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THE STUDY ON THE ANALYSIS OF PROBIOTICS IN THE MANAGEMENT OF LOWER GASTROINTESTINAL SYMPTOMS

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ABSTRACT
This study studies the effectiveness of probiotics in mitigating the lower gastrointestinal symptoms contributing to our understanding of gastrointestinal health management. After obtaining approval from the Institutional Ethics Committee, a cross-sectional study was carried out among 600 inpatients in a tertiary care hospital in Bangalore. In this study The Recovery rates for patients with lower GI symptoms is accessed and were found to vary between those taking probiotics and a control group. Gastrointestinal symptom severity was positively associated with almost all the disease. Patient with probiotics had better management with the lower gastrointestinal symptoms than those that has not been prescribed with probiotics. However, some more research is required to see if probiotics better alone or if probiotics 's effect is only an additive effect.

KEYWORDS: Probiotics, Lower gastrointestinal symptoms, Management.

INTRODUCTION

Gastrointestinal tract anatomy

It begins at the mouth, from the oesophagus to the stomach and then to the small and large intestines. The human GI tract is about 9 meters in length. In the GIT system, there are many supporting organs including the liver which helps by secreting enzymes that helps in digestion.

The human GI tract can be divided into two parts, namely

1. Upper GI tract
2. Lower GI tract

Lower gastrointestinal tract

The lower GI consists of the organ below

Small intestine

The small intestine is a coiled thin tube. The length of the small intestine is about 6 meters in length. The absorption of nutrients takes place in mostly in small intestines. The Food mixes with the enzymes from the liver and the pancreas in the small intestine. The surfaces of the small intestine function by absorbing the nutrients from the food into the bloodstream, which carries them to the rest of the body.

Large intestine

The large intestine is a thick tubular organ wrapped around the small intestine.it is also known as the Colon. The primary function is to absorb any remaining nutrients and water back into the system and process the waste products. The remaining waste is then sent to the rectum and discharged from the body as stool.[1]

Lower GI complaints include

1. Constipation
2. Diarrhea
3. Gas and bloating
4. Abdominal pain

The lower GI complaints mostly results from the physiologic illness or it represent a functional disorder (i.e., no radiologic, biochemical, or pathologic abnormalities are found even after extensive evaluation). The reasons for functional symptoms are not well clear. Evidence suggests that patients with functional symptoms may have disturbances of motility, nociception, or both; ie, they perceive as uncomfortable certain sensations (eg, luminal distention, peristalsis) that other people do not find distressing.

Diarrhea

Diarrhea can be defined as stool which weight > 200 g/day. It is considered as any increased in stool fluidity to be diarrhea. Diarrhea included Stool to be 60 to 90% water.

Complications of diarrhea

- Fluid loss with consequent dehydration, felectrolyte loss (Sodium, Potassium, Magnesium, Chloride), even vascular collapse sometimes occurs.
- Collapse can develop rapidly in patients who have severe diarrhea (eg, patients with cholera) or are very young, very old, or debilitated.
- Bicarbonate loss can cause metabolic acidosis.
- Hypokalemia can occur when patients have severe or chronic diarrhea or if the stool contains excess mucus.
- Hypomagnesemia after prolonged diarrhea can cause tetany.

Nausea and Vomiting

Nausea can be defined as the unpleasant feeling of needing to vomit. It represents awareness of afferent stimuli (Including increased parasympathetic tone) to the medullary vomiting center. Vomiting is the forceful expulsion of gastric contents caused by involuntary contraction of the abdominal musculature when the gastric fundus and lower esophageal sphincter are relaxed.

Vomiting is different from regurgitation, the spitting up of gastric contents without associated nausea or forceful abdominal muscular contractions. Patients with achalasia or rumination syndrome or a Zenker diverticulum may regurgitate undigested food without nausea.

Complications

Severe vomiting can often leads to symptomatic dehydration electrolyte abnormalities (Typically a metabolic alkalosis with hypokalemia) rarely an esophageal tear, that can be partial (Mallory-Weiss) or complete (Boerhaave syndrome).

Chronic vomiting can result in undernutrition, weight loss and metabolic abnormalities.

However, if the patient is unconscious or partly conscious, the vomitus may be inhaled (Aspirated) and cause aspiration. The acid in the vomitus can severely irritate the lungs, causing aspiration pneumonia.

Constipation

Acute constipation is caused by an organic cause, whereas chronic constipation is caused by organic or functional cause.

Mostly constipation is highly associated with sluggish movement of stool through the colon and this delay may be due to drugs, organic conditions, or a disorder of defecatory function or a disorder that results from diet.

Patients with disordered defecation do not generate adequate rectal propulsive forces and do not relax the puborectalis and the external anal sphincter during defecation, or both.

In IBS, patients have symptoms (eg, abdominal discomfort and altered bowel habits) but generally normal colonic transit and anorectal functions. However, IBS-disordered defecation may coexist.[2]

Excessive straining, perhaps secondary to pelvic floor dysfunction, may contribute to anorectal pathology (eg, hemorrhoids, anal fissures, and rectal prolapse) and possibly even to syncope. Fecal impaction, which may cause or develop from constipation, is also common among older patients, particularly with prolonged bed rest or decreased physical activity. It is also common after barium has been given by mouth or enema.

Chronic abdominal pain (CAP)

Chronic abdominal pain (CAP) is pain that persists for more than 3 months either continuously or intermittently. Intermittent pain may be referred to as recurrent abdominal pain (RAP). Acute abdominal pain is discussed elsewhere. CAP occurs any time after 5 years of age. Up to 10% of children require evaluation for RAP. About 2% of adults, predominantly women, have CAP (a much higher percentage of adults have some type of chronic gastrointestinal [GI] symptoms, including nonulcer dyspepsia and various bowel disturbances).[5]

Functional bowel disorders are common causes of chronic abdominal pain. Irritable bowel syndrome (IBS) is a functional bowel disorder that causes recurrent abdominal pain and altered bowel habits. Centrally mediated abdominal pain syndrome, previously known as functional abdominal pain, is a similar but less common disorder that does not cause altered bowel habits. (See the American College of Gastroenterology's 2021 clinical guideline for the management of IBS.)

Pathophysiology

Physiologic causes of chronic abdominal pain (see table Physiologic Causes of Chronic Abdominal Pain) result from stimuli of visceral receptors (mechanical, chemical, or both). Pain may be localized or referred, depending on innervation and specific organ involvement. Irritable bowel syndrome and centrally mediated abdominal pain syndrome cause pain that persists > 6 months without evidence of physiologic disease. The pathophysiology of these disorders is complex and seems to involve altered intestinal motility, increased visceral nociception, and psychologic factors. Visceral hyperalgesia refers to hypersensitivity to normal amounts of intraluminal distention and heightened perception of pain in the presence of normal quantities of intestinal gas; it may result from remodeling of neural pathways in the brain-gut axis.[3]

Probiotics

The World Health Organization defines probiotics as "live microorganisms that, in sufficient amounts, provide health benefits to the host". Foods like fermented yogurt and kimchi are natural sources of probiotics. They can

also be found in your gut, where they play a role in several vital body functions, such as vitamin synthesis, mood regulation, digestion and immune response. In addition, probiotics are offered as dietary supplements. These nutritional supplements contain a high concentration of either a single probiotic strain or several different probiotic strains. There are some health benefits associated with probiotic supplementation. Despite the robust growth of probiotic research over the past 20 years, there is still much to understand about probiotics and their health effects. Probiotics in the treatment of gastrointestinal symptoms Probiotics are live microorganisms that, when ingested, provide health benefits to the host. They are becoming increasingly popular as an alternative complementary treatment for gastrointestinal symptoms. The gut microbiota plays an important role in maintaining gut health and is thought to complement these beneficial bacteria. Numerous studies have shown the efficacy of probiotics in management of gastrointestinal symptoms such as bloating, constipation, and diarrhea. Probiotics can also provide relief for inflammatory bowel disease (IBD and irritable bowel syndrome IBS) symptoms. Despite these findings, the mechanisms by which probiotics work are not fully understood, and not all probiotic strains have been shown be effective for every condition. Further research needed to determine optimal usage and dosing of probiotics for benefit.

Probiotics Functions of the Gastrointestinal System | SJFM.[4]

Enteric microbiota or beneficial intestinal bacteria, they make up the gut microbiome. It plays an important role in defense system. About 100 trillion bacteria are present in the human digestive tract. Hence, there are 10 times more bacterial cells in the gastrointestinal tract than there are cells in the human body.

About 1,000 different species of known bacteria with more than 3 million genes (Approximately 150 times more bacterial genes than human genes) are present. Mostly the commensal gut bacteria reside primarily in the large intestine and therefore they have a direct impact on promoting a healthy gut barrier, supporting various immune functions of defense and protecting from a wide range of diseases.

The study of gut microbiota is a rapidly moving field of research. The importance of gut microbial communities on human health is widely perceived as one of the most exciting advancements in biomedicine for the past years and years to come. the biodiversity of the gut microbiota when disturbed are associated with far reaching consequences on host health and development.

For example, the production of short-chain fatty acids (SCFA) by these bacteria promotes growth and differentiation of intestinal mucosal cells, this role protects against intestinal permeability and colon cancer. These also play an important role in immune tolerance to prevent against allergic diseases such as atopic skin disorders, eczema, and asthma. High diversity of these gut flora appears to be protective of many chronic health conditions and loss of this diversity predisposes to a wide variety of chronic conditions such as inflammatory bowel disease, irritable bowel syndrome (IBS), type 1 and type 2 diabetes, obesity, cancer, cardiovascular disease, bone loss, and urinary tract infection. Recent research has also focused on the gut-brain axis and has discovered an important connection of the microbiome to psychiatric conditions such as anxiety, depression, bipolar disorder, schizophrenia and autism. Recent evidence has also shown a connection of the gut microbiota to neurodegenerative diseases as well, such as multiple sclerosis and Alzheimer's disease.

Aims

To analyse the effect of probiotics in the management of lower gastrointestinal symptoms.

Objectives

The objectives of this present study are

- To assess the lower GI symptoms in in-patient using standard questionnaires (bio med central gastroenterology)
- To assess the gut health in patient using self-designed questionnaires.
- To compare the management of lower gastrointestinal symptoms between the control group and the ~~un~~controlled group

METHODOLOGY

Study design: This study is a cross sectional study.

Site of study: The study has done at Sapthagiri Institute of Medical Science and Research Centre, Bangalore-90.

Duration of study: The study was conducted for a period of six months.

Inclusion criteria

Inpatients of both genders aged above 18 years with lower gastrointestinal symptoms admitted to various departments in a tertiary care hospital.

Exclusion criteria

- Patients with HIV infections.
- Patients who left the hospital in between the therapy.
- Patients admitted in the ICU.
- Unconscious patients.
- Pediatric patients.
- Pregnant and lactation mothers.

Sources of data and materials

- Patient case sheet.
- Nurses `s notes.
- Doctor`s notes.
- Dietician`s notes.
- Patient and patient`s attender interview.

Method of collecting data

The details were collected from the Patient case sheet, Nurse's notes, Doctor's notes, Dietician's notes, Patient and patient's attender interview.

The relevant patient demographics, comorbidity, laboratory and treatment details were collected.

GUT health was assessed using Self designed questionnaires after interviewing the patient or the patient care giver

METHODOLOGY

Study procedure

- This is a cross sectional study. A cross sectional cohort study was conducted on the patients according to the inclusion criteria after obtaining the consent form.
- All the inpatients were reviewed daily for their progress. Details on patients demographics (age, gender, occupation, past medical history, co-morbidities, diagnosis), laboratory details (Complete blood count, endoscopy, stool (PCR) test, ultrasound, pH-monitoring, barium swallow test, etc.) treatment details on therapy appropriateness (dose, duration, frequency) rational use of drug, drug interactions and adverse drug reaction were noted from the medical records.
- The data was analyzed using descriptive inferential statistics.

Statistical analysis

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

RESULTS

Patient's age wise categorization

The patients were distributed according to age and was observed patients under the age group of 48-58 were on high risk of obtaining GI with the total of 119 patients having (19.8%) followed by patient at age of 38-48 with the total of 117 having percentage of 19.5% and least were on the age of 88-98 having percentage of 0.2% and 78-88 having the percentage of 2.5%.

Table 1: Patients age wise categorization.

Patient's age Between	Frequency	Percentage %
18-28	114	19.0
28-38	91	15.2
38-48	117	19.5
48-58	119	19.8
58-68	84	14.0
68-78	59	9.8
78-88	15	2.5
88-98	1	0.2
Total	600	100.0

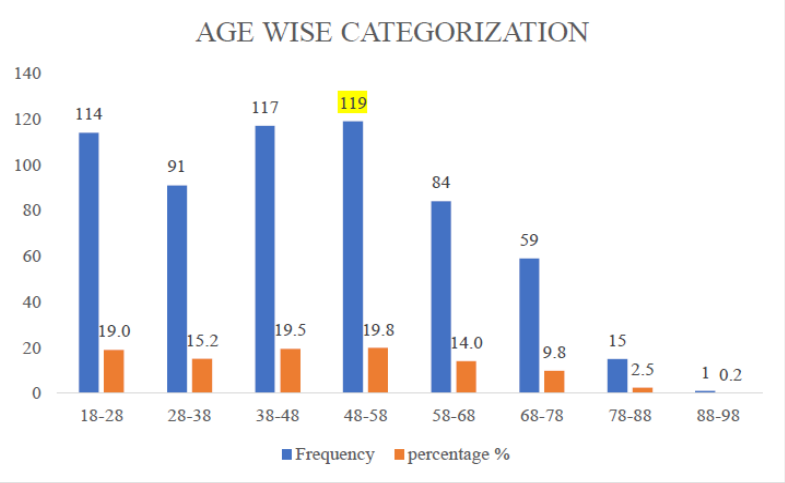

Fig. 1: Age distribution.

Gender distribution

Current study shows males 348 (58%) were more prone to GI abnormalities than females 252 (42%).

Table 2: Gender distribution.

Patients gender	Enumeration	Percentage
Male	348	58%
Female	252	42%

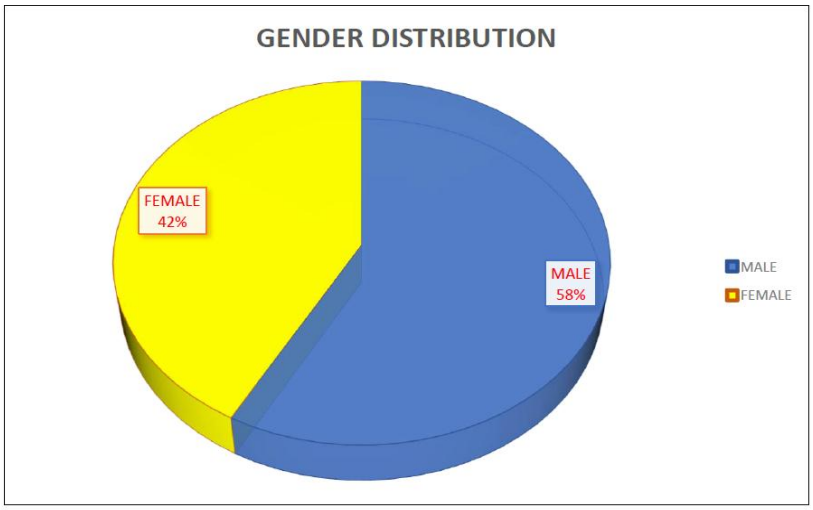

Fig. 2: Gender distribution.

Patient's diagnosis

Various department patients were diagnosed with GI disorder out of which patient admitted to GI department were high.

Table 3: Patient's diagnosis.

Department	No. Of patients	Percentage %
Gastrointestinal tract System	296	49.3
Neurology	44	7.3
Cardiovasucular system	129	21.5
Nephrology and urology	66	11.0
Orthology	45	7.5
Haematology	20	3.3
	600	100.0

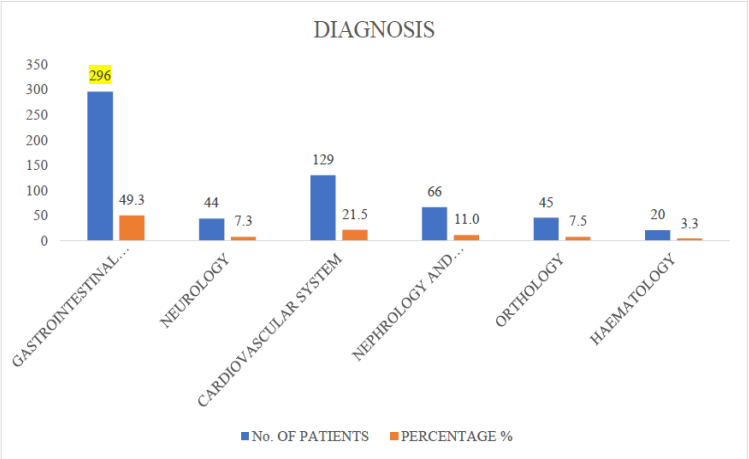

Fig. 3: Patient's Diagnosis.

Patient with comorbidities

All 600 patients were assessed for the co morbidities at time of admission and was noticed patient with more than one co morbidities 276 patients (31.83%) have high risk of having GI complaints.

Table 4: Patient with Co-Morbidities.

Co-morbidities	No. Of patient	% of patient
Htn+dm+other	276	31.83
Diabetes mellitus	104	12.00
Hypertension	105	12.11
Hyperthyroidsm	27	3.11
Hypothyroidsm	23	2.65
Ischemic heart disease	5	0.58
Tuberculosis	4	0.46
No co-morbidities	323	37.25

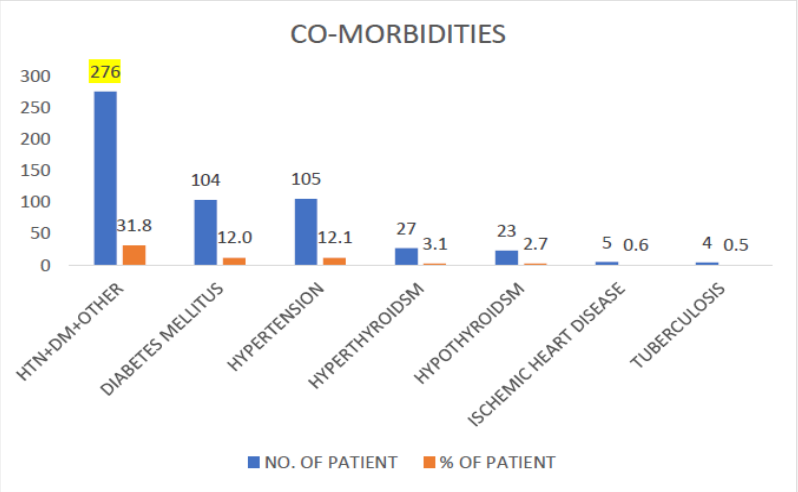

Fig. 4: Patient's distributions with co-morbidities.

Probiotics enumeration

There are 187 patients were are on probiotics containing Lactic Acid Bacillus and 20 patients who are on probiotics containing Bifidobacterium and 19 patients who were on probiotics containing Saccharomyces Boulardii. The total number of patients on probiotics (all strains combined) was 226.

Additionally, there are 370 patients who are not on probiotics.

Table 5: Probiotics enumeration.

Probiotics	Patinets who are on Probiotics
Lactic acid bacillus	187
Bifidobacterium	20
Saccharomyces Boulardi	23
Total	230
Patients who are not on Probiotics	370

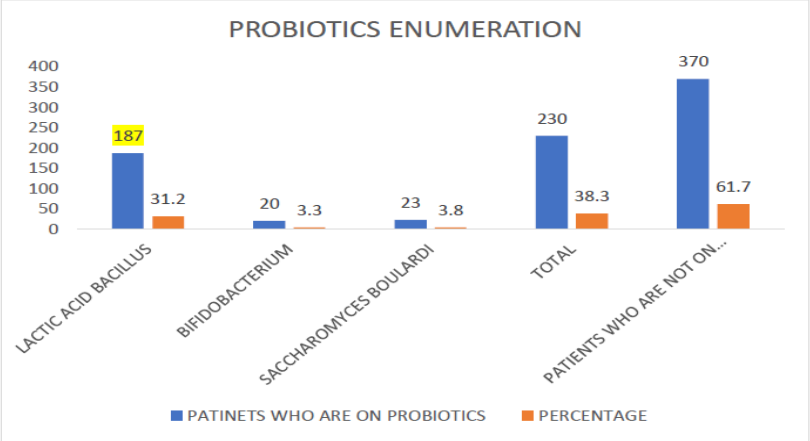

Fig. 5: Probiotics enumeration.

Lower gi symptoms

The data provided represents the frequency and percentage of lower gastrointestinal (GI) symptoms experienced by a sample population. Among the symptoms studied, abdominal pain was the most prevalent, reported by 27.17% of the individuals in the sample, followed closely by nausea, which was reported by 26.70% of the participants. Vomiting was the third most common symptom, with a frequency of 341 cases, accounting for 22.99% of the total. Diarrhea followed with a frequency of 261 cases, constituting 17.60% of the responses. Constipation was the least frequently reported symptom, with 82 cases, making up 5.53% of the total. In total, these symptoms collectively affected 1,483 individuals in the sample. This data provides valuable insights into the prevalence of lower GI symptoms within this population, with abdominal pain and nausea being the most reported issues.

Table 6: Lower GI Symptoms.

Lower gi symptoms	Frequency	Percentage%
Vomiting	341	22.99
Diarrhoea	261	17.60
Abdominal pain	403	27.17
Constipation	82	5.53
Nausea	396	26.70
	1483	100.00

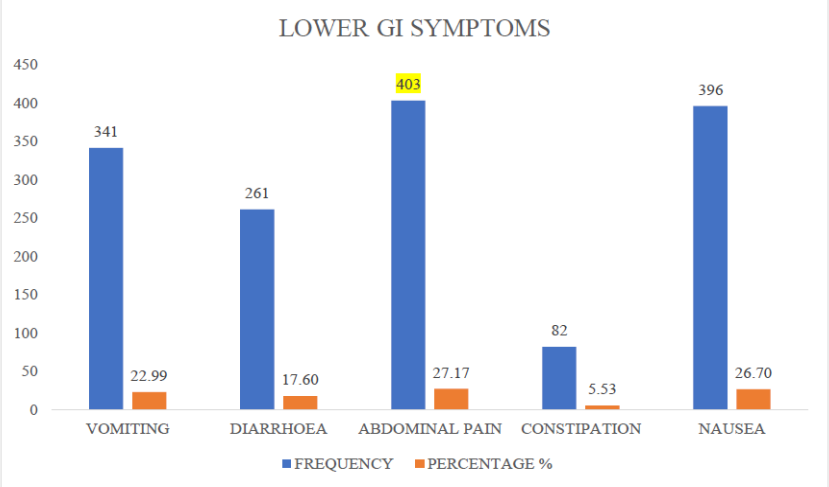

Fig. 6: Lower GI Symptoms.

Recovery rate

This data compares the average recovery rates of individuals with lower gastrointestinal (GI) symptoms in two groups: the Probiotics group and the Control group. In the Probiotics group, 147 individuals with vomiting had an average recovery rate of 44, whereas in the Control group, consisting of 78 individuals, the average recovery rate was 27. For diarrhea, the Probiotics group (41 individuals) had an average recovery rate of 18.25, while the Control group (36 individuals) had an average recovery rate of 14.25. Similarly, for abdominal pain, constipation, and nausea, the Probiotics group showed varying recovery rates compared to the Control group, suggesting potential differences in the impact of probiotics on these lower GI symptoms.

Table 7: Recovery rate.

Lower gi Symptoms	Probiotics groups		Control group	
	No.of individuals	Avg. Recovery rate	No.of individuals	Avg. Recovery rate
Vomiting	147	44	78	27
Diarrhoea	41	18.25	36	14.25
Abdominal Pain	27	10.67	10	7
Constipation	4	2.5	6	5.5
Nausea	1	1	5	5

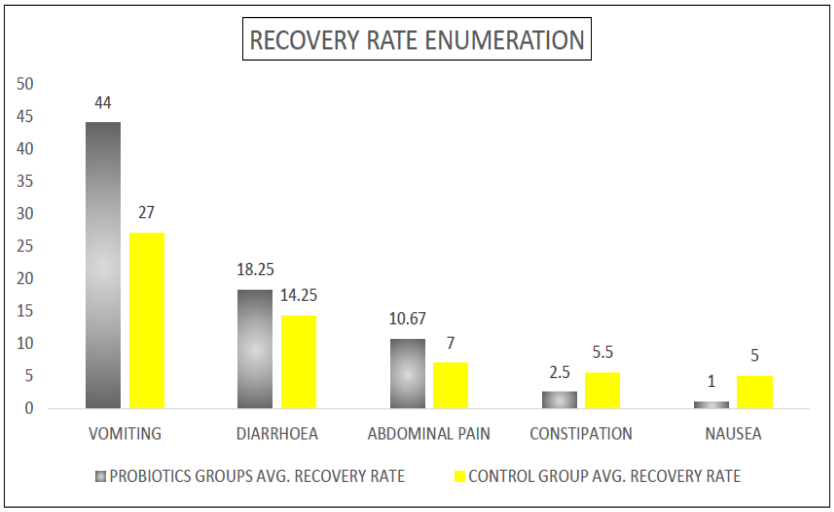

Fig. 7: Recover rate.

DISCUSSION

- Among the 600 cases collected for our study, we found that majority of patients aged between 48-58 (19.8%) having more percentage of being admitted in the hospital. Total of 278 were above 50 years of age and 322 were below 50 years of age. The study found out to be consistent with the study conducted by P Moayyedi, conducted a study on the efficacy of probiotics in the treatment of irritable bowel syndrome: a systematic review, Probiotics may benefit irritable bowel syndrome (IBS) symptoms . Out of 600 cases, Majority were males 348 (58%) and females were 252 (42%).
- Out of 600, patients among different medical departments, with Gastrointestinal and Liver (GITS) having the highest representation at 49.3%, indicating a significant prevalence of gastrointestinal issues. Cardiovascular (CVS) follows at 21.5%, underscoring the importance of cardiac care. Neurology, Nephrology and Urology, Orthopedics and Hematology departments account for 7.3%, 11.0%, 7.5%, and 3.3%, respectively.
- All 600 patients were assessed for the co morbidities at time of admission and was noticed patient with more than one co morbidities 276 patients (31.83%) have high risk of having GI complaints.
- There are 187 patients who are on probiotics containing Lactic Acid Bacillus and 20 patients who are on probiotics containing Bifidobacterium and 19 patients who are on probiotics containing Saccharomyces Boulardii. The total number of patients on probiotics (all strains combined) is 226. Additionally, there are 370 patients who are not on probiotics.
- In the Probiotics group, 147 individuals with vomiting had an average recovery rate of 44, whereas in the Control group, consisting of 78 individuals, the average recovery rate was27. For diarrhea, the Probiotics group (41 individuals) had an average recovery rate of 18.25, while the Control group (36 individuals) had an average recovery rate of 14.25.
- it was found a larger burden of lower gastrointestinal symptoms in patients compared with healthy controls. Gastrointestinal symptom severity was positively associated with almost all the disease. Patient with probiotics had better management with the lower gastrointestinal symptoms than those that has not been prescribed with probiotics. However, some more research is required to see if probiotics better alone or if probiotics 's effect is only an additive effect.

CONCLUSION

The recognition that certain types of microbes provide health benefits to the host and that the human body and planet are literally filled with microbes, has brought new opportunities to the management of personal and ecosystem health. In the Probiotics group, 147 individuals with vomiting had an average recovery rate of 44, whereas in the Control group, consisting of 78 individuals, the average recovery rate was 27. For diarrhea, the Probiotics group (41 individuals) had an average recovery rate of 18.25, while the Control group (36 individuals) had an average recovery rate of 14.25. It emphasizes the need for targeted interventions to improve medication safety and patient education. While probiotics appear to have a positive impact on recovery rates, more research is needed to confirm their effectiveness. Overall, the data underscores the importance of continuous monitoring and improvement in healthcare practices to enhance patient outcomes and safety.

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