

A Perilous Consequence Of Ice-Cream

R. Angayarkanni, G. Sridevi, D. Mohanambal, B. Nagamuruga

Abstract: The topic about the paper is toxic ingredients in the ice creams and their effects. Basically the people from all ages love ice creams, but ice creams of now-a-days are not healthy and good as we think. Every ice cream is manufactured with lots of poisonous chemicals like Heliotropin, Diethyl Glycol, Sodium Benzoate, etc., which is to be banned in food products. A very few websites and journals mentioned these details and these are successfully founded by us. These details are to be explained to create awareness about what are the harmful components are present in their delicious ice creams. The food items prescribed by our ancestors should be given more importance than today's artificial food stuffs. Because, the artificial manufacture of vanilla ice creams includes an animal's anal juice (beaver) and coal tar. Actually these are not held for eating purposes, but they are using it, and without knowing this we are also consuming it and also suffer from many diseases like heart and lung diseases. So, let us raise our hands against artificial stuff and also prevent ice creams for our healthy life.

Index Terms: Artificial ingredients, Additives, Food colors, Harmful effect, Health diseases. Ice cream, Toxic chemicals,

1. INTRODUCTION

Ice cream is one of the delicious, nutritious frozen products, mostly eaten as a snack, commonly made from dairy products, such as skimmed milk powder, butter and often combined with sucrose, stabilizers, emulsifiers, colorings, and flavorings.[1] Generally, Ice-cream is sweetened with sugar or sugar alternatives. Flavorings and colorings are combined in combination with stabilizers and emulsifiers. For ice cream preparation, the prepared ice cream mixture is agitated to incorporate void or air spaces and cooled down rapidly below the freezing point of water to prepare ice cream of desired characteristics. As a result; smooth ice-cream is produced and at low temperature, it becomes semi-solid foam. It becomes softer again as the temperature increases. [2]Ice cream could be a form of an emulsion, a combination of fat and water that usually wouldn't combine along while not separating. However, in an emulsion, the very tiny droplets of fat area unit spread through the water, avoiding this separation. The way during which this can be accomplished could be results of the chemical properties of molecules within the emulsion. Ice cream, one in every of the favorite food for each human that is dissimilar archaic. Many surveys too prove the factor. But no one thinks concerning it is we tend to all recognize the fact that ice creams are a unit created of eggs, sugar, and milk, however, several people don't recognize about the opposite ingredients that area unit gift in ice cream. You will be stunned to grasp that a number of the additives that area unit employed in your ice cream aren't listed on the packet. The ice cream makers take full liberty of the fact that you simply needn't show all the ingredients. Just for the sake of style and save some quantity of cash, these manufacturers add a myriad quantity of chemicals that they're not even accounted for and that they sell these as 'ice creams'. A classic vanilla ice cream may be expected to be made of a dish of egg yolks, milk, cream, vanilla, and sugar, which is then aerated and frozen. Italian gelato simplifies this direction, even additional by mistreatment solely contemporary milk instead of the mixture of cream and milk, yielding a smoother, softer ice cream. Stabilizers, too, affect the body of the liquid. They're soluble molecules that are normally derived from plants, and play a variety of roles. A commonly used example is sodium alginate, which is derived from brown alga, as is another stabilizer, gum (less frequently used because of its cost). Stabilizers additionally facilitate scale back the melting rate of ice cream and provide it a sander texture. [3] Skatole may be a molecule

that's found in body waste – and additionally in ice cream in very little amounts. It's an associate odd molecule that, at higher concentrations, smells similarly however you'd expect it to consider it's found in body waste, but smells oral at terribly low concentrations. In some ice creams, it's additional as a flavor foil. The earlier ice cream was considered a food for enjoyment, rather than basic food. Driven by increasing incomes and health consciousness among the consumers, value addition to dairy products has witnessed a significant increase over the past few years. [4]. This review is a cautioning about the worst consequences of the artificial flavors, colorants, and stabilizers present in the ice cream.

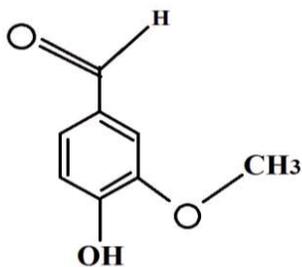
2 IMPORTANT CONSTITUENTS OF ICE CREAM

The major constituents in the ice cream formula backbone are milk fat, milk solids not fat, sweetener, stabilizer and/or emulsifiers, water and air. [5] Milk proteins – joined of the key ingredients, milk proteins guarantee the production of little fat, air bubbles, and thickness. The presence of this ingredient will manufacture varying amounts of energy in our metabolism, varied from two to 12-tone system of the full ice cream product (average quantity is around 8%). [6] Milk proteins conjointly contribute to ice cream's flavor. Sugar – This ingredient is off beam to blame for giving ice cream its sweet style, however, that's not its sole purpose. [7] Sugar is represented natural regulator UN agency controls what quantity ice will type within water crystals of ice cream throughout the chilling method (this permits ice cream to not become too exhausting and cumbersome to scoop), and it conjointly give heat protection that's terribly helpful once ice cream is placed in and out of the electric refrigerator repeatedly. In average ice cream sugars or sugar, substitutes represent 16-to twenty third of its mass and up to five hundredths of its energy content. [8] The ice cream contains milk proteins which includes essential amino acids like tryptophan and lysine. The commonly used sugar in Ice cream is sucrose which is a disaccharide. Lactose constitutes over one-third of the solid matter in milk and _20% of the carbohydrates in ice cream. [9] Fat – This ingredient offers ice cream its structure, delivers flavor, stabilizes air bubbles, and boosts the thickness. In standard ice cream formula, farm or vegetable fat will take between zero and twelfth of its mass, and it will provide between zero and forty fifth of its total energy. [9] Stabilizers – Stabilizers and emulsifiers (additives) area unit a district of the much ice cream recipes, owing to their distinctive options. They'll

improve texture, forestall meltdown, improve structural properties, and more. [10]Flavorings –Several efforts have been devoted to exploiting flavoring ice cream because flavors are very important in food appreciation. It is a complex of sensations of taste and smell derived from food. Ice cream flavor is very important in the judgment of the consumer. The effect of different flavorings on ice cream quality was observed in many studies. The chemical composition of ice cream made by different flavoring agent was not significant. Industrial flavoring's area unit utilized in several recipes, and by law, they have to be given on the ice creams label [11].Air and Ice- Both of those ingredients area unit vital (some would say most important) to the texture of ice cream. By the smaller the ice bubbles and ice crystals, the creamier the ice cream are going to be.

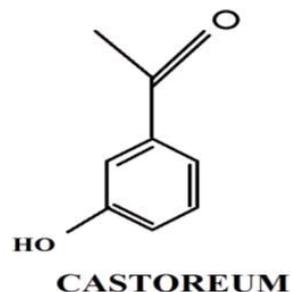
3 OTHER CONSTITUENTS OF ICECREAM

The above we studied was something about basic constituents; there are some more constituents which are hidden in the name of GRAS [Generally Recognized As Safe] by FDA (US Food and Drug Administration). Dairy products – there's no strict guideline that daily product should be accustomed be a basis of contemporary ice cream formula. Tips set by numerous countries regulate the presence of animal fat (minimum is about to a minimum of 10%) Recipes will use something from light powdered milk to milk powder. [12].Let's take another serious issue; it is very common that everyone likes vanilla flavored ice cream the most. But what everyone in the world nearly a 75% eats is not real vanilla flavored ice creams, but of artificial vanilla powder which is made by castoreum. Castoreum is nothing but a yellowish brown, unctuous substance with a robust, penetrating odor that beavers secrete from castor sacs set in skin cavities between the pelvis and therefore the base of the tail and spray. When scent -marking their territory. (The place of the beaver's castor sacs implies that castoreum conjointly usually includes a mix of anal organ secretions and piddle further.) Due to the beaver's typical diet of leaves and bark, castoreum doesn't "stink" as different similar animal secretions do, however rather contains a fragrant, vanilla scent delineate at the fragrance web site as a "sharp spreading tar-like note that reminds one in all the odor of birch tar or the Russian leather" that once diluted in alcohol picks up "more pleasant, fragrant and fruity nuances." [13].



VANILLIN

Natural vanillin formula, a costlier ingredient also essential for the production of vanilla ice cream.



CASTOREUM

Artificial castoreum, the product from beavers as an ingredient for the production of vanilla ice cream.

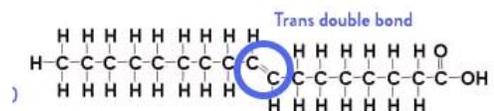
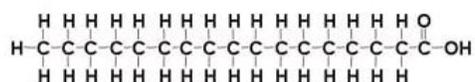
Because of its scent properties has long been utilized within the perfume making industry, and processed sorts of castoreum have conjointly been used as food additives, in the further case primarily as enhancers of vanilla, strawberry and raspberry flavorings found in merchandise like tea, ice cream, gelatin, candy, fruit - flavored drinks, and yoghurt. Castoreum as an additive is assessed by the FDA as "generally defined as safe" (GRAS), and so food makers don't need to embrace castoreum in their ingredients lists and should instead check with it as "natural flavoring." [13].

4 LIST OF HARMFUL CHEMICALS IN ICE CREAM

There are a wide range of harmful chemicals found and in the flavor of ice cream also some more is peculiarly taken and going to be explained with their effects.[14].

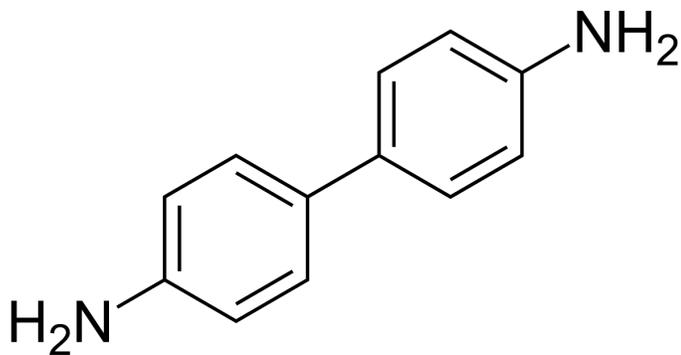
Partially Hydrogenated Oils

Trans fats raises bad cholesterol levels and lowers good cholesterol are likely to be present in the partially hydrogenated oils. Trans fats are also linked to many other lifestyle diseases including cancer.



Artificial Food Dyes

Benzidine present in Yellow 5 and Yellow 6 is a carcinogen. They are used ingredients in the ice creams. FDA approves only for the usage of low levels. Food net India recommends avoiding ice creams with them. Artificial flavours added in the ice cream are the reason for developing ADHD and hyperactivity in children. [15].



BENZIDINE

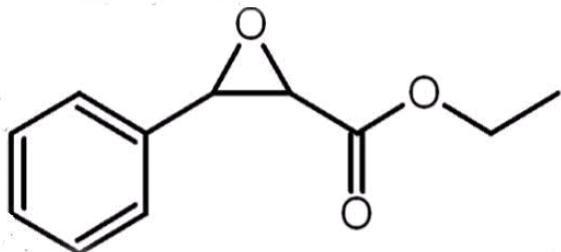
Artificial Flavours

The artificial flavours used are listed below and their harmful effects are also given for creating awareness among ice cream lovers.

1. Aldehyde C-17
2. Benzyl acetate
3. Ethyl Acetate
4. Amyl acetate
5. Butyraldehyde
6. Diethyl glycol
7. Propylene Glycol
8. Piperonal
9. Polysorbate 80
10. Mono, Di, Tri glycerides
11. Potassium sorbate
12. Modified corn starch
13. Soy lecithin

Aldehyde C-17

Aldehyde C-17 is an inflammable liquid utilized in dyes, plastics, rubber and as a food flavoring. This chemical is additionally utilized in aniline oil dyes. It is added to improve the taste of sour cherry ice cream. We are taking this as a food flavouring moreover which is used in the manufacture of plastics and rubber. In the comprehensive toxicology, it was stated that aldehydes are highly reactive and it will lead to molecular biotransformation and oxidative stress in the human system and also responsible for the hepatocellular injury. [16]

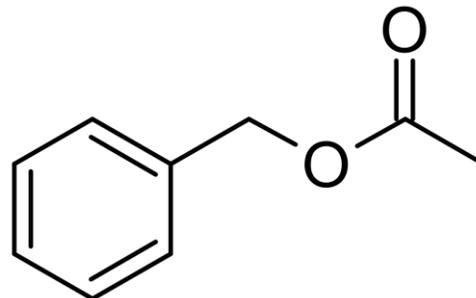


ALDEHYDE C – 17

1. Benzyl acetate

Gives the artificial strawberry flavor. It is used in soaps, detergents, incense, oils, lacquers, polishes, printing inks and as a solvent in plastics and resins. It is used as nitro

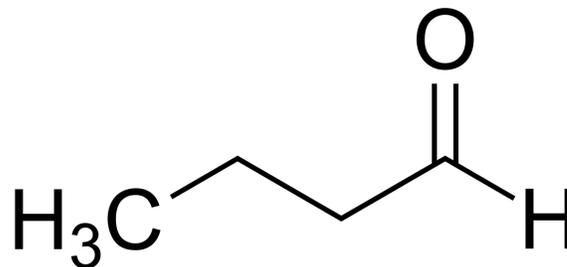
diluents. It is also used in food flavors. It is known to be carcinogenic in rodents, causing tumors in lungs, liver and gastrointestinal organs, though it's claimed that there's only a 0.1% probable chance of such in humans. It is given that if ingested it will cause gastrointestinal irritation, vomiting and diarrhea. [17]



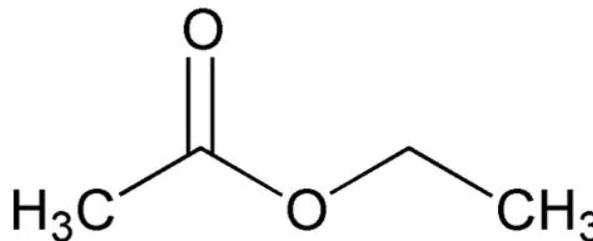
BENZYL ACETATE

2. Ethyl Acetate

Producers use it to induce the synthetic pineapple flavor. It's used as a cleansing agent for animal skin and alternative materials. Ester could be a solvent in coatings and inks and is employed for the extraction of fatty materials throughout the food process. It's also accustomed to a pineapple flavor.



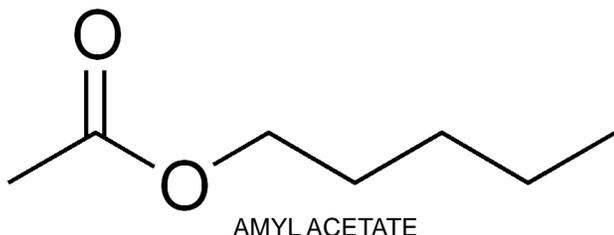
The vapor is thought to cause chronic respiratory organ, liver, and heart harm. The MSDS (Material Safety Information Sheet) claims toxicity if eaten in amount however warns that aldehyde toxicity increases with ester. That may be a motivating twist in "diet" ice creams that use sweetening, as sweetening is a chemical that transforms into aldehyde within the body. It was found that ethyl acetate was effective in causing considerable cytotoxicity in breast cancer cells at a concentration of 0.026 M. [18]



ETHYL ACETATE

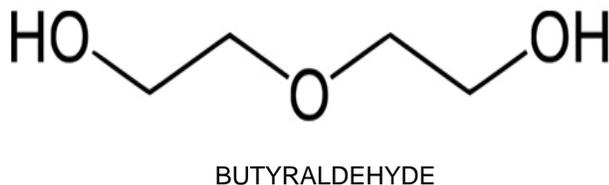
3. Amyl acetate

This chemical gives the artificial banana flavor. It is used as a developer for oil colors. It is also a paint and lacquer solvent, and is used in the preparation of penicillin. Isoamyl acetate is a central nervous depressant. Several studies reported that amyl acetate is more CNS depressant than ethyl acetate and more irritating than butyl acetate. Vapor has produced edema of glottis. [19]



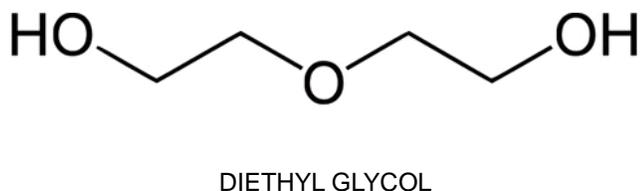
4. Butyraldehyde

Butyraldehyde is a derivative of butane, used in manufacturing plasticizers, alcohols, solvents and polymers. It has an almond like smell and is used to make flavors. This is generally used in nut flavored ice cream. It is also used as an oil paint solvent. Butyraldehyde is extremely destructive of tissues of the mucosal membranes and upper respiratory tract, as well as of tissues of the eyes and skin. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonia, and pulmonary edema. Signs and symptoms of overexposure are a burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. [20].



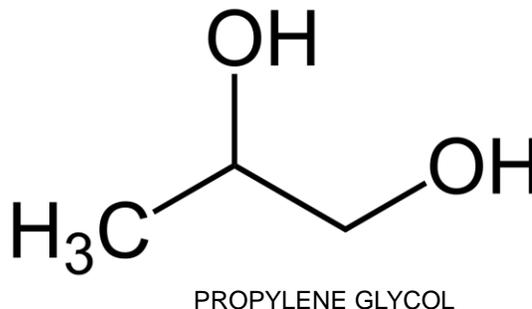
5. Diethyl glycol

Diethyl glycol is used as a substitute for eggs. Surprisingly the same chemical is used for the purpose of anti-freezing and removing paint. Diethyl glycol is used in the production of polyester resins and plasticizers, and is paint solvent. In ice cream, it's used as a cheap substitute for eggs to thicken the product. Health officials called it a sweet syrupy poison and warned it was toxic to children and people with kidney or liver disease. It was also observed that diethylene glycol affects the CNS, heart, respiratory system, liver, pancreas, and kidneys. It is considered as a fatal agent in the chemistry world. [21]



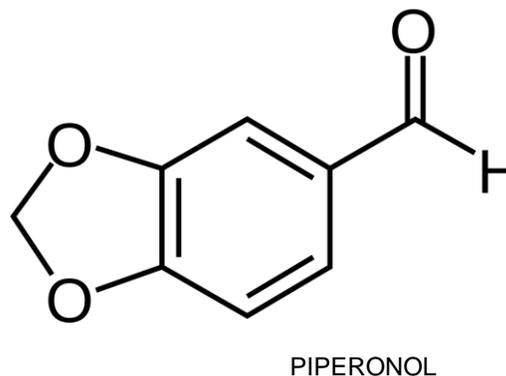
6. Propylene glycol

It's a solvent for food colors and flavors, and in plastics and paint. A recent study says that skin, kidneys, urinary, and respiratory systems as being affected by this chemical. It's a synthetic liquid that absorbs water and is used in foods to absorb extra water and maintain moisture. One of these dirty very little secrets is that the proven fact that propylene glycol [11], a cosmetic style of liquid, is further to business ice cream. It was found that Polyethylene glycol is generally considered safe, when used in high doses or for prolonged periods, Polyethylene glycol toxicity can occur. Reported adverse effects from PG include central nervous system (CNS) toxicity, hyperosmolarity, hemolysis, cardiac arrhythmia, seizures, agitation, and lactic acidosis. Patients at risk for toxicity include infants, those with renal or hepatic insufficiency, epilepsy, and burn patients receiving extensive dermal applications of PG containing products. Numerous studies and case reports have been published on PG toxicity in adults. [22]



7. Piperonal

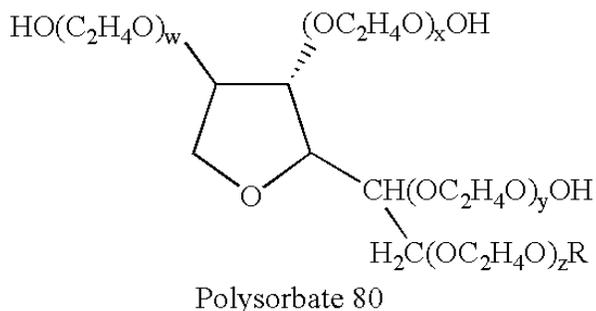
Used to get the distinctive vanilla flavor. It is also used to get rid of lice. Piperonal is employed insitu of vanilla as an inexpensive substitute through; curiously, it's a natural substance that comes from the flavor. It's listed within the National Library of drugs HSDB info as "moderately toxic" and a "human skin irritant"[23]. Another use is, to kill lice.



8. Polysorbate 80

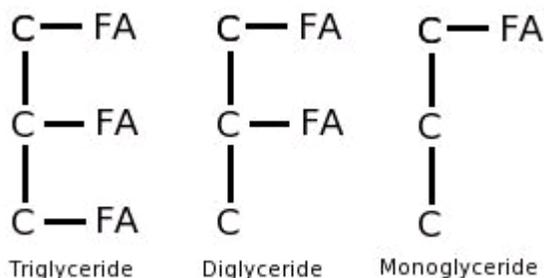
Polysorbate 80 is used in ice cream to resist melting. So while we get to enjoy ice cream that takes longer to become a drippy mess, this chemical is working to suppress our immune system. It can cause severe allergic reactions including anaphylactic shock, and causes infertility, abnormal heart rhythm, heat attack, stroke, tumor growth and cancer. In some studies it was given that polysorbate 80 also causes fertility problems. This is a

controversial ingredient which is listed as low hazard by The Environmental Working Group (EWG). Other studies have linked it to bowel problems, especially for people with colitis, and exacerbation of Crohn's disease. Reports have been given that polysorbates have also been associated with serious adverse effects, including some deaths, in low birthweight infants intravenously administered a vitamin E preparation containing a mixture of polysorbates 20 and 80. [24]



9. Mono, Di, Tri glycerides

These square measure artificial fats used as wetter and made from glycerin and natural fatty acids, principally from plant origin, however additionally fats of animal origin are also used. Vegetarians and vegans ought to ensure with the manufacturer that they need used mono and diglycerides of vegetable origin.

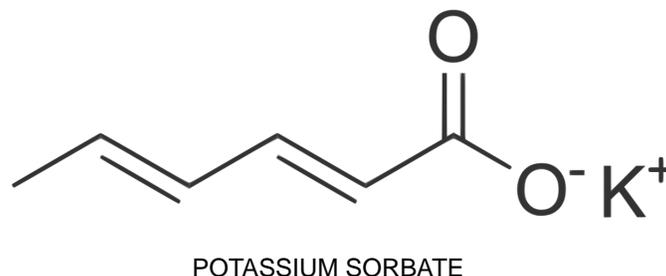


Food net India doesn't but, takes into account these to be a food safety risk. All 3 substances square measure composed of fatty acids and everyone could contain trans fats once those fatty acids square measure subjected to the high heat process. The business solely must report trans fat content from triglycerides (not mono or di) albeit trans fats square measure inevitably shaped once mono and di square measure manufactured. And also namely amyl acetate, diethyl glycol, disodium phosphate, benzyl acetate, soy lecithin and so on. Mono and Diglycerides These are synthetic fats used as emulsifier and produced from glycerol and natural fatty acids, mainly from plant origin, but also fats of animal origin may be used. Vegetarians and vegans should confirm with the manufacturer that they have used mono and diglycerides of vegetable origin. Foodnetindia does not however, consider these to be a food safety risk. [25].

10. Potassium sorbate

Potassium sorbate is used as a preservative to inhibit the growth of yeast and molds, therefore increases shelf life. Continued ingestion of the substance over time leads to allergic reactions such as nausea, diarrhea, and nutrient loss

in food. Potassium sorbate is used as a preservative to inhibit the growth of yeast and molds, therefore increases shelf life. Continued ingestion of the substance over time leads to allergic reactions such as nausea, diarrhoea, and nutrient loss in food. [26].



11. Modified corn starch

Modified corn starch – all modified food starches have been treated with an acid in order to lower their viscosity (thick, not free flowing, semifluid). Long term effects are completely unknown. Generally speaking, modified starches are very hard for the human body to digest. Modified corn starch often contains about 10% maltodextrin, a common keyword used by the industry to hide the presence of MSG. If it's on the label, you can bet it's not a natural genetic modification, but rather something done in a laboratory. About 70% of all processed foods contain genetically modified ingredients. [27][28].

12. Soy lecithin

Soy lecithin – The biggest problem with this ingredient is that most of the world's soybeans have been genetically modified which in itself poses many health hazards to humans and the environment in which we live. When it comes to the process used to manufacture soy lecithin, it is usually confined to unfermented soy sources because it becomes cheaper and quicker to make. Unfermented soy has been linked to digestive distress, immune system breakdown, PMS, endometriosis, reproductive problems for both sexes, allergies, ADD and ADHD, a higher risk of heart disease and cancer. There is a question of malnutrition as a result of digestion issues and a loss of libido. [29][30]

FURTHER RESEARCH

We are planning to further extend our research by direct analysis during the production of ice creams in factories. To find alternate solutions for these toxic and carcinogenic also to manufacture harmless and safe ice creams for everyone.

CONCLUSION

By the way of conclusion, we as a result of this to say that nearly 75% ice creams in the world is toxic even though it is approved by the FDA. Because kids during summer season also try to eat more than one ice creams which lead to storage of such harmful chemicals more in their body. Not only that we provide a bit of common advice to everyone instead of purchasing costlier ice creams or shopping with very care it is better to prevent them and buy handmade sweets by our ancestors like puffed rice balls, jaggery sweets etc will keep us healthy and free from chemicals.

5 FURTHER RESEARCH

We are planning to further extend our research by direct analysis during the production of ice creams in factories. To find alternate solutions for these toxic and carcinogenic also to manufacture harmless and safe ice creams for everyone.

6 CONCLUSION

By the way of conclusion, we as a result of this to say that nearly 75% ice creams in the world is toxic even though it is approved by the FDA. Because kids during summer season also try to eat more than one ice creams which lead to storage of such harmful chemicals more in their body. Not only that we provide a bit of common advice to everyone instead of purchasing costlier ice creams or shopping with very care it is better to prevent them and buy handmade sweets by our ancestors like puffed rice balls, jaggery sweets etc will keep us healthy and free from chemicals.

REFERENCES

- [1] Shanmugam M and Marimuthu M, "Quality Characteristics of Ice Cream Prepared Using Stabilizers/Emulsifiers Blends Created with Semi-Refined Carrageenans (E407a) of Commercial Production at Different Fat Levels", RRJOB 2017;4:1-7.
- [2] Anirudh Gururaj Patil, Soumitra Banerjee, "Variants of ice creams and their health effects", MOJ Food Process Technol. 2017;4(2):58-64.
- [3] Maryam Bahramparvar, Mostafa Mazaheri Tehrani, "Application and Functions of Stabilizers in Ice Cream", Food Reviews International 2011; 27:389-407.
- [4] Terri Meredith, "Commercial Ice Cream Ingredients Will Make You Scream", <https://caloriebee.com/nutrition/Commercial-Ice-Cream-Ingredients-Will-Make-YOU-Scream>, 2017.
- [5] Varnam, A.H. and Sutherland, J.P. "Milk and milk products, Technology, Chemistry, and Microbiology", 1994; 78-83:340-60.
- [6] P.S. Lucas, "Ice Cream Manufacture", Journal of Dairy Science.1956; 39(6): 833-7.
- [7] H. A. Schuette, and Francis J. Robinson, "Ice cream", J. Chem. Educ. 1933; 10 (8): 469.
- [8] Qamar Abbas Syed, Saba Anwar, Rizwan Shukat, Tahir Zahoor, "Effects of different ingredients on texture of ice cream", J Nutr Health Food Eng. 2018;8(6):422-35.
- [9] SS Deosarkar, SD Kalyankar, RD Pawshe and CD Khedkar, "Ice Cream: Composition and Health Effects", The Encyclopedia of Food and Health, 2016; 3:385-90.
- [10] SS Deosarkar, SD Kalyankar and AR Sarode, "Ice Cream: Uses and Method of Manufacture", The Encyclopedia of Food and Health. 2016; 3:391-97.
- [11] Manik Eirry Sawitri, Umi Wisaptiningsih, Abdul Manab and Ria Dewi Andriani, "Effect of Flavouring Agent on Ice Cream Quality", Int.J.Curr.Microbiol.App.Sci. 2017; 6(11): 4196-200.
- [12] Charles D. Howard, "The analysis of Ice Cream", J. Am. Chem. Soc., 1933;10 (8): 469
- [13] Burdock GA, "Safety Assessment of Castoreum Extract as a Food Ingredient", Int J Toxicol. 2007; 26(1):51-5.
- [14] Aleong JM, Frochot S, Goff HD, "Ice recrystallisation inhibition in ice cream by propylene glycol monostearate", J Food Sci. 2008;73(9):463-8.
- [15] Joseph Tobias, "Ice Cream and Frozen Desserts", 1981 J Dairy Sci.1981; 64:1077-86.
- [16] J.R.RoedeB.J.StewartD.R.Petersen, "Hepatotoxicity of Reactive Aldehydes", Comprehensive Toxicology. 2010; 9(2):581-94.
- [17] Budavari, S. (ed.). The Merck Index – "Encyclopedia of Chemicals, Drugs and Biologicals". Rahway, NJ: Merck and Co., Inc; 1989. p. 176
- [18] Mohsin A.Khan, RumanaAhmad, Anand N.Srivastava, "Effect of ethyl acetate aroma on viability of human breast cancer and normal kidney epithelial cells in vitro", Intgr Med Res. 2017;6(1) : 47-59.
- [19] Gosselin, R.E., R.P. Smith, H.C. Hodge. "Clinical Toxicology of Commercial Products". 5th ed. Baltimore: Williams and Wilkins, 1984. p. II-20.
- [20] Bingham, E.; Cochrane, B.; Powell, C.H.; Patty's Toxicology Volumes 1-9 5th ed. John Wiley & Sons. New York, N.Y. (2001)., p. V5:978
- [21] Manu Sebastian, "Chapter 38 - Renal Toxicity," Handbook of Toxicology of Chemical Warfare Agents, 2009, Pages 561-574
- [22] Terri Y. Lim, PharmD, Robert L. Poole, PharmD, and Natalie M. Pageler, MD, "Propylene Glycol Toxicity in Children", J Pediatr Pharmacol Ther. 2014 Oct-Dec; 19(4): 277-282.
- [23] Lewis, R.J. Sr. "Sax's Dangerous Properties of Industrial Materials". 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 298
- [24] Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 551-3
- [25] <http://foodnetindia.in/?s=artificial+fats>
- [26] S.P. Anand and N. Sati, "artificial preservatives and their harmful effects: looking toward nature for safer alternatives", International Journal of Pharmaceutical Sciences and Research, 2496-2501, 2013
- [27] "Modified starch side effects". <https://www.foodsweeteners.com/modified-starch-side-effects/15July2015>
- [28] "Modified starches" <http://www.nutrientsreview.com/carbs/polysaccharides-modified-starches.html>
- [29] "Soy lecithin and why should avoid it" <https://sunwarrior.com/blogs/health-hub/soy-lecithin-avoided>, 3 April 2018
- [30] Hallett, M., Canter, N., and Growdon, J. Neurophysiologic Parameters in Alzheimer Disease: "Effect of Lecithin. Neurology" 1982; 32(2):a126.