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Opinion Article

Foods and COVID-19

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The unexpected, long and violent pandemic from SARS-COV-2, or COVID-19, requires a profound reflection on the relationship between food, balanced nutrition and the general health status.

Although this relationship is a substantial part of our subconscious, it has not yet been sufficiently explored and unfortunately only superficially shared with the real beneficiaries or consumers.

We know that on January 30, 2020, WHO declared COVID-19 a public health emergency of international concern that represents a high and uncontrollable risk especially for countries with poor and vulnerable populations.

Despite rigorous social containment measures through varying degrees of quarantine or lockdown, the incidence of COVID-19 infections continues to rise. The Emergency Committee stated that the spread of COVID-19 and its more severe symptoms and courses can be countered by early diagnosis, social isolation, targeted and timely pharmacological treatment and the implementation of a robust contact tracing system.

In the light of these sudden health emergency and urgent needs in the prevention and control of the COVID-19 pandemic, it is necessary to reflect on two aspects concerning the close relationship between food and COVID-19.

The first question all consumers ask to be solved is to assess if foods can be a possible vector for the disease transmission in humans through the food chain.

The second strong doubt consumers often raise is if foods can represent a further strategy tool for containing the virus infection alongside with those more conventional ones already in place or on the way from the various research sectors involved.

The premise for giving scientific and databased answers to these questions is to better understand COVID-19 in order to better counteract it.

The chronology tells us that around the end of 2019 in the city of Wuhan, Hubei province in China, an inexplicable increase in cases of pneumonia with an unknown etiology, highly contagious and very often with a fatal course, was reported. The culprit was identified in an unknown strain of Coronavirus, an animal retrovirus from the same large family as the viruses that cause zoonoses and which have been the well know cause of Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). This viral strain was named SARS-CoV-2, and according to the recommendations of the World Health Organization (WHO), the clinical condition related to the infection was termed Coronavirus Disease-2019 (COVID-19).

The origin of the epidemic was identified in a local Chinese wet market where seafood, bats, frogs, snakes, birds and other wildlife were sold without any hygienic control. The type of market, where the slaughter takes place on the spot and where the basic rules of hygiene are not applied probably allowed the Coronavirus to make the leap of species spreading among the people connected to this market.

The evidences of COVID-19's genomic similarity with the SARS-like bat viruses made bats suspected as the most likely reservoirs of this Coronavirus type. Further homology studies indicated that SARS-CoV-2 receptor binding spike glycoprotein as a recombinant product between SARS-CoV and an as yet unknown Beta-CoV, thus suggesting that SARS-CoV-2 originating from bats required additional hosts intermediate animals for the leap of species in humans.

These results suggested that the new Coronavirus could use the same receptor of SARS-CoV, the Angiotensin Converting Enzyme 2 Receptor (ACE2R), to enter the cells and infect new hosts and spread among humans.

Although the origin of SARS-CoV-2 still remains elusive, the new virus revealed an impressive human-to-human viral spread and the disease spreads rapidly among individuals even not directly in contact with the primary source of infection. As with other respiratory infectious diseases, COVID-19 spreads primarily through the respiratory tract via droplets, respiratory secretions and direct contact, in addition the presence of SARS-CoV-2 in blood and fecal swabs generates fear and concerns regarding these other possible modes of transmission.

The focus of this reflection is on the theme relating to food as a vehicle for the transmission of this zoonosis as it has been demonstrated in other forms of toxic infections due either to bacteria or viruses. In the case of COVID-19, the World Health Organization (WHO), the European Food Safety Authority (EFSA), the Higher Institute of Health of the Italian Ministry of Health (ISS) agree that the agri-food chain is not the main way to spread COVID-19.

The molecular structure of the SARS-CoV-2 virus allows the viral load to be completely removed when the virus is exposed for a few minutes to temperatures of at least 70°C. This intrinsic weakness of COVID-19 means that products intended for cooking can be washed carefully and then safely used.

Industrial processes for food production often require pasteurization or sterilization phases carried out at temperatures above the deactivation limit of COVID-19. Therefore, these temperatures significantly reduce the viral load in industrial food products that can thus be considered intrinsically safe.

In fresh food products such as fruit and vegetables, the presence of the virus on the external surface cannot be excluded a priori. The presence of COVID-19 may be due to improper application both of hygiene rules and of food prophylaxis by staff involved in food manipulation or even by consumers. Fresh products must be selected and purchased using disposable gloves and, before being consumed, they need to be washed with appropriate alcohol-based sanitizing solutions or with similar products. Food packaging is another crucial point to be considered since it could promote the access of COVID-19 into the food chain. A recent study reported in the "The New England Journal of Medicine" [1], has investigated the resistance of the COVID-19 virus on materials such as plastic, copper, cardboard and steel measured by means of the so-called half-life of the viral load. The results show that coronavirus particles remain viable in the aerosol for about 3 hours taking 60-70 minutes to halve the viral load whereas on a cardboard surface, the common material for takeaway food packaging, the viral load is halved in about 3 hours. In the case of plastic surfaces, COVID-19 halves its viral load in about 7 hours whereas on steel surfaces the residence time is 72 hours being the half-life of about 6 hours.

Packaging improvements can be obtained by the introduction of active materials to protect foods and neutralize the viral load possibly present on the external surface. Production processes can also be improved by introducing new microbiological control points.

The tracing processes of the agri-food chain can be strengthened by reducing significantly the response time by the control and security staff. In addition, it is also important to transfer the basics of food hygiene to the school population as well as to create appropriate sites to combat fake news that can mislead consumers.

Scientific evidence has also proved that drinking water is not a carrier of SARS-CoV-2 in developed countries due to the advanced water purification practices adopted. Therefore, there are no health reasons that can justify the choice of mineral waters, except for personal taste.

It is thus clear that foods cannot be considered vectors of contamination. On the other hand, in the context of a healthy nutrition, foodstuffs can be convenient sources of functional components that can support prophylaxis or pharmacological protocols applied in the clinical path against COVID-19.

Unfortunately, much fake news is still circulating on this topic: biological antiviral activities are attributed, without any scientific evidence, to different molecules present in food, usually vegetable and / or botanicals.

This fanciful and erroneous news probably arises from the great request for information regarding the possible role of food in the reduction of risk from Coronavirus infection.

Foods are very complex systems made up of macro and micronutrients and secondary metabolites that can interact with the organism, cells or metabolism pathways helping to achieve or maintain a well-being state. Some specific compounds or certain classes of compounds have recognized properties and if isolated and concentrated can be proposed as nutraceuticals or food supplements. Among the compounds present in food, for example, vitamin D has a recognized action to strengthen the immune system.

It is important to underline that it is not possible to attribute a specific Coronavirus prevention effect to a single food, or a single compound. However, a component or class of components could play a key role in inhibiting infection. In fact, do to their chemical structure, some compounds could interact with ACE2R, counteracting the action of the virus. In the literature, several studies based on molecular docking hypothesize the ability of some natural compounds occurring in Curcuma sp., Citrus sp., Alpinia galanga and Caesalpinia sappan to bind ACE2R, thus counteracting the mechanism of viral infection. Therefore, phytocomplexes derived from food are proposed as food supplements with prodrugs potential aimed at inhibiting COVID-19 infection.

It is extremely important to clarify to the public opinion all the aspects here reported considering that the world population is exposed to a very serious risk caused by a so far unknown animal virus which has caught the scientific community partially unprepared.

As researchers in the food sector, we are widely aware that the main way to face Coronavirus is to immunize a large part of the population, especially the most fragile one. As it is well known, finding the optimal protocols aimed at the treatment of viral infection takes time: the therapeutic protocols are still in evolution and each COVID case supply new information and new idea to improve the reduction of the COVID symptoms.

The awakening from this health nightmare must also go through the testing and development of prophylaxis protocols as already happened for diseases such as malaria, hepatitis, measles etc. which cause thousands of victims every year. These protocols will be extremely important since, when the pandemic will undergo the natural flattening phase, non-immune subjects will be dangerously at risk. In this context, on this last front of prophylaxis, the hypothesis of supporting therapeutic protocols with foods, in their possible forms, including supplements and or botanicals, should not be neglected.

Food is a complex matrix that offers numerous facets that in turn become focuses for further study in different topics. The food production, safety and quality of food, technological aspects, the contribution of foods to the well-being and health of consumers are only some of the most consolidated investigation fields that should also include evaluation of food nutraceutical potential, drug / food interactions, improved bioavailability and equilibrated formulations of different natural components. The food community that studies food from a chemical, health and innovation point of view must be as the main interlocutor to better investigate the role of food both in a normal context and in a sanitary emergency phase as it is today.

Refernces

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