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A Narrative Review of Probiotics and their Effects on Sports Nutrition

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ABSTRACT

Background: Probiotics, which are found in certain foods, are a suitable source for boosting our immune system and a proper choice for overall health. Regarding this, they might be also considered a health supplement for athletes thanks to their numerous benefits on the body in the sports world.

Materials and Methods: In the search for scientific literature related to this review the US National Library of Medicine (PubMed) used MEDLINE and Sport Discus data and the terms ' probiotics ' ' sports' and 'immune system' were used. The relevant literature has also taken its source from the research of relevant articles from reference lists derived from data studies.

Results: When all the possible advantages of probiotics on the overall health of athletes are considered, their consumption of them should be encouraged much more in the sports world. In this way, athletes could improve their performances by maintaining and improving their immune systems and be protected against common health problems.

Conclusion: Studies show that probiotics provide protection against various diseases and disorders that athletes commonly suffer from, and they also reduce the number of days with symptoms when in case of diseases such as upper respiratory or gastrointestinal infection by boosting the immune system.

Introduction

In a world, where being healthy is more meaningful and crucial nowadays, people have been trying to find proper methods to keep their bodies fit and strong and to boost their immune systems. Nutritional habits and supplementary are reliable sources to achieve this goal. In this sense, one source, which also supports the immune system apart from its many other benefits, is probiotics. As probiotics have been in our lives since old times, various attempts to define them are carried out. One of these definitions is made by the World Health Organization and Food and Agriculture Organization of the United Nations (FAO) and probiotics are defined as "live microorganisms which, when administered in adequate amounts, confer a health benefit on the host" (Report of FAO/WHO [1]). Although this definition has recently been discussed, the history of probiotics dates back to older times. In ancient times, people used to benefit from the fermentation process of milk before the

discovery of microscopes (Amara [2]), which indicates that people already took advantage of probiotics without having knowledge related to them. Later, it is assumed that Ilya Ilyich Metchnikoff first implied the impact of probiotics by mentioning that bacteria, Lactobacillus bulgaricus, and Streptococcus thermophilus, in yogurt were healthful for the body since they restrained the putrefactive form of fermentation of intestinal flora (Metchnikoff, et al. [3,4]). After that, in 1965, "probiotics" was used as a term for the first time by Lilly and Stillwell. But what are these "probiotics" and how could they provide benefits both for human health and athletes? (Lilly, et al. [5]).

As the definition of probiotic is explained in the previous paragraph, it is necessary to discuss it and its advantages in detail. Some microbes, which are generally utilized as probiotics, consisting of bacteria, yeast, or mold. For instance, these bacterias might be Lactobacillus such as acidophilus, sporogenes, fermentum, lactus; Bifidobacterium such as bifidum, infantis, adolescentis, lactis; Streptococcus such as cremoris, intermedius, diacetylactis; Leuconostoc mesenteroides; Pediococcus; Propionibacterium; Enterococcus; Enterococcus faecium. On the other side, some of these yeast and molds are Saccharomyces cerevisiae, Aspergillus niger, and Candida pintolopesii (Amara, et al. [6]). Moreover, some of the most frequently used probiotic forms are Lactic acid bacteria, Bifidobacteria, Leuconostoc, Streptococcus, Saccharomyces, Bacillus, and Enterococcus (Sivamaruthi [7]). These bacteria, yeast, and molds have always been in our food even during the time's humanity had no idea of them. Also, these foods that we accept that provide benefits to our body with probiotics might be considered yogurt, cheese, salty fish, and so on 2. (Amara [2]). Therefore, for a person, who wishes to boost his/her immune system and stay healthy, it is not very difficult to have access to food containing probiotics. As we all know, nutrition and a proper diet are very crucial in terms of the general health of all people without exception. However, when it comes to athletes, a correct diet plays a huge role in the sports world since it affects various factors apart from their body significantly such as their performance, which is vital for them.

Therefore, athletes generally show a maximum effort to consume appropriate nutrients, receive necessary supplements from foods, protect their bodies against diseases and disorders and boost their immune systems to carry out training and exercises. In this sense, probiotics might be very useful to be able to complement all these goals. Studies show that athletes are at risk in terms of diseases and disorders due to various negative factors circumstances such as exercise intensity, fatigue and heavy exercise load, poor nutrition, and lack of proper rest levels (Pyne, et al. [8,9]). Also, some studies point out there is a link between probiotics and muscle repair in strength sports (Jäger, et al. [10]), which shows us that probiotics also have positive impacts on post-training and exercise periods and may even prevent sports injuries. In this regard, when all the studies are evaluated related to probiotics, Figure 1 below provides us a fine summary of the possible advantages of probiotics on athletes (Sivamaruthi, et al. (2019)).

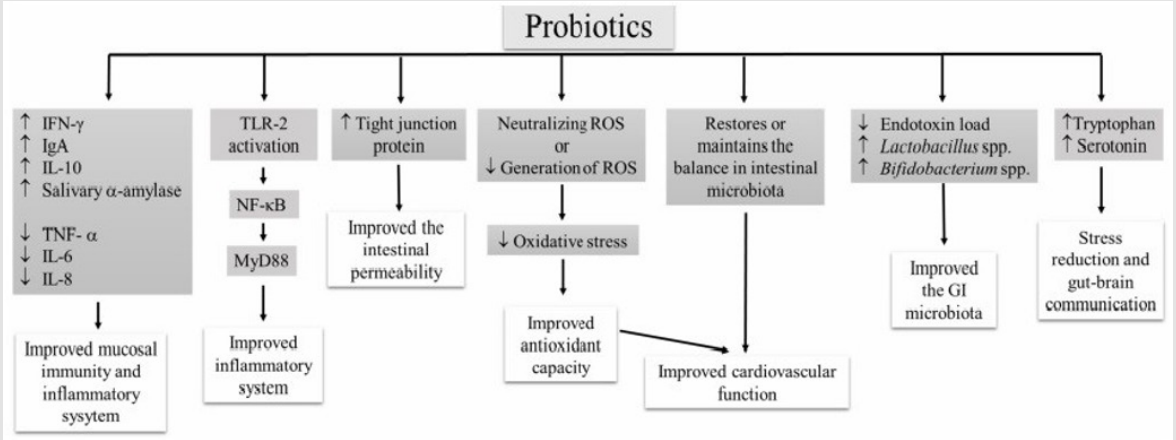

Figure 1: The chart demonstrating the possible effects of probiotics on athletes (Sivamaruthi, et al. 2019).

Discussion

Leite et al. stated that probiotics can attenuate Upper Respiratory Tract Symptoms (URTS) and gastrointestinal (GI) symptoms in endurance athletes and the diversity in the results of different studies may be due to the period of consumption, dose, kind of strain or even the form of products (fermented dairy, sachets or capsules) but the probiotics that affect upper respiratory illness, seem to stimulate the increase of interferon-γ and immunoglobulin A, while those affecting GI, increase the barrier functions (Leite, et al. [11]). In a study conducted by Clancy et al. on fatigued

athletes, the effect of L.acidophilus was studied. IFN-γ production was decreased by CD4 blood cells and after the consumption of L.acidophilus, an increase in IFN-γ production was induced by T-cells both in fatigued and non-fatigued athletes. There was also an increase in salivary IFN-γ concentration (Clancy, et al. [12]). In 2010, Cox et al. evaluated the effect of probiotic Lactobacillus fermentum VRI-003 (PCC) consumption in elite endurance athletes and showed that it is associated with reduction of respiratory symptoms (Cox, et al. [13]). In line with Cox et al. study, another research carried out by Gleeson et al. on endurance athletes who consumed fermented milk for 4 months, which includes a probiotic L.casei Shirota, it is found that URTS were reduced in the probiotic group (Gleeson, et al. [14]). In 2012, Lamprecht et al. showed that probiotics consumption can beneficially affect TNF-α and protein oxidation during severe exercises in trained men (Lamprecht, et al. [15]). Studies of approximately four weeks to examine the changes that probiotic supplement has made in the intestinal system and their contribution to immune function were considered too short to evaluate in a long-term clinical realistic way (West, et al. [16]). Therefore, it's considered that it may take a few weeks to several months to observe the effects of probiotics consumed as sports nutrition supplements on athletes' health and immune system (Aagaard, et al. [17]).

Conclusion

In the light of data related to probiotics, all the knowledge provided by the studies carried out and applications since the old times, it is possible to point out that probiotics are essential in terms of overall health since they have numerous benefits on the body. As the studies related to them stated, probiotics have a positive impact on athletes in terms of protection against disorders and diseases such as URTS and GI and muscle repair as well. Besides, they are easy to access and have already been available in our daily foods such as yogurt. Consequently, the consumption of probiotics should be encouraged more in the sports world for the health of athletes, and awareness related to them should be raised in terms of their advantages and benefits to the body.

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Author's Contributions

All authors read and approved the final version of the manuscript.

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