

# COVID-19 and Food Safety Management Systems

## COVID-19 ve Gıda Güvenliği Yönetim Sistemleri

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**ABSTRACT** On January 30, 2020, the World Health Organization (WHO) announced coronavirus disease-2019 (COVID-19) as an international public health concern. Currently, due to COVID-19 the world is facing a remarkable danger. As proposed by WHO, many countries have applied physical distancing together with the obligatory use of mask as a practice to stop the transferral of the disease. Within these measures, people working in many branches of business carry out their work from their homes without going to their workplaces. Nevertheless, healthcare specialists and people working in the food industry sector, in the absence of the opportunity to work from home still continue working in their normal workplaces. So far, data suggest that the virus cannot be transmitted through food, but since the virus can remain viable in plastic and packages, the application of food safety management systems remains highly important. The possibility that food can be cross-contaminated is important in order to take the necessary preventive measures. Reinforcement of personal hygiene rules, raising awareness of their importance, and application of good practices is essential to lower the risk of the virus entering the food chain.

**ÖZET** Dünya Sağlık Örgütü (DSÖ) 30 Ocak 2020 tarihinde, koronavirüs hastalığı-2019 [coronavirus disease-2019 (COVID-19)]'ni uluslararası halk sağlığı sorunu olarak ilan etti. Şu anda dünya ülkelerinin tamamı, şiddetli akut solunum sendromu-koronavirüs-2 virüsünün neden olduğu COVID-19 pandemisinden büyük bir tehditle karşı karşıya bulunmaktadır. Birçok ülke, hastalığın bulaşmasının azaltılma yollarından biri olarak, fiziksel mesafe ve diğer önlemler konusunda DSÖ'nün tavsiyelerini takip etmektedir. Bu önlemler çerçevesinde, birçok iş kolunda çalışan insanlar işlerini, iş yerlerine gitmeksizin evlerinden yürütmektedirler. Bununla birlikte, sağlık uzmanları ve gıda endüstrisi çalışanları, evden çalışma şansına sahip değildir ve her zamanki gibi iş yerlerinde çalışmaya devam etmeleri gerekmektedir. Şimdiye kadar virüsün gıda yoluyla bulaşabileceğine dair bir kanıt yoktur, ancak virüs plastik ve ambalajlarda yaşayabildiğinden dolayı üretimde gıda güvenliği yönetim sistemlerinin uygulanması oldukça önemlidir. Gıdalarla çapraz kontaminasyon olasılığının bulunması, bulaşmanın önlenmesi açısından gerekli önleyici tedbirleri almayı önemli hâle getirmektedir. Virüsün, gıda zincirine girme riskini azaltmak için bireysel hijyen kurallarının güçlendirilmesi ve önemli konusunda farkındalığının artırılmasıyla iyi uygulamaların yerine getirilmesi gereklidir.

**Keywords:** COVID-19; food safety; public health practices; HACCP

**Anahtar Kelimeler:** COVID-19; gıda güvenliği; halk sağlığı uygulamaları; HACCP

Viruses are microorganisms that differ in size from 0.02 to 0.4 micrometres. They are obligate intracellular parasites which means that they require a susceptible host in order to realize their metabolic activities.<sup>1,2</sup> Viruses can be transmitted in different ways. Transmission of viruses is dependent not only on their interaction with the host, but also on the interaction with the environment. Factors such as temperature, moisture, and pH significantly affect the stability of the virus in the environment. They can be

transmitted via respiratory droplets (aerosols) or by the faecal-oral route from the infected individuals. In addition, other routes of transmission have been demonstrated such as; sexual intercourse, contaminated blood, contact with infected animals or via vectors.<sup>2,3</sup>

From time to time, it is difficult to determine the ways of transmission of a virus, which is often a point of discussion between researchers. Moreover, uncommon situations may become the cause of a non-

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typical way of transmission especially for respiratory viruses. For example, it is confirmed that environmental contamination by faecal matter had an important role in the transmission of severe acute respiratory syndrome (SARS) coronavirus (CoV) outbreak in China.<sup>4,5</sup> Evidence suggests that contaminated fomites also play a key role in the spread of respiratory viruses.<sup>6,7</sup> Food represents a potentially probable course of transmission for emerging zoonotic respiratory viruses such as CoV (SARS) and influenza virus.<sup>8</sup> Such a situation was encountered during the SARS outbreak of 2002-2003 in southern China, where there was continual concern that the SARS CoV could be transported between countries by food.<sup>4</sup> Mainly, these viruses do not only persevere in the environment but also can withstand food production processes which intends their control and inactivation. As well, some viruses even though their typical mode of transmission is different on occasion they may be transmitted via food. Such an occurrence has been recorded for SARS-CoV and highly pathogenic avian influenza virus.<sup>3</sup>

This study intends to demonstrate the ability of COVID-19 to survive and be transmitted via food and to identify the measures to be taken in food establishments.

## ORIGIN AND TRANSMISSION OF COVID-19

CoVs belong to the family Coronaviridae. They are a large family of single-stranded RNA surrounded by an envelope. Depending on genetic investigation, CoVs are classified into four genera, the Alphacoronavirus, Betacoronavirus, Deltacoronavirus, and Gammacoronavirus. Based on sequence identity, the new SARS-CoV-2 belongs to Betacoronavirus genus.<sup>9</sup> The first description of a CoV was provided in 1931 by veterinarian Dr. Oskar Seifried; as the responsible virus for causing Infectious Bronchitis (IBV).<sup>10</sup> IBV is known to cause infection in the upper respiratory tract, but also associated with infections of the reproductive and renal systems in poultry.<sup>11</sup>

In humans, several CoVs are associated with respiratory infections ranging from a mild degree to more complex diseases. To date, the most deadly of the known CoVs are SARS, Middle East respiratory syn-

drome (MERS), and COVID-19 and they belong to the genera Betacoronavirus.<sup>12</sup> Genetic sequence relates COVID-19 with another CoV found existing in Rhinolophus bat (Horseshoe Bat) communities. However, further research is needed to determine the ways in which this virus is transmitted to humans, to discover the source of the virus, and demonstrate the potential role of an animal reservoir in the spread of this disease.<sup>13</sup>

In December 2019, human cases of unknown origin pneumonia were reported in Wuhan City, Hubei Province of China. A new CoV was identified as the responsible agent by Chinese Authorities. The COVID-19 has been named by the International Committee on Taxonomy of Viruses as SARS-CoV-2. Since then, the number of announced cases has increased and the disease caused by COVID-19 has been declared by the World Health Organization (WHO) to be pandemic.<sup>13</sup>

The advancing outbreak of SARS-CoV-2 in a short time has caused to a great extent more infections than SARS or MERS. This may be because a significant percentage of patients in the very beginning of the infection do not become seriously ill thus resulting in the lack of early diagnosis. According to the WHO, the most common symptoms accompanying the infection are pyrexia, fatigue, and a dry cough. In some cases, it may be accompanied by several pains, nasal congestion, rhinorrhea, sore throat or diarrhea.<sup>14</sup>

## TRANSMISSION

So far, the evidence suggests that human-to-human remains the predominant route of transmission. Current assertion reveals that COVID-19 is transmitted through the contact with respiratory droplets.<sup>14</sup> Transference by asymptomatic portors also is not excluded. It is proclaimed that an asymptomatic carrier who travelled from the epidemic center of Wuhan was likely responsible for the infection of the other members of the family with COVID-19 once back home.<sup>9</sup>

Contact is another route of transmission. Droplets from infected persons may also come down on surfaces where the virus could remain viable; thus, the immediate environment can be a possible source of transmission.<sup>15</sup>

The fecal-oral route can be a possible transmission way. Approximately 2-10% of confirmed cases were accompanied by diarrhoea.<sup>16</sup> The data indicate that SARS-CoV and MERS-CoV remain viable in environmental conditions that eases oral-fecal transmission.<sup>17</sup>

Although persistence in the water is possible, to date there is no confirmation COVID-19 to be transmitted through contaminated drinking-water. SARS-CoV-2 is an enveloped virus and appears to be susceptible to oxidants, such as chlorine. High temperatures, high or low pH levels, sunlight and common disinfectants (such as chlorine) facilitate the inactivation of the virus.<sup>15</sup>

Cases of dogs and cats (and a tiger) after close contact with infected humans, have tested positive to COVID-19. Studies have shown that cats have been more sensible to the virus and were able to transmit the infection to other cats. So far, data indicates that chicken and pigs are not susceptible to SARS-CoV-2 infection.<sup>13</sup>

## POTENTIAL TRANSMISSION OF COVID-19 VIA FOOD

Like all viruses, for CoVs also food presents a transient phase where they cannot proliferate; they need a human host to do so. Up to this point, food does not pose a risk of infection with COVID-19. Research done in laboratory conditions suggests that the virus is able to save its viability for almost 72 hours on plastic and stainless steel, four hours on copper materials, and 24 hours on cardboards.<sup>14</sup>

At the community level, bakery goods represent an important route of transmission of COVID-19. CoVs can generally reach bakery products through an infected person sneezing or coughing directly on them. Since the virus can save its viability up to 24 hours on cardboard, transmission through money remains a possible way.<sup>18</sup> Taken this into consideration especially in developing countries, measures such as avoiding contact with money in bakery stores or while one person distributes the product the other can work in the cash register, can result in a successful break in the circle of transmission.

## FOOD WORKERS AS POTENTIAL TRANSMITTERS OF COVID-19

Unlike the rest of society, food industry employees do not have the chance to work from home. In this context, it is important that personal hygiene and health are crucial to carry on a hygienic food processing environment. The health of workers who are engaged in the food production and supply chain is principal in preventing the contamination and spread of disease. The application of Food Safety Management Systems (FSMS) based on the Hazard Analysis and Critical Control Point (HACCP) principles help in assuring food safety through the control of food safety risks. FSMS are strengthened by prerequisite programmes that cover good hygiene practices, good manufacture practices, cleaning and disinfection, segmentation of processing areas, supply control, storage, administering and transport and personal cleanliness.<sup>14</sup>

In these conditions, it is obligatory for the food industry to strengthen personal hygiene actions and arrange appropriate education on food hygiene fundamentals in order to prevent the transmission of the virus from food workers to the working environment and food packaging materials.

## FOOD SAFETY MANAGEMENT SYSTEMS

EU legislation requires that all food business operators apply a system established on HACCP principles.<sup>19</sup> HACCP is a systematic food safety assertion system used to identify, evaluate and prevent food hazards. The HACCP system consists of 7 principles and 12 stages of implementation.<sup>20</sup> HACCP can be used in accompaniment with good practices. Food and Agricultural Organization described good practices as a collection of particular methods that supports and forms the basis of HACCP implementation.<sup>21,22</sup>

Good Manufacturing Practices (GMP) are important in order to assure the manufacture of safe food. This process is a legal and moral responsibility of the food businesses.<sup>23</sup> GMP consist of practices that guarantee a quality system, allow a consistent manufacturing and control of products by qualitative criteria, and compatibility assessing criteria with the intended purpose. It is the responsibility of the quality assurance to

guarantee that food products are consistently manufactured and controlled in accordance with the appropriate quality standards.<sup>21</sup>

Likewise, Good Hygienic Practices (GHP) comprise a set of instructions that define measures to be undertaken and hygienic state to be carry out and keep track of, at all steps of the food chain. Both GMP and GHP represent a necessity for the implementation the HACCP system.<sup>24</sup>

#### CLEAN AND SANITIZE

■ Like other CoVs, it is expected that COVID-19 is also susceptible to sanitizers and disinfectants registered by the Environmental Protection Agency (EPA). The EPA has a listing of registered sanitizers labeled for use to fight the novel CoV. It is important that all food contact surfaces such as utensils and cutting boards must be washed, rinsed, and sanitized often throughout the day.

■ All areas not in contact with food, such as tools, counters, menus, tables, chairs, bathrooms, and doors should be cleaned and sanitized often. Wash, rinse and sterilize all non-food places contacted by workers and customers at the end of the day with effective disinfectants.

■ Increase the frequency of cleaning and disinfecting customers' contact areas in order to help protect employees and clients.

■ Think about removing ornamental items, and other unneeded objects from benches to permit for thoroughgoing sanitization of surfaces.<sup>25</sup>

#### INCREASE HAND HYGIENE

Remains crucial for the food sector to strengthen individual hygiene measures to prevent the transmission of the virus from food workers to the working environment and food packaging materials. Wearing disposable masks and gloves, effective and frequent hand washing at every phase of food processing, manufacturing, and marketing can be efficient in minimizing the spread of virus.<sup>14</sup>

#### PHYSICAL DISTANCING

Physical distancing in the workplace is principal to decrease the span of COVID-19.<sup>14</sup> It is suggested to

keep a social distance of at least one meter between individuals.<sup>26</sup>

#### MONITORING

Another important issue is the training of employees to be able to notice and identify early symptoms so that they can query testing, proper medical care and cut down the risk of spreading the virus. The most typical symptoms include:

- Temperature exceeding 37.5°C,
- Cough,
- Struggle in inhalation,
- Lethargy.<sup>14</sup>

#### CONTROL MEASURES

Workers that are possibly sick or appear to have the symptoms matching COVID-19 should be tested and if the result is positive, they should undergo quarantine and necessary medical treatment. At the same time, employees who are family members with symptoms matching COVID-19 should also stay at home and take the precautions mentioned above.<sup>25</sup>

#### OTHER MEASURES

Since so far it is known that the virus can persist on surfaces, it is important to highlight some measures, such as:

- First of all, after touching the raw materials or packages, washing hands thoroughly with soapy water (at least 20 seconds),
- Keep away from touching the nose, mouth and eyes with dirty hands,
- Avoid consuming open products,
- Cooking at high temperatures (72°C),
- Vegetables and fruits should be washed thoroughly.<sup>14</sup>

#### CONCLUSION

Ensuring food safety in the times of COVID-19 pandemic is a moral responsibility. If we perform sufficient training and education in the importance of hygiene in working environment we will be able to prevent the virus transmission cycle. So far, it remains unknown whether COVID-19 will disappear,

similar to SARS, or become a confirmed disease that will follow seasonal appearance.

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### Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

### Authorship Contributions

All authors contributed equally while this study preparing.

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