A Study on the Usage of Probiotics as a Safer Antipyretic

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Introduction

‘Probiotic’ is a derived Greek word which means ‘for life.’ It is considered the opposite of the term antibiotics and has had different meanings over time. The Probiotic was first introduced in mid 1950’s by scientist Werner Kollath and was first used by Lilley and Stillwell in the year 1965 describing probiotics as a substance that are secreted by one microorganism mainly *Lactobacillus* which stimulates the growth of another microorganism [1-3]. However in 1971, there was a different description of the word probiotics; as the tissue extracts which stimulate microbial growth and in 1974, scientist Parker defined Probiotics as “Organisms and substances which contribute to intestinal microbial balance” [4]. Probiotics is a field of study that is growing. A Medline search for the term “probiotics” turned up almost 1,000 publications, compared to 85 during the previous 25 years, indicating a huge increase in research in this area during the last 5 years [5]. This demonstrates the potential significance of this nascent field, but much work has to be done to clarify what a probiotic is and which strains satisfy the criteria for true probiotic bacteria. Despite mounting clinical evidence of the probiotics’ true benefits, the commercial front has not yet caught up. Unfortunately, many products labelled as “probiotic” aren’t actually “probiotic” because they haven’t been sufficiently identified, documented, made using appropriate manufacturing techniques, or clinically validated [6]. Nevertheless, many companies make claims that lead consumers to believe they are using reliable goods. To guarantee the validity and effectiveness of probiotic products, creating guidelines and norms is an essential first step. These recently developed standards and recommendations will be covered later [7].

Methodology

For papers without a language constraint, PubMed, Medline, Google Scholar, Scopus, and UpToDate databases were...
Probiotics As a Safer Antipyretic

Probiotics are non-pathogenic living microorganisms that comprise certain mutualistic bacteria that, when given to the host in the proper amount, can bestow health-promoting and disease-preventing qualities [8]. Probiotics must be accurately defined, refined to remain viable during their shelf life in a formulation, and have at least one successful human study to demonstrate their effectiveness and safety [9]. Lactic acid bacteria, comprising several strains of Lactobacillus, Bifidobacterium, Streptococcus, and Enterococcus, make up the majority of probiotics [10]. Of these, Lactobacillus and Bifidobacterium may be found in various fermented milk products as well as being sold commercially as nutraceuticals or functional foods. L. acidophilus LA14, a probiotic lactic acid bacterium, increases the beneficial bacteria in the gut, reduces opportunistic infections there, breaks down oxalates, produces bacteriocin, and improves immunological response [11-13]. Because they are popular nutraceuticals that are often regarded as safe and well-tolerated, probiotic dietary supplements may be a cutting-edge treatment approach for treating acetaminophen (APAP) toxicity. L. acidophilus LA14 has been demonstrated to have hepatoprotective properties in rats with an acute APAP overdose [14]. A drop in IL-1 levels in sera was another indication of how the probiotic reduced the hepatic inflammation brought on by APAP [15]. Furthermore, L. acidophilus LA14 treatment significantly decreased nuclear shrinkage in hepatocytes, inflammatory cell infiltration, and hepatic hemorrhage caused by APAP, according to liver sections [16].

Infection Control

The mechanisms by which probiotics function are still poorly understood and there are still many open research concerns. Probiotics do, however, play a part in modifying gut pH, preventing infections by producing antimicrobial compounds, competing for nutrients, growth factors, and pathogen binding and receptor sites, activating immunomodulatory cells, and producing lactase [17]. The most important characteristic of probiotics is that they have been demonstrated to be affordable, safe, and effective at preventing microbial diseases [18]. According to the World Health Organization in 1994, probiotics are thought to be the second-most important immune defense mechanism when commonly prescribed antibiotics stop working owing to antibiotic resistance. "Microbial interference therapy" refers to the use of probiotics to address antibiotic resistance [19].

How Probiotics Reduce the Duration of Diarrhea

There have been several proposed mechanisms for how Lactobacillus reduce rotavirus diarrhea, but none of them have been shown, and they all have drawbacks [20]. Initially, Lactobacillus link to receptors and prevent the virus from sticking and invading by connecting to them through competitive inhibition of receptor sites [21]. This theory may hold water if there was evidence of specialized receptor competition. Patients normally experience diarrhea for at least 12 hours by the time a probiotic is administered [21]. Mature enterocytes have already been infected by the virus in the middle and upper regions of the small intestinal villi. Fluid and glucose absorption is decreased when the virus and/or its enterotoxin, NSP4, interfere with the transfer of fluid and electrolytes [22]. The secretory reflexes may have been set off by the toxin, resulting in fluid loss from secretory epithelia and diarrhea. It is uncertain if such suppression would reduce diarrhea; at most, the viral attachment might benefit from competitive exclusion afterward [23]. If Lactobacilli competed in any manner with the toxin or peptides produced by villous endocrine cells, the chain of events that causes diarrhea may be prevented [24].

Table 1. Claimed health benefits of probiotic microorganisms.

<table>
<thead>
<tr>
<th>Genus</th>
<th>Species</th>
<th>Health benefits</th>
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<tbody>
<tr>
<td>Lactobacillus</td>
<td>L. rhamnosus</td>
<td>Viral-associated pulmonary damage reduction [25]</td>
</tr>
<tr>
<td></td>
<td>L. plantarum</td>
<td>Antifungal activities and reduction in irritable bowel movements [26]</td>
</tr>
<tr>
<td></td>
<td>L. reuteri</td>
<td>Reduction in diarrhea associated episodes in children [27]</td>
</tr>
<tr>
<td>Bifidobacterium</td>
<td>B. longum</td>
<td>Effective in gastrointestinal disease treatment [28] and allergic sensitization [29]</td>
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Other Miscellaneous Advantages of Probiotics

Probiotics and pathogens compete for attachment sites on the host cell's surface [48]. This binding may cause the host cells to produce anti-inflammatory cytokines, reducing inflammation at the tissue's surface. Probiotics can also secrete several antimicrobials that can either inhibit the spread of illnesses or eradicate them [49]. Probiotics can immunomodulate, which increases overall body immunity. During the same process, probiotics react with APC (Antigen Presenting cells) (macrophages and dendritic cells), which are essential for healing wounds and developing scars [50]. A 90% decrease in the size of chronic leg ulcers was observed in 43% of individuals with diabetes and 50% of non-diabetic patients after the 30 days of topical treatment with L plantarum. A significant decrease in colony-forming units was also observed after 5 days [51].

Several types of research have shown that strains of Lactobacilli are very effective in preventing antibiotic-associated diarrhea [52]. Lactobacilli species are easily available in the form of probiotics because of their crucial properties such as higher tolerance to hydrochloric acid and bile juice along with having the capability to adhere to the surfaces of the intestine and can also tolerate low pH [53,54]. Results show that Lactobacillus rhamnosus CRL1505 has been effective in reducing pulmonary damage due to viral infections by blocking the protein chains [25]. In a recently published meta-analysis, it has shown that probiotic strains were safe and effective in reducing urinary tract infections in adult women [55].

Conclusion and Future Research

In conclusion, because bacteria make up a significant physical portion of the gastrointestinal tract and other places, it is crucial that professionals recognize their existence and deliberately evaluate what role they may play in health and disease. Probiotics must be well documented to be used as therapeutic or health maintenance treatments. This includes the strain(s), product formulation, and mechanisms of action. The vast array of microbial species found in the gut must be further understood to employ probiotic strains in a way that makes sense given their interactions with host cells and one another. It's only that people are just now realizing how important microbes have always been to the human body.

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References


