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ADVERSE EFFECT OF FOOD ADDITIVES ON HUMAN HEALTH AND MEASURES TO CONTROL ILL HEALTH CAUSED BY FOOD ADDITIVES.

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INTRODUCTION:

Food Chemistry is the branch of science which deals with the use of chemistry in food we consume in daily life. It studies the chemical processes and interactions of the biological and non-biological components of foods. In this paper, we will study the application of chemistry in food and food industry, food additives, food preservatives, food anti-oxidant, food flavours, artificial sweeteners, emulsifiers. Reasons for adding chemicals to foods are, Preservation of them, Increasing attractiveness and Promoting nutritional quality.

Food additives are the chemicals which keep foods fresh or enhance their colour, texture or flavour. They may include flavour enhancers (such as MSG), food colourings such as (cochineal or tartrazine), or a range of preservatives.

Artificial food colours also called synthetic food colours, can be understood as dyes that are used to enhance the visual appeal of **food** and beverages. Derived from petroleum-based chemicals, these are designed to mimic natural colours.

ABSTRACT:

Colour is a key component to increase the attractiveness and consumer acceptance towards foods and beverages. Synthetic food Colours have been increasingly used than natural food Colours by food manufacturers to attain certain properties such as low cost, improved appearance, high Colour intensity, more Colour stability and uniformity. Different foods available in the market may contain some non-permitted synthetic colours. They may lead to health problems such as **cancers**, **mutations**, reduced haemoglobin and allergic reactions.

The study concluded that there is a high tendency to use synthetic food Colours in candies and beverages which contain unidentified Colours including a textile dye. Therefore, the implementation of regulations and awareness programs of food Colours for consumers and food manufacturers are highly recommended.

Key Words: Food additives, Preservatives, Antioxidants.

TYPES OF FOOD ADDITIVES:

The different types of food additive and their uses include:

- 1. Anti-caking agents prevent ingredients from becoming lumpy.
- 2. Antioxidants prevent foods from oxidising or rancidity.
- 3. Artificial sweeteners increase the sweetness.
- 4. Bulking agents increase the volume of food without major changes to its energy.
- 5. **Colours** enhance or add colour.
- 6. **Emulsifiers** stop fats from clotting together.
- 7. **Food acids** maintain the right acid level.
- 8. **Flavours** add flavour.
- 9. Flavour enhancers increase the power of a flavour. (MSG) 621
- 10. Flour treatment improves baking quality.
- 11. Foaming agents maintain uniform aeration of gases in foods.
- 12. Glazing agent improves appearance and can protect food.
- 13. Gelling agents alter the texture of foods through gel formation.

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- 14. Humectants keep foods moist.
- 15. Mineral salts enhance texture and flavour.
- 16. **Preservatives** stop microbes from multiplying and spoiling the food.
- 17. **Propellants** help propel food from a container.
- 18. **Raising agents** increase the volume of food through the use of gases.
- 19. Stabilisers and firming agents maintain even food dispersion.
- 20. Thickeners and vegetable gums enhance texture and consistency.

TYPES OF SYNTHETIC FOOD COLOURS:

There are many types of synthetic food colours, they are as follows:

Primary Food colours: Primary food colours are shown in Fig.1, that is water soluble and exhibit colour when dissolved. Primary food colours have high utilisation value and vastly used in pharmaceuticals, food dyes, cosmetic and various other industries. The main composition of primary food colours are $(CH_2)_2CHNH_2$ -COOH – **Glutamine**, $(CH_2)_2OH$ (methylene glycol) and $CH_2NHCOCH_3$ (formylglycinamidine synthetase (FGAM) etc.



Fig. 1. Food colour in picture (A) Quinoline Yellow and (B) Carmoisine red.

Quinoline Yellow: Quinoline yellow, a bright yellow dye used as food additives.

Carmoisine: Carmoisine, a red dye, is admired for its usage in beverages, ice cream, sweet meat.

Tartrazine: is a yellow azo-dye, used in wide range of foods including soft drinks, condiments, desserts and candies and breakfast cereals.

Erythrosine: Erythrosine shows a pink to reddish pink shade. It is commonly used in cake, decorating gels and candies.

Dark Chocolate Blended colours: Used for food flavourings, dairy products, bakery items, cosmetics and soft drinks is an essential food colouring ingredients across the world.

Apple Blended colours: Used for esters, hydrocarbon solvents, paraffin wax, candles and soap kind of colouring. The chemical composition of apple blended colour is (CH₃)₂=O-OH





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Fig. 2. Artificial Food colours in (A) Erythrosine, (B) Allura-Red, (C) Tartrazine, (D) Sunset Yellow, (E) Brilliant Blue and (F) Indigo Carmine.

EFFECTS OF FOOD ADDITIVES:

Some people are sensitive to particular food additives and may have reactions like inflammation, hypersensitivity reactions and diarrhoea. Many people see food additives as a major food threat. However, food additives in terms of health risk lies at the bottom, after food-borne microorganisms (like salmonella), inappropriate hygiene and eating habits, environmental contaminants and naturally occurring toxins.

It is often that additives are used to give a food a marketable quality, such as colour, that most commonly cause **allergic reactions**. Some of these hypersensitive reactions include:

Nervous disorders – hyperactivity, **Respiratory problems** – asthma, rhinitis and sinusitis, **Skin problems** – itching, rashes and swelling, **Digestive disorders** – diarrhoea and colicky pains, insomnia and irritability.





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Fig. 1. Publication (1962–2020) Usage of food dyes and health relationship. (SCOPUS database).

Chemical	Food-Related Use	Selected Health Concerns
Bisphenol A (BPA)	 Hardens plastic containers Prevents rust on metal food and beverage cans 	 Can act like estrogen in the body and may change the timing of puberty, decrease fertility, increase body fat, and possibly affect the nervous and immune systems
Phthalates	 Makes plastic and vinyl flexible for use in plastic tubing Used in industrial food production 	 Can affect male genital development increase childhood obesity and metabolic function, and may affect the cardiovascular system
Perfluoroalkyl chemicals (PFCs)	 Creates grease-proof paper and cardboard in food packaging 	 Can reduce immune response, birth weight, and fertility May also cause changes to the thyroid hormone system, which is crucial for metabolism, digestion, muscle control, brain development, and bone strength
Perchlorate	 Controls static electricity in some dry food packaging 	 May interfere with thyroid hormone, affecting early life brain development and growth
Synthetic artificial food colors (AFCs)	 Helps improve the appearance of processed foods and beverages— common in children's food products 	 Can sometimes act as substitute for nutritious ingredients, such as in fruit juice drinks that contain little or no actual fruit May have effects on child behavior and attention
Nitrates/nitrites	 Preservative and color enhancer—especially to cured and processed meats, fish, and cheese 	 Linked with tumors in the digestive and nervous system, as well as thyroid problems Can cause methemoglobinemia in infants and toddlers Can interfere with the blood's ability to deliver oxygen in the body.

Food Additives: Us	es & Health Concerns
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MEASURES:



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To reduce our family's exposure to food additives;

- Buy fresh or frozen. It's better to buy fresh or frozen fruits and vegetables.
- Eat fewer processed meats. Try to avoid processed meats, such as hot dogs and meats in prepackaged meals, especially during pregnancy.
- Wash plastic food containers and utensils by hand, rather than in the dishwasher.
- Use glass and stainless steel. Especially when cooking or serving hot foods, use alternatives to plastic, such as glass or stainless steel, when possible.
- Learn plastic recycling codes. See the recycling code on the bottom of products to find the plastic type. Try to avoid plastics with recycling codes 3 (phthalates), 6 (styrene), and 7 (bisphenols).
- Wash your hands. Because chemicals from plastics are so common, make sure to wash your hands thoroughly before and after handling food.

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