

Microbial Load In Packaged Frozen Food Available In The Market

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Abstract

Introduction : Frozen food is consumed worldwide. It is an upcoming market in India. Many multinational companies are involved in this market. In India market regulation of food products is practically impossible because of the unorganised sector playing a major role here. Food safety is a great concern. This study is done to find out the quality of the food materials available in the market. Samples were collected from the supermarkets and subjected for microbiological evaluation. The study shows that the bacterial load in the food samples are not in acceptable range. Some even contain pathogenic bacteria like coliforms

Materials and methods: Study is done to find out how safe is the packaged frozen food available in the market. Five grams of the food materials is measured and dissolved in sterile saline, 50 microlitre is pipetted out and inoculated in the selected culture media to find out total bacterial load and the coliform bacteria. The plates were inoculated and incubated at 37 degree C for 24 hours.

Result: Then after the incubation period the plates were examined for the total colony forming unit and the type of the bacterial species present. In many samples the count was innumerable and shows the coliform growth.

Discussion: The frozen food materials available in the market are found to be heavily contaminated. There is no hint of sterility in any of the samples tested. Strict regulation should be imposed on the food industries to safeguard the health of the consumers

Conclusion : In this study ,it was observed that the packaged frozen food has bacterial contamination which is not acceptable in any food safety standards. The local food materials, though they are packed in an attractive and colourful way, are not produced by the leaders in the market, mostly done like a cottage industry without any expertise.

Keywords: frozen food ;market; culture medium;innovative techniques

Introduction

Frozen food is consumed world wide. It is an upcoming market in India. Many multinational companies are involved in this market(1). In India market regulation of food products is practically impossible because of the unorganised sector playing a major role here(2). Food safety is a great concern. This study is done to find out the quality of the food materials available in the market. Samples were collected from the supermarkets and subjected for microbiological evaluation. The study shows that the bacterial load in the food samples are not inacceptable range. Some even contain pathogenic bacteria like coliforms. Freezing is one among the simplest, quickest, versatile and convenient methods of preserving foods. The condition of the food at the time of freezing will determine the ultimate quality of the frozen foods(2,3) . Frozen food is often no better than the food before it was frozen ,but it simply reduces the expansion of microorganisms which slow down the chemical changes that deteriorate quality and cause food spoilage(2–4).Freezing, Heating and Chemical compounds may control enzyme actions which slows enzyme activity in order to maintain frozen food, like meats and fruits that will enhance it with no further treatment. Blanching process is suggested to inactivate

the enzymes in vegetables ,if the food is wrongly packed the oxygen within the air may cause flavor and color changes(4). Microorganisms will not grow at freezer temperature, but most of the pathogenic microbes doesn't seem to be destroyed and it can be easily multiplied as quickly as ever, even if the food product is thawed and allowed to square at room temperature .

There are many studies supporting microbial load in packaged frozen food which investigate the microbial profile of frozen fish and meat sold in Ota Ogun state Nigeria, with a view to educate the general public on proper handling and processing of frozen foods to forestall food borne diseases(5).There are even more studies which is based on the microbiological stability and overall quality of ready-to- eat meals based on traditional recipes of the basilicata region.The main challenges faced in other studies is that that the no of frozen food is limited to conduct their research.

This research was conducted to analyse the quality of packed frozen food presently available in the market.The theme of this research was to evaluate and compare the advantages and disadvantages of frozen food in the upcoming market. This study in Indian conditions will give an elaborate and detailed reports of the hazardous nature of frozen foods .In India the average population both the parents are the breadwinners,so in this situation frozen food is used as a alternative and convenient method for cooking.So Commodity in India has to be regulated so that risk for the public health can be minimised Our team has extensive knowledge and research experience in quality analysis and quality control has translate our experience into high quality publications(6–17),(18–22). (23) (24) (25).The aim of this study is done to find out contaminations in the packaged frozen food available in the market and to identify the risk of pathogens present in packaged frozen food.

Materials and methods

This study is done to find out how safe is the packaged frozen food available in the market. Five grams of the food materials is measured and dissolved in sterile saline, 50 µl is pipetted out and inoculated in the selected culture media to find out total bacterial load and the coliform bacteria. The plates were inoculated and incubated at 37 degree C for 24 hours. Brain-heart infusion agar, sabouraud's dextrose agar(SDA) and Roberts cooked medium broth(RCMB) was used as the selected culture media. The growth on the media was identified by grams staining and with standard microbiological protocol. Those colonies are biochemically identified. The results were tabulated and analysed

Results

Brain-heart infusion agar:

S.no	Frozen foods	No of bacterial colonies/50 µl	Organism grown in aerobic culture	Growth on RCMB
1	Chicken meat roll	621	Staphylococcus and enterococcus	Aerobic spore bearer
2	Curry cut chicken	Confluent growth	Bacillus and CONS	Aerobic spore bearer
3	Chicken seekh kebab	560	CoNS and bacilli	Enterococcus
4	Chicken keema	447	CoNS ,proteus and enterococcus	Aerobic spor bearer, eEnterococcus
5	Chicken nugget	324	CoNS and Bacillus	Aerobic spore bearer

6	Processed fish	500	CoNS	Micrococci
7	Chicken pop	292	Staphylococcus and Bacillus	Clostridium tetani
8	Chicken sausage	Confluent growth	CoNS and Enterococcus	Aerobic spor bearer, Clostridium tetani, Lactobacillus and Enterococcus
9	Fish fillet	137	Bacillus	Clostridium tetani
10	Chicken breast	Confluent growth	CoNS and Streptococcus	Aerobic spor bearer, Lactobacillus
11	White fish	333	CoNS and Staphylococcus	Aerobic spor bearer, Enterococci
12	Seer fish steaks	Confluent growth	Staphylococcus	Aerobic spor bearer, Staphylococcus
13	Minced chicken	525	CoNS , Bacillus and Enterococcus	Aerobic spore bearer, Lactobacillus
14	Prawns	Confluent growth	Staphylococcus	Staphylococcus
15	Cheese	25	Staphylococcus	Aerobic spore bearer, Lactobacillus
16	Corn	489	Staphylococcus ,Bacillus andCandida	Aerobic spore bearer
17	Veg cutlet	20	CoNS	Cocci, Aerobic spore bearer
18	Peas	659	Staphylococcus	Staphylococcus, micrococcus
19	Paneer	Confluent growth	Staphylococcus And Enterococcus	Cocci
20	Prawan	615	Staphylococcus and CoNS	Aerobic spore bearer, cocci

Table 1:

Tabular column showing no. of samples tested, total number of organisms grown, the organisms grown in aerobic culture and anaerobic culture illustrate that the organism grown in most of the frozen food is staphylococcus. The confluent growth colonies are represented in the numerical value

Discussion

The frozen food materials available in the market are found to be heavily contaminated. There is no hint of sterility in any of the samples tested. Basic requirement is education in this field. This can be tackled only by including this in the curriculum in school education. This will cultivate good practice in the community. Food handlers should be specifically trained in good hygienic practices for safe serving. Packaged food needs more

technical knowledge on preservation and to avoid contamination during the process. The system should have a strict regulatory mechanism to monitor the food industries. Basic infrastructure is mandatory, that takes care of the entire process of decontamination, safe handling till packing. Strict regulation should be imposed on the food industries to safeguard the health of the consumers. Unorganised industries should be brought under the monitoring system to augment the supply chain. Compromise in quality will have a devastating impact on the society, which may not be visible at the time. History has proved the possibility of outbreaks related to food materials. Certain bacterial species have an inherent capacity to grow in storage condition itself. Knowledge on this aspect will ensure safe handling and storage of food. It is practically not possible to have sterile packed food, the requisite is that it should not have bacterial count that goes beyond the safety limit and that it should not include pathogenic microorganisms that are toxigenic and entero-active.(26,27)

The key is that when there is a variation in the temperature the growth of the microorganism will be increased, so packing the food at the appropriate temperature is mandatory to prevent the growth of the microorganism. For every microorganism there is specific temperature for the growth and multiplication in the frozen food which will act as a via-medium that will lead to uncontrolled multiplication of this microbes. In this situation we should have profound knowledge to store the food below a temperature to prevent microbial colonisation. To prevent microbial colonisation in the frozen packed food, it should be preserved by freezing in an appropriate manner to retard the microbial growth so that the multiplication of the microbes does not occur.(26)

As we compare with previous study done by Oranusi Solomon et al conclude that freezing to a large extent doesn't destroy these microorganisms, it's especially important to make food wholesome before freezing. If the situation is conducive for growth these microbes can multiply and cause food borne illness. The safety of foods that are frozen depends on the condition and handling of the food before and after being frozen and also the temperature of the freezer plays a major role. In a whole scale industries it is defrosted quickly which maintains hygiene and prevents the growth of microbes (5). In the study by Matera et al conclude that the formulation of meals with traditional recipes are often considered a technique to boost their natural quality but at a similar time the non-standardized manufacturing practices can determine the legal and sensory unacceptability over the storage. In specializing in those quality features that are laid low with the storage time and packaging system used to indicate the necessity to straighten the hindrance involving biological hazards which may potentially leads to unsatisfactory limits with the consumer's behavior(28). On the observation of previous study done by Muñoz-Seca et al prove that bacteria *Listeria* seen in ice cream, frozen vegetables and fruit. *Listeria* can grow and multiply in the freezer and refrigerator. These bacteria are often killed by proper cooking and pasteurization(28,29). In the study by Syed et al conclude that theoretical and experimental results for a range of frozen food products in relevance to the properties of the packaging materials are discussed. Methods of prediction of food stability and their industrial applications are emphasized by specific examples(30). In the study by MacDonald et al conclude that cryoprotectants are compounds that improve the standard and extend the time period of frozen foods. The term cryoprotectant includes all compounds that help to forestall deleterious changes in foods caused by freezing, thawing processes or frozen storage. These substances could also be added during processing and merchandise formulation or produced naturally within the living organism to prevent the further growth of the microbes (31).

The limitation of the study states that the sample size was less, long duration of the study.

Conclusion

In this study, it was observed that the packaged frozen food has bacterial contamination which is not acceptable in any food safety standards. The local food materials, though they are packed in an attractive and colourful way, are not produced by the leaders in the market, mostly done like a cottage industry without any expertise. The procedure for packing the frozen food as to be standardised and made to be followed by the manufacturer so that food borne illness can be minimised to a smaller percentage. The manufacturers have to utilise better facilities to store food and also to preserve food which will be of great help to the consumers and the community.

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CONFLICT OF INTEREST

The authors would like to declare no conflict of interest in the present study.

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