

FRUIT JUICES AS A SOURCE OF INFECTION. A REVIEW

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ABSTRACT:

Fresh fruits are always nutritious whether taken raw or made as a juice and consumed. Everyone has an addiction towards fresh fruit juices. But fresh fruit juices always carries a risk of having contaminants in it. These contaminants are risky when it is a pathogenic agent. The risk is more when there is an outbreak of infection. Episodes of disease related to utilization of natural product juice have been a developing general medical issue since the mid 1990s. Because of epidemiologic examinations of episodes in which juice was entrap, the U.S. Food and Drug Administration actualized the process and control measures to manage the creation of organic product juice. The last squeeze guideline, which got powerful in 2002, 2003, and 2004, contingent upon the size of the business, necessitates that juice tasks conform to a risk investigation basic control point (HACCP) plan. The Center for Disease Control and Prevention (CDC) gets reports of food-related episodes of ailment. We looked into natural product juice-related flare-ups of disease answered to the CDC's Foodborne Outbreak Reporting System. From 1995 through 2005, 21 juice-related flare-ups were accounted for to CDC; 10 ensnared squeezed apple or juice, 8 were connected to squeezed orange, and 3 included different sorts of organic product juice. These episodes caused 1,366 diseases, with a middle of 21 cases for each flare-up (2 to 398 cases). Among the 13 flare-ups of known etiology, 5 were brought about by Salmonella, 5 by Escherichia coli O157:H7, 2 by Cryptosporidium, and one by Shiga poison delivering E. coli O111 and Cryptosporidium. Less squeeze related flare-ups have been accounted for since the juice HACCP guideline was actualized. Some juice tasks that are excluded from handling prerequisites or don't conform to the guideline keep on being involved in flare-ups of sickness.

Keywords: Fresh juices; cleaning; outbreak; health.

I. INTRODUCTION:

Fresh fruits are always nutritious, it is taken raw or made as a juice and consumed. Everyone has an addiction towards fresh fruit juices. But fresh fruit juices always carries a risk of having contaminants in it. These contaminants are risky when it is a pathogenic agent. The risk is more when there is an outbreak of infection. Outbreaks of sickness brought about by microscopic organisms and parasites have been connected to juices for a long time[1]. Although the affirmation of the causative agents in these outbreaks has been abnormal. The causticity of organic product juice has been truly thought to be an important deterrent against endurance and development of foodborne pathogens[2]. Many microbes like E.coli, salmonella, enterococcus may contaminate juices[3][4].

In 1991, an episode of Escherichia coli O157:H7 contaminations and haemolytic uremic condition (HUS) was connected to generally squeezed apple juice[5]. This pathogen has since been appeared to make due for a few days in new juice at pH esteems extending somewhere in the range of 3.6 and 4.0. A range recently thought to be inhibitory[6]. This juice-related Episodes of disease related with utilization of natural product juices have animated new research of the variables influencing the conduct of pathogens in foods grown and how the security of these items can be improved[8]. Natural

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episode and others brought about by *E. coli* O157:H7, *Salmonella*, parasites, and different pathogens have brought about an expanded familiarity with the microbiological security of organic product juices[7].

acids, hydrogen peroxide monocaprylin, dimethyl bicarbonate, vanillin corrosive, basic oils, and nisin and cinnamon are among the antimicrobials that slaughter or repress the development of foodborne pathogens in organic product juices[9]. Treatment of apple cider and squeezed orange with ozone makes 4.26.0-log decrease in *E. coli* O157:H7 and *Salmonella*[10][11]. Treatment with UV radiation is compelling for slaughtering *E. coli* O157:H7 and non pathogenic *E. coli* in organic product juices[12]. Gamma radiation, electron beam radiation, high-pressure treatment, ultrasound, and beat electric field handling additionally show guarantee for inactivating pathogens[13].

The rise of juice-related episodes additionally stimulated the improvement of new administrative methodologies[14]. In 1998, the U.S. The Food and Drug Administration (FDA) published the last squeeze marking guideline as a between time measure to disease coming about because of utilization of contaminated organic product juice[10]. The juice naming guideline was focused on processors of refreshments containing juice or juice fixings that had not been prepared to accomplish a 5-log pathogen decrease. These processors are required to utilize a notice mark showing the wellbeing dangers related with drinking these refreshments[15]. In 2001, the FDA distributed the last squeeze dangers investigation and basic control point (HACCP) guideline which necessitates that juice.[16]. The procedure used to forestall natural pollution must result in at any rate a 5-log decrease in the pathogen of worry to general wellbeing, normally *E. coli* O157:H7 or *Salmonella*[17]. Treated juices should be ensured to prove that they achieve a 5-log reduction[18]. The juice HACCP regulation applies to all juice processors except those who qualify as retail establishments. Businesses qualify as retail establishments when they process juice themselves and sell directly and exclusively to consumers[8]. Presented here is the epidemiology of juice-associated outbreaks in the United States as reported to the Centre for Disease Control and Prevention (CDC) during the period of 1995 through 2005[19]. While trying to all the more likely see a portion of the reasons why juices have been involved in episodes of human ailment, the endurance, development, and inactivation qualities of foodborne pathogens in these items are quickly depicted.

II. Sources of fruits:

A fruit is the seed-bearing structure in flowering plants (also known as angiosperms) formed from the ovary after flowering. Those fruits were cultivated by the farmers in all parts of the world. A lot of fertilizers and manures was used for proper growth of the fruits and for protecting it from flies, insects etc. The fertilizers and pesticides used during cultivation can be both organic and inorganic. If chemicals such as nitrates and sulphur in inorganic fertilizers exceeds certain amount it will cause certain diseases in humans while consuming those fruits. This can have a small but cumulative effect on the health of people that consume them. At worst, chemical fertilizers may increase the risks of developing cancer in adults and children and adversely affecting fetal brain development. Microorganisms present in human and animal feces can also contaminate the fruits. Contamination of fruits can also happen due to improper handling during transport and storage due to improper packing, lack of maintaining optimum temperature. Fruits are the significant source of vitamins, minerals and antioxidants[20]. They may contain substantial amounts of potassium, calcium, magnesium, iron, copper and sulphur. Fruits are usually low in sodium and contain trace minerals. Fruits are also rich in water soluble vitamins such as vitamin-c (citrus fruits, strawberries). Vitamins of B group and carotenoids, precursors of vitamin A[21][22]. Different fruits contain different vitamins. They are also important source of carbohydrates like fiber and sugar. They are low in calories and naturally sweet. Fruits and their juices are important sources of water too. Mangoes, papayas, melons and citrus fruits like oranges and grapefruit are high in vitamin C. Canned fruits packed in syrup have a lot of added sugars[23].

Storage:

Storage is an important process. Fruits meant for direct consumption should be stored properly. The storage environment should be clean and free from microbes and pathogens and the following factor should be noticed[24]. All the important parameters such as room temperature, visual guide, ageing due to ripening, softening, undesirable metabolic changes, respiratory heat production and undesirable growth should be maintained in optimum condition[25]. The fruits for such purpose should be packed immediately after cleaning till it is opened for consumption. Storage at the juice vendor's place is more important because they are unaware of the mode of contamination and possible transmission of infection.

Cleaning:

All the fruits that are purchased from the market can be rinsed in running water, followed by rubbing with hands. This is all that is needed to clean a majority of fruits. The FDA recommends, "Rinse produce before you peel it, so dirt and bacteria aren't transferred from the knife onto the fruits. There is a myth that soap, detergent or any special liquid is required to clean produce. "Gently rub produce while holding under plain running water. There's no need to use soap or a produce wash." If damage or bruising occurs before eating or handling, it is best to cut away the damaged areas before preparing. Use a clean vegetable brush to scrub firm produce such as melons. Berries require extra attention during the cleaning process, place them in a colander and rinse them under running water to remove pathogens[26,27]. In big factories the quantity of production is high so the machines were used. Fruit washing equipment consists of a roller with a brush washing machine for washing fruits. Roller with a brush is made up of stainless steel tube and brush[28]. Brush is made of polyethylene and will revolutionize the movement of stainless steel chains. Fruits are driven to circulate and washed by brush. Simultaneously, the terrible or dismissed organic products are gotten by manual and afterward sent away to a piece passing on gadget.[29]

III. Preservation methods:

There are various techniques to prevent pathogenic as well as non pathogenic microflora such as chilling, freezing, water activity, modified atmosphere packaging pasteurization, nonthermal physical techniques to inactivate microorganisms[30][31]. Another method is by use of some chemical preservatives such as sodium benzoate and potassium sorbate is used to prevent microbial spoilage of fruit juices[32]. Customers relate manufactured additives as fake items bringing about dismissal of this sort of food prepared. So demands for natural preservatives have increased drastically. Natural antimicrobials such as bacteriocins, organic acids, essential oils[33] and phenolic compounds have shown considerable use in food products[34]. Many herbs and plant extracts have broad spectrum activity against microorganisms[35][36]. Food antimicrobials are generally biostatic and not biocidal. Hence their effects on foods are limited. On other hand, a combination of antimicrobial and nonthermal methods is effective against pathogenic and spoilage microorganisms[37]. So combination of these techniques could provide synergistic effects on prolong shelf period of fruit juices and potentially as the best option for traditional pasteurization methods[38][39].

Clean containers:

Container holders have to be washed totally with water and disinfect the compartments with chlorine containing disinfectant. The sanitized container should be air dried and then juices can be stored in containers and covered with a tight[40].

IV. Health of food material handler:

Anemia was the most well-known disorder among the food handlers [27,41] are orodental lesions, gastroenteritis and febrile sickness, many of these settings present multiple opportunities for spread of pathogens within at-risk populations, and extra vigilance must be applied. Unfortunately, hand hygiene is not always carried out effectively, and both enteric and respiratory diseases are easily spread in these environments. This plays a vital role in transmission of food borne diseases. The health of the food handlers is of great importance for maintaining hygiene quality of food prepared and served by them[42]. Handwashes and mouthwashes and sanitizers can be used to prevent the spread of infection[43][44]. The individuals may be able to satisfy their taste and nutrition needs, but should pay little attention to hygiene and food safety.

V. Cross contamination:

Cross-contamination is the physical movement or transfer of harmful bacteria from one person, object or place to another. Preventing cross-contamination is a key factor in preventing food borne illness. There are three main types of cross-contamination: food-to-food, equipment-to-food, and people-to-food. In each type, bacteria are transferred from a contaminated source to uncontaminated food. For instance, in a refrigerator, meat drippings from raw meat stored on a top shelf might drip onto cooked vegetables placed on the lower shelf.

VI. CONCLUSION:

The demand for fresh juices has been increasing due to their health benefits. Changes in dietary and social habits and preservation methods have led to an increase in disease outbreaks linked mainly with fresh juices in recent years. In this review, we discussed with previous articles relating to fresh juices during outbreaks. Adequate

precautions should be taken to prevent autoinoculation during any outbreaks. The moistness of fruits will hold the microbes viable for a longer period in the atmosphere.

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