



# AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: <http://www.ajptr.com/>

## Preservatives -A Masked Health Attacker and Aggression In Human Life Span

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### ABSTRACT

Preservatives extend the shelf life of food, cosmetics and pharmaceutical products by preventing their deterioration. Antimicrobials such as nitrites, nitrates, benzoates and sulfur dioxide destroy or retard the growth of bacteria, yeasts and moulds. Antioxidants such as butylated hydroxytoluene (BHT), Butylated hydroxyanisole (BHA) and propyl gallate slow or stop the decomposition of fats and oils. Anti-enzyme preservatives such as citrus and Erythorbic acids block enzymatic processes such as maturation that occur in food even after harvest. Natural substances such as salt, sugar, vinegar and Spices have been used as preservatives since time immemorial. The majority of the preservatives used today are artificial rather than natural. Several of them are toxic and several others have life-threatening side effects. Researchers have reported that artificial preservatives such as nitrates, Benzoates, sulfites, sorbates, parabens, formaldehyde, BHT, BHA and miscellaneous others can lead to serious health risks such as hypersensitivity, allergies, asthma, hyperactivity, neurological damage and cancer. Studies have shown that various natural preservatives obtained from plants, animals, microbes and the minerals contain antioxidant, antimicrobial and anti-enzymatic properties Basil, clove, neem and rosemary extracts are promising alternatives to their artificial counterparts. This article aims to raise awareness of the harmful effects of artificial preservatives and recommends the use of preservatives for better therapeutic efficacy, safety and preservation of substances with better overall health

**Keywords:** Preservatives, life span, nitrates, BHA, BHT, Sorbates.

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Received 03 July 2023, Accepted 06 August 2023

Please cite this article as: Siva B., Preservatives -A Masked Health Attacker and Aggression In Human Life Span. American Journal of PharmTech Research 2023.

## INTRODUCTION

Preservatives is the functional name for the different types of synthetic and natural compounds that minimize and prevent bacterial growth in an extensive range of products that include food, medicine and personal care products <sup>1</sup>.

Although, there are options to avoid the use of chemical preservatives, more often than not, they are necessary to ensure the safety of a food product. According to the FDA, common chemical food preservatives are considered safe if the quantity of the preservative added to the food 'does not exceed the amount required to accomplish its intended physical, nutritional, and technical effect in food'<sup>1</sup>.

Glutamates can cause headaches, palpitations, and dizziness. In some cases, it can even cause cancer. Monoglycerides and diglycerides can cause birth defects. Propyl gallate (PG) can also cause birth defects. They have also been found to damage the liver. Furthermore, products containing PG are not suitable for frying due to their poor stability at high temperatures<sup>1</sup>.

Sulfites, if used in excess of what is allowed, can cause allergies, headaches, joint pain and, like most preservatives, cancer. BHA and BHT have been shown to cause cancer in laboratory animals. Other butoxides can cause high blood pressure and high cholesterol. They can also affect kidney and liver function. Nitrates and nitrites are known carcinogens. TBHQ can cause apoptosis and promote DNA damage. It was banned in Japan and European countries.

However, the scientific fraternity is divided in its opinion on the carcinogenic effect of certain chemical preservatives in food<sup>1</sup>.

For example, BHT (butylated hydroxytoluene) is a fat-soluble organic compound that is used as an antioxidant additive in foods, medicines, cosmetics, and petroleum products. The Food and Drug Administration (FDA) had approved its use in food products in 1954. Subsequently, serious concerns arose about the safety of the use of BHT in food products due to its suspected mutagenic and carcinogenic properties. A Japanese study published in the journal Anticancer Research suggested that "BHT cytotoxicity may be caused by reactive intermediates." So that BHT as a food preservative has been banned in the UK, Australia, Japan and some European countries. However, a number of studies, including a US study published in the journal Food and Chemical Toxicology and a cohort study from the Netherlands published in the same journal have suggested that "BHT poses no cancer risk and may instead be anti-carcinogenic at current levels of food additive use."

Once again, studies have shown that benzene, a suspected carcinogen, can form in soft drinks containing benzoate salts and ascorbic acid (vitamin C). Although the FDA has not set any standards for benzene in beverages, it recommends a maximum of 5 parts per billion (5 ppb) for

bottled drinking water. With respect to beverages, the FDA has determined that "the benzene found in beverages to date does not pose a safety concern to consumers."<sup>1</sup>

## **PRESERVATIVES TO AVOID**

### **BHA and BHT**

There is an ongoing debate about the safety of BHA (butylated hydroxyanisole) and BHT (butylated hydroxytoluene), two petroleum-derived antioxidants commonly used to prevent rancidity in fats and oils. Although BHA, which is a heat-stable additive used in baked goods, is a suspected carcinogen and is banned in the UK (in instant foods), parts of Europe and Japan, the Food and Drug United States administration classifies it as GRAS (Generally regarded as Safe).

It is found in vegetable oils, margarine, butter spreads, cookies, cakes, cereals, candies, gum, powdered milk, frozen dinners, bread, wraps, and frozen fries. Potential effects: suspected carcinogen, gastrointestinal disorders, aggression, hyperactivity, mood disorders (depression, insomnia), asthma, eczema, dermatitis, hives, and rashes.

Precaution: Avoid products that contain vegetable oils. Choose foods that say "preservative-free" on the packaging or packaged organic foods, as they contain little or no synthetic colors or preservatives. Look for products that contain ascorbic acid. The products use ascorbic acid or vitamin C, a much safer antioxidant than those mentioned above and you will also find it in other products on supermarket shelves. Another safer antioxidant option is citric acid, although it may cause mild symptoms in sensitive individuals.

### **Sorbats**

Sorbic acid and its calcium, sodium, and potassium salts (collectively called sorbates) are another group of preservatives used to inhibit mold growth. Derived from petroleum, they can cause an allergic reaction in sensitive people and are on the "to avoid" list of the Royal Prince Alfred Hospital's elimination diet. Sorbates are banned in baby food and two studies have shown they have the potential to alter our DNA.

It is found in orange juice, cheese, pickles, yogurt, sauces, dried meats, soft drinks, ice cream, baked good. headaches and migraines, asthma, allergic reactions (rhinitis, skin irritation), hyperactivity; gastrointestinal disorders.

Advice: Prepare fruit, ice cream and homemade chocolate sorbets. Make your own freshly squeezed orange juice. Choose plain yogurts, which contain no additives, or easily make your own coconut yogurt at home<sup>2</sup>.

### **Propionates**

Derived from propionic acid, calcium propionate is more commonly known as "bread preservative". It's often added to supermarket breads and other commercial baked goods to prevent the growth of mould and bacteria (now you know why some breads can last up to 10 days out of the fridge). Australia has one of the highest permitted amounts of propionic acid. A report on a controlled trial co-authored by Sue Dengate in the Journal of Pediatrics and Child Health in 2002 indicated that although calcium propionate may have few or no side effects for the average person, irritability, restlessness, inattentiveness and sleep disturbances in some children can be attributed to the fact that this preservative is consumed daily in their diet.

It is found in Pre-packaged breads and wraps, cheese, pasta, baked goods, breadcrumbs. As food intolerance expert Sue Dengate states, "If you want to create a nation of underachieving children, you can't do better than adding a preservative known to cause learning difficulties to a daily staple."<sup>2</sup>

### **Nitrates**

Nitrates, when ingested, are converted to nitrites that can react with haemoglobin to produce methemoglobin, a substance that can cause unconsciousness and death, especially in babies. Proteins in the stomach react with nitrites and produce nitrosamines, carcinogens. Researchers say there is a substantial relationship between increased levels of nitrates in food and increased deaths from Alzheimer's, Parkinson's and type 2 diabetes.<sup>3</sup>

Nitrite and nitrate are used as additives to improve food quality and protect against microbial contamination. Nitrate and nitrite from processed meat are exogenous sources of endogenously formed Nnitroso compounds (NOCs) and NOC precursors which are known carcinogens<sup>4</sup>. Endogenous NOC formation by nitrosation of secondary amines via nitrite under acidic conditions is estimated to contribute between 45% and 75% of total NOC exposure<sup>5</sup>. The richest food sources of nitrosamines are bacon, deli meats, hot dogs, and hot dogs with added nitrates/nitrites, such as chorizo and salami. Nitrite is an active ingredient used as a food additive to extend shelf life and provide protection against Clostridium botulinum bacteria. And give the processed meat its typical pink colour. Studies have indicated that there is a positive, but not necessarily linear, correlation between the amount of nitrite added and the amount of NOC formed<sup>6,7</sup>

**Table 1 Permissible limits of preservative**

<b>Preservatives</b>	<b>Types</b>	<b>Food products</b>	<b>Maximum permissible limit</b>
Benzoates and sorbates	Antimicrobial	Pickles, margarine, fruit juices, jams, cheese	200 ppm (200 parts per million)
Propionates	Antimicrobial	Bakery products, cheese, fruits	0.32 percent
Sulfites and sulfur dioxide	Antimicrobial	Dry fruits and fruits, molasses, wine fried or frozen potatoes, prevent discoloration in fresh shrimp and lobster	200-300 ppm
Nitrites and nitrates	Antimicrobial	Meat products	100-120ppm
Propyl gallate	Antioxidant	Baked foods, meats	200 ppm
BHA (butylated hydroxyanisole) and BHT (butylated hydroxytoluene)	Antioxidants	Baked foods and snacks, meats, breakfast cereals, potato products	100 ppm for meat products, 50 ppm for breakfast cereals and potato products
Tert-Butylhydroquinone (TBHQ)	Antioxidant	Baked foods and snacks, meats	100 ppm
Erythorbic acid (iso-ascorbic acid) and citric acid	Antienzymatic	Soft drinks, juices, wine, and cured meats	200-350 ppm

**Note:** from country to country the permissible limit vary depending on the food product<sup>1</sup>

### **ALTERNATIVES TO ARTIFICIAL PRESERVATIVES**

The days of benzoates, sorbates, metabisulfites, toxic gases and other synthetic chemical preservatives seem numbered. Manufacturers and retailers are responding to consumer resistance to chemical preservatives in food, beverages and cosmetics, and to research that has shown that artificial preservatives are causative agents of hyperactivity even in previously non-hyperactive individuals. Natural substances or extracts obtained from plants, animals or minerals can serve as beneficial alternatives. Besides their use in foods, cosmetics and pharmaceuticals as flavoring, binding, disintegrating, gelling, thickening or suspending agents, or as vehicles, they can also be used as preservatives. Here are some alternatives to artificial preservatives:

1. Algin - a compound extracted from seaweed including giant kelp *Macrocystis pyrifera*, *Ascophyllum nodosum* and various types of *Laminaria*, is used to make puddings, milkshakes, ice creams creamier and thicker, is also used to extend shelf life preservation of food products.
2. Grapefruit Seed Extract – also known as Citrus Seed Extract, is a liquid derived from the seeds, pulp and white membranes of the Citrus paradise grapefruit. It is a broad-spectrum natural preservative used to kill or inhibit the growth of bacteria, viruses, fungi and other microbes. It must be used in conjunction with other broad-spectrum preservatives to be effective. It can be used up to 1% of the recipe.

3. Rosemary extract - obtained from *Rosmarinus officinalis*, is an antioxidant that slows the oxidation of natural materials. Rosemary extract has been shown to improve the shelf life and heat stability of omega 3-rich oils, which are prone to rancidity. It can be used up to 0.5% in pharmaceutical formulations.
4. Vitamin E oil - an antioxidant used in cosmetics, pharmaceuticals and anhydrous products. It is found most abundantly in wheat germ oil, sunflower and safflower oils.
5. Carrageenan - a compound extracted from Irish moss *Chondrus crispus*, a type of seaweed, is used to make puddings, ice creams and milkshakes. It gels food and stabilizes food to keep colour and flavour uniform.
6. Citric acid - an acid found naturally in fruits like lemon and lime. It is used in canned fruit juices, cheese, margarine, pickles and salad dressings as flavouring and acidifying agent.
7. Erythorbic acid - also known as iso-ascorbic acid, is a plant-derived food additive produced from sucrose, widely used in processed foods as an antioxidant preservative. Along with sodium erythorbate, it is also used in hair and nail products.
8. Guar Gum - a substance made from the seeds of the guar plant *Cyamopsis tetragonoloba*, a legume grown in India, is used as a stabilizer in pharmaceutical preparations and food products such as processed cheese, ice cream, jelly and the dressings.
9. Sodium aluminosilicate - a natural mineral used in powdered milk substitutes, egg mixes and shredded cheeses, prevents food from clumping and clumping. It is also an acidity regulator used at concentrations below 2%.
10. Honey - a sweet food made by bees using the nectar of flowers. In its undiluted form, it is a rich source of nutrients and keeps well. It is a natural energy booster, boosts immunity and is a natural remedy for many ailments <sup>8-30</sup>

## DISCUSSION

The practice of using food additives spans centuries. At the time, people had their own land and they practiced agriculture to eat and live. The majority of the population existed in the same way until the industrial revolution. The shift in migration from rural to urban life as well as the improvement in the way of life led to the discovery of food preservation. They had to find an alternative to not cultivating every day. It was then that the idea of preservation came to give birth to food additives. The first additive to preserve food was salt. Especially in fish, salts were used extensively as a preservative. Later, the sugar that emerged was also used as a preservative, possibly from India. Salt however is a simple inorganic chemical whereas sugar is a more complex organic molecule in honey and dried fruits, sugar occurs naturally as a preservative. Fermentation

has long been used as a preservation method. The production of lactic acid in cheese or yogurt. Also in sauerkraut, is another historical example of the formation of in situ preservation by fermentation. The Romans used the acetic acid in vinegar as a preservative for fruits and vegetables. Later, the use of spices as a flavouring began as the spice trade of the West with the East. Before factory-produced foods, this only meant that preservation and flavour were more important than colour. To showcase the best of their foods, all the emperors worked hard to find new food additives that enhance the colour of foods and the discovery led to saffron which was used as a food colouring by ancient Egypt. In the 17th century, cochineal and annatto reached Europe. Annatto obtained from the seeds of the *Bixa orellana* shrub was used to colour butter in the 18th century. But later annatto was banned due to its harmful effects. In 1856, William Perkins accidentally discovered mauveine in the dye industry which, at the beginning of the 20th century, made a large number of synthetic colours available. Their amazing properties were such that they only required a very low concentration to achieve the desired result and therefore they were perceived as and were much safer than lead, copper. Also at the end of the 20th century, borates and salicylates fell out of use as preservatives and were largely replaced by sulfites and benzoates. In many ways, people's demand for convenient, quality foods has stemmed the proliferation of food additives. In order to meet these demands while remaining cost effective, many other food additives have been discovered and used and have therefore been banned due to their carcinogenic qualities. Science has always been a boon and also a curse.<sup>31</sup>

## CONCLUSION

Since we extend the shelf life of products by using preservatives and on the other side we forget to preserve the good health and ultimately it will attack the lifespan of individual by using different food preservatives. If countries like India we had come from traditional basic and it is easy to avoid preserved food products because we are the second most in agricultural food production. It might have been needed those countries who had lack of agriculture land and depletion of food materials. As the personal view it is better to banned the preserved material particularly from backed products as a primary step means most of the backed preserved foods are consumed by children at the age from one. The scariest thing behind the every taste there is an highly dangerous and toxic life threatening chemicals are hided. The awareness has to be created particularly in children to avoid high colorant preservative and strict rules hat to make particularly the usage of preservatives above the limit has to observe strictly from authority. Most of the high risk health disorder is avoided by only avoiding the packed food which contains preservatives. So the concept is Healthy food habit is a precaution to be followed by every individual by eating the freshly

prepared food material that lead to the great health and wealth and also we can bring back the original life span of human as the initial era started . It is not about the constructing hospital, it is all about to build ,create , cultivation of a good food habit and also stop using the harmful chemical preservative and minimizing the risk disorders by making the awareness programme in public which is highly needed in this fast food world .

## ACKNOWLEDGEMENT

I am really thankful to the principal, director and management of Bharathi college of pharmacy for the completion of this work.

## REFERENCE

1. Mita Majumdar. (2018, July 19). *Food Preservatives -How Safe Are They?* Medindia. Retrieved on Jul 11, 2023 from <https://www.medindia.net/patients/lifestyleandwellness/food-preservatives.htm>.
2. <https://www.womenshealth.com.au/food-additives-to-avoid>
3. Anand SP, Sati N (2013) Artificial preservative's and their harmful effects: Looking toward nature or safer alternatives. International journal of pharmaceutical science and research. Vol. 4(7): 2496-2501.
4. Mirvish SS (1842) Effects of vitamins C and E on N-nitroso compound formation, carcinogenesis and cancer. Cancer 58: 1842-1850.
5. Tricker AR (1997) N-nitroso compounds and man: Sources of exposure, endogenous formation and occurrence in body fluids Eur J Cancer Prev 6: 226-268.
6. Drabik-Markiewicz G, Van den Maagdenberg K, De Mey E, Deprez S, Kowalska T, et al. (2009) Role of proline and hydroxyproline in N-nitrosamine formation during heating in cured meat. Meat Science 81: 479-486
7. Yurchenko S, Mölder U (2007) The occurrence of volatile Nnitrosamines in Estonian meat products. Food Chemistry 100: 1713-1721.
8. Pawar HA, Shenoy AV, Narawade PD, Soni PY, Shanbhag PP and Rajal VA: Preservatives from Nature: A Review. Int J Pharm Phytopharmacol Res 2011; 1: 78-88.
9. Jakoweinko P, Wojcik-Stopczynska B and Jadczyk D: Antifungal activity of essential oils from two varieties of Sweet Basil (*Ocimum basilicum* L.). Veg Crops Res Bulletin 2007; 74: 97-106.
10. [http://www.dweckdata.com/Published\\_papers/Natural\\_Preservative.pdf](http://www.dweckdata.com/Published_papers/Natural_Preservative.pdf) (Accessed 3rd Feb, 2013)

11. [http://www.naturalingredient.org/Articles/Natural\\_Preservatives\\_original.pdf](http://www.naturalingredient.org/Articles/Natural_Preservatives_original.pdf) (Accessed 3rd Feb, 2013)
12. <http://onlinelibrary.wiley.com/doi/10.1002/9781119962045.ch24/summary> (Accessed 3rd Feb, 2013)
13. <http://www.naturalcosmeticnews.com/new-ingredients/the-mostpopular-natural-preservatives-2/> (Accessed 3rd Feb, 2013)
14. <http://www.makingcosmetics.com/Preservatives-c34/> (Accessed 3rd Feb, 2013)
15. <http://www.food.gov.uk/policyadvice/additivesbranch/enumberlist#.URj3yh3Wg48> (Accessed 12th Feb, 2013)
16. Dorman HJ and Deans SG: Antimicrobial agents from plants: antibacterial activity of plant volatile oils. *J Appl Microbiol* 2000; 88: 308-316.
17. Ranasinghe L, Jayawardena B and Abeywickrema K: Fungicidal activity of essential oils of *Cinnamomum zeylanicum* (L.) and *Syzygium aromaticum* (L.) Merr et L.M. Perry against crown rot and anthracnose pathogens isolated from banana. *Lett Appl Microbiol* 2002; 35: 208-211.
18. Rajkumar V and Berwal JS: Inhibitory effect of clove on toxigenic mold. *J Food Sci Techol* 2003; 40: 416-418.
19. Friedman M, Buick R and Elliott CT: Antibacterial activities of naturally occurring compounds against antibiotic-resistant *Bacillus cereus* vegetative cells and spores, *Escherichia coli*, and *Staphylococcus aureus*. *J Food Prot* 2004; 67, 8: 1774-1778.
20. Guynot ME, Ramos AJ, Seto L, Purroy P, Sanchis V and Marin S: Antifungal activity of volatile compounds generated by essential oils against fungi commonly causing deterioration of bakery products. *J Appl Microbiol* 2003; 94: 893-899.
21. Lusby PE, Coombes AL and Wilkinson JM: Bactericidal activity of different honeys against pathogenic bacteria. *Arch Med Res* 2005; 36: 464-467.
22. Cavanagh HM and Wilkinson JM: Biological activities of Lavender essential oil. *Phytother Res* 2002; 16: 301-308.
23. Petersen M and Simmonds MSJ: Molecules of interest: Rosmarinic acid. *Phytochemistry* 2003; 62: 121-125.
24. Kalembe D and Kunicka A: Antibacterial and antifungal properties of essential oils. *Curr Med Chem* 2003; 10: 813-829.
25. Evans W and Saunders WS: *Trease and Evans: Pharmacognosy*. Saunders Elsevier, Sixteenth Edition 2009.

26. Juntachote T and Berghofer E: Antioxidative properties and stability of ethanolic extracts of Holy basil and Galangal. Food Chem 2005; 92: 193-202.
27. Pai MR, Acharya LD and Udupa N: Evaluation of antiplaque activity of Azadirachta indica leaf extract gel: A 6-week clinical study. J Ethnopharmacol 2004; 90: 99-103.
28. Kahkonen MP, Hopis AI and Heinonen M: Berry phenolics and their antioxidant activity. J Agric Food Chem 2001; 49: 4076-4082.
29. Mandal MD and Mandal S: Honey: its medicinal property and antibacterial activity. Asian Pacific J Tropical Biomed 2011; 154- 160.
30. Subbalakshmi G and Naik M: Nutritive value and technology of spices, current status and future perspectives. J Food Sci Technol 2002; 39: 319-344.
31. <https://www.worldhistory.biz/sundaries/37289-foodadditives-in-history>.

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