Original Research Paper

Volume - 10 | Issue - 10 | October - 2020 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Home Science

MICROBIAL ANALYSIS OF FOOD PACKAGING CONTAINERS OF PACKED FOODS SOLD AT EMU RAILWAY STATION

Ms. S. Soundariya* — Student of Queen Mary's college, Post Graduate, Department of Home Science. *Corresponding Author

Mrs. P. Muthulakshmi — Guest Lecturer, Department of Home Science, Queen Mary's college.

ABSTRACT Packaging has a fundamental role in ensuring safe delivery of goods throughout supply chains to the end consumer in good condition. It also has great potential to contribute to sustainable development. Proper food packaging process is very important to protect the foods from physical, chemical and microbiological contamination. If the food is not packed properly it may be the main source of contamination. Hence the present study was carried out to assess the microbial quality of Food Packaging Containers which are sold at Railway Catering establishment. Purposive sampling technique was used for the study. Different agar media such as plate count agar (PCA) for microorganism, sabourad dextrose agar (SDA) for bacteria and Eosin methylene blue (EMB) for coliforms was prepared by using standard procedures. After incubation period, the growth of microorganisms were counted and the results were presented in terms of mean microbial count. The findings of the study revealed that higher number of microbial growth was seen in PCA media (7.5x108 log CFU/Container) of sample-VI, while in the case of SDA media of sample –VI showed more number of microbial colonies (5.0x107 log CFU/Container). In EMB media, there was no microorganisms observed in the tested food packaging containers. Surface contamination of food packaging materials can be prevented by testing the Total Viable Count during packaging, practicing good personnel hygience and maintaining hygienic environment around the site of the establishment.

KEYWORDS : food packaging, containers, microbial analysis, bacteria pathogens.

INTRODUCTION

Food packaging is meant for protection, communication, convenience and containment (Robertson 2006). The package is used to protect the product from the deteriorative effects of external environmental conditionals like heat, light, presence or absence of moisture, pressure, microorganisms, gaseous emissions and so on. It also provides the consumer with the greater ease of use and time saving convenience and contain product of various size and shapes (Marsh and Bugusu 2007).

Food packaging is not only indispensable in the distribution chain but is designed to prevent the spoilage of food products throughout the supply chain. The primary function of packaging remains similar in order to preserve the freshness as well as to prevent spoilage and pathogenicity and to extend the shelf life (Wani*et.al*, 2014).

Since early man first used a variety of locally available natural containers to store and eat foods, significant developments in food packaging materials have provided the means to lower the growth of microbes as well as protect foods from external microbial contamination. Packaging materials were developed over the years to prevent the deterioration of foods by microbes resulting from exposure to air, moisture, or pH changes associated with the food or its surrounding atmosphere.

MATERIALS AND METHODS

Selection of Sample

The Food Packaging Container was purposively selected to analyse the microbial quality packaging containers of railway foods because it may be the direct mode of contamination in the foods, however it was prepared and sealed hygienically.

Procedure

Sterilization Process

The autoclave is usually operated at 15 –pounds pressure for a period of 20 minutes, which corresponds to a temperature of 121 c. This temperature is sufficient to destroy both vegetative cells and spores in one operation. There are certain precautions to be taken in operating an autoclave. Make sure that there is water at the bottom of the vessel before heating the autoclave. Place the articles to be sterilized on the perforated shelf. Open steam-escape valve. See that the screw clamps are tight. Start the autoclave. When the water boils, steam will be seen to emerge in jerks, since there will be some air also in the chamber. When the steam begins to come out freely, close the steam-escape valve. Allow the pressure to rise until the desired pressure is reached, as seen by means of the pressure gauge. After the desired pressure has been maintained for 15 to 20 minutes, stop heating the autoclave. Allow the autoclave to cool down until the pressure gauge reads zero, which means atmospheric pressure. After sterilization is completed, allow the apparatus to cool before opening the lid. Test tubes, petri dishes & glassware, saline solution, Q tip sterile cotton swab, pipette tip, conical flasks, agar media, rubber handgloves etc. were also sterilized by standard sterilization process.

Preparation of Media

Plate Count Agar media, Sabouraud Dextrose Agar media and Eosin Methylene Blue Agar media were prepared by AOAC method (2015).

Plate Count Agar

Media Plate Count Agar (PCA) media was used to detect the microorganisms. All glassware were cleaned and dried, 200ml of distilled water was taken in the measuring cylinder and 100ml of distilled water was poured into a conical flask. Weigh 2.35g of PCA and added to the conical flask containing distilled water. Further, add 2g of Nutrient agar was added to conical flask and remaining 100ml of distilled water was also poured and dissolved. The mouth of the conical flask was covered with aluminum foil and then kept in the autoclave till it reached 121c temperature and it was maintained for 15 minutes. Autoclaved media was poured on the sterile petri dish plate in laminar air flow wood and was allowed to solidify. Once the media was solidified keep it aside. Label all petri dish plates with the sample number, dilution, date and any other desired information.

Sabouraud Dextrose Agar (SDA)

The same instructions used in the preparation of PCA agar was used here instead of 2.35 g of PCA and 6.5 g of SDA was weighed.

Eosin Methylene Blue Agar

The same instructions used in the preparation of PCA agar was used here instead of 2.35 g of PCA and 7.18 g of EMB was weighed.

Preparation of Petri Dish

The different types of prepared agar solution were poured into each of the two Petri dishes in a way so that each Petri dishes gets 12-15 ml agar medium. Agar medium was dispensed into each petri dish to get 3-4mm depth of agar media in each petri dish. After pouring the agar medium, all petri dishes were kept in room temperature so that agar medium can become properly solidified. Label all petri dish plates with the sample number, dilution, date and any other desired information.

Preparation Of Saline Solution

0.85% NaCl was prepared by taking 4g of NaCl and dissolved in 500 ml of distilled water. Put magnet in it and keep in the magnetic stirrer to dissolve it. After few mintues, take 9ml of the prepared saline solution in series of the test tube and one 10ml of the prepared saline solution in

a test tube, is closed with a cotton plug and sterilized the autoclave.

Collection of sample

Six Samples of Food Packaging Container were chosen for the study and collected on three different days (Day I, II & III) which was labelled from Sample 1 to Sample 6. These packaging materials have been collected aseptically in a different sterilized sealed air lock bag, to prevent their contact with any other source that can contaminate the sample. The collected samples were carried to laboratory for the process.

Sample Processing

A Q tip cotton swab was sterilized by the sterile syringe water and then swabbed the container by wearing a sterile handgloves. The area of the swab should be approximately 10 sq. cm. By keeping in laminar air flow wood, and then replace the swab immediately in 10 ml of sterile saline solution of the test tube and close, mixed it well.

Dilution

Six test tubes were taken and labeled from $10^{-1}$to $10^{-6.}$ And 10ml of sterile saline add to a swabbed sample solution was given into the test tube marked in 10^{-1}. The contents were mixed and using a new pipette tip of micropipette 1ml from the 10^{-1}tube was pipette into the 10^{-2}tube. This was continued until transfers had been completed to the 10^{-6} tube.

Plating of Sample

Raise the lid of a sterilized petri dish carefully and pour the melted agar from a tube into the plate, without any contamination. From 10^{-6}dilution 0.1µl of solution was taken in micropipette and poured on solidified plates of agar media such as PCA and SDA, For EMB 10^{-5} dilution was used 0.1µl of solutions was pipette into the base of correctly labeled plates using a separate pipette to avoid carry over errors. Allow the agar media to spread evenly swirled and set as a thin layer at the bottom of the plate, using sterile L rod, clockwise and anticlockwise rotate, to and for thrice and taking care that the contents do not touch the lid. When plates have been poured, the steam from the hot medium condenses inside the lid and this water of condensation is likely to fall on the surface of the medium. This can be prevented by allowing the poured plates to dry in the incubator at 37c for one hour. Quickly and carefully invert both the lid and the bottom of petri dish while holding them above the shelf of the incubator. When the culture medium was set, the plate was incubated to suitable time.

Incubation

The prepared petri dishes were incubated by keeping inverted at room temperature for 48 hours.

Counting Of Colonies

After the incubation period, all colonies in a petri dishes plates containing 30-300 colonies were counted and the result were expressed as mean number of microbial growth per selected Food Packaging Containers.

Interpretation Of Data

Total microbial count in the food packaging container was estimated by using suitable media which are appropriate to the specific microorganisms. The obtained data was estimated by mean number of colonies of microorganisms.

RESULT AND DISCUSSION

Mean Microbial Count in the Selected Food Packaging Containers sold at EMU railway station by Plate Count Agar

Microbial analysis was carried out for all the selected Food Packaging Containers collected from Railway EMU stations. The result showed that higher number of Mean Microbial Count was observed in Sample 6 (7.5×10^{8} log CFU/Container) whereas Sample 1and 2($5.0X10^{6}$log CFU/Container) contain less number of microbial colonies when compared to other tested Food Packaging Containers.

Table -1 Mean Microbial Count In Food Packaging Containers-[PCA]

Samples	Mean Microbial Count (Log CFU/ CONTAINER)
Day I	
SAMPLE 1	5.0×10^{6}
SAMPLE 2	5.0×10^{6}
Day II	
SAMPLE 3	1.4×10^{7}
SAMPLE 4	1.5×10^{8}
Day III	
SAMPLE 5	8.0×10^{6}
SAMPLE 6	7.5×10^{8}

CFU- Colony Forming Unit

Mean Microbial Count in the Selected Food Packaging Containers sold at EMU railway station by Sabouraud Dextrose Agar.

Mean Microbial load in the Food Packaging Containers were collected from Railway EMU station on three consecutive days. It was clearly reported that the prepared SDA media showed that increased number of microorganisms in Sample 6 (5.0×10^{7} log CFU/Container). Less number of mean microbial count was noticed in Sample 4(1.0×10^{6} log CFU/Container). The total viable microbial count was 5.0×10^{6}, 5.0×10^{5} and 5.5×10^{6} log CFU/Container) in the Sample 1, Sample 2, Sample 3 and Sample 5 respectively.

Table -2 Mean Microbial Count In Food Packaging Containers -[SDA]

Samples	Mean Microbial Count (Log CFU/ CONTAINER)
Day I	
SAMPLE 1	5.0×10^{6}
SAMPLE 2	5.0×10^{6}
Day II	
SAMPLE 3	5.0×10^{5}
SAMPLE 4	1.0×10^{6}
Day III	
SAMPLE 5	5.5×10^{6}
SAMPLE 6	5.0×10^{7}

Mean Microbial Count in the selected Food Packaging Containers sold at EMU Railway station by Eosin Methylene blue Agar

The below table clearly indicated that EMB media there was no coliforms formed in all the collected food packaging container in which the food was sold at food outlets in EMU railway station.

Table -3 Mean Microbial Count In Food Packaging Containers-[EMB]

Samples	Mean Microbial Count (Log CFU/ CONTAINER)
Day I	
SAMPLE 1	ND
SAMPLE 2	ND
Day II	
SAMPLE 3	ND
SAMPLE 4	ND
Day III	
SAMPLE 5	ND
SAMPLE 6	ND

CFU- Colony Forming Unit, ND- Not Detected

CONCLUSION

In Packing Containers of Railway Foods were chosen for the current study are widely used to create an awareness for importance of its food packaging. And it can be reduced or eliminated the microbial activity. The microbial load in Packaging Container of Railway Foods was analysed by PCA, SDA and EMB media and total bacterial count were studied.

REFERENCE:

1. Ana R.V. Ferreira 1, Membranes,13 April 2016.
2. Brody, A.(2008).Packaging by the numbers. Food Technology, 62(2),89-91.
3. Bucchetti V (2005) Packaging design. Storia, linguaggi, Progetto, Franco Angeli, Milan.
4. Converting Knowledge Pvt ltd,2006. Food Processing and Packaging Equipment Market in ASEAN – An Industry overview. Swiss Business Hub ASEAN, Embassy of Switzerland
5. Germinara G.S, Innovative Food Science and Emerging Technologies 11(2010) 498-502
6. Han H.J. (2005). New technologies in food Packaging. In: Han H J (Ed). Innovations in Food Packaging. Elsevier, Academic Press 1,3-11.
7. Horst-christianlangowski, Food Packaging materials,1-9,2017
8. Indian Railway Catering and Tourism Corporation (2015-16). IRCTC Annual report. Retrieved from IRCTC website on August 12, 2017, from http:// www. Irctc.com/ annual report EN. jsp
9. Institute of Food Technologies (IFT) 2008. Innovative Food Packaging Solutions: Recent Innovations in Food Packaging Materials.
10. John Brockgreitens and Abdennour Abbas. Vol.15,2016, Comprehensive Reviews in Food Science and Food Safety

11. Kirwan, M.J., & Strawbridge, J.W. (2003). Plastic in food packaging. Food Packaging Technology, 174-240.
12. Mahalik, N.P and Arun N. N ambiar (2010). Trends in Food Packaging and manufacturing systems and technology, Trends in Food science and Technology 21pp.117-128.
13. Mahmoud M. Berekaa, International Journal of Current Microbiological Applied Science (2015) 4(5): 345-357.
14. Parisi S (2013) Food industry and packaging materials – performance – oriented guidelines for users. Smithers Rapra Technology, Shawbury
15. Risch, S.J. (2009). Food packaging history and innovations. Journal of Agricultural and Food Chemistry,57,8089-8092.
16. Robertson, G.L. (2006) Food packaging. In: Food science and Technology. Campbell-Platt G. (Ed). Wiley-Blackwell publishing Ltd.1,279-298.
17. Salfinger Y., and Tortorello M.L. fifth (Ed), 2015, Compendium of methods for the Microbiological Examination of foods, 5th edition., American Public Health Association, Washington, D.C.
18. Silva. L, Understanding Microbial pathogens: current knowledge and educational ideas on antimicrobial research.
19. Soni, S., Sandhu,D., Vilkhu, K. and Kamra, N.(1986). Microbiological studies on packaging materials. Food Microbiology,3(1), pp.45-53.
20. World Packaging Organization, April2008. Position Paper- Market Trends and Development, Brazil. http://www.wprldpackaging,org
21. Yam, K.L.(2005) . Intelligent Packaging: Concepts and applications . Journal of Food Science,70(1), R1-R10.