



Title: The role of probiotics in times of COVID-19

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INTRODUCTION

Wuhan, China. December 2019.

A rapidly spreading pneumonia posed a global threat, which emerged and became known as COVID-19 (an acronym for coronavirus disease 2019) (Xie & Quiong, 2020).

Current preventive measures include constant hand washing, the use of masks and avoiding person-to-person contact (Palacios-Cruz, 2020).



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It seeks to strengthen the immune system, however, there are still no effective therapeutic resources, so there is a constant search for alternatives such as the use of probiotics in the human diet.

There is no evidence that probiotics can help cure or prevent as such, but there is a study that found that some probiotics reduce the incidence of common respiratory infections (Lenoir-Wijnkoop *et al.* 2019).

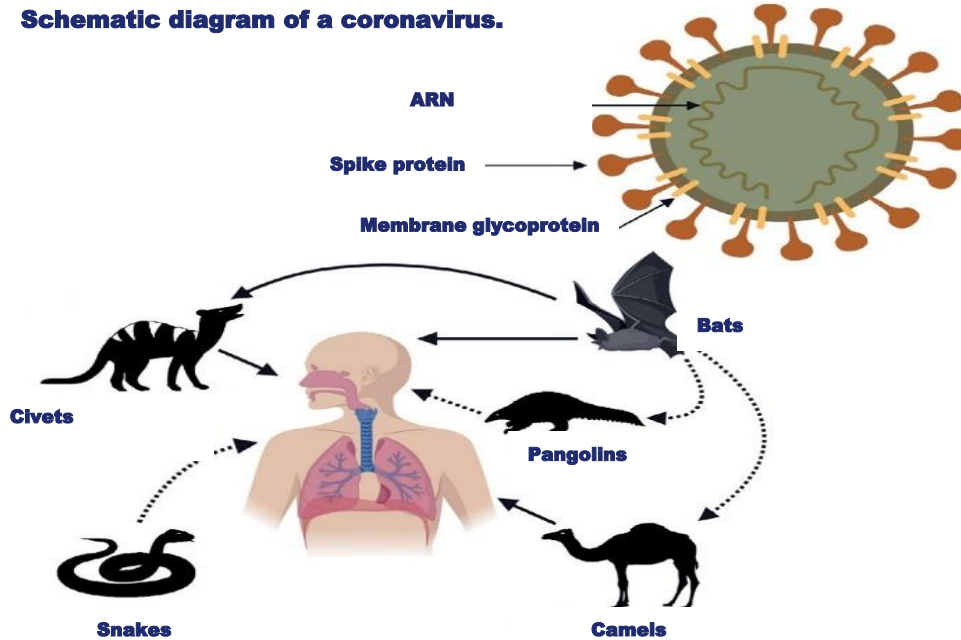


METHODOLOGY

Coronavirus and COVID-19

Big family of viruses of single-stranded RNA genetic material, they have an envelope, they are called “coronaviruses” due to the corona shape they present in their structure.

Schematic diagram of a coronavirus.



*Figure: Schematic diagram of a coronavirus. Zoonotic transmission.
Source: (Cortés, 2020).*

The cause of severe acute respiratory syndrome, SARS-CoV. It is of zoonotic origin (Cortés. 2020). The word is of Greek origin, zoon which means animal and nosos disease.

The natural reservoir for SARS-CoV-2 is believed to be bats, with snakes and other animals as intermediaries. However, the route of transmission to humans at the beginning of this event remains unclear.

Characteristics of the disease.



The typical symptoms associated with this infection includes:

- Fever
- Asthenia (weakness and fatigue)
- Dry cough
- Picture of respiratory failure (in the most serious patients)

(Alcántara-Montero, 2020).



There is a population that does not present symptoms or these are imperceptible, the so-called asymptomatic.



Respiratory secretions are the main means of infection and spread of the virus.

This disease has a low lethality, around 3% but with a high transmissibility (Palacios-Cruz *et al.* 2020).

Clinical test

RT-PCR

Is commonly used to identify viruses that are causing respiratory secretions.

Extraction of RNA from clinical samples with the MagNA Pure 96 System.



Respiratory material (nasopharyngeal and oropharyngeal swab or endotracheal aspirate or bronchoalveolar lavage in patients with severe respiratory disease).

Serum for serological tests, acute sample and convalescent sample (additional to respiratory materials)

Prevention measures

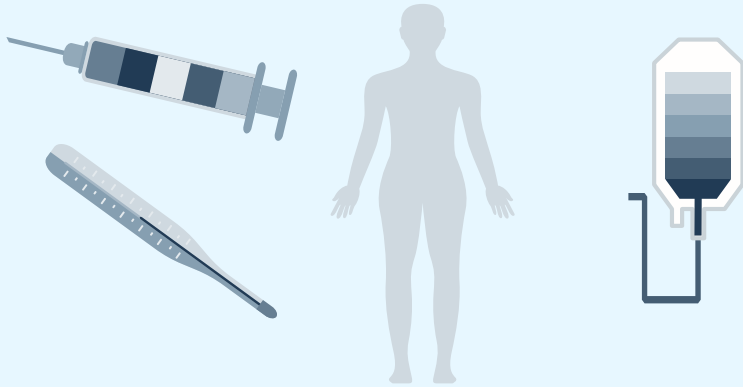


The WHO issues standard recommendations to prevent the spread of infection include:

- Wash your hands regularly, especially after contact with sick people or their environment.
- Correct cooking of foods such as meat and eggs.
- Use of face masks.
They are not a 100% effective protection against viruses or bacteria carried in the air, since they do not have an adequate air filter and leave the eyes exposed, and although they could help reduce the risk of contracting the virus through sneezing or coughing of others (Palacios-Cruz, 2020).



Each of the aforementioned measures must be adopted and put into practice by the population every day, but not only should we keep that information, but each individual should seek prevention and control alternatives for the disease in question.



Photography. Source: <https://pixabay.com/es/>

Probiotics

They are living microorganisms that, when ingested in adequate quantities, exert a positive influence on the health or physiology of the host.

Once the probiotics are ingested, changes occur in the intestinal microflora that have a positive impact on the consumer's state of health.

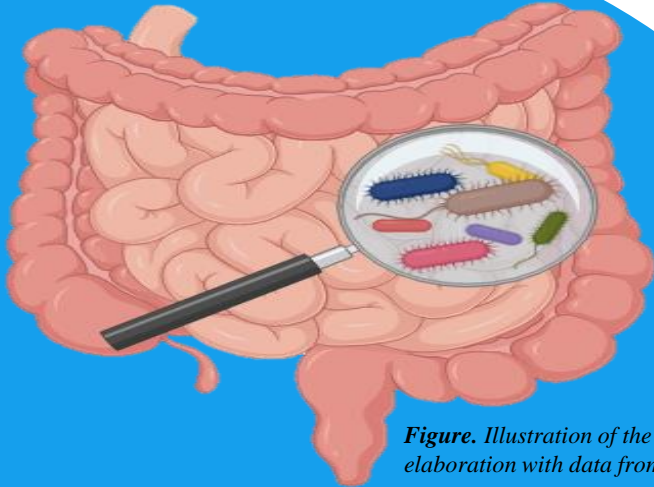


Figure. Illustration of the intestinal microbiota. Source: Own elaboration with data from: <https://biorender.com/>

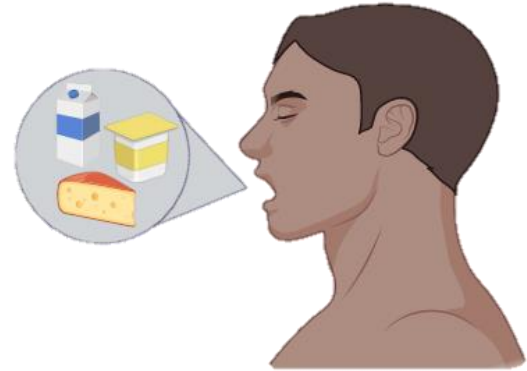


Figure. Intake of foods containing probiotics. Source: Own elaboration with data from: <https://biorender.com/>

The most common way to consume probiotics is through dairy foods that contain intestinal species of lactobacilli and bifidobacteria. They are considered in the group of functional foods.

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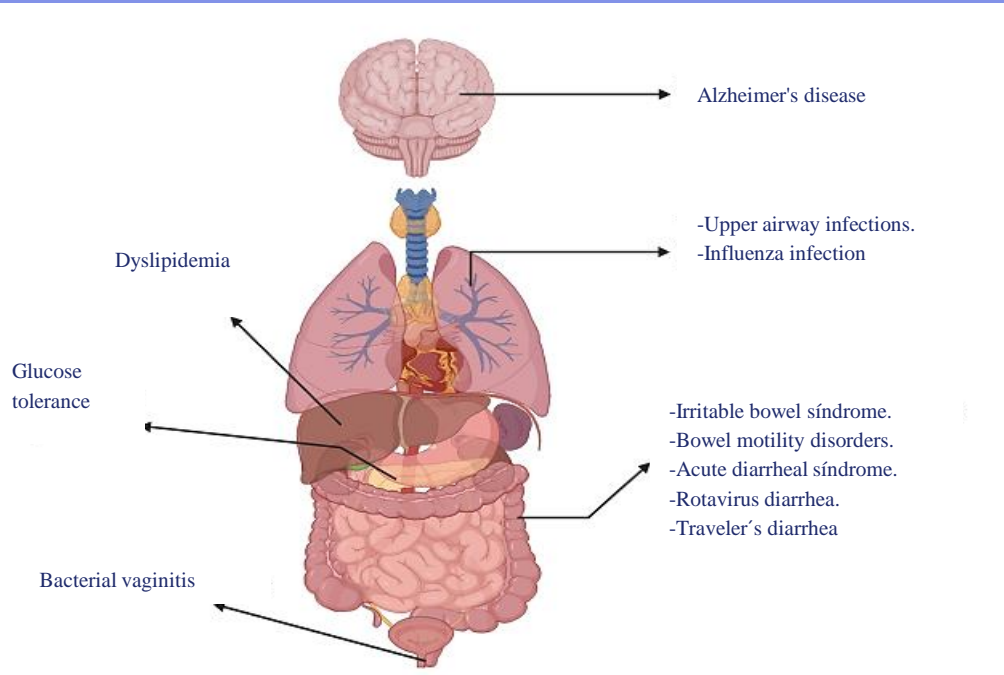
Mechanism of action of probiotics

- Induction at pH less than 4.
- They inhibit the growth of pathogenic bacteria.
- They produce lactic acid.
- They decrease intestinal permeability.
- They increase the activity of lactase.
- They have a competitive effect on other pathogenic bacteria.
- They produce effects on immunity.

The clinical utility of probiotics is different in each case, it depends on the strain and the dose administered.

Lactobacilli and bifidobacteria can secrete natural antibiotics with a wide spectrum of activity and there are studies that reveal their action on the immune system (Rondon, *et. al* 2015).

Diseases in which probiotics have a beneficial effect



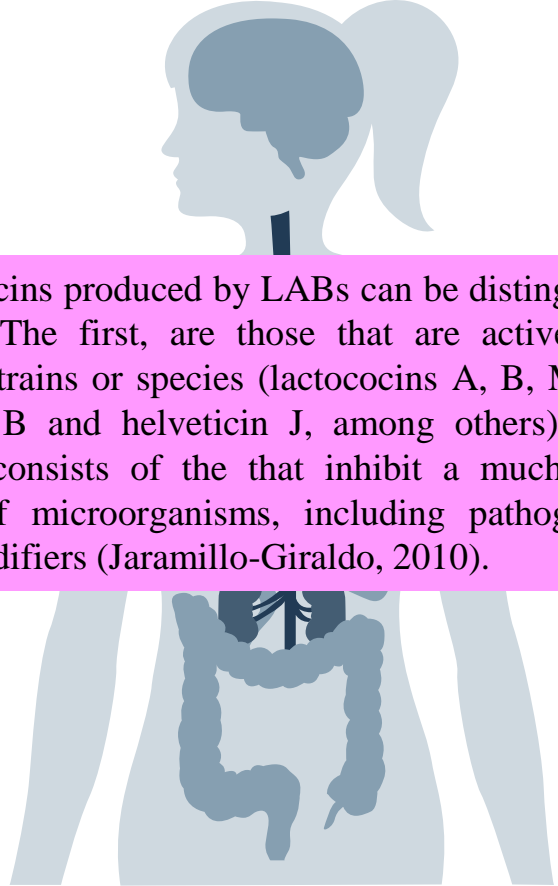
Some groups of probiotics can produce antimicrobial compounds providing an environment not suitable for pathogens. They generate a multitude of substances with antibiotic capacity such as **bacteriocins**.

Figure. . Diseases in which probiotics have a beneficial effect. Source: Adapted from (Ortíz, 2018). Own elaboration with data from <https://biorender.com/>

Bacteriocins

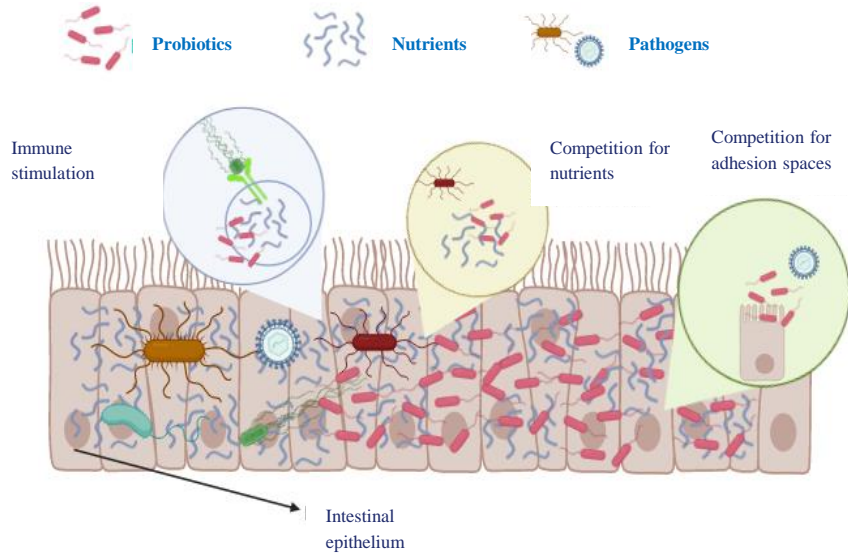
They are protein toxins synthesized by bacteria. There are numerous bacteriocins produced by LABs and each have particular inhibition spectra.

They have an antimicrobial activity even in pathogenic bacteria.



Bacteriocins produced by LABs can be distinguished 2 groups: The first, are those that are active against related strains or species (lactococins A, B, M and G, lactacin B and helveticin J, among others) and the second consists of the that inhibit a much broader group of microorganisms, including pathogens and food modifiers (Jaramillo-Giraldo, 2010).

Role of probiotics in the immune system.



The microorganisms of the microbiota constitute a protective barrier in the mucosa of individuals since they confer a first line of defense against pathogens: **the microbiological barrier.**

This barrier of microorganisms generates the well-known mechanism of microbial antagonism, that is, it prevents the establishment of external microorganisms to our system, which can be pathogenic and can act on our mucous membranes.

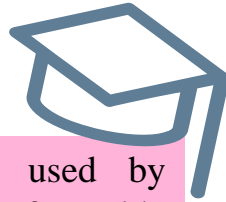
Figure. Microbial antagonism of probiotics and pathogens in the intestinal epithelium. Source: Adapted from (News, 2015). Own elaboration with data from <https://biorender.com/>



There are studies that affirm the fact that certain probiotics can improve the answer to the vaccine against influenza; With revised experimentation and meta-analysis, it was concluded that, when administered by the digestive route, they improved seroconversion and seroprotection in vaccinated adult patients.



That is, the protection obtained by the vaccine was verified, and they showed significant improvements against the H1N1 strain. The effective probiotic bacteria in the study were different strains of *L. fermentum*, *L. casei*, *L. casei Shirota*, *L. paracasei*, *L. rhamnosus GG*, *L. plantarum*, *B. longum* y *B. animalis* (Lei et al. 2017).



The study confirms that the mechanism used by probiotics to exert their immune effect is the favorable induction of activity in phagocytes and NK cells, and the secretion of IgA in mucosa.

Also, the peptidoglycan components of probiotic bacteria and their metabolites, short chain fatty acids, act on the epithelium and the intestinal microbiota, modulating the immune response. The increase in mucosal IgA secretion is important in the prevention of influenza virus infection.

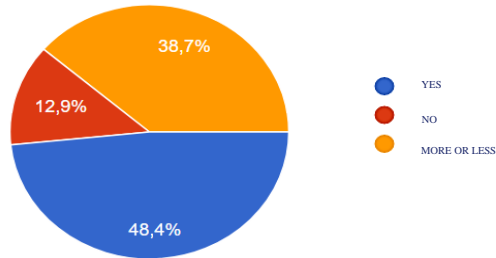
Pilot Survey

According to the bibliographic review described above, it was decided to carry out a pilot survey to obtain a broader and more accurate picture of the opinion of people interested in the benefits that probiotics provide, for this particular case, to strengthen the immune system and thus way to prevent the spread and spread of COVID-19 disease, as well as other infections.

The survey was carried out in a Google form, and distributed to a total of 62 people between 15 and 53 years old.



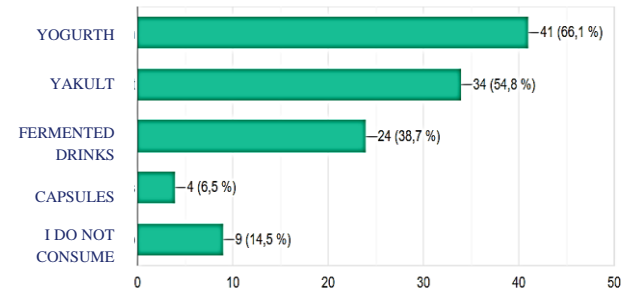
Do you know the benefits of probiotics?



We note that of the 62 people surveyed, 48% answered yes, and 39% answered more or less, the rest said no.

Graph. Source: Own elaboration.

In what presentation do you consume them?

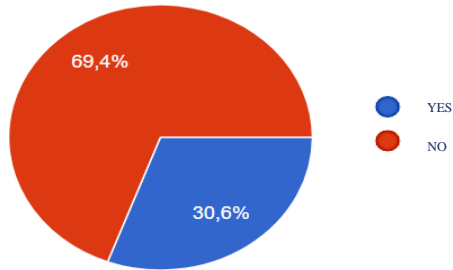


It is reflected that yogurt and Yakult are the most consumed beverages of those surveyed.

Graph. Source: Own elaboration.

Pilot Survey

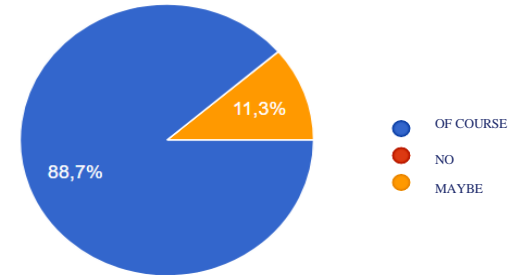
Do you consume any type of vitamins or another type of drug to strengthen your defenses?



The large percentage (69.4%) of people who do not consume any vitamin or any defense-strengthening drug is observed.

Graph. Source: Own elaboration.

If it was scientifically proven that probiotics help strengthen your immune system and thus prevent you from getting sick with COVID-19, would you consume more of them?



It is strongly appreciated with an affirmative response from a total of 55 people of the 62 respondents and only 7 responded perhaps.

Graph. Source: Own elaboration.

Conclusions

The efficacy of most vaccines is high, however, they are designed to generate an immune response that will protect the vaccinated person from future exposures to the disease.

According to the survey carried out, it was found that thanks to this research project it was possible to publicize the benefits of probiotics to increase immunity, and avoid bacterial and viral infections such as COVID 19, so that their consumption could help us not to get sick, or lessen the symptoms of the disease.

There are studies carried out against the H1N1 influenza disease, based on the use and application of probiotics, resulting in beneficial effects.

This makes clear a panorama that it would be very useful to study these microorganisms because it has sufficient bases to justify the investigation of probiotics in the face of the COVID-19 disease, and in that way we can prevent, which is the first option.

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