

## STUDY OF THE PRESCRIBING PATTERN OF PROBIOTICS IN PAEDIATRIC PATIENTS OF A TERTIARY CARE TEACHING HOSPITAL, SOUTH INDIA

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### ABSTRACT

**Objective:** The study was aimed to analyse the prescribing pattern of probiotics in paediatric patients.

**Methods:** The study was conducted in the paediatric department of a 1450 bedded multispecialty tertiary care teaching hospital. During the period of 3 months study, 52 prescriptions containing probiotics were randomly selected and analyzed using a structured data entry format.

**Results:** Out of the 52 prescriptions reviewed, majority of the probiotic prescription were for the prophylaxis of 'Antibiotic associated diarrhoea' then for the treatment of urinary tract infection, followed by the treatment of diarrhea, respiratory tract infection, and the least for chronic liver disease. All the patients under study received the combination of probiotics either in the capsule form or in the sachet form.

**Conclusion:** The study concluded that usage of probiotics is not rare in paediatric patients for most of the indications for which probiotics are recommended in adults.

**Keywords:** Prescribing pattern, Probiotics, Prophylaxis

### INTRODUCTION

The term probiotic was derived from the Greek, meaning "for life [1]." Probiotics are viable microorganisms that are thought to have a beneficial effect in the prevention and treatment of specific pathologic conditions. They consist of either yeast or bacteria, especially lactic acid bacteria. They can influence intestinal physiology either directly or indirectly through modulation of the endogenous ecosystem or immune system [2]. For human adult use, this includes fermented milk products as well as over-the-counter preparations. The most common bacteria in this group include Bifidobacteria and Lactobacilli. These organisms are identical to those commonly found in fermented food products such as yogurt, sour cream, sauerkraut and butter milk [3].

In 1965, Lilley and Stillwell used the term 'probiotic' to describe them as beneficial micro-organisms. Finally, in 1989 'A live microbial food supplement which beneficially affects the host animal by improving its microbial balance. Probiotics generally enhance the intestinal microflora by replenishing suppressed bacteria and inhibiting the growth of pathogenic flora [4]. Probiotics can be in powder form, liquid form, gel, paste, granules or available in the form of capsules, sachets, etc[3].

Today probiotics are available in a variety of food products and supplements. There has been increasing interest in the use of probiotics for the treatment and prevention of infectious and antibiotic associated diarrhea, including inflammatory bowel disease, necrotizing enterocolitis, and extraintestinal disorders including atopic dermatitis and recurrent urinary tract infections [5]. Probiotics have been used as growth promoters, for lactose intolerance, antitumour and anticholesterolaemic effects. Probiotics, in general, help improve balance of the intestinal microflora. The most studied gastrointestinal condition treated by probiotics is acute infantile diarrhea [5]. As early as 1906, Tissier noted that significant stool colonization with bifidobacteria was protective against the likelihood of the presence of diarrhea in children. Probiotics, in general, help improve balance of the intestinal microflora. Probiotics may be similar to antibiotics in that certain formulations are more efficacious for specific applications [3]. A large number of trials on the role of probiotics in preventing the onset of antibiotic-associated diarrhea have been published [6]. Antibiotic-associated diarrhea (AAD) results from an imbalance in the colonic microbiota caused by antibiotic therapy. Microbiota alteration changes carbohydrate metabolism with decreased short-

chain fatty acid absorption and an osmotic diarrhea as a result. Another consequence of antibiotic therapy leading to diarrhea is overgrowth of potentially pathogenic organisms such as *Clostridium difficile*. The Culturelle product contains the strain *Lactobacillus rhamnosus* GG, which studies indicate may reduce the risk of antibiotic associated diarrhea, improve stool consistency during antibiotic therapy and enhance the immune response after vaccination [7]. Enteral administration of probiotics may modify the gastrointestinal environment in a manner that preferentially favours the growth of minimally virulent species [8].

Probiotics have the potential to reduce intestinal permeability and the generation of proinflammatory cytokines that are elevated in patients with a variety of allergic disorders [9]. Several probiotic preparations seem to have promise in prevention or treatment of various conditions. Probiotics are generally considered safe. There are three general methods by which the intestinal microflora can be altered: administration of antibiotics or prebiotics (ie, dietary components that promote the growth and metabolic activity of beneficial bacteria), or administration of probiotics. Probiotic supplements are easily accessible and available in the market worldwide. Probiotics exert a beneficial effect in the prevention as well as treatment of allergic diseases through modification of immune system of host via gut ecosystem [10]. The most commonly used probiotics in allergy prevention are bifidobacteria and lactobacilli, normal commensals of the mammalian microbiota. They have been available in various types of foods for many years and are "Generally Recognized As Safe" (GRAS).

Various probiotic species have shown promise in the treatment of ulcerative colitis in small studies. There currently exists good evidence for the therapeutic use of probiotics in infectious diarrhea in children, recurrent *Clostridium difficile* induced infections and postoperative pouchitis. The possible benefit in other gastrointestinal infections, prevention of postoperative bacterial translocation, irritable bowel syndrome and inflammatory bowel disease continues to emerge. Probiotics introduce new microbes to the GI tract to enhance microbiota maintenance and modification. Probiotics have been shown to amplify the gut mucosal barrier functions [1].

Probiotics – mechanism of action is,

- Adherence and colonization of the gut
- Suppression of growth or epithelial binding/invasion by pathogenic bacteria and production of antimicrobial substances.

- Improvement of intestinal barrier function.
- Controlled transfer of dietary antigens
- Stimulation of mucosal and systemic host immunity<sup>[1]</sup>.

The consumption of probiotics may have several antimutagenic effects. Alteration of gut flora (either with probiotics or with prebiotics such as fermentable fiber) has been associated with improvement in hepatic encephalopathy in pilot studies. Such therapy appears to lower blood ammonia concentrations, possibly by favoring colonization with acid-resistant, non-urease producing bacteria.

Ischemic heart disease is a major cause of morbidity and mortality that is often associated with elevated cholesterol levels and primary prevention with lipid lowering drugs or dietary modification can reduce the incidence and mortality of ischemic heart disease in healthy individuals. A wide variety of probiotic products have been used in clinical trials of serum lipid modulation. Some of the studies report a positive effect on improving cardiovascular risk factors and there seems to be a trend towards decreasing risk factors<sup>[5]</sup>.

Other health conditions that may benefit from probiotic consumption include hypertension, illness-related weight-loss, reducing recurrence of bladder cancer, collagenous colitis and alcohol-induced liver damage. To fulfill a beneficial role, a probiotic should be able to colonize the gut following an acute or chronic change in normal gut flora. This function requires viability during digestive tract transit, resistance to bile and gastric acids, and the ability to attach to gut epithelium. There are many organisms that could potentially function as a probiotic; however, the most commonly used are non-pathogenic lactic acid bacteria (i.e., Gram-positive bacteria that produce lactic acid), including, but not limited to, *Lactobacillus* and *Bifidobacterium* species. In addition, non-pathogenic yeasts such as *Saccharomyces* have also been used as probiotics<sup>[3]</sup>.

The kidney's primary function is excretion of several waste solutes or nitrogenous metabolites. When the kidney malfunctions, these

waste materials accumulate, leading to a condition known as Azotemia or kidney failure. Probiotics are generally known for their use in gut and digestive health. However, use of specially formulated and selected strains of probiotics may also be helpful in the elimination of accumulated waste. Therefore, this kind of probiotic formulation may have significant potential in maintaining a healthy kidney function<sup>[11]</sup>.

Theoretically probiotics may cause systemic infections, deleterious metabolic activity, excessive immune stimulation, and gene transfer. In addition, caution is advised when using probiotics in immunocompromised patients due to an increased risk of adverse effects. Probiotics were generally safe, with no serious adverse effects reported. Thus, a growing number of studies have evaluated probiotics in allergic conditions including rhinitis, atopic dermatitis, and food allergy.

#### Inclusion Criteria

1. Both inpatients and outpatients in paediatric department with probiotic prescription.

2. Age not more than 17 years.

#### Exclusion Criteria

1. Patients aged above 17 years.

2. Immunocompromised patients.

#### MATERIALS AND METHODS

A hospital based prospective cross sectional study was conducted for a period of three months, in both inpatients and outpatients in a paediatric department of a tertiary care teaching hospital, Kochi. A total of 52 patients who satisfied the study criteria were included in this study. Prescriptions of outpatients and the treatment charts of the inpatients were reviewed prospectively for the prescribing pattern of probiotics and its usage.

**Table 1: Assessment of prescription pattern in study population**

Indications	Number of prescriptions	Percentage (%)
Prophylaxis of antibiotic associated diarrhoea	20	38.4
Urinary tract infection	8	15.3
Diarrhoea treatment	6	11.5
Upper respiratory tract infection	4	7.6
Renal failure	3	5.7
Chronic-obstructive pulmonary disease(COPD)	2	3.8
Pneumonia	2	3.8
Coronary artery disease	2	3.8
Oral ulcer	1	1.9
Asthma	1	1.9
Inflammatory bowel disease	1	1.9
Chronic liver disease	1	1.9
Pseudocolitis	1	1.9

#### Study approval

The study Protocol was approved by the Research ethics committee of AIMS Hospital, Kochi.

#### RESULTS

Out of the 52 prescriptions reviewed, during 3 months study period, majority of the probiotic prescriptions were for the prophylaxis of antibiotic associated diarrhoea then for urinary tract infection followed by the treatment of diarrhoea, respiratory tract infection and the least for chronic liver disease. All the patients under study received the combination of probiotics either in the capsule form or in the sachet form. From the study populations 43 patients received Bifilac Capsule and 9 patients received Bifilac Sachet. The result shown that probiotics prescribed for prophylaxis of antibiotic associated diarrhoea as 38.4%, for treatment of urinary tract infection as 15.3% and treatment of diarrhoea treatment as 11.5% and then least prescribed for prophylaxis of chronic liver disease. According to the indication they are categorized in the Table.1.

#### DISCUSSION

In our study inpatients and outpatients prescriptions were analyzed from which probiotics containing prescriptions so obtained have been categorized according to their indication. In India, few studies have been done on the use of probiotics in children. A study conducted by Michael D et al reported that probiotics were prescribed for the prophylaxis of antibiotic associated diarrhoea<sup>[2]</sup>. In this study, most of the probiotics were prescribed for the prophylaxis of antibiotic associated diarrhoea i.e., 38.4%. In another study Harish K et al reported that probiotics were prescribed for Inflammatory bowel disease, diarrhoea, chronic liver disease<sup>[11]</sup>. In this study it also found that probiotics were also prescribed for Inflammatory bowel disease (i.e. 1.9%), chronic liver disease (i.e. 1.9%), and diarrhoea (i.e. 11.5%). From a study of S. Anuradha et al reported that probiotics were also used for Urinary tract infection<sup>[4]</sup>. In this study it shows that Probiotics were used for Urinary Tract Infection (15.3%). Rashmi R. Das et al reported that probiotics were prescribed for Asthma<sup>[10]</sup>. In our study too probiotics were prescribed for treatment of Asthma (1.9%).

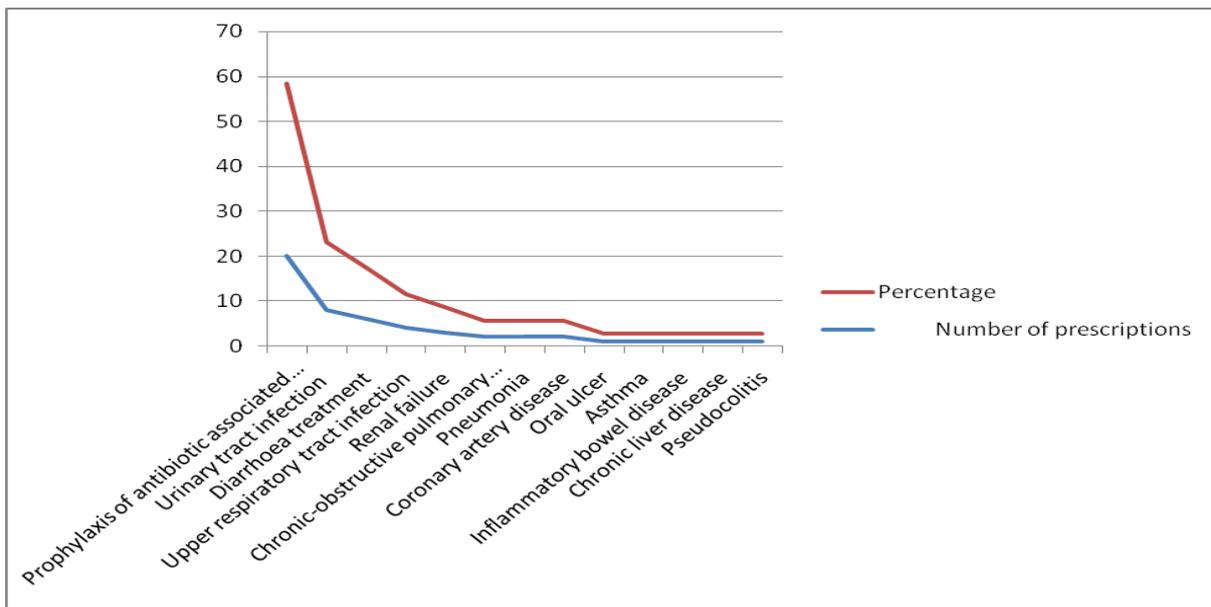


Fig. 1: Graphical presentation of Assessment of prescription pattern in study population

Table 2: Gender distribution

X	No. of female patients received probiotics	% of male patients received probiotics	% of female patients received probiotics
30	22	57.69%	42.30%

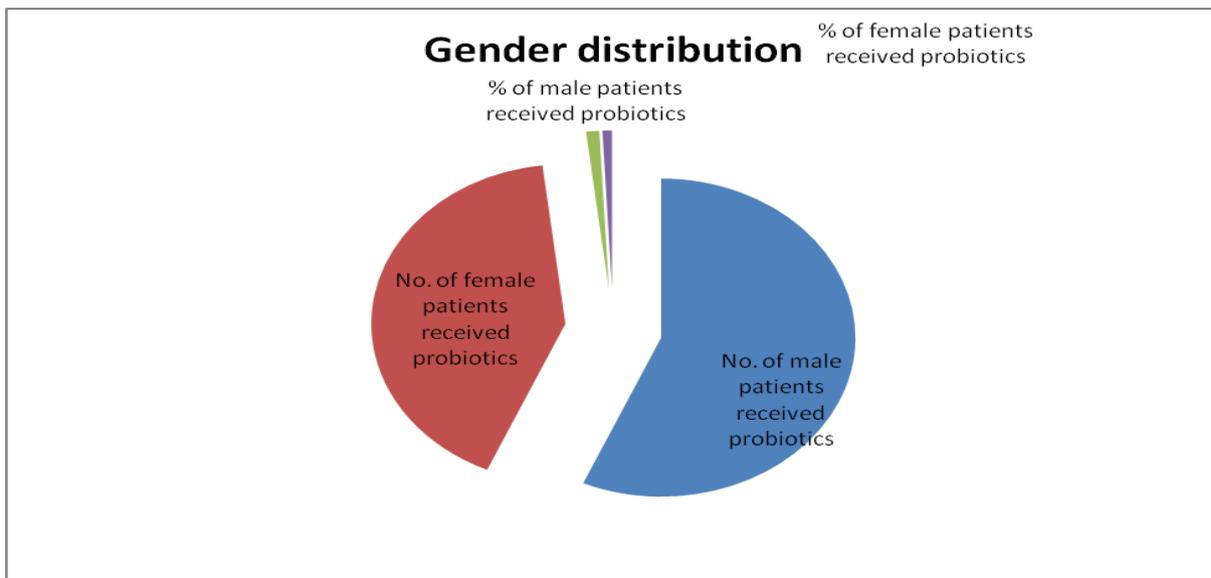


Fig. 2: Graphical presentation of Gender distribution

**CONCLUSION**

The study concluded that probiotics are mainly used for the prophylaxis of antibiotic associated diarrhea, followed by urinary tract infections, chronic liver disease, and ulcerative colitis and for the treatment of diarrhea etc. So the pattern of prescription of probiotics are some what similar to what we see in adult prescribing pattern. This shows that the probiotics are being prescribed even in pediatric patients too. Taking probiotics may improve health, which in turn could improve performance. Probiotics contain species of beneficial bacteria that are commonly found in the intestinal tract. Studies suggest that consumption of certain probiotic strains, primarily Lactobacillus GG, may

temporarily alter the intestinal microflora to produce a beneficial effect. Most commercially available strains of lactobacilli and bifidobacteria species are generally considered safe and may be especially helpful in treatment of pediatric diarrheal illnesses. However, clinical benefit of probiotic therapy is dependent on numerous factors such as type of bacteria, dosing regimen, delivery method, and other underlying host factors.

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