

## Chapter 2

# Impact of Probiotics in Human Health and Disease Treatment

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### ABSTRACT

*Probiotics have become the major breakthrough in therapeutic applications due to their various health promoting effects in humans by maintaining the homeostasis of the intestine and prevent microbial imbalance (dysbiosis) without any side effects. Dysbiosis in the microbial population is the major cause for several diseases in humans. Treatment of diseases using antibiotics is not recommended due to high cost, side effects, and the loss of intestinal friendly bacteria. Probiotics work in symbiotic association with the intestine and produce several metabolites which not only regulate the growth of pathogenic bacteria but also provide vital nutrients which contribute to human health. The present chapter highlights about the role of probiotics in treatment and prevention of different human diseases.*

### INTRODUCTION

Probiotics are generally defined as *live microorganisms when administered in adequate amounts confer a health benefit on the host* (UNFAO/WHO, 2001). The concept of probiotics was evident from earlier reports dating back in 1907, when Ellie Metchnikoff reported a relationship between ingestion of yogurt containing

DOI: 10.4018/978-1-5225-3267-5.ch002

lactic acid bacteria and enhanced longevity in Bulgarian peasants (Bron, Baarlen, & Kleerebezem, 2012). Probiotics exist naturally in several fermented foods such as beverages, yogurt, cheese and pickles (Amara & Shibl, 2015). The common microbes which are used as probiotics belong to bacteria, yeast or molds (Bron, Baarlen, & Kleerebezem, 2012). Among the copious number of strains identified with probiotic features *Lactobacillus*, *Bifidobacterium*, and *Saccharomyces* species were most frequently, used with major health benefits and good market value (Turroni, Ventura, Buttó, Duranti, O'Toole, Motherway, & Van Sinderen, 2014).

Consumption of probiotics as functional foods has become more popular among the consumers in recent years. They are available in variety of sources such as dietary supplements, food products, ointments, and nasal sprays (Tripathi & Giri, 2014). Modulation of gut bacteria during the diseases condition can be accelerated by consumption of probiotics. Pioneering studies on probiotics have shown their therapeutic applications on human health by maintaining the microbial balance and homeostasis in the intestine (Kechagia, Basoulis, Konstantopoulou, Dimitriadi, Gyftopoulou, Skarmoutsou, & Fakiri, 2012). The primary criteria for standard probiotics include: stable shelf life; survival during intestinal transit, and production of beneficial products such as bacterocin, short chain fatty acids, and other inhibitory metabolites which can regulate the growth of pathogenic bacteria in the intestine (Vandenplas, Huy, & Daube, 2015).

The key mechanism of probiotics in controlling the disease is mediated by enhanced epithelial barrier function, increased adhesion to intestinal mucosa, and competitive exclusion of pathogenic microorganisms, production of antimicrobial, immune-modulatory substances (Kechagia, Basoulis, Konstantopoulou, Dimitriadi, Gyftopoulou, Skarmoutsou, & Fakiri, 2012). The present chapter is focused on the properties, mechanism of action, global prospects, and different dairy and non-dairy based probiotics available in the market will be addressed. Role of probiotics in treatment and prevention of different diseases associated due to the microbial dysbiosis will be discussed. In addition, safety issues related to probiotics will also be highlighted along with future prospects and development.

## **BACKGROUND**

Human health and diseases are mainly driven by the microbial balance of the body, homeostasis of microbial population is considered as beneficial, while the dysbiosis causes many health problems (Gareau, Sherman, & Walker, 2010). The distinction between research aimed at health and disease treatment has unique regulatory

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