Evaluation of the microbiological state of surfaces that come into direct contact with food.

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Introduction

Food contact surfaces that have been tainted by bad hygiene or biofilm growth may have foodborne microorganisms on them. There are many factors in the food processing sector that encourage microbial adhesion, including moisture, nutrients, and microbial inoculums received from the raw material. The ideal antimicrobial surface works to stop bacteria from attaching in the first place, kill the bacteria, or remove the dead bacteria. The possible application of methods like surface functionalization, high-intensity ultrasound, cold plasma technologies, etc. for cleaning surfaces that come into touch with food is discussed. The newest antibacterial surface designs offer the chance to lessen or completely eliminate microbial adherence. These surfaces' main goals are to stop bacteria from sticking to them and to eliminate any bacteria that do. The development of safe and inert food contact materials for the food sector has a great potential thanks to these emerging technologies [1].

On the surfaces of equipment that comes into touch with food in food processing plants, residues of every kind chemical, biological, organic, or inorganic inevitably build up. Concerns about the attachment of undesired bacteria to these surfaces arise from the possibility of product contamination, which can have detrimental effects on both health and the economy. In actuality, this microbial contamination consists of two parts: the saprophytic flora that spoils food and the pathogenic flora that infects both people and animals. Food spoilage-causing microbes need a huge population to negatively impact the sensory, physical, and chemical properties of food, but food pathogens only need a small number of cells to compromise product safety and result in food poisoning [2].

The physicochemical characteristics (hydrophobicity and charges), substrates, or surface topography are all key factors in the phenomena of bacterial adherence to inert surfaces. The most conducive places for bacterial adherence are joints like valves and any other hard-to-reach regions. Since corrosion can cause cavities and grooves to grow and expand, its impact on solid materials must also be taken into account. The effectiveness of cleaning and disinfection methods is then compromised since this creates breeding grounds for bacteria. Microbial attachment to inert surfaces is also influenced by the surface properties of the microorganisms and the many environmental factors present in the agri-food sectors (organic materials, pH, temperature, water activity, etc.). Numerous things, including contaminated equipment, dirty work surfaces, unclean food supplies, inadequate cooking, unsuitable holding temperatures, and poor personal hygiene, could contribute to contamination during the production process. Some foodborne infections have the ability to develop biofilms on food contact surfaces, which could have an impact on the nutritional value of the patient's diet [3].

Therefore, to ensure food safety and high standards of quality, proper cleaning, effective hygiene practises, and an assessment of the presence, spoilage, and harmful microorganisms are crucial. As a result, the microbiological examination of surfaces that come into touch with food enables the detection of germs that indicate unsanitary circumstances. *Aerobic Mesophilic Bacteria, Staphylococcus and Enterobactericeae* are three types of these indicator bacteria. As seen by the transfer of E. aerogenes from tile, stainless steel, wood, and carpet to watermelon, it appears that the wetness of the food has the greatest impact on the transfer of bacteria from surfaces to food. More bacteria were typically transferred from each surface to food when there were longer periods of food contact. Compared to tile and stainless steel, carpet has very low transfer rates, although transmission from wood is more variable. Bacterial transmission appears to be significantly influenced by the topography of both the surface and the meal [4].

The likelihood of contracting an illness as a result of eating food that has fallen to the ground is influenced by a number of variables, including the organism's prevalence, concentration and type; the food's nature (particularly its moisture content); the topology of the surface; and the amount of time it has been in contact with the surface. This study demonstrates that the five-second rule is "actual" in the sense that greater transmission occurred with longer contact times, but it also demonstrates that other factors, such as the type of food and the surface, are equally important or more so. The five-second rule greatly oversimplifies the real process by which germs move from a surface to food [5].

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