



PROCESSED FOOD FILLERS: A REVIEW

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ABSTRACT

Processed food, more commonly known as convenience food are found in every house these days all over the world. Besides a lot of merits they bring, for instance say ready to eat, 2-minutes cooking, they also come with a cost, which is painful on both: our pocket and our body health. They come with a whole long list of unwanted fillers in the form of numbered ingredients mentioned in the ingredients list of the product, in the form of stabilizers, preservatives, acidity regulators, colour additives, sweetening agents, humectants, sequestrants, emulsifiers, flavour enhancers and many other chemicals. INS and E are used as prefix before those numbers. Many food additives are safe and have no reported side effects, but as researches continue to conduct in various parts of population, side effects like carcinogenicity, lifestyle disorders like Obesity, Type 2 Diabetes Mellitus, neurological disorders like Alzheimer's disease, Parkinson's disease, Attention-deficit hyperactivity disorder (ADHD), and even early death are linked positively with the consumption of a lot of additives. Animal studies have proved the mutagenic properties of different chemicals used in food and beverage industry. Proactive nations like Europe, Canada and a few more have banned many such additives to be used in the food due to the detrimental effects they bring on human health. The list of banned additives keeps getting longer every year. If you are interested in knowing more about these numbered ingredients, then keep reading. This article will help you to come to a point where you can study the ill effects caused by these fillers on our health in reference to the recent studies published on these additives. Even this is observed that the supporting studies are often widely referenced and appreciated and the opposing studies are not paid attention to or dismissed.

Keywords: *Processed food additives; Preservatives; Sweeteners; Side-effects of food additives; Carcinogenicity*

INTRODUCTION

INS is used as a prefix representing International Numbering System as decided by the Codex Alimentarius Committee. You must also have seen E before the numbers. It represents European Union. A subgroup of INS approved additives are allowed to use in European Union, giving rise to the 'E' prefix.

Let's talk about sweeteners first. Artificial sweetener is an additive used in packaged food products to replicate the taste of sugar minus the energy released by it upon its metabolism. These are great for weight watchers. These artificial sweeteners are not fermented by dental

microflora, so even dentists recommend the usage of ASW in place of table sugar. Still artificially produced sweetener's safety remains controversial. Animal studies have repetitively proven its side effects. Some of the studies also indicate the carcinogenic risks of approved artificial sweeteners like aspartame. Artificial sweeteners are cheaper than sugar, so the manufactures of these artificial sweetener loaded drinks and other confectionaries are really making a huge profit, as they have to spend relatively less. Not only ASW but all those sugar alcohols come relatively cheaper than sugar. Many studies were done but there's no such strong evidence proving the side effects caused by these sweetening agents. A study on rats showed that the aspartame intake resulted in weight gain due to increased caloric intake, hunger and adiposity, because sweet taste induces insulin response which leads to hypoglycaemia and increased food intake (Tandel, 2011). It is too early to gather the concrete epidemiological data proving the ill-effects like carcinogenicity, and other metabolic disorders of these ASW but there is a plethora of studies which indicate towards the same. A lot of studies were discarded and not considered reliable due to limitations like small sample size, low doses, effects shown only in animals, non-significant effects or marginal effects in humans, etc. (Weihrach et al., 2004)

Apart from artificial sweeteners there are many polyols, better explained as sugar alcohols are those derived from sugars when they are fermented. They contain negligible energy and are used to sweeten many food products these days. They are about 25-30% less sweet than sugar and are widely marketed as healthy sweetener as they don't have that bad of an image in the consumer's eyes. Moreover, we don't have many studies linking sugar alcohols to metabolic and lifestyle diseases.

Another food additives are colourants. They can be natural, nature-derived and completely synthetic. Many colours have been banned over the years in various countries worldwide. This list seems to be getting longer in the upcoming years, but the issue is that, these colours have been banned in some countries where the government and citizens is proactive enough to take action, while in other countries, where no awareness, campaigns are done by people, especially under-developed and developing economies, these colours are still consumed every day without any restrictions. Recently on 7 August, 2022 European Food Safety Authority, EFSA banned the use of E171, titanium oxide as a food additive as a possible carcinogen, due to the presence of nanoparticles although it is supposed to contain microparticles only (Boutillier et al., 2022)

Preservatives exist in our food from very old times to prevent food wastage and spoilage. Earlier preservatives like salt, oil was used to keep the food from undesired physical and chemical changes. Such preservatives are common preservatives find in any general kitchen. The type of preservatives used today has completely replaced those which we used in ancient times. A lot of chemically synthesized preservatives are used very commonly in processed food. These Class II preservatives bring merits like increased quality of food, reduced cost of food, but they also cause destructive effects on our bodies. The ever-increasing demand of convenience food and the lifestyle which we have adopted over the years made the use of processed food with exceptionally long shelf life essential which can only be achieved by the use of synthetic preservatives. High doses of the man-made preservatives seem to cause problems like shortness of breath, digestive disturbances, and serious complications like Hyperactivity syndrome, kidney problems, respiratory issues (Silva et al., 2016).

ARTIFICIAL SWEETENING AGENTS

There is a whole variety of sweeteners used in daily foods such as flavoured breakfast cereals, beverages, biscuits, chocolates, etc. US Food and Drug Administration, FDA approves of five artificially produced sweeteners which are Aspartame, Acesulfame-Potassium, Neotame, Sucralose and Saccharin. Out of all these sweeteners the side effects of Aspartame and Acesulfame-K are well studied and discussed. San Antonio heart study and National Health and Nutrition Examination Survey, NHANES found a positive link between the increased consumption of artificial sweeteners and weight gain in all age groups, more specific in children. A regular usage of artificial sweeteners in the diet may make the less intensely sweet food, let's say fruits less attractive and appealing. This can even turn into avoiding the natural foods, which are high in other nutrients too and going for artificially flavoured food with little or no nutritional value, which is again harmful to the body. Right now, there is no information on how these artificially produced chemicals will impact our bodies in long run with such amounts being consumed every single day in many parts of the world population (Brown et al., 2010). It can make us crave for sweet food even more and our mind is now not able to link sweetness with extra calories as we use artificial sweeteners, but many times sweets are not sweetened with artificial sweeteners and eating sweet food instead of nutritious food can be linked with easy weight gain and obesity in long term (Sleman, 2022).

ASPARTAME is the most commonly used artificial sweetener, still its safety remains arguable. It is better seen as E951 in the ingredient lists. Aspartame contains zero calories hence reducing the calorific value of the food. It was discovered by James M. Schlatter Schlatter when he was researching about anti-ulcer drugs and licked his finger against the laboratory regulations. It is about 200 times sweeter than sucrose and its flavour takes a while to appear. It typically have an aftertaste. The Acceptable Daily Intake, ADI is 40 mg/ kg body weight/ day in Europe and 50 mg/ kg body weight/ day in United States. It is widely available as NutraSweet and Sugar Free, etc. Aspartame is stable in its solid form, but highly unstable in the presence of moisture, in solutions, pH values above 6 and high temperature. It is not used for baked and fried food and for those dessert dry mixes as in high temperature it loses all its sweetness. The chemical structure of aspartame (carboxylate and amino acids) makes it perfect to bind to metals, and can be potential source of heavy metals in food from the packaging on which the food is stored and further served. The long-term use of aspartame remains unpredictable, but the digestion of aspartame causes the release of its components which are more toxic than aspartame itself. Aspartame is broken down into three metabolites, methanol (10%), L-aspartic acid (40%) and L-phenylalanine (50%) with the help of esterase and peptidases. All of them are absorbed in intestines and are harmful at high doses and are found toxic to brain.

- Methanol is a poison for humans and also known to cause damage to hepatocytes. With the help of Alcohol Dehydrogenase, ADH it is converted to formaldehyde and then to formic acid. Formaldehyde may damage DNA by its ability to cross link proteins, inducing genotoxicity and mutagenicity. Methanol also increases the level of free radicals, damaging the cell membrane by causing peroxidation of fatty acids of phospholipids. Those free radicals are also responsible for low enzymatic activity in liver and also gene damage resulting in apoptosis and necrosis.
- L-phenylalanine (Phy) is converted majorly to tyrosine with little phenylethylamine and phenylpyruvate. Aspartame is a strict no-no for Phenylketonurics. Phenylketonuria is a rare congenital recessive genetic disorder due to the changes in the gene encoding for Phenylalanine Hydroxylase, PAH following the rise of plasma

Phenylalanine levels as phenylalanine can't be converted to tyrosine without PAH. Such people are given low-Phy diet from birth. According to FDA, there should be label informing the presence of phenylalanine in the food product as high plasma Phy levels can be dangerous, it can cause brain damage which can show up in the form of symptoms like intellectual disabilities, autism, rashes, seizures, developmental problems and other psychiatric symptoms. Increased plasma Phy level are also responsible for decreased dopamine and serotonin levels in brain.

- L-aspartic acid is metabolized into oxaloacetate and alanine.

A study stated that the high intake of artificial sweeteners aggravates the pro-inflammatory process which increases the risk of type-2 diabetes mellitus. The clear link between aspartame and T2DM is still uncertain. More researches are yet to be done. Aspartame is also associated with early menarche in 9–10-year-old girls. It has also been linked with neurodegenerative diseases like Alzheimer's disease and Parkinson's disease. Just after the aspartame intake, the level of adrenocorticotropin and corticosterone levels in plasma are elevated which leads to neuropsychiatric reactions like mental stress, headaches, convulsions and even depression. Aspartame also activates few calcium channels in neurons, resulting in cell death (Czarnecka et al., 2021). Aspartame causes increase in the mRNA expression of Bcl-2 gene, an anti-apoptotic gene, also suppresses the expression of p53 tumour suppressor gene. A study indicates that aspartame slows down apoptosis in cancer cells and increase and sustain their proliferation. A study done on laboratory rats show the cases of bladder cancer in aspartame fed rats.

A latest large scale cohort study on humans conducted in France on 1 lakh adults for 7-8 years found a positive link between ASW intake and overall risk of cancer, specifically breast cancer and obesity related cancers, specifically Aspartame and Ace-k consumption (Debras et al., 2022)

ACESULFAME-K is about 200 times sweeter than table sugar. It is sold as SweetOne, Sunett, Swiss sweet, etc. It is stable even at high temperatures up to 400°F and also used in baked goods. This is seen as E950 under the ingredient list of food products. The acceptable daily intake set by FDA is 15 mg/ kg body weight/ day. A study reported that aspartame when combined with Ace-K is found to have an increase in the genotoxic activity, but the same study also stated that Ace-K is not mutagenic, again indicating the genotoxicity and mutagenicity of aspartame (Czarnecka et al., 2021).

SACCHARIN is the first ever and the oldest artificial sweetener. It is also known as acid saccharin, sodium saccharin and E954. It is marketed as 'Sweet n Low'. It is around 300 times sweeter than regular sugar and typically have a bitter aftertaste. The ADI is 5 mg/ kg body weight/ day. It is mostly used in beverages and must be avoided in pregnancy and lactation. It is banned in many countries due to its carcinogenic properties. Canada has banned after its adverse effects on rats were found, causing cancer in rats.

NEOTAME is the most recently FDA approved artificial sweetener in 2002. It is manufactured by NutraSweet and is about 8000 times sweeter than sucrose. This is a derivative of a dipeptide composed of two amino acids, aspartic acid and phenylalanine. So Phenylketonurics can't have neotame sweetened products as well. Its ADI is 18 mg/ kg body weight/ day.

SUCRALOSE is also called E955 and chlorinated sugar as it is made by replacing three hydroxyl groups of sucrose by chlorine atoms. This is also heat stable and around 600 times

sweeter than sugar. It is marketed under the name of Splenda. Most of the sucralose leaves the body unaffected and unmetabolized. There have been no negative results reported against the use of sucralose (Tandel, 2011). Other sweeteners like Cyclamate also called E952 is found toxic and banned in many countries across the globe (Weihrauch et al.,2004).

The products with added sugar, specifically fructose is known to increase the uric acid levels of the blood, leading to hyperuricemia which can directly be related to kidney disease. Increased sugar intake also results in hypertension, obesity and diabetes which are indirectly related to kidney diseases like Chronic Kidney Disease, CKD and End Stage Renal Disease, ESRD. People already having kidney issues are told not to consume food with high fructose content and especially those sweetened by High Fructose Corn Syrup, HFCS. (Karalius et al., 2013). HFCS is under the list of natural sweeteners released by FDA, due to the alteration caused by the enzyme to corn syrup which first turns it into glucose and then further glucose is converted to fructose (Mazi et al., 2023).

The sugar alcohols which are very commonly used in beverages and other sweet food products are sorbitol, mannitol, erythritol, xylitol, lactitol and maltitol. Polyols don't cause any tooth decay as they are not fermented by the bacteria in our mouth. They are not even related to any blood glucose spikes after their consumption, they don't even have any effect on insulin response. They are absorbed very slowly by our intestines, and it may cause the retention of extra water in stools, leading to diarrhoea. Erythritol is one of the polyols used in F&B industry. It is a small 4-Carbon molecule, which is found naturally in plants. It is also produced commercially by the fermentation of sugars. It contains about 0.4 kcal/gm and is 30% less sweet than table sugar. It doesn't have any aftertaste and there is a cooling effect in the mouth. Erythritol induces the suppression of the secretion of Ghrelin (hunger hormone) and promotes the release of Leptin, which is responsible for the feeling of satiety and ultimately resulting in weight loss. A large portion of erythritol, about 80% of the amount which is consumed is un-metabolized and released out of our body via urine unaffected. The fate of the remaining 10-20% of the erythritol is unclear and we don't really know much about it. Various observational studies have reported a positive association between the chronic erythritol consumption and obesity and other metabolic disease. A three-year study found a link between erythritol and cardiovascular diseases like heart attack, stroke, etc. Researchers found that erythritol exposition to human blood causes the risk of development of blood clots. Even though it is found naturally in fruits, wine, etc but the amount used in low-calorie beverages, ice-creams is way higher than what is present in fruits, etc. (Mazi et al., 2023).

COLOUR ADDITIVES

Colour is directly related to consumer acceptance. It is one of those things which can lure the consumers to select a particular food, no wonder colour is a significant part of every food sensory evaluation done. It makes the food appealing. There are some natural colour additives like E100(i) which is essentially curcumin, aka Indian Saffron. It is a safe additive as it has antioxidant and anti-cancer properties. Processed food comes with a long list of food colour additives which are produced synthetically. Again, and again these additives are linked to certain neurocognitive, behavioural effects and allergic reaction in humans. Some of the colour additives commonly used are mentioned below.

- E110 is a yellow-orange food colour. Also called sunset yellow FCF. It is widely used in soft drinks, flavoured fermented milk products, etc. It is petroleum derived

azo (nitrogen-containing) dye. It is known to cause health problems like allergic reactions, and even hyperkinesia. It has some proven side effects in animals including carcinogenicity. This colourant is banned in Norway and Sweden.

- E133 is a blue-coloured dye often used in beverage industry. Another name is Brilliant Blue FCF. Most of E133 consumed is excreted out in faeces. About 5% is absorbed from the gut. However, it can be absorbed from tongue and shaved skin. High doses of E133 in humans resulted in deposits in kidneys and lymphatic vessels. DNA damaging and tumorigenic properties are seen in animals
- Other commonly used food colours like E122, E120, E102 have similar deteriorating results on human health (Silva et al., 2022).

Colours derived by burning the sugar into caramel has been used all around the globe in different foods and beverages. They are readily soluble in water. Its colour ranges from pale yellow to amber dark brown for example, in breads, soft drinks, beer, chocolates, etc. There are four different classes of caramel colours.

Class I: E150a is Plain Caramel

Class II: E150b is sulphite caramel

Class III: E150c is ammonia caramel

Class IV: E150d is sulphite ammonia caramel

A compound named 4-methyl imidazole which is released during the manufacture of caramel colourings is classified as potential carcinogen and promoting reproductive toxicity by California. As per existing researches, intake in acceptable amounts have not been identified to cause genotoxicity in humans (Vollmuth, 2018). Convulsions were observed when 4-MI was fed to mice, chicks and rats. Caramel class 3 additive is known to cause decreased number of lymphocytes and a compromised immune system in rats. This was caused by the imidazole derivative THI, 2-acetyl-4(5)-tetrahydrozbutylimidazole. But double-blinded research done on humans in elderly male population showed no effects on immune system on the consumption of class 3 additive under Acceptable Daily Intake for 7 days (Houben et al., 1992)

PRESERVATIVES

Food preservatives are substances or more precisely chemicals which are qualified to halt the fermentation of food, delay the acidification and other reactions which result in food degradation. They help in minimizing the food waste. Preservatives also helps to preserve the quality of the food product by conserving the texture, taste, colour, and other physical aspects of food. The range from 200 to 299 of E-numbers and E1105 is assigned to preservatives added in food. On the basis of their origin the preservatives are divided into two different classes,

- Class I: This category of preservatives includes all the natural preservatives, such as salt, sugar, oil, honey, spices, vinegar, lemon juice, and others. The products containing Class I preservatives are safe for our health as these preservatives do not have any long term after effects on the body.
- Class II: It includes the chemically derived preservatives like acids and their salts. Benzoic acid and benzoates, sorbic acid and sorbates, nitrates, nitrites are few examples of Class II preservatives. One food product cannot contain more than one

preservative, according to the standard regulations as it increases the exposure of body to multiple chemicals at a time.

Different preservatives are used in distinct foods according to their desired effects against specific chemical changes associated with that particular food product. Preservatives are also classified on the basis of the activity through which they protect the food against decomposing reactions. Both Class I and II preservatives are divided into three types,

Antimicrobial agents, are those additives which inhibit and retard any form of growth of microorganisms, related to that food, protecting the food borne infections and diseases and the spoilage of food. They restrict the undesired growth of bacteria, yeast, moulds, fungi, and other microbes (Anand et al., 2013).

Antioxidants, are those food additives which helps to increase the shelf-life of the food by slowing down or complete inhibition of those unnecessary oxidative reactions of substances present in food specifically fats and oils which lead to rancidity (Silva et al., 2016). There are three distinct types of antioxidants, first is True Antioxidants, they basically block the chain reactions by binding the free radicals. Examples, BHT, BHA. Next is Reducing Agents, these are the substances which possess a lower redox potential when compared to the food which they are preserving, examples include Ascorbic acid, TBHQ. The last category of antioxidants has Synergistic Antioxidants, which enhance the effect of other antioxidant present in the food. Tetrasodium EDTA is a good example of Synergists.

Anti-enzymatic agents, inhibits the action of enzymes which ultimately lead to spoilage of food. Example citric acid blocks the enzyme phenolase which is responsible for the brown colour on cut fruits and potato (Anand et al., 2013). The same preservative can have multiple mechanisms to protect the food, like one preservative can have both anti-oxidative and anti-microbial properties. Talking about some widely used preserving agents worldwide,

- E200 denotes Sorbic acid, E201 is the sodium salt of sorbic acid, namely Sodium Sorbate, E202 is Potassium Sorbate and E203 is Calcium Sorbate. Sorbic acid is linked more to skin related problems like irritation, rashes, itching and other allergic reactions than Sorbates.
- E220 symbolizes Sulphur dioxide. It destroys the thiamine present in food, leading to the loss of Vitamin B1. Various sulphate salts are Sodium Sulphite (E221), Sodium Hydrogen Sulphite (E222), Sodium Metabisulphite (E223), Potassium Metabisulphite (E224), Calcium Sulphite (E226), Calcium Hydrogen Sulphite (E227) and Potassium Hydrogen Sulphite (E228). The genotoxicity of sulphites in humans is still argumentative. They are also known to exacerbate asthma (Silva et al., 2016).
- Benzoic acid has given the number of E210. Some of the benzoate salts are E211, which is Sodium Benzoate; E212, called as Potassium Benzoate; E213 known as Calcium Benzoate and many others. All of these salts have been associated with the synthesis of other compounds when reacted with the constituents of food, which are reported for detrimental effects. **Sodium Benzoate** is the additive which requires our special attention. It is linked with aggravating the breathing difficulty in asthmatic patients, is a suspected carcinogen as well as a neurotoxin, it may be a causative factor for foetal abnormalities. It is largely used in carbonated drinks. The property of Sodium Benzoate is to form Benzene when in contact with Ascorbic acid. Benzene is potential carcinogen which is known to cause leukaemia and other forms of cancer and is a natural component of crude oil. It is found in the gas emissions of vehicles, factories, volcano and forest fires. FDA requested the companies not to use benzoate

salts as a preservative in soft drinks, in the early 1990s, even after that, the benzene was still detected in beverages in 2000s. In 2006, a legal action was taken against those companies who still used Sodium Benzoate as a preservative in their drinks in United States to completely cease the use of such life-threatening chemicals. But in many other countries, it is still in use without any restrictions (Mirza et al., 2017). Parabens is the umbrella term for all the alkyl and aryl esters of p-hydroxybenzoic acid. They are commonly used as a preservative in cosmetics, pharmaceutical and food products. Exposure to such products increases the level of parabens in the body through ingestion, inhalation and on application on skin. They have anti-microbial properties. Their interference with the metabolism of microbes defines their mode of action. Butylparaben are more efficient and have a stronger ant-bacterial action than Propylparaben. Parabens are found in high amounts in urine, breast milk, blood serum, placenta, fat tissue, seminal fluid which raised the awareness of parabens in general public. They cause a dysfunction of endocrinal system by hindering the function of hormones, resulting an increased threat of hormone related diseases like Diabetes Mellitus and Obesity. Parabens even abuse liver function and can even cause loss of nuclei by hepatocytes. Women having higher concentration of parabens are linked with shorter menstrual cycle. Studies have reported men having higher levels of parabens have reduced levels of testosterone and sperm, also a group of pregnant women who were exposed to parabens in the first trimester shows increased occurrence of gestational diabetes mellitus. A recent study that compared a group of beauty salon employees to housewives found increased concentration of parabens in urine and also observed some positive indicators of kidney damage. Australia banned the use of these parabens, E214, E215, E217 and E219 (Ahmed et al., 2022).

- E249 is Potassium nitrite, E250 is Sodium nitrite, E251 is Potassium nitrate and E252 is Sodium nitrate. Nitrate when ingested get converted into nitrites, which react with Hb, to produce methaemoglobin (formed by the oxidation of Hb which converts the iron which is previously in ferrous state to ferric state, losing the capability to bind to oxygen), which can lead to various abnormal defects, even loss of consciousness and death, particularly in infants. Moreover, Scientific committee of food of EU stated that in meat products nitrates turn into nitrites, which turn into nitrosamines when reacted with acid in food or stomach. Nitrosamine are carcinogens and there is no safe limit under which the use of nitrates and nitrites cannot be associated with tumorigenesis (Anand et al., 2013).
- Propionic acid is E280. E281 is Sodium Propionate, E282 is Calcium Propionate and E283 is Potassium Propionate. The quantity approved by EU is considered safe for human health. Although, studies found that Calcium propionate induces DNA damage and carcinogenesis in humans, especially breast and ovarian tumorigenesis. It is also used as an emulsifier in food (Pongsavee, 2019)
- Nisin is a natural active polypeptide against the gram-positive microbes. It is antibiotic in nature but it is not used in any therapeutic applications of antibiotics. E234 is the number assigned to it. It is added to food to halt the growth of bacteria and is often associated with the growth of resistant microorganisms which lead to health problems (Silva et al., 2016).
- E319 aka Tertiary Butylhydroquinone, TBHQ, it is derived from petroleum. The mechanism through which TBHQs promote carcinogenicity have been observed in research, by inducing Cyp1a1 (an enzyme which activates the carcinogenic derivatives) gene expression. It is widely used in processed and refined oils, and the food containing high amounts of vegetable oils (Gharavi and El-Kadi, 2005).

- E612 also called MSG, Monosodium Glutamate is a salt of glutamic acid. It is used as a very common flavour enhancer and preservative in Food and Beverage industry. It is a well-known food additive and symptoms like headache, nausea is very common after MSG consumption. More popularly, MSG is known as Ajinomoto (Anand et al., 2013).
- E321 is Butylated Hydroxy Toluene, BHT and E320 is Butylated Hydroxy Anisole, BHA. Both of these synthetically produced antioxidant preservatives are often linked with their carcinogenic as well as anti-carcinogenic properties. Their effect on health is still unclear (Botterweck et al., 2000)

There is a never-ending list of these preservatives. Some are extracted from coal tar. Some have reported mutagenicity. Even cases of poisoning are also filed against some preservatives.

ANTIOXIDANTS

Antioxidants prevents the oxidative deterioration of food while storage and processing of use of antioxidants might possess risks to human health. Fats especially unsaturated are very prone to oxidation. Many antioxidants don't have any detrimental effects on human health, like Ascorbic acid and Ascorbates, Citric acid (E330) and citrates, Acetic acid (E260) and acetates, Lactic acid (E270) etc. E300 is the number assigned to L-Ascorbic acid, Sodium ascorbate and Calcium ascorbate rewritten as E301 and E302 respectively.

They are also used as acidity regulators and have no ill effects on health. Acidity Regulators are acidifying agents which increases the acidity of the food, also providing a sour taste to the beverage or any other food product. They change and regulate the pH of foodstuff. Lactic acid has antioxidative, acidifying and gelling properties. Gelling agents are the substances which contribute to the texture of the food by assisting to the gel-formation.

E385, Calcium disodium EDTA. It is a Sequestrant (agents that binds metallic ions by making complexes with metal ions, preventing them to catalyse the decomposition reactions in food) and have some antioxidant properties too. It is the calcium and sodium derivative of EDTA, Ethylenediaminetetraacetic acid. High doses of E385 causes diarrhoea, vomiting, abdominal cramps, urinary problems and even haematuria. It is banned in Australia (Silva et al., 2016). High doses of E385 with may result in the reduction of iron levels in blood. Calcium EDTA has a powerful affinity for Zinc, which can lead to Zinc deficiencies (George and Brady, 2020).

EMULSIFIERS AND STABILIZERS

Stabilizers maintains the physical and chemical state of food and also ensures homogeneity of food. Emulsifiers maintains the homogeneity of mixtures of two or more immiscible liquids. E322 also known as Soya Lecithin is a very popular emulsifier with no related side effects (Silva et al., 2016).

ANTI-FOAMING AGENTS

Anti-foaming agents reduce and restrict the formation of foams in food. These are particularly used in vegetable oils to prevent foam formation when they are heated. E900, Dimethyl-polysiloxane, DMPs are used in vegetable oils to prevent frothing (Mandal, 2019).

FEW CONTROVERSIAL CASES

Research done by CSE, Centre of Science and Environment evaluated the 38 bread samples available all over India and found that 84.2% of all the breads contained Potassium Bromate and Potassium Iodate. FSSAI banned its use on June 20, 2016 (Sahu et al., 2016). Potassium bromate is used as a flour improver (Agents that help to increase the speed of dough rising, and increases the strength and workability of dough. They fall into 4 categories, bleaching agents, oxidizing/reducing agents, enzymes and emulsifiers) in bread dough. It is also an oxidizing agent and is very affordable among all. IARC, International Agency Research on Cancer classified it under group 2B, which is the category of chemicals which are possibly carcinogenic to humans. Many nations have banned it from usage in food like China Brazil, Canada and Europe. EU classified it as a carcinogen (Shanmugavel et al., 2020).

In order to expand the market for Coca-Cola's water bottle Dasani, they launched it into UK market. But exceptionally high levels of bromate, a potential carcinogen has been found in the bottled water and the bottles were immediately pulled back from all the stores(Doria, 2006). In Argentina, an internet campaign called Dasani water as "Cancer Water" (Brooks, 2009).

CONCLUSION

Food additives have assisted us to achieve the optimal quality of processed food by eliminating the problems like food deterioration, loss of texture and taste, appearance, colour and much more meeting the consume expectations. But the main puzzle is the ill-effects, like kidney diseases, endocrinal disorders, neuropsychiatric disorders, cancers, etc. which they bring to the plate which no one really want to talk about openly. Many countries have banned the additives which we have consumed for countless days. There's no such concrete evidence to prove that these additives cause disorders however a lot of studies indicate towards their damaging effect on our health and we can't just simply ignore the indications shown by such large number of researches conducted. Right now, we don't really know what will be the long-term side effects of these additives on the human population, which we are putting into our precious bodies literally every single day. More and detailed researches are yet to be done for us to come to a real conclusion as our methods of testing, evaluation and understanding continue to improve. Scientists are divided in their views, some are in favour while others are against of the usage of fillers in food, there's no such one opinion. That's why, its high time we should take a step by reducing processed and packaged food from our diet to gradually using such convenience food only in times of extreme cases to keep ourselves healthier, even in later stages of our life and also prevent early death. We should even try to spread awareness about these unwanted fillers and minimize the exposure of these hazardous chemicals of questionable origins and effects by including freshly harvested and prepared food in our diets. Make a habit of reading the ingredients label of your favourite food products while grocery shopping.

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