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Short Communication

Probiotics as a Promising Therapeutic Strategy

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Probiotics are defined by Food and Agriculture Organisation of the United Nations (FAO) and the World Health Organisation (WHO) as 'live microorganisms which when administered in adequate amount confer health benefits to the host [1].

Early exposure to probiotics is achieved through breastfeeding. Human milk contains more than 200 different bacterial species with great individual variations [2]. Breast milk is recognized as a source of commensal and potentially probiotic bacteria, including *Staphylococci, Streptococci, Corynebacteria,* lactic acid bacteria and *Bifidobacteria* [3,4]. These probiotics are responsible for development of immune response leading to decreased incidence of intestinal infections and allergies in breast fed infants [5]. Moreover, some food products can be a source of probiotic strains such as dairy products including yogurts, cheese, ice cream, and buttermilk and non-dairy food including soy based products and cereals [6].

Some properties are essential for effective use of probiotics. The probiotic strain should preferably be of human origin that is able to survive, proliferate and colonize at the site where it is presumed to be active. Besides, it should also be tolerated by the immune system. It should be generally regarded as safe, not pathogenic, allergic, or mutagenic/carcinogenic and of course of health benefit [7,8].

The promising evidences of the role of probiotics in human health as well as their safety pave the way for their application for treatment of different conditions. Treatment of gastrointestinal infections was the primary goal of using probiotics. However, many other effects were reported such as improvement of intestinal health, resistance to enteric pathogens including parasitic infections, anti-allergic effect, reduction of serum cholesterol, anti-hypertensive, immune system modulation, anti-cancer colon effect and enhancement of nutrient values. It is important to mention that the probiotic must be specified at a strain level and course dose to establish their suitability and performance before being applied in humans [9]. At present, several well-characterized strains of *Lactobacilli* such as *L. acidophilus, L. casei* and *L. reuteri* and *Bifidobacteria* such as *B. infantis, B. lactis* and *B. longum* are available for human use [10].

Probiotics have shown beneficial effects in many clinical aspects including Rotavirus diarrhea, traveller's diarrhea, *Helicobacter pylori* infection, reduction of antibiotic-associated side effects, food allergies and lactose intolerance, atopic eczema, prevention of vaginitis, urogenital infections, irritable bowel syndrome, inflammatory bowel disease, enhance oral vaccine administration, and dental caries [11]. Some of the clinical applications of probiotics proved to have a beneficial effect in human are listed in table 1.

The list of probiotics and their health benefits is not limited. Moreover, other promising effects require further investigations to determine which probiotic strain is associated with the greatest efficacy and for which pathologic condition. There is no doubt that the future carries a lot for probiotic use. As a part from the global focus on the natural products, probiotics will be considered for therapeutic and prophylactic strategies of various disorders.

Disease	Probiotic strain	References
Ulcerative colitis	*Escherichia coli* Nissle 1917	[12]
Inflammatory bowel syndrome	*E. coli* DSM 17252	[13]
Antibiotic-associated diarrhea	*Lactobacillus rhamnosus* GG	[14]
Radiation-induced diarrhea in tumor therapy	*L. acidophilus* NCDO1748	[15]
Atopic dermatitis	*Bifidobacterium lactis*	[16]
Chronic periodontitis	*L. reuteri* DSM17938	[17]
Infectious diseases Bacterial: *Vibrio cholerae* *Helicobacter pylori* Parasitic: *Cryptosporidium parvum* Viral: *Rotavirus*	 *L. reuteri* ATCC 55730 *L. johnsonii* NCC 533 *L. casei* DN-114001 *L. rhamnosus* GG + *L. casei* shirota *L. reuteri* DSM 17938	 [18] [19] [20] [21] [22]

Table 1: *Clinical applications of different probiotic strains.*

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