strains of organisms that exhibit resistance to ceftriaxone are gram-negative bacteria *Escherichia coli* and gram-negative bacteria *Pseudomonas aeruginosa*.

The study was also conducted to find the etiological factors for performing laparotomy surgery such as exploratory laparotomy, laparoscopic appendectomy, and emergency laparotomy. Majorly conducted laparotomy surgery was laparoscopic appendectomy. Major etiological factors for performing laparotomy surgery were found to be acute appendicitis, acute intestinal obstruction, and sub-acute intestinal obstruction.

The study gives an insight into rational drug use, especially of analgesics and antibiotics. Among observed cases, long-term use of opioid analgesics was seen. This can be rationalized by prescribing dual therapy of a low-dose opioid analgesic along with an NSAID.

Similarly, rational use of antibiotics can be implemented by prescribing fixed dose combinations.

ACKNOWLEDGMENT:

It is a genuine pleasure to express gratitude to our guide, **Dr. Charan C S**, Associate Professor and Head Department of Pharmacy Practice, Sarada Vilas College of Pharmacy.

We sincerely thank our co-guide 2, **Dr. Raghuveer**, Associate Professor Department of Surgery, Krishna Rajendra Hospital, MMC&RI, Mysuru.

We respect and thank **Dr. Hanumanthachar Joshi K**, Principal, Sarada Vilas College of Pharmacy.

We remember the support provided by our lecturer and co-guide 3, **Dr. Bilal K V**, Assistant Professor, Department of Pharmacy Practice, Sarada Vilas College of Pharmacy.

Our special thanks to **Dr.Ravindra P Choudhary** for his moral support, suggestions, and guidance without which our work would not have been completed successfully.

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