



Review

Hygienic and safety requisites for consumption a safe food during the pandemic of the Covid-19 disease

Gholamreza Jahed Khaniki, Ali Salehi*

Division of Food Safety and Hygiene, Department of Environmental Health Engineering, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

ARTICLEINFO

Article history:

Received 11 Jun. 2019

Received in revised form

17 Aug. 2019

Accepted 09 Sep. 2019

Keywords:

Covid-19;

Food hygiene and safety;

Human health

ABSTRACT

COVID-19 is a new disease that caused by SARS-CoV-2. It is a highly contagious disease and we are still learning about how it spreads. Food is an integral part of human culture that its safety is very important during an epidemic. This article reviews the covid-19 transmission routes especially through food, nutritional recommendations and hygienic and safety requisites for consumption a safe food during the pandemic of the Covid-19 disease. Finally, we conclude that in order to prevent food contamination with coronavirus, personal hygiene, environmental hygiene and food hygiene should be observed during the epidemic period. Also, to reduce the risk of chronic and infectious diseases during the outbreak, well-balance and variety diet is essential to boost the human immune system.

Citation: Jahed Khaniki GhR, Salehi A. **Hygienic and safety requisites for consumption a safe food during the pandemic of the covid-19 disease.** J food safe & hyg 2019; 5(3):126-130

1. Introduction

In recent decades, several new diseases have appeared in world, with pathogens including Ebola, Zika, Nipah, and coronaviruses (CoV) (1). Coronaviruses (CoV) are a large family of viruses and that cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV) (2). Until 2020, six coronaviruses were known to infect humans include 229E, NL63, OC43, HKU1, SARS-CoV, and MERS-CoV. The first four types of viruses regularly cause infections in the human population and infect the respiratory system with mild symptoms in

children and adults. The other two types (MERS-CoV and SARS-CoV) have more severe symptoms, which appeared in 2002 and 2012, respectively (3). At present, a novel coronavirus has emerged in December 2019, in Wuhan City, Hubei Province of China which may pose a global health threat given the ongoing epidemic in China and other territories (4).

This novel virus is a significant threat to global public health and is entirely different from the viruses responsible for Middle East respiratory syndrome coronavirus (MERS-CoV) and severe acute respiratory syndrome coronavirus (SARS-CoV). The all ways of transmitting this virus have not been determined yet. However, as a general principle, the transmission route of respiratory viruses are mainly through direct and indirect contact with respiratory droplets of infected persons (5).

* Corresponding author. Tel.: +982142933277

E-mail address: salehia15@yahoo.com

Among the first people infected with the virus, it was found that two-thirds of infectious people were linked to the wholesale seafood market in Havana, where live animals are also sold (6,7). The exact origin source of this virus is not yet known. Some researchers have suggested the Huanan Seafood Wholesale Market may not be the original source of viral transmission to humans (8). However, regardless of the primary source of the disease, people are concerned about the virus being transmitted through food (5). Studies have shown that corona viruses are not water and food borne. There is currently no scientific evidence to suggest that the virus can infect us through the digestive system (7, 8). But it is possible for food-related staff to transmit the virus to the food by coughing or sneezing, or transmitting the virus to food through contaminated hands (9). So the main risk of transmission is from close contact with infected people. In this regard, in order to prevent any kind of contamination and quality assurance of food in food production and distribution units, Prerequisite Hygiene Requirements such as good manufacturing practice (GMP) and good hygiene practice (GHP) principles can be effective.

It is noteworthy that the new coronavirus is a respiratory virus which spreads primarily through droplets generated when an infected person coughs or sneezes, or through droplets of saliva or discharge from the nose. Therefore, the virus can survive on surfaces and foods. However, it is not certain how long the virus that causes COVID-19 survives on foods (10). So food hygiene is very important in this regard. This article refers to food safety and hygiene factors during the covid-19 epidemic.

A. 1. Food of animal origin

According to the classifications of the World Health Organization, covid-19 is a zoonotic disease. Therefore, food hygiene of animal origin such as meat, poultry, fish, milk and egg will be important.

"Cross-contamination" is the term used to describe the transmission of microorganism from raw food to cooked food (11). In order to prevent cross-contamination, the following steps should be taken:

- Hand washing before food preparing and cooking for at least 20 seconds

- Washing and disinfection of surfaces and equipment

It is important to distinguish between "cleaning" and "disinfecting". "Cleaning" is the physical process of removing food particles. "Disinfecting" is the process of disinfecting or destroying germs / viruses (12). Regardless, it's always critical to follow the four key

steps of food safety (clean, separate, cook, and chill) to prevent foodborne illness (13). It's also important to washing hands frequently with soap and water before preparing, cooking and eating food.

- Face masks are essential for people who may experience sneezing or coughing during food processing.

- Separate raw foods from cooked foods

- Avoid buying bulk or unpackaged foods

It is possible to transmit coronavirus through food packages. It is recommended to be washed and disinfected before consuming a variety of dairy products, canned food and prepared foods, drinking water bottles, beverages and other packaged food products (14).

- Avoid eggs, meat, poultry and raw fish that are not fully cooked. And boil the milk before consumption.

Favorable cooking of foods can destroy almost all dangerous microorganisms. Thorough cooking to a core temperature of 70°C is recommended for inactivating pathogenic microorganisms. 70°C is critical temperature limit for cooking. Cooking food up to 70°C ensures that the food is safe to eat. Covid-19 virus is sensitive to temperature of 70°C for 5 min, or 56°C for 30 min (15). In another research, it is reported that the virus is killed at temperature and time of 56°C and 70°C after 10 and 5 min, respectively (16). It is expected that the cooking process will kill the virus completely.

- Store foods at a temperature near or above 60°C

COVID-19, SARS- CoV and MERS-CoV have different durability based on different conditions such as temperature, humidity and light. The Coronaviruses are active and stable even at -20°C or less for 2 years. Therefore storing foods in the refrigerator (4-8°C) will not disable the coronavirus (17).

A.2. Vegetables and fruits

There are some recommendations for consuming vegetables and fruits at the following.

- Choose the vegetable and fruits with desirable appearance

- Washing thoroughly fruits and vegetables after purchase, or before eating and cooking.

- peeling the fruits before using

- As far as possible, eat cooked vegetables.

Possible contamination of the coronavirus in cooked vegetables is eliminated by heat (18). Also, the some vegetables are more nutritious when cooked. Such as Tomatoes, Asparagus, Spinach, Mushrooms, Celery and Green Beans (19).

A.3. Bread

Bread is one of the most widely used staple foods that almost all people consume daily. In Iran, the bread supply process is often traditional (20), so the possibility of bread contamination with the coronavirus is very high. Traditional breads, which are baked in traditional bakeries, can transmit the virus and cause disease if health tips are not followed. Fortunately, due to the use of high baking temperatures in the preparation of bread, all traces of viruses will be eliminated. But, when safety and hygiene rules have not been followed in the bakery, Bread will be virus transmission agent. Also, bread cannot be washed or disinfected. So in order to cross-contamination prevention, it is necessary to reheat bread in home (21).

B. Food contact surfaces, kitchen and food packaging

Food contact surfaces are defined as any surface that touches food such as knives, pans, cutting boards and etc (22). Cleaning, sanitizing and disinfecting of food contact surfaces is very important to prevent possible contamination caused by microorganisms such as coronavirus. Recent laboratory researches, have shown that the covid-19 virus can remain infectious on different surfaces (23). Chin *et al.* (2020) reported the stability of SARS-CoV-2 in different environmental conditions (16). This virus is removed on tissue paper, cloth and stainless steel after 3 h, 2 days and 7 days, respectively. They reported that the virus can remain viable for up to 72 h on plastic and stainless steel, up to four hours on copper, and up to 24 h on cardboard.

Therefore, the contamination of foods and hands will be possible both in stores and at home. Also, food packaging may have been contaminated when handled by an infected person. This is why it is important to follow these rules:

- cleaning and drying the food packaging with disinfectant Wipes or a damp single-use paper towel
- Using the latex gloves when removing food packages from store shelves
- Do not touch your face while shopping
- Washing your hands when you return home after putting away your groceries.
- Cleaning and disinfecting of high touch surfaces daily in kitchen

Chin *et al.* (2020) reported that household bleach (1:49), ethanol (70%), povidone-iodine (7.5%), chloroxylenol (0.05%), chlorhexidine (0.05), and Benzalkonium chloride (0.1%) can remove virus for 5 min

. In order to disinfecting surfaces can be used ether, 75% ethanol, chlorine disinfectant, peracetic acid, and chloroform, except for chlorhexidine (23).

C. Covid-19 and Nutrition advices

Well-balance and variety diet boosted the human immune system. Therefore, in order to reduce the risk of chronic and infectious diseases during the outbreak, proper nutrition is essential (24). According to the World Health Organization you should eat a variety of fresh and unprocessed foods every day to get the vitamins, minerals, dietary fiber, protein and antioxidants. To reduce the risk of overweight, obesity, heart disease, stroke, diabetes and certain types of cancer, drink enough water and avoid sugar, fat and salt (25).

Recently, studies have shown that vitamin D supplementation could prevent and treat several infections including influenza, coronavirus, and pneumonia.. In a study, Grant *et al.* (2020) have mentioned to the mechanism and role of vitamin D in reducing the risk of respiratory infections. They have reported that vitamin D can be reduced risk of Influenza and COVID-19 Infections through reducing concentrations of pro inflammatory cytokines, and increasing concentrations of anti-inflammatory cytokines. Also, they recommended that the consumption of vitamin D3 might be useful for treatment of people who become infected with COVID-19 (26). In other research, Zhang and Liu (2020) also have been proposed significant nutritional interventions to prevention and treatment of covid-19. They have suggested taking vitamins (A, B complex, C, D, and E), minerals (selenium, zinc, iron) and omega-3 to preventing and treatment of infectious (27).

In another study, Dayrit and Newport (2020) suggested the coconut oil as an effective antiviral agent against the Novel Coronavirus. The antiviral properties of coconut oil is due to its compounds such as Lauric acid, monolaurin, and sodium lauryl sulfate (28).

Also, Dushianthan *et al.* (2011) emphasized the consumption of omega-3 supplements and foods containing antioxidants in patients with acute respiratory distress syndrome (ARDS) (29). Because the coronaviruses involved most the patients with poor immune system, the use of foods containing high antioxidants can be effective in controlling and preventing of infectious.

D. foodborne viruses and covid-19

Norovirus and hepatitis A are the most important foodborne viruses. As they originate within the intestines of humans and animals, these viruses are mainly spread and transmitted through fecal oral route (30, 31). Therefore, these viruses, as food pathogens, have the ability to survive in food. According to WHO

guidance, Coronaviruses cannot multiply in food; they need an animal or human host to multiply (7).

COVID-19 is a respiratory pathogen. Its main transmission route is through person to person contact and through direct contact with respiratory droplets generated when an infected person coughs or sneezes. [32]. recently, new researches from China showed that the novel coronavirus is also spread by fecal-oral transmission.

Xiao *et al.* (2020) reported that out of a total of 73 patients tested, 53 patients were positive for fecal SARS-CoV-2 RNA (33). Also, Jin *et al.* (2020) have shown that among 651 patients tested, 74 (11.4%) patients were presented with at least one GI symptom (nausea, vomiting or diarrhoea) (34). Fortunately, CDC (Center for Diseases Control) has reported that the risk of transmission of COVID-19 from the feces of an infected person is low based on data from previous outbreaks of related coronaviruses. However, according to these findings, it is very important to observe and implement food hygiene in order to prevent fecal contamination in food. Also, many efforts should be made to detection and diagnosis of viruses in foods.

Conclusion

Until this date no evidence of food transmission of covid-19 has been reported. Coronaviruses cannot grow and multiply in external environment (such as foods, food packaging and Food contact surfaces), they need a live host (animal or human) to multiply. But, there is possibility of transmitting of virus in to foods by touching contaminated surface, object, or the hand of an infected persons. Therefore, Observing hygienic tips such as frequent hand washing, separating raw materials from cooked ones, cleaning food contact surfaces and not using raw foods, can play a preventive role in transmitting the virus through food. Also, due to the diagnosis of the virus in the feces of patients, there is also the possibility of fecal contamination. Therefore, more attention should be paid to disposal of sanitary sewage. Finally, it can be concluded that in order to prevent food contamination with coronavirus, personal hygiene and food hygiene are vital during the epidemic period.

Conflict of interest

The authors declared that they have no conflict of interest.

Acknowledgements

None

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