

IDENTIFICATION OF MICROORGANISM RESPONSIBLE FOR BULGING OF PLASTIC CONTAINERS USED FOR STORING TOMATO SAUCE

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Tomato sauce is a processed food that contains not less than 6% of tomato solids, with sugar, salt, spices and vinegar with or without optional ingredients. The sauce in bulged containers indicates the signs of spoilage, unpleasant odour and taste. Bulging of plastic containers can be resulted due to accumulation of gas during microbial activities. This study was carried out to reason out bulging of considerable number of four-liter (4 L) plastic containers filled with tomato sauce. Total plate count, yeast & mould count, thermophilic microorganism count, *Lactobacillus* count, pH, sodium benzoate level and sulphur dioxide levels were determined in tomato sauce in bulged and non-bulged 4 L plastic containers. Open plate tests, swab tests and rinsing tests were performed to determine the microbial quality of the indoor air, processing equipment and 4 L plastic containers respectively. Gas accumulated in headspace was determined using saturated calcium hydroxide solution and potassium dichromate wetted filter papers. Two sample t-test ($p < 0.05$) was performed to tomato sauce in bulged ($n = 5$) & non bulged ($n = 5$) containers to identify the difference in tested parameters. Yeasts and moulds were observed only in tomato sauce samples from bulged containers. *Lactobacillus* colonies were observed in tomato sauces in both bulged and non bulged containers. However, *Lactobacillus* count in tomato sauce taken from non-bulged containers (2.20×10^6 CFU/g) was significantly ($p < 0.05$) lower than that in bulged containers (2.84×10^6 CFU/g). pH of the tomato sauce in bulged containers (pH = 3.3) was significantly ($p < 0.05$) lower than that in non-bulged containers (pH = 3.5) and that can be due to microbial activity. Sulphur dioxide levels were not significantly ($p > 0.05$) different in both tomato sauce samples. However, sodium benzoate level in tomato sauce in bulged containers (0.00 %) was significantly ($p < 0.05$) lower than the normal level (0.23 %) maintained. Therefore, inadequate level of sodium benzoate in sauce in bulged containers can be the suspected reason for higher microbial counts. Carbon dioxide was identified as the gas accumulated in headspace responsible for bulging. Carbon dioxide is mainly produced by yeast and mould and rarely by some strains of lactobacilli. It can be confirmed that bulging of containers were resulted due to release of carbon dioxide by yeast and mould activity due to low sodium benzoate level. Indoor air and processing equipment are contaminated with yeast and mould, are the sources of contamination. It is necessary to find out the reason for inadequate level of sodium benzoate only in bulged containers, though they have been produced together with non-bulged containers, to solve the problem.

Keywords: Bulge, *Lactobacillus*, Tomato sauce, Sodium benzoate, Yeast and mould