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COVID-19 pandemic in food safety perspective

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Gıda güvenliği perspektifinde COVID-19 pandemisi

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Öz

"Yeni koronavirüs hastalığı 2019" olarak da bilinen COVID-19, resmen "SARS-CoV-2" olarak adlandırılan solunum yolu hastalığıdır. 5 Ağustos 2020 itibariyle dünya üzerinde 18,4 million onaylanmış vaka ve 692.000 ölüm ile pandemiye sebep olmuştur. Covid 19 dünya genelinde artan vaka sayları ile birlikte panik ve karantina sonuçlarına bağlı olarak ekonomik ve insan aktiviteleri üzerine olumsuz etkiler doğurmuştur. Bu etkilerin hissedildiği en nemli konulardan biri de gıda güvenliğidir. Her ne kadar bulaşmanın klasik olarak enfekte bireylerin öksürme veya hapşırma esnasında havaya saçılan aeroseller içerindeki virüslerin alınması ile gerçekleştiği bilinse de virüsün ambalajlı ve/veya ambalajsız gıdalar üzerinde taşınabileceği dikkat edilmesi gereken bir noktadır. Nitekim yetkili otoriteler bunu göz ardı etmeyerek gıda güvenliğinin sağlanmasında bir takım öneri ve tavsiyelerin bulunduğu raporları güncel olarak hazırlamaktadırlar. Bu bağlamda mevcut derlemede COVID-19'un bulaşması, gıdalardaki varlığı ve dekontaminasyonuna dair mevcut bilgiler ele alınmıştır.

Anahtar kelimeler: COVID-19, gıda güvenliği, risk değerlendirmesi

Abstract

COVID-19, also known as "new coronavirus disease 2019", is a respiratory disease formally called "SARS-CoV-2". As of August 5, 2020, it caused pandemics with 18.4 million confirmed cases and 692.000 deaths worldwide. COVID-19 has had negative effects on economic and human activities due to panic and quarantine results with increasing number of cases worldwide. One of the most important topics in which these effects are felt is food safety. Although it is known that the transmission is carried out by taking viruses in the aerosols emitted into the air during the coughing or sneezing of infected individuals, it is not overlooked that the virus can be transported on packaged and/or unpackaged food. Hence, the competent authorities do not ignore that the virus can spread by packaged and/or unpackaged food between population and prepare reports that have some suggestions and recommendations for ensuring food safety. In this regard, this review discusses of presence in foods and contamination /decontamination of the COVID-19 by the up to date knowledge.

Keywords: COVID-19, food security, risk assessment

Introduction

Coronaviruses are a large group of viruses which is responsible for serious infections at different severities. Coronaviruses (CoVs) with RNA under the Order Nidovirales are divided into 4 classes: Alpha (α-), Beta (β-), Gamma (δ-) and Delta (γ-). Of these, α- and β-CoV strains are known to infect mammals, whereas δ- and γ-CoVs infect birds (Kim et al 2020). The last two viral pneumonia outbreaks, especially caused by β-CoVs, have caused Severe Acute Respiratory Syndrome (SARS) and the Middle East Respiratory Syndrome (MERS) worldwide causing epidemics (Petrosillo et al 2020). In late December 2019, a massive pneumonia case occurred in Wuhan, China, which caught the attention of health officials, but was unexplained. Following this case, on December 31, the China Center for Disease Control and Prevention sent a quick response team to Wuhan and possible causes were investigated. As a result of epidemiological research, they pointed out that the cases may be related to the South China seafood market in Wuhan, and on 1 January, the local government shut the South China seafood market downed and asked for the active investigation and emergency surveillance of cases (Wu et al 2020). On January 3, the outbreak informed to World Health Organization (WHO) by Chinese government. By January 7, 2020, this factor was identified as a new Coronavirus (2019-nCoV) that was not previously detected in humans. From here on, the 2019-nCoV disease caused by the agent was adopted as COVID-19 by taking a new name. In addition, this virus has been named SARS-CoV-2 because of its similarity to SARS CoV. A global epidemic was declared by the World Health Organization on March 11, 2020, with intense virus cases in various countries in Asia-Pacific, North America and Europe in the coming days (CSG 2020).

Increasing number of cases worldwide has had negative effects on economic and human activities due to panic and quarantine results. This has been observed with pandemics in the past. In particular, agricultural activities have been one of the titles most affected by emerging outbreaks. The emergence of hunger or malnutrition as a result of the outbreak will not be a surprise (Siche 2020). No confirmed cases of COVID-19 contamination with food have yet been reported. Therefore, the American Food and Drug Administration (FDA) has examined the effects of COVID-19 in terms of food safety under two main headings: food supply and food demand (FAO 2020). In this regard, measures to ensure the continuous functioning of the food supply chains, to secure the food supply, and to prevent the food crisis in countries with difficulties in food and nutritional safety will be very important. On the other hand, although COVID-19 is a respiratory-type disease, not with the gastrointestinal tract, it appears to be an alarming situation for the average food consumer in terms of food safety. Considering this situation, which is very important for human development and nutrition, this study describes the offering of a solution of COVID-19 pandemic and analyzing its effects on food safety.

Transmission of COVID-19

The most common conventional form of transmission of COVID-19 is through person-to-person contact and droplets in sneeze and coughs. However, it is important to identify the source of contamination and to develop strategies to prevent the spread of this infection. In this context, various researchers have conducted on living things that are thought to contribute the emergence of the infection. Initially, researchers assumed that raccoons, dogs and musk rats are a crucial infection reservoir. Indeed, the presence of viral RNA in samples isolated from musk rats in the food market where the infection was first reported (Kan et al 2005). This suggests that musks may be secondary hosts. A later study reported that Rhinolophus bats had anti-SARS-CoV antibodies (Shi and Hu 2008). In addition, a group of researchers have suggested that snakes are potential hosts (Lu et al 2020), but the genomic similarity findings of the SARS-like bat viruses and the new coronavirus have revealed that bats may be key reservoirs, not snakes (Chan et al 2020). Despite this information, further studies are needed to identify the intermediate zoonotic source that causes the virus to be transmitted to humans (Shereen et al 2020). However, what is certain that the spread of COVID-19 from person to person is the same as in other respiratory viruses. It is thought that the virus detected to cause COVID-19 is transmitted to healthy individuals by the droplets spread by infected individuals during coughing and/or sneezing. These droplets can land in the mouths or noses of people who are nearby or possibly inhaled into the lungs. Despite this information, recent studies have shown that the virus easily detect in the nasolacrimal ducts and later in the respiratory system due to the fact that the posterior tissues of the eye contain an important receptor of the virus, angiotensin-enzyme II (ACE2) (Qing et al 2020). The available data show that further studies are needed to expose all reasons involved in the transmission of the virus in the background.

Presence of COVID-19 in foods

Foods may initially be contaminated with the surface that they contact at the beginning of the processing step. Hence, the main contamination factors during food processing are air and materials such as plastic packages, machines, etc.. The majority of current studies on the persistence of SARS-CoV-2 on surfaces have been performed on surrogate human Coronavirus strain HCoV-229E (Carraturo et al 2020). A study investigating the determination of SARS-CoV, which shares high phylogenetic similarities with SARS-CoV-2, in paper, plastic, wood metal and aluminum, revealed that this pathogen with 105 viral titers can survive for 4-5 days at room temperature (Kampf et al 2020). According to the same study, it has been stated that endemic human coronaviruses

(HCoV) can survive on surfaces such as glass, plastic or metal for up to 9 days. In another study, the half-life of SARS-CoV-2 in polypropylene material reported to be 6.8 hours under 21-23 °C and 40% relative humidity conditions (van Doremalen et al 2020). On the other hand, Chin et al (2020) reported that 102 TCID50 (Median Tissue Culture Infectious Dose) viable SARS-CoV-2 per ml was detected for 7 days after inoculation of SARS-CoV-2 with viral titer of 107.8 TCID50 per ml on plastics under conditions of 22 °C and 65% relative humidity. Warnes et al (2015) reported that the HCoV 229E, with an initial concentration of 103 PFU (Plaque Forming Units), dropped to an undetectable level on polyvinyl chloride (PVC) and polytetrafluoroethylene (PTFE) for 4-5 days. In addition, they suggested that none of live virus could be detected after 2 days on wood or fabric, or 4 days on glass or banknote. Also in a another study on remaining of SARS-CoV-2 on stainless steel, it has been reported that after 48 hours there is a decrease from 103.7 TCID50 to 100.6 TCID50, and it also has a half-life of 5.6 hours on stainless steel under 21 °C and 40% relative humidity (van Doremalen et al 2020). Considering the results of allover these studies, it has been suggested that SARS-CoV-2, MERS-CoV and SARS-CoV survive on surfaces better than influenza virus, whereas SARS-CoV has been suggested to have similar survival times on most surfaces, except for cardboard containing SARS-CoV-2 (van Doremalen et al 2020).

Based on outbreaks caused by Coronavirus species such as SARS and MERS, cases of viral infection from food have never been reported. Also, no SARS-CoV-2 infections transmitted through food have been reported to date. In recent studies, the viability of SARS-CoV-2 in the food matrix is investigated. It has been reported that the HCoV 229E, which was inoculated to iceberg lettuce, can no longer be detected after 4 days at +4 °C (Yépiz-Gómez et al 2013). In addition to that, it determined that there was no viral load on strawberry samples immediately after HCoV 229E inoculation. MERS-CoV RNA and MERS-CoV antibodies were detected in dromedary camel milk, although they were very low in quantities for testing virus isolation (Reusken et al 2014). In a similar study, it has been reported that the milk in which MERS-CoV is experimentally inoculated is a gradually decreasing trend in viral titer for several days at +4 °C. In addition, heat treatment applied to camel milk containing MERS-CoV (30 minutes at 63 °C) has been shown to reduce infectious virus levels (van Doremalen et al 2020). Shellfish, which are generally consumed uncooked, can collect viral particles from water and accumulate biologically. Therefore, observation of SARS-CoV-2 in seawater and shellfish poses a potential risk for food processors and consumers (Oakenfull and Wilson 2020). After evaluating this result, the author pointed out that contaminated vegetables could be one of the potential sources for the coronavirus to infect humans. Although COVID-19's main route of transmission is through droplets and close contacts, it has been reported that potential environmental spread through water, bioaerosols and food should also be considered (Carraturo et al 2020).

Conclusion

In summary, we believe that the information about food safety risk caused by COVID will continue to update in the near future. Especially the most of authorities do not deny the spreading way of the virus via packaged and/or unpackaged food between population and also, they prepare reports that have some suggestions and recommendations for ensuring food safety.

Conflict of Interest

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