

# Synthetic Food Preservatives and their Impact on Human Health

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## ABSTRACT

Preservatives prolong the shelf-life of food, cosmetics and pharmaceuticals by preventing their spoilage. Antimicrobials such as nitrites, nitrates, benzoates and sulfur dioxide destroy or delay the growth of bacteria, yeast and molds. Anti-oxidants such as butylated hydroxy toluene (BHT), butylated hydroxy anisole (BHA), and propyl gallate slow or stop the breakdown of fats and oils. Anti-enzymatic preservatives such as citric and erythorbic acids block the enzymatic processes such as ripening occurring in foodstuffs even after harvest. Natural substances like salt, sugar, vinegar and spices have been used as preservatives since time immemorial. The majority of preservatives used today are artificial rather than natural. Several of them are toxic and several others have potentially life-threatening side effects. Researchers have reported that artificial preservatives such as nitrates, benzoates, sulfites, sorbates, parabens, formaldehyde, BHT, BHA and several others can cause serious health hazards such as hypersensitivity, allergy, asthma, hyperactivity, neurological damage and cancer. Research has proven that several natural preservatives obtained from plants, animals, microbes and minerals contain antioxidant, antimicrobial and antienzymatic properties. Extracts of basil, clove, neem and rosemary are promising alternatives to their artificial counterparts. This article aims at increasing awareness about the harmful effects of artificial preservatives and recommends the usage of natural preservatives for better therapeutic efficacy, safety and preservation of substances along with improved general health.

**Keywords:** *preservatives, health, human, synthetic, food, impact, artificial, hazards, natural, therapeutic, safety*

## Introduction

The levels of food contamination have reached an all-new level. To preserve the taste, freshness, and color of the foods, even fresh fruits and vegetables are loaded with chemicals and preservatives. Taking into

consideration the increased use of **chemicals** and **preservatives**, it is extremely important to avoid **junk food**. However, when it comes to fresh fruits and vegetables, it is impossible to avoid them considering their dietary significance. This is the reason why it is extremely important to **wash fruits** and vegetables in the right way using a **vegetable and fruit cleaner**. Food products that have artificial preservatives come with 'additive' food labels. Jams, different types of spreads, packed juices, ketchup, and baked foods are loaded with artificial preservatives.[1,2] These preservatives help in increasing the shelf life of food items and also maintain the flavor of food for a long time. However, all **preservatives** used in food items are not bad for health. Natural preservatives, which are used to preserve food 'as is' are not harmful to your health. The reason is they are not mixed with synthetic items and the chemical composition is not altered.

Artificial or Chemical preservatives which are used to delay the **contamination of foods** are the ones that lead to health problems. These preservatives are artificially produced and synthetic in nature. These are often labeled as additives on food labels.[3,4]

Using a lot of preservatives has a negative impact on your health. Listed below are some of the health problems that you may suffer from if you eat foods loaded with preservatives.

### 1. Heart Diseases

Cardiovascular diseases have become quite common and the presence of **preservatives** on food items is one of the main causes of increasing heart problems. Research conducted by **In Chem** suggested that food preservatives can weaken the heart tissues. When you consume food items that have a residue of the preservative on the surface, it can increase the chances of heart damage.

### 2. Breathing Problems

Preservatives and chemicals present in food items also increase the chances of breathing problems.

According to research by **MayoClinic**, removing foods with preservatives from the diet can help in reducing the symptoms as well as the severity of breathing problems and asthma. Some of the preservatives present in food items such as aspartame, sulfites, and benzoates aggravate breathing problems. [5,6]

### 3. Cancer

One of the most harmful effects of preservatives on food items is their ability to transform into carcinogen agents. Some of the food items consist of nitrosamines, a preservative that has nitrites and nitrates, which mix with the gastric acids and form **cancer-causing agents**. To ensure that you avoid eating this preservative, you need to avoid snacks or meals that are loaded with nitrites and nitrates.

### 4. Behavioral Changes

Another harmful effect of food preservatives is behavioral changes, particularly in children. In fact, the consumption of food additives and preservatives led to a massive increase in hyperactive behavior.[7,8]

Artificial way of food preservation can be done by nuclear radiation, vacuum packing and hypobaric packing. Nowadays certain synthetic Chemical are used as food preservatives. They are the most effective for a longer shelf life and stop or delay the growth of bacteria, suppress the reaction when food comes in contact with oxygen or heat, they also prevent the loss of some essential amino-acids and some vitamins enhance the food flavours and colours. Sodium benzoate, Benzoic acid, Sodium sorbate, Potassium sorbate, Sodium nitrite are used as Antimicrobial agents they inhibit the growth of bacteria, molds, insects and other microorganisms.

Some substances used as Antioxidants (that act as free radical scavengers) are Vitamin E, Vitamin C, Pine Bark Extract, Grape Seed Extract, Sodium Erythorbate Sodium Diacetate, Sodium Succinate, Sodium Dehydro Acetate, Succinic Acid and Ascorbic Acid, Parabens, Erythorbic Acid, Propylphenols.[9,10] Also some Chelating agents work as preservatives for example Disodium ethylenediaminetetraacetic acid (EDTA), Polyphosphates, Citric acid and Ascorbic acid Monosodium Glutamate (MSG) Disodium Guanylate and Disodium Inosinate are used as food flavouring agents

There are certain harmful effects of using chemicals for preservation such as; Sulfites are common

preservatives used in various fruits, may have side effects in form of headaches, palpitations, allergies, and even cancer. Nitrates and Nitrites: These additives are used as curing agents in meat products. It gets converted into nitrous acid when consumed and is suspected of causing stomach cancer. Benzoates are used in foods as antimicrobial preservatives, and have been suspected to cause allergies, asthma and skin rashes. Sorbates/sorbic acid are added to foods as antimicrobial preservatives. Reactions to sorbates are rare, but have included reports of urticaria and contact dermatitis. Also a nuclear radiation when used for preservation does not make foods radioactive, but may cause changes in food color or texture. After consuming certain foods if it causes allergy that can be noticed but some people develop the symptoms of allergy day or two later, so it is difficult to know what is causing the problem. People consume variety of foods so it is difficult to find out the exact substance which causes allergy. For this reason people have to go on an elimination diet. They stop eating all foods that might be problematic and introduce one at a time to see if side reaction occurs. Side reactions of these preservatives can be immediate or build up in the body over time. Only in recent years have researchers seriously considered the physical impact of these additives over the long term[11,12]

### Discussion

Natural Preservatives that are utilizing to preserve food are not harmful to your health. The reason is they are not mixed with synthetic items. Naturally, occurring preservatives include oil, sugar, and salt. Pickles can last for years because of a potent combination of salt and oil – that acts as a natural preservative for the vegetable chunks. While the, Artificial preservative is utilized to delay the contamination of foods that lead to health problems. In fact, these preservatives are artificially produced and synthetic in nature.

You should consider limiting certain food preservatives and additives, according to Cleveland Clinic and Berkeley Wellness.[13,14] These include:

- Sodium nitrites. Nitrites add color and flavor to preserved meat. The problem comes when nitrites are heated or mix with stomach acid. They produce nitrosamines, which are linked to an increased risk of colon and pancreatic cancer.
- Sulfites can trigger asthma. Sulfites are banned on fresh fruits and vegetables in the U.S. but are used in other foods. Sulfites may be present when the

label says sulfur dioxide, potassium bisulfite, sodium bisulfite or sodium sulfite, so it's best to avoid these ingredients.

- Trans fats or partially hydrogenated oils. These are banned in the U.S. because of their link to heart disease.
- BHA (butylated hydroxyanisole) is a solid used to preserve butter, lard and meat. Berkeley Wellness says this common ingredient is found in bags of chips, vegetable oils, cereal and cookies. Its role is to prevent food from becoming rancid. The National Toxicology Program says BHA may be a human carcinogen. Berkeley Wellness says other research is mixed but suggests limiting BHA.[15,16]

A study in the journal *Nature* says emulsifiers used in mayonnaise, ice cream and other foods to keep ingredients from separating may alter gut bacteria, potentially leading to inflammatory bowel disease.

Harvard Health Publishing says preservatives are everywhere and impossible to avoid completely. Parents of young children should buy and serve more fresh and frozen fruits and vegetables and fewer processed meats.

Some other suggestions from Harvard Health Publishing and Cleveland Clinic include:

- Cut back on processed foods.
- Read labels and learn what's in the food you buy.
- Shop at farmers markets or sign up for Community Supported Agriculture deliveries of fresh produce.
- Cook most of your meals and avoid pre-packaged, precooked meals.

## Results

Preservatives are also beneficial to you in that you're not eating food that has begun to decay. These chemical compounds, however, can have may undesirable side effects in your body.

## Nitrates and Nitrites

Sodium nitrate and nitrite are food preservatives often used in meat products. They help to prevent oxidation of meats, keeping them red in color and preventing bacterial growth. The U.S. Environmental Protection Agency notes that consumption of nitrates may be linked to an increased risk of cancers, such as leukemia, brain tumors and nasopharyngeal tumors. Nitrates and nitrites may also increase risk for diabetes, diarrhea and respiratory tract infections in children. Ingesting a large amount of these

preservatives at one time may cause you to experience abdominal pain, muscle weakness, bloody stools and fainting, according to the EPA. You'll find nitrates and nitrites in bacon, lunch meat, hot dogs, sausage, smoked fish, ham and corned beef.[17,18]

## Sulfite Dangers

Sulfites in dried fruit, wine, shrimp and processed potato foods are preservatives that prevent discoloration in food. They also destroy vitamin B-1 content, however, and may cause adverse health impacts. If you are sensitive to sulfites, you may experience skin irritations, hives, flushing, hypotension, abdominal pain, diarrhea and asthmatic breathing after eating them, according to a study published in November 2009 in the journal "Clinical and Experimental Allergy." The U.S. Food and Drug Administration continues to allow the use of sulfites in food, and the preservative appears on the "Generally Recognized as Safe" list.[19]

## Sodium Benzoate

Sodium benzoate, or benzoic acid, is another preservative used to prevent bacterial growth in foods. The Center for Science in the Public Interest notes that people who are sensitive to sodium benzoate may experience hives, asthma or allergic reactions after consuming it. When combined with vitamin C, also known as ascorbic acid, sodium benzoate may pose a small risk of cancer, including leukemia. According to the World Health Organization, animal studies reveal that high doses of the preservative may cause damage to the heart, spleen, liver, kidneys, brain and adrenal glands. But human studies and studies with lower consumption rates are limited.[20]

## Antioxidant Preservatives

Propyl gallate and tert-butylhydroquinone are antioxidant preservatives that help prevent the spoilage of fats and oils. They're found in processed foods, vegetable oils and meat products. According to the Center for Science in the Public Interest, animal studies reveal that low doses of propyl gallate may increase risk of cancer. Tert-butylhydroquinone increases the incidence of tumors in studies conducted on rats. More research is needed to determine the impacts of these preservatives on human health, however.[21]

**Bisphenols, such as BPA.** They can act like the hormone estrogen and interfere with puberty and fertility. Bisphenols can also increase body fat, and



cause problems with the immune system and nervous system. They are found in the lining of food and soda cans, plastics with the number 3 or 7, and cash register receipts, among other places. They used to be found in plastic baby bottles and sippy cups; while this has been banned, older bottles and cups may still contain them.[22]

**Phthalates.** These can also act like hormones, interfering with male genital development, and can increase the risk of obesity and cardiovascular disease. They are ubiquitous, found not just in plastic packaging, garden hoses, and inflatable toys, but also in things like nail polish, hairsprays, lotions, and fragrances.[23]

**Perfluoroalkyl chemicals (PFCs).** They can lead to low-birthweight babies, as well as problems with the immune system, the thyroid, and fertility. They are commonly found in grease-proof paper, cardboard packaging, and commercial household products such as water-repellent fabric and nonstick pans, among other places.

**Perchlorate.** This chemical also interferes with thyroid function, and can disrupt early brain development. It's found in some dry food packaging — it's used to decrease static electricity — and sometimes in drinking water.

**Artificial food colors.** These have been found to increase symptoms in children who have attention deficit hyperactivity disorder, or ADHD. They are found in all sorts of food products, but especially those marketed for children.[23]

### Conclusions

Buy and serve more fresh or frozen fruits and vegetables, and fewer processed meats, especially during pregnancy.

Since heat can cause plastics to leak BPA and phthalates into food, avoid microwaving food or beverages in plastic containers. Also: wash plastics by hand rather than putting them in the dishwasher.

Use more glass and stainless steel instead of plastic.[24,25]

Avoid plastics with the numbers 3, 6, and 7 on them.

Wash hands thoroughly before and after touching food, and clean all fruits and vegetables well.

And here are a few more ideas:

Cut back on canned foods and beverages in general.

Cut back on fast food and processed foods.[31]

Read labels. Get to know what is in the products you use.[26,27]

Look for lotions, soaps, and other products that are made naturally — and are fragrance-free.

Consider making your own home cleaning products. You'd be amazed what a little baking soda or vinegar can do.

The idea isn't to get paranoid (although that's an understandable feeling); the idea is to get informed — and to make some simple changes that can go a long way toward keeping children and their families healthier.[28,29]

### References

- [1] Ahmed N. 2013. Naturally Occurring Preservatives In Food And Their Role In Food Preservation. International Journal Of Pharmaceutical & Biological Archive, 4(1): 22-30.
- [2] Anand Sp, Sati N. 2013. Artificial Preservatives And Their Harmful Effects: Looking Toward Nature For Safer alternatives. International Journal of Pharmaceutical Sciences and Research, 4(7): 2496.
- [3] Aneja Kr, Dhiman, R, Aggarwal, Nk, Aneja A. 2014. Emerging Preservation Techniques for Controlling Spoilage and Pathogenic Microorganisms In Fruit Juices. International Journal of Microbiology, 2014.
- [4] Baudouin C, Labbé A, Liang H, Pauly A, Brignole-Baudouin F. 2010. Preservatives In Eyedrops: The Good, The Bad And The Ugly. Progress In Retinal And Eye Research, 29(4): 312- 334.
- [5] Abdulmumeen, H. A., Ahmed, N. R., And Agboola, R. S. 2012. Food: Its Preservatives, Additives And Applications. Int'l J. Of chemical And Biochemical Sciences, 1: 36-47.
- [6] Acgh, 2001. Industrial Ventilation: A Manual Of Recommended Practices, American Conference Of Governmental Industrial Hygienists Cincinnati, Ohio, Usa, 24th Edition.
- [7] Admas, J. B. 1997. Food Additive- Additive Interactions involving Sulphur Dioxide And Ascorbic Acid Nitrous Acids: A review, Food Chemistry, 59. 401-409.
- [8] Alpana Deshpande And Bhagyashree Deshpande Et Al. 2013. Food Additives And

- Preservation, Indian J. Sci. Res., 13(2): 219-225  
Issn: 2250-0138.
- [9] Hamid Aa, Ahmed Nr, Agboola Rs. 2012. Food: Its Preservatives, Additives And Applications., International Journal Of Clinical And Biologicalsciences 1, 36-47, Hugo Wb, Russell Ad. 2004. Pharmaceutical Microbiology. Seventh Edition, Pp. 120-125, Blackwell Science.
- [10] Inetianbor Je, Yakubu Jm, Ezeonu Sc. 2015. Effects Of Food Additives And Preservatives On Man—A Review.
- [11] Inetanbor, J. E. Et Al. 2015. Effects Of Food Additives And Preservatives On Man: Asian Journal Of Science Andtechnology, Vol. 6, Issue 02, Pp. 1118-1135.
- [12] Pandey, R. M., And Upadhyay, S. K. 2012. Food Additives, Food Additives Prof. Yehia ElMmsamragy (Ed.), Isbn: 978-953- 51- 0067- 6.
- [13] Riddervold A. 2008. High Pressure Food Preservation, Food Conservation. Pp. 12- 166, Isbn 9780907325406.
- [14] Sager T. M., C. Komminent, And V. Castranova, 2008. “Pulmonary Response To Intratracheal Instillation Of Ultrafine Versus Fine Titanium Dioxide: Role Of Particle Surface Area”Particle And Fiber Toxicology, Vol. 5, Article17.
- [15] Sharif Zim, Mustapha Fa, Jai J. Yusof Nm, Zaki Nam. 2014. Review On Methods For Preservation And Natural Preservatives For Extending The Food Longevity. Chemical Engineering Research Bulletin, 19: 145-153.
- [16] Winter, R. A. 1994. Consumer's Dictionary Of Food Additives. Three River Press, New York. 112pp.
- [17] Asian Journal Of Science And Technologies, 6(2): 1118-1135. Juneja Vk, Dwivedi Hp, Yan X. 2012. Novel Natural Foodantimicrobials. Annual Review Of Food Science And Technology, 3: 381-403.
- [18] Kulkarni C, Deshpande A, More S. 2010. Assessment Of Microbial Contamination In Commercial Herbal Oral Medicinal Liquids. International Journal Of Research And Development In Pharmacy & Life Sciences, 2(9): 191-193.
- [19] Lado Bh, Yousef Ae. 2002. Alternative Food-Preservation Technologies: Efficacy And Mechanisms. Microbes Andinfection, 4(4): 433-440.
- [20] Leistner L. 1992. Food Preservation By Combined Methods. Food Research International, 25(2): 151-158.
- [21] Leistner L. 2000. Basic Aspects Of Food Preservation By Hurdle Technology. International Journal Of Food Microbiology, 55(1): 181-186.
- [22] Mirza Sk, Asema Uk, Sayyad Sk. 2012. To Study The Harmfuleffects Of Food Preservatives On Human Health. Journal Ofmedicinal Chemistry And Drug Discovery, 2 (2): 610-616.
- [23] Ottoboni A, Ottoboni F. 2004. The Food Guide Pyramid: Will The Defects Be Corrected. Journal American Of Physician Surgeon 9(4): 109–113.
- [24] Rahman Ms. 2007. Food Preservation: Overview: Handbook Of Food Preservation. 2nd Edition, Pp. 3-7, London, Crc Press.
- [25] Russell Ad, Hugo Wb, Ayliffe Gaj. 1999. Principles Andpractices Of Disinfection, Preservation And Sterilization. Third Edition, 80-85 Blackwell Scientific Ltd., Oxford. Sabir Ms, Rajendra Cd, Amol S, Poournima Ss. 2016. A Review On: Preservatives Used In Pharmaceuticals And Impacts On Health. Pharmatutor, 4(5): 25-32.
- [26] Sharif Zim, Mustapha Fa, Jai J, Yusof Nm, Zaki Nam. 2013. Review On Methods For Preservation And Natura Lpreservatives For Extending The Food Longevity. Chemical Engineering Research Bulletin, 19: 145-153.
- [27] Sharma S. 2015. Food Preservatives And Their Harmful Effects. International Journal Of Scientific And Researchpublication, 4(5).
- [28] Smith Aa. 2011. Preservatives In Food Products—Review. International Journal Of Pharmaceutical & Biological Archive, 2(2): 583-599.
- [29] Strickley Rg, Iwata Q, Wu S, Dahl Tc. 2008. Pediatric Drugs—A Review of Commercially Available Oral Formulations. Journal Of Pharmaceutical Sciences, 97(5): 1731-1774.
- [30] Vega Mh, Martin Bo, Qin Bl, Chang Fj, Góngora Mm, Barbosa Gv, Swanson Bg. 1997. Non-Thermal Food Preservation: Pulsed Electric Fields. Trends In Food Science & Technology, (5): 151-157.
- [31]