

# The Effect of Nutrition on Immune System Review Paper

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## Introduction

The most basic definition of immunity is the ability of the organism to resist the invasion of microorganisms and harmful substances. Blood plays an important role in immune development due to the presence of certain types of white blood cells in the blood and in some other tissues have the ability to eliminate strange organisms and destroy it as well the blood plasma contains antibodies made by certain immune cells to resist any strange proteins or any other substances linked to proteins, such proteins that stimulate the body tissues to form antibodies called antigen generators or antigens. Some objects work on precipitation these strange proteins to isolate them, so it called precipitins, while others work on the conglomerate of microorganisms or red blood cells. These are called agglutinins, while some act on neutralizing of toxins, called antitoxins. Immunizations are either natural immunity or innate immunity or acquired immunity. When the body resists the invasion of a particular species of microorganisms for the first time, it will have natural immunity, But the immunity acquired by the individual as a result of immunizations or vaccination of such microorganisms is known as acquired immunity, However, acquired immunity may be natural or artificial. The immunity generated in the individual an actual measles infection is known as naturally acquired immunity, but the immunity that is formed as a result of vaccinating the individual of typhoid or diphtheria vaccine is artificially acquired immunity (1, 2, 3, 4, 5). However, acquired immunity may be natural or artificial. The immunity generated in the individual following an actual measles infection is known as naturally acquired immunity (6).

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## 1. Colostrum and strengthening the immunity of infants

First, Colostrum is the breast secretion that follows the release of mature milk, which is different in form and nutritional properties, it is a yellow liquid water, but it forms a high degree of immunity to infants by affecting it on the digestive tract more than its absorption in the blood later. The colostrum is exposed from 5-10 days after birth for changes in the chemical composition and its natural properties until it reaches at the tenth day to its natural properties of mature milk (7, 8).

It is worth mentioning that the materials responsible for the anti-infection properties in the mother's milk are the colostrum particles which are stable in the acidic environment of the stomach and resistant to digestive enzymes (9), including lysozymes, which has a concentration of 300 times compare to what is found in cow's milk, which attacks and destroys the cell membranes of bacteria after inhibition it with peroxides found in breast milk, infant saliva and vitamin C found in colostrum (10), in addition, lactoperoxidase which kills *Streptococcus* bacteria (11).

Another group of cells that have a protective role which are macrophages, these molecules are not absorbed but they improve the immune system of infants by protecting them from pathogenic bacteria and viruses such as influenza, diphtheria, and poliomyelitis (12), these cells also create complements, which are a protein that enters a series of reactions that produce immunity against infectious organisms (13).

Lactoferrin is a protein containing iron that has immunological properties, it is found in colostrum and mature mother's milk, this substance inhibits the growth of *E. coli* and *Staphylococcus* bacteria by binding the iron that necessary for the growth of these bacteria, in case of addition of iron to the meal food, the lactoferrin becomes saturated and any additional iron in a free state supports the growth of infectious organisms, so children who take iron supplementation are then exposed to infection (14, 15).

On the other hand, there is a carbohydrate-containing nitrogen found in breast milk is the *Lactobacillus bifidus* factor and this substance creates an encouraging environment in the digestive tract activates the growth of *Lactobacillus bifidus* bacteria, and these bacteria produce acetic acid or lactic acid from lactose, which inhibits the growth of pathogenic microbes, which reduces the infant's susceptibility to infectious diseases and inhibits the growth of *E. coli* (16, 17).

Lactulose exists in large quantities in mother's milk, which is derived from lactose, it is found in larger quantities in heat-treated cow's milk comparing to non-heat-treated cow's milk. It is worth mentioning that *Lactobacillus bifidus* grows when eating a rich meal of high lactose and low protein, and the ratio of lactose/protein in breast milk is 1:7 compared to bovine milk 1:4. (18).

In addition, a group of proteins (Immunoglobulins) in breast milk play an important role in protecting the body against infectious diseases such as IgA, which are present at high concentrations in the early days of the infant's life, because they contain many antibodies that act as anti-viral, antibacterial against pathogens, which are