

What Are The Most Common Foodborne Viruses?

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Viral foodborne illnesses are caused by a number of different viruses, which can contaminate foods during all stages of the food supply chain.

Foodborne illnesses (i.e. illness resulting from the consumption of contaminated food) are a growing public health burden worldwide. Viral foodborne illnesses have emerged as a significant cause of all reported foodborne illnesses. In 2007, viruses were estimated as being responsible for almost 12% of all reported foodborne outbreaks in the European Union. The European Food Safety Authority reported that this value had increased to 14% by 2012.^{1,2}

What is a virus?

Viruses are very small infectious microorganisms (i.e. on average, about one hundredth the size of most common bacteria) composed of a DNA or RNA genome enclosed within a protein coat.³ Unlike bacteria, viruses can only multiply inside living cells of other organisms. However, many viruses show a high resistance to stresses such as heat, drying, freezing, UV light etc. and may survive for long periods of time in foods or the environment. The majority of viral infections are due to human to human contact, with food transmission being a minor risk in the overall context.^{3,4}

What viruses commonly cause foodborne illness?

The majority of viral foodborne illnesses are caused by a few types of viruses including:

- Norovirus (most common viral foodborne illness, which causes gastroenteritis, a medical condition characterised by diarrhoea, vomiting and abdominal pain),
- Hepatitis A and E (which cause inflammation of the liver),
- Rotavirus (particularly associated with gastroenteritis in children).⁵⁻⁸

How are foodborne viruses spread?

The origin of all foodborne viruses are the intestines of humans and animals. As such viruses are often shed in faeces or other body fluids. As viruses do not replicate in foods, foodborne transmission of viruses occurs through:

- Contamination of food by infected food handlers due to poor hygienic practices,
- Contact of food with animal waste, human sewage or sewage-polluted water,
- Consumption of products of animal origin contaminated with viruses (e.g. meat, fish etc.).^{1,3,7,9}

The relative contributions of the different routes by which viruses can cause foodborne illnesses have not

been determined.¹

Foods associated with viral foodborne illnesses

The main foods associated with viral foodborne illnesses include:

- Shellfish (e.g. Oysters, mussels), crustaceans and their products which are farmed and/or harvested in waters near human sewage outlets (e.g. waste-water treatment plants),
- Fruit/vegetables grown on land fertilised with animal waste or irrigated with contaminated water,
- Undercooked meats such as pork.^{1,6,7,10}

Recent outbreaks of viral foodborne illness

In the EU, in 2008, crustaceans, shellfish and associated products were most frequently implicated in outbreaks of foodborne viral illness.^{1,2} However, in 2013 one of the most notable issues was foodborne outbreaks due to the presence of hepatitis A virus found in berry mixes and strawberries which affected 315 people across 11 European countries.^{11,12}

It is thought that the majority of foodborne viral illness is under diagnosed and unreported.^{1,2} This is often because people do not go to a doctor when they have mild gastroenteritis, which can be associated with some foodborne viral illness.

How are viruses in food detected?

Detection of foodborne viruses is difficult and requires a different approach to the detection of most foodborne bacteria. As viruses cannot be cultured in the laboratory like bacteria, their detection often requires molecular techniques with various steps to extract, purify and identify.^{8,12,13}

Standardised methods for detecting viruses are not widely available, which makes it difficult to set safety limits for viruses in foods. While microbiological quality control criteria for food is often used as an indicator of the presence of viruses, there is substantial evidence that these criteria are insufficient to protect against viral foodborne illnesses.⁴ However, a European Committee has recently developed and published a standardised laboratory method (i.e. an accepted method, which can be used by different laboratories to achieve comparable results) for detection and quantification of norovirus and hepatitis virus in foods such as shellfish, soft fruit, fresh produce and bottled water.^{12,13}

How can foodborne viral illnesses be prevented and controlled?

Antibiotics are not effective against viruses, so measures to try to prevent viral foodborne illness should include the following:

- Training and awareness in good hygiene practices (e.g. hand washing, washing and proper handling

of fruits and vegetables, adequate storage of food in the refrigerator, thorough cooking of pork meat). This is particularly important where food is prepared for sick or vulnerable people in hospitals for example,

- Employees suffering from illness should be restricted from food service work,
- Use of clean water to irrigate crops, particularly ready to eat crops,
- Avoiding the use of animal manures on crops, particularly ready to eat crops,
- Farming of shellfish in clean seawater protected from sewage contamination.^{5,7}

Conclusion

While a number of viruses are associated with foodborne illness and its transmission, norovirus and hepatitis viruses are of primary concern. Increased awareness of the importance of good food hygiene practice and training in the production and handling of foods is necessary to minimise the transmission of foodborne viral illnesses. Improving the methods of detection of viruses will allow for better monitoring of viruses in food and help improve the safety of those foods commonly associated with foodborne viral illnesses.

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