



Awareness of food & beverage additives and their potential effects

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Abstract

Last winter, I got a chance to intern with Paper Boat, a company offering beverages with a traditional twist. From carrying out chemical tests every 15 minutes to ensure the quality of products in the manufacturing plant to assisting researchers at the R&D lab, I gained experience in a whole array of fields. One of the most striking things about Paper Boat is that it does not use any preservatives or colour additives of any kind. One thing that instantly popped up in my mind when I observed this was that why would some companies, use additives, while others, like Paper Boat, would not. To answer this question, I began researching on the effects of preservatives, both good and bad. Half-way through my research, I realized that I had learned several new things about the variety of preservatives used in foods and beverages. This made me wonder; how much do we actually know about the preservatives and their effects. I followed this up by carrying out a survey amongst over 200 people, from which I concluded that people from various demographic groups are generally aware about additives and their use in today's food and beverage industry.

Keywords: additives, preservatives, shelf-life, fresh foods, organic, ready-to-eat, usage and attitude research study, consumer perception and awareness, natural, synthetic, chemicals

Introduction

Recently I got an opportunity to intern at Paper Boat, a brand offering traditional Indian beverages and foods produced and marketed by Hector Beverages. Located in Bangalore, India's start-up capital, Hector Beverages has over 500 employees. Paper Boat's beverages, which are produced using local spices, fruits, and flowers, consist of traditional, authentic, and indigenous Indian juices packaged in unique flexible pouches. Unlike the other leading brands, Paper Boat does not use any artificial colours or preservatives.

In layman's terms, preservatives are food additives that are used in packaged foods to increase shelf life, enhance taste, and improve the visual appeal. However, along with the benefits they bring, food preservatives pose some serious problems such as allergies, high cholesterol, and some may even prove to be carcinogenic.

1.1 This led me to think

- Are common people aware about the preservatives present in their daily foods?
- Why are people purchasing ready-to-eat foods & beverages over fresh foods?
- Can we do something to increase the awareness of such additives and hence give the people a reason to choose fresh over artificial?
- Can the food industry and various companies work together to create safer alternatives for preservatives?
- How can science play a role in such a market?

2. Growing market of ready to eat & drink foods

Multiple factors like continued urbanization in India, increase in percentage of women in the workforce, increase in the

number of nuclear families, rising affluence, growth of service sector and higher disposable incomes are leading to an increase in the purchase of ready-to-eat processed and packaged foods. Another factor that may be attributed to this rise is the expansion of the food and beverage market with the arrival of more internet retail or e-commerce companies.

We as Indians typically prefer to consume fresh food. But over the last few years, with the modernization of factories, greater availability of cold storages, quicker modes of transportation for perishable goods, arrival of food processing technology and machinery, there has been an explosion of ready-to-eat foods in the market. Hence, because of the reasons stated above, the population has been forced to consume these foods as the emphasis on and supply of fresh foods has fallen.

3. Category of foods used by consumers

According to research by the BCG (Boston Consulting Group), India's urban population is about 30% of its total and is said to increase to over 40% within the next decade. With an increase in employment opportunities in urban areas as well as the changing lifestyle of consumers, the demand for ready-to-eat food products in the country is estimated to grow at over 20% in the next 5 years. India has the world's largest base of young consumers (65% of the population is below 35 years). With the youth flooding the country's workforce, the time available to these people to focus on the other aspects of their lives has decreased drastically. It is because of this that these young consumers don't have time cook for themselves and are hence driven to purchase ready-to-eat foods for consumption. This is another reason for the increase in demand for these products which is thus fuelling their supply.

Table 1

Occasion	Food & Beverage	Brands
1 Breakfast	Poha, dosa, dhokla, idli	MTR
2 Breakfast	Muesli, cornflakes, what flakes, porridge, milk, flavoured yoghurts	Kellogg's, Saffola, Nestle, Gaia, Quaker Oats, Danone
3 Afternoon	Insta-soups (ready in 1 minute) – tomato, vegetable, hot & spicy	Knorr, Café Coffee day, Nestle
4 Afternoon	Beverages – juices, tea, coffees	Tropicana, Paper boat, Dabur, ITC B'Natural
5 Evening	Snacks – dry - chips, Indian savouries, biscuits	Bikanerwala, Haldirams, Pepsi leher, Kurkure, Britannia, Parle
6 Evening	Snacks – fry & eat – fries, nuggets, samosa	Al Kabeer, Godrej, McCain, Yummiez
7 Dinner	Indian naan, paratha, curries, daals	Sumeru, Jalaram Foods, ITC Kitchens of India, Fingerlix

4. Survey of additives/preservatives added in foods

As consumers, we eat pre-cooked and packaged foods practically every day. As eating fresh gives way to consuming packaged foods, we hardly get the time to go through the fine print indicating preservatives that go into their production. While the government & brands make every effort to use safe preservatives, the average consumer's awareness about the use and effects of preservatives is something that cannot be stressed enough.

For the uninitiated, preservatives are a type of food additive

that is put into packaged food to prolong its shelf life, enhance the taste, or keep the colour and nutrients of the product intact. Commonly used preservatives like butylated hydroxytoluene, butylated hydroxyanisole, and tert-butylhydroquinone are antioxidants that prevent fats and oils from going bad (rancidity) but are carcinogenic (having the potential to cause cancer). Other preservatives like potassium sorbate and sodium benzoate prevent mold are known to cause headaches, upset stomachs, asthma attacks and hyperactivity in children.

Table 2

Preservative	Usage	Used in	Excess consumption causes / Linked to
High Fructose Corn Syrup (HFCS)	Sweet liquid sweetener	Soda, sweetened yoghurt, Juices, candies, jams, salad dressing, canned fruit, granola bars, cereals, nutrition bars, energy drinks, coffee creamers, ice cream	Bad cholesterol (LDL) levels, Obesity, Diabetes.
Aspartame	Artificial sweetener, about 200 times sweeter than sugar	Diet sodas, teas, energy drinks, coffee flavourings, protein shakes, flavoured milk, juices, ice cream, hard candy, chewing gum, cereals, granola bars and protein bars	Headaches, nausea, vertigo, slurred speech, memory loss, blindness, ringing in the ears, loss or change of taste
Monosodium Glutamate (MSG)	Flavour enhancer and common food additive	Noodles, Chinese food, potato chips, frozen dinners, cold cuts, gravies, salty snacks, burger, fried chicken	Damages cells, results in overeating & obesity
Potassium Bromate (E924)	Flour enhancer to make it rise better and uniform consistency	White-bread	Inhibits the metabolism of iodine and is regarded carcinogenic
Diacetyl	Imparts a buttery flavour and aroma to foods as well as to delay rancidity	Popcorn, potato crisps, cookies, chocolate, candy, gelatine desserts, flour mixes, flavoured syrups, sauces, soft drinks, chewing gum and ice cream	lung ailments
Sodium Benzoate (E211)	Used as a preservative in many foods to kill bacteria in acidic conditions.	Carbonated drinks, cereals and meats, salad dressings, jams, fruit juices, pickles, condiments, frozen foods	Headaches, stomach upsets, asthma attacks and hyperactivity in children. Along with ascorbic acid (vitamin C), it can form benzene, which is linked to higher risk of leukaemia and other blood cancers
Colour Additives	Food dyes, mostly petroleum-derived, are added to foods to modify the appearance of insufficiently coloured or discoloured foods	Candies, jelly beans etc.	Attention deficit hyperactivity disorder (ADHD), carcinogenic.

5. Consumer awareness survey of additives/preservatives in their foods

In a research of over 200 people across different age groups, genders across India and other countries, following findings came up:

- Foods with preservatives that were consumed regularly included soda, juices, chips, salt-based snacks, fast-food (pizza, noodles, burgers), flavoured milks, yoghurts & sweets. Foods with preservatives that were consumed irregularly included frozen & processed meats and energy bars & drinks.

- About 58% of the people surveyed consumed foods with preservatives multiple times in a week, while 30% did once or twice a month, and only 12% did not at all. A younger audience (92% of <30 years) consumed foods with preservatives more often (multiple times in a week) than older (54% of >30 years).
- Preservatives about which at least 50% of the respondents were aware of included High Fructose Corn Syrup (HFCS), Monosodium Glutamate (MSG) & Colour Additives. Preservatives about which less than 50% respondents were aware included – Aspartame, Potassium Bromate (E924),

Diacetyl, Sodium Benzoate (E211). About 10% of the respondents hadn't heard about any of these preservatives.

- About 25% or more of respondents had one of their family members suffering from following - High cholesterol, Obesity & Diabetes. While 10-20% had family members suffering from headaches, nausea, vertigo, slurred speech, lung ailments, asthma, hyperactivity in children & cancer.
- About 64% of the respondents were aware that having foods with artificial preservatives can be a cause of the ailments in their family. Another 24% expressed that preservatives maybe a cause of ailments, while 13% didn't think any correlation between artificial preservatives & ailments. More men than women (68% vs 61%) and the older population rather than the youth (63% of > 30 years vs 61% of < 30 years) believed the causal relationship between preservatives and ailments. Surprisingly, more men than women (18% vs 11%) equally didn't believe that there is causal effect between preservatives and ailments
- About 43% of the people try all or most of the times to avoid foods with preservatives/additives while shopping. Another 53% avoid it sometimes. Older audience (45% of those above 30 years) avoid shopping foods with preservatives more often than younger (only 28% of those <30 years).
- While buying foods, 41% of the respondents try to avoid foods with preservatives by checking the list of ingredients used, 49% buy organic foods/brands or if packaging reads "natural only", while 10% do not make any effort to avoid artificial additives.
- An overwhelming 84% of the respondents felt that foods without additives are healthier than those with. However, those older (85% of those > 30 years) believed so more than the younger audience (76% of those < 30 years).
- About 51% of those surveyed said that they are willing to pay up to 10% premium to obtain foods without artificial additives, another 41% said they are willing to spend up to 30% more to avoid foods with artificial additives. In India, men are more price sensitive and hence more men than women are ready to pay only up to 10% premium (66% vs 50%) for foods without artificial additives, while more women than men are inclined to pay higher premium up to 30% (46% vs 28%).

6. Pros & cons of current preservatives

The Food Safety and Standards Authority of India (FSSAI) has been established under Food Safety and Standards, 2006 and handles food related issues in various Ministries and Departments. FSSAI outlines science-based standards for food articles and regulates their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.

FSSAI has laid down several rules and regulations for the safe

use of preservatives. It has fixed maximum limits for use of additives in various food items to ensure safe intake and the daily acceptable intake is not exceeded. This also covers caffeine, metal contaminants and other residues in food products.

A leading instant-noodles brand learned this the hard way in 2014, when a food inspector checked and found an excess amount of MSG and lead in the product, despite the company claiming otherwise on its pack. Noodle samples were then sent to the Central Food Laboratory in Kolkata and the results that came after almost one year in April 2015 read: "MSG: Present and Lead: 17.2ppm (parts per million)". The amount of lead found was over 1,000 times more than what the brand had claimed. This led to ban on the said company noodles and other noodle brands and brought forward the issue of food additives, their display by brands, safe usage, and self-regulation by companies.

In India, it is mandatory for a food & beverage companies to write the ingredients and preservatives used in the packaged food product on the label generally found on the back of the packaging.

6.1 Pros of using preservatives

- Increase the food shelf-life. This minimizes food wastage during storage, transportation
- By preserving food supply, it helps increase supply and thereby keeps food prices affordable
- Enrich foods with nutrients. e.g., adding milk is often fortified with vitamin D, Wheat flour fortified with folic acid, riboflavin, and iron; salt enriched with Iodine
- Make foods safer to eat by removing toxins, e.g., meats
- Make them more visually appealing. E.g., orange colour in drinks, bleached flour in breads.

6.2 Cons of using preservatives

- Headaches, stomach upsets, asthma attacks and hyperactivity in children
- Can cause allergic reactions for asthma-sufferers
- Increase bad cholesterol (LDL) levels and cause obesity & diabetes
- Cause headaches, nausea, vertigo, slurred speech, memory loss, blindness, ringing in the ears, loss or change of taste
- Linked to Attention deficit hyperactivity disorder (ADHD), cancer.

7. Need for safer and healthier alternatives

While, convenience and time-pressured people will continue to use ready-eat packaged foods, they should actively start looking for alternatives having natural preservatives. I've summarized below a list of natural preservatives that keep the food safe and are healthy too.

Table 3

Natural preservatives	Properties	Used for
Clove	Contains high amounts of phenolic compounds that have antioxidant properties	Keeping food from going bad by preventing the growth of fungus and bacteria
Rosemary	Rosmarinic acid and carnosic acid, are responsible for the long-life effect.	Can be used in preserving meats and non-rosemary flavoured sweet and savoury foods also.

Lemons	Natural source of citric acid, an antibacterial preservative found in their peel and flesh	to preserve your food, squeeze them into cold dishes or on top of items right after you cook them
Oregano	Used for its warm herby flavour	Antioxidant, antibacterial and antifungal properties that can be used to preserve meats
Garlic	A potent antiviral food that's incredibly good at fighting bacteria	Helps ward off harmful bacteria and prevent food from spoilage
Sage	Natural preservative	To keep meats and cheese from going bad
Thyme, cinnamon	Has preservative and antioxidant properties	Prevents food from decaying. Most effective when it's used along with other natural preservatives
Stevia	Plant based zero-calorie sweetener	Used as natural sweetener and health remedy. Is about 30–40 times sweeter than sugar.

The market for food colourings is shifting away from lab-made to naturally-made foods. As per The Chemical & Engineering News magazine in 2011, global sales of natural food colourings surpassed those for synthetics. It is forecasted that additives such as flavours, preservatives and artificial sweeteners will also get replaced by their natural alternatives in future. In the short-run, prices may go up due to usage of natural ingredients, but the long-term health benefits will outweigh the slightly higher cost in short term.

While, in the short term, finding natural alternatives for every chemical preservatives is difficult, but if food regulators, consumers, and companies continue to work together, we will see innovation coming into the natural ingredients market, thereby leading to higher usage of natural food products in the coming years.

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