

PalArch's Journal of Archaeology of Egypt / Egyptology

Impact Of Chemical Food Preservatives On Human Health

Ritu Gupta¹ , Dr Rakesh Kumar Yadav²

¹scholar , Dept. Of Chemistry Dr. C.V. Raman University, Kota, Bilaspur,

² Dept. Of Chemistry , Dr. C.V. Raman University, Kota, Bilaspur, Chhattisgarh, India

Ritu Gupta¹, Dr Rakesh Kumar Yadav² Impact Of Chemical Food Preservatives On Human Health-- Palarch's Journal Of Archaeology Of Egypt/Egyptology 18(15). ISSN 1567-214x, Keywords: - Preservatives, Allergy, Side Effects, Industrialized Food, Sodium Benzoate

Abstract :- Every Living Organism Need Food To Live. The Food Has Limited Shelf Life, In Order To Increase The Shelf Life And Maintain The Quality Certain Preservatives Are Used, These Preservatives May Have Some Harmful Effect So If Possible, And Food Without Preservatives May Be Used. This Additive Is A Sodium Salt Which Is Commonly Used As Chemical Preservative In Foods And It Is Found Mainly In Industrialized Drinks. Sodium Benzoate Is Considered Safe By Measurability Agencies But There Is Still Controversy Over Its Effect On Human Health. Many Effects Like Food Allergy, Food Intolerance, Cancer, Multiple Sclerosis, Attention Deficit, Hyperactivity Disorder ,Brain Damage, Nausea, Cardiac Disease Among Other Have Been Reported.

Keywords: - Preservatives, Allergy, Side Effects, Industrialized Food, Sodium Benzoate

Introduction: -

Food Preservatives Are Added To Food To Fight Spoilage Caused By Bacteria, Mould, Fungus And Yeast. Preservatives Can Keep Food Fresher For Longer Periods Of Time, Extending Its Shelf Life. Food Preservatives Also Are Used To Slow Or Prevent Changes In Colour, Flavour And Texture And Delay Rancidity.

In Many Parts Of World Food Is Being Stored In Houses For Emergency. In Addition To Basic Food Items, People Also Store Frozen Reserved Garden, Growth Fruits, Vegetables And Freeze Dried Or Canned Food Product. Now A Days Mostly All Food Products Have Food. The Purpose Is Generally To Preserve The Natural Characteristics Of Food And To Increase The Shelf Life Of Food, And Inhibit Natural Ageing And Discoloration That Can Occur During Food Preparation.

Classification Of Preservatives:-

There Are Two Main Classes Of Preservatives:

1. **Natural Preservatives:-** In This Class Included Those Food Preservatives Which Are Obtained From Nature For Example Salt, Sugar ,Vinegar ,Spices ,Honey ,Edible Oil Etc.

2. **Chemical Preservatives:-** In This Class Included Those Food Preservatives Which Are Chemical Semi Synthetic Or Synthetic In Nature Such As Benzoates ,Sorbates ,Nitrites And Nitrates Of Potassium Sulphites, Glutamates ,Glycerides Etc.

Chemically Preservatives Are Categorized As Antimicrobial ,Antioxidant ,And Antienzymatics.

Antimicrobials: They Can Destroy Or Impede The Growth Of Bacteria Yeast And Moulds Example Nitrites And Nitrates Prevent Food Poisoning By Bacteria In Meat Products. Sulphur Dioxide Prevents For The Degradation In Fruits, Wine And Beer. Benzoates And Sorbates Are Antifungal Agents Use Din Jams ,Salads, Cheese And Pickles Prevent Fungal Growth.

Antioxidants: These Slow Or Stop The Break Down Of Fats And Oils In Food That Occurs In Presence Of Oxygen Proceed To Rancidity. There Are Three Types Of Antioxidants:

- (a) True Antioxidants: Bha, Bht
- (b) Reducing Agents: Ascorbic Acid
- (c) Antioxidants Synergists : Sodium Edetate.

Anti Enzymatic Preservatives:- These Block The Enzymatic Processes Like Ripening Occuring In Food Stuffs Even After Harvest,Example Erythorbic Acid And Citric Acid Stop The Action Of Enzyme Phenology That Leads To A Brown Colour On The Exposed Surface Of Cut Fruits. (Kulkarni 2010)

Table:Preservatives With Their Maximum Possible Limits And Food Products Where They Can Be Used (Sharif 2017)

Preservatives	Class	Max Possible Limit	Products Where They Are Found
Sodium And Potassium Benzoate, Benzoic Acid	Antimicrobial	200ppm	Pickles, Margarine, Fruit Juices, Jams, Cheese,Baked Goods, Snacks
Methyl And Propyl Paraben	Antimicrobial	0.1%	Baked Goods, Beverages, Dressings, Relishes

Sorbic Acid, Sodium, Potassium And Calcium Sorbates	Antimicrobial	200ppm	Dairy Products, Bakery Goods, Sweets, Syrups, Fruit Juices, Jams, Jellies, Beverages
Sulfites And Sulfur Dioxide	Antimicrobial	200-300ppm	Dry Fruits And Fruits, Molasses, Fried Or Frozen Potatoes, Shrimp And Lobster
Propionates	Antimicrobial	0.32%	Bakery Products, Cheese, Fruits
Nitrites And Nitrates	Antimicrobial	100-200ppm	Meat Products
Propyl Gallate	Antioxidant	200ppm	Baked Foods, Meats
Bha (Butylated Hydroxy-Anisole) And Bht (Butylated Hydroxytoluene)	Antioxidants	100ppm For Meat Products, 50ppm For Breakfast Cereals And Potato Products	Baked Foods And Snacks, Meats, Breakfast Cereals, Potato Products
Tert-Butylhydro-Quinone	Antioxidant	100ppm	Baked Foods And Snacks,
(Tbhq)			Meats
Erythorbic Acid (Iso-Ascorbic Acid) And Citric Acid	Antienzymatic	200-350ppm	Soft Drinks, Juices, Wines And Cured Meats

Health Hazards Caused By Artificial Preservatives:

Artificial Preservatives Are Mostly Considered Safe, But Several Have Negative Effects And Carcinogenic And Toxic Threatening Side Effect.

Chemical Food Preservatives	Where Found	Negative Effect
Sodium Benzoate(E211)*	Carbonated Drinks, Pickles, Sauces, Certain Medicines.	Aggravates Asthma And Suspected To Be A Neurotoxin And Carcinogen May Cause Fetal Abnormalities

Sulphur Dioxide (E220)*	Carbonated Drinks , Dried Fruits , Juices, Potato Products.	May Induce Gastric Irritation Nausea, Diarrhea, Asthma Attacks, Skin Rashes
Potassium Nitrate(E249)	Cured Meats , Canned Meat Products.	May Lower Oxygen Carring Capacity Of Blood, May Combine With Other Substances To Form Nitrosamins That Are Carcinogens.
Calcium Benzoate(E213)	Drinks , Low Sugar Products , Cereals, Meat Products .	May Temporarily Inhibit Digestive Enzyme Function And May Deplete Levels Of The Aminoacid Glycin
Aspartame (E951)	200 Times Sweeter Than Sugar.	May Cause Neurological Damage.
Calcium Sulphite	In A Vast Arry Of Foods From Burgars To Biscuits, From Frozen Mushrooms To Horseraddish. Used To Make Old Produce Look Fresh.	May Cause Bronchial Problems, Flushing , Low Blood Pressure, Tingling And Anaphylacting Shock . Avoid Them If You Suffer From Bronchiral Asthma, Respiratory Problem.

Methodology:- Many Analytical Methods Have Been Reported For The Determination Of Preservatives. The Proposed Methods Which Used For Detection Of Different Preservatives In Various Food Stuffs By Different Analytical Method Like Uv-Visible ,Colorimeter, Hplc And Electrophoresis.(Juneja At Al., 2012)

Determination Of Preservatives In Food By Different Analytical Method

Preservatives	Method
Benznzoic Acid And Sorbic Acid	Overlapped Hplc – Pda
Sodium Benzoate And Potassium Benzoate	Hplc
Benzoic Acid	Uv Spectroscopy

Sorbic Acid	Uv Spectroscopy
Sodium Potassium Salts Of Nitrates And Nitrites	Colorimeter
Bht And Bha	Hplc
Methyl Paraben Propyl Paraben	Hplc

Result :- Those Foods Which Are Preserved With The Use Of Natural Additives Have Become More Popular Due To Greater Consumer Awareness And Concern Regarding Harmful Effects Of Synthetic Chemical Preservatives. These Had Lead Researchers And Food Processors To Look More And More On Natural Preservatives. If Use Of Food Additives Must, Because Of Their Advantage, Then They Should Be The Natural Ones Which Have Minimal Effects And Those Head That Are Generally Recognised As Safe.

Natural Preservatives Offer Great Advantage Over Wear Artificial Counter Parts You To The Are Non-Toxic Nature Along With A Wide Range Of Health Benefits.

It Has Been Reported That Chemicals Which Are Used As Preservatives Have Side Effects. It Is Best To Eat A Preservative Free Diet If It All Possible.

Discussion :- The Days Of Benzoates, Sorbates, Metabisulphites, Toxic Gases And Other Synthetic Chemical Preservatives Appear To Be Numbered. Manufacturers And Retailers Are Responding To Consumer Resistance To Chemical Preservatives In Food, Beverages And Cosmetics, And To Research Which Has Showed That Artificial Preservatives Are Causative Agents Of Hyperactivity Even In Previously Non Hyper-Active Individuals. Natural Substances Or Extracts Obtained From Plants, Animals Or Minerals, Can Serve As Beneficial Alternatives. Other Than Their Use In Food, Cosmetics And Pharmaceuticals As

Flavoring, Binding, Disintegrating, Gelling, Thickening Or Suspending Agents, Or As Vehicles, These Can Also Be Used As Preservatives. Listed Below Are Some Alternatives Of Artificial Preservatives:

Algin - A Compound Extracted From Seaweed, Including The Giant Kelp *Macrocystis Pyrifera*, *Ascophyllum Nodosum* And Various Types Of Laminaria, Is Used To Make Puddings, Milkshakes, Ice Cream Creamier And Thicker, Is Also Used To Extend Shelf Life Of Food Products.

Grapefruit Seed Extract - Also Known As Citrus Seed Extract, Is A Liquid Derived From The Seeds, Pulp And White Membranes Of Grapefruit *Citrus Paradise*. It Is A Natural Broad Spectrum Preservative Used To Kill Or Inhibit The Growth Of Bacteria, Viruses, Fungi And Other Microbes. It Should Be Used In Conjunction With Others Broad Spectrum Preservatives To Be Effective. It Can Be Used In Quantities Of Up To 1% Of The Recipe.

1 **Rosemary Extract** – Obtained From *Rosmarinus Officinalis*, Is An Anti-Oxidant That

Slows Down Oxidation Of Natural Materials. Rosemary Extract Has Been Shown To Improve The Shelf Life And Heat Stability Of Omega 3-Rich Oils, Which Are Prone To Rancidity. It Can Be Used Up To 0.5% In Pharmaceutical Formulations.

- 2 **Vitamin E Oil** - An Anti-Oxidant Is Used In Cosmetics, Pharmaceuticals And Anhydrous Products. It Is Found Most Abundantly In Wheat Germ Oil, Sunflower, And Safflower Oils.
- 3 **Carrageenan** - A Compound Extracted From Irish Moss *Chondrus Crispus*, A Type Of Seaweed, Is Used To Make Puddings, Ice-Cream And Milkshakes. It Makes Foods Jell And Stabilizes Food To Keep Color And Flavor Even.
- 4 **Citric Acid** - An Acid Which Occurs Naturally In Fruits Such As Lemon And Lime. It Is Used In Canned Fruit Juices, Cheese, Margarine, Pickle And Salad Dressings As Flavoring And Acidifying Agent.
- 5 **Erythorbic Acid** - Also Known As Iso-Ascorbic Acid, Is A Vegetable-Derived Food Additive Produced From Sucrose, Is Widely Used In Processed Foods As An Antioxidant Preservative. Along With Sodium Erythorbate, It Is Also Used In Hair And Nail Products.
- 6 **Guar Gum** - A Substance Made From Seeds Of The Guar Plant *Cyamopsis Tetragonoloba*, A Legume Grown In India, Is Used As A Stabilizer In Pharmaceutical Preparations And Food Products Such As Processed Cheese, Ice Cream, Jelly And Dressings.
- 7 **Sodium Aluminosilicate** - A Naturally-Occurring Mineral Used In Dried Milk Substitutes, Egg Mixes And Grated Cheeses, Keeps Food From Caking And Clumping Up. It Is Also An Acidity Regulator Used In Concentrations Below 2%.
- 8 **Honey** - A Sweet Food Made By Bees Using Nectar From Flowers. In Its Undiluted Form, It Is A Rich Source Of Nutrients And Is Self-Preserving. It Is A Natural Energy-Booster, Builds Immunity And Is A Natural Remedy For Many Ailments.
- 9 **Basil Extract** - Derived From The Culinary Herb *Ocimum Basilicum*, It Is Popularly Used For Its Medicinal Properties In Ayurveda And Siddha Medicines. It Is A Useful Antioxidant And Anti-Microbial Agent.
- 10 **Neem Oil** - A Vegetable Oil Pressed From The Fruits And Seeds Of The Neem Tree *Azadirachta Indica* Are A Popular Anti-Fungal, Anti-Bacterial As Well As Anti-Protozoal Agent. It Has Rejuvenating As Well As Its Detoxifying Effects. It Is Used For Preparing Cosmetics Such As Soap, Hair Products, Body Hygiene Creams, Hand Creams, And In Ayurvedic, Unani And Folklore Traditional Medicine, In The Treatment Of A Wide Range Of Afflictions.

Conclusion: Artificial Preservatives Are Chemical Substances That Can Cause Health Hazards.

Awareness About The Harmful Effects Of These Chemicals In Food, Cosmetics And Pharmaceuticals Is Increasing. Natural Preservatives Offer Greater Advantages Over Their Artificial Counterparts Due To Their Non-Toxic Nature Along With A Wide Range Of Health Benefits. Extracts Of Basil, Neem, Citrus And Rosemary Are Better Alternatives To Preservatives Such As Benzoic Acid, Nitrates, Msg, Bha And Bht. In Order To Obtain And

Maintain Good Health, People Should Opt For Products Containing Natural Preservatives And Should Read Labels Of Eatables, Cosmetics And Pharmaceuticals Carefully.

Acknowledgement: The Authors Are Thankful To Prof. Kumud Upadhyaya, Director, Gyani Inder Singh Institute Of Professional Studies Dehradun, For His Kind Support And Help.

References:

- i. Ahmed N. 2013. Naturally Occurring Preservatives In Food And Their Role In Food Preservation. International Journal Of Pharmaceutical & Biological Archive, 4(1):22-30.
- ii. 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.
- iii. 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.
- iv. 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.
- v. 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.
- vi. Acgh, 2001. Industrial Ventilation: A Manual Of Recommended Practices, American Conference Of Governmental Industrial Hygienists Cincinnati, Ohio, Usa, 24th Edition.
- vii. Admas, J. B. 1997. Food Additive- Additive Interactions involving Sulphur Dioxide And Ascorbic Acid Nitrous Acids : A Review, Food Chemistry, 59. 401-409.
- viii. Alpana Deshpande And Bhagyashree Deshpande Et Al. 2017. Food Additives And Preservation, Indian J.Sci.Res., 13(2):219-225 Issn :2250-0138.
- ix. Hamid Aa, Ahmed Nr, Agboola Rs. 2012. Food: Its Preservatives, Additives And Applications., International Journal Of Clinical And Biological Sciences 1,36-47 , Hugo Wb, Russell Ad. 2004. Pharmaceutical Microbiology. Seventh Edition, Pp.120-125, Blackwell Science.
- x. Inetianbor Je, Yakubu Jm, Ezeonu Sc. 2015. Effects Of Food Additives And Preservatives On Man—A Review.
- xii. Inetanbor, J.E. Et Al. 2015. Effects Of Food Additives And Preservatives On Man: Asian Journal Of Science And Technology, Vol.6, Issue 02, Pp.1118-1135. Pandey, R.M., And Upadhyay, S.K. 2012. Food Additives, Food Additives Prof. Yehia El-Mmsamragy (Ed.), Isbn:978-953- 51- 0067-6.
- xiii. Riddervold A. 2008. High Pressure Food Preservation, Food Conservation. Pp. 12-166, Isbn 9780907325406.
- xiv. 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.
- xv. Sharif Zim, Mustapha Fa, Jai J. Yusof Nm, Zaki Nam. 2017. Review On Methods For Preservation And Natural Preservatives For Extending The Food Longevity. *Chemical Engineering Research Bulletin*, 19:145-153.
- xvi. Winter, R.A. 1994. *Consumer’s Dictionary Of Food Additives*. Three River Press, New York. 112pp.
- xvii. *Asian Journal Of Science And Technologies*, 6(2):1118-1135. Juneja Vk, Dwivedi Hp, Yan X. 2012. Novel Natural Food antimicrobials. *Annual Review Of Food Science And Technology*, 3:381-403.
- xviii. 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.
- xix. Lado Bh, Yousef Ae. 2002. Alternative Food-Preservation Technologies: Efficacy And Mechanisms. *Microbes And Infection*, 4(4):433-440.
- xx. Leistner L. 1992. Food Preservation By Combined Methods. *Food Research International*, 25(2): 151-158.
- xxi. Leistner L. 2000. Basic Aspects Of Food Preservation By Hurdle Technology. *International Journal Of Food Microbiology*, 55(1):181-186.
- xxii. Mirza Sk, Asema Uk, Sayyad Sk. 2017. To Study The Harmful Effects Of Food Preservatives On Human Health. *Journal Of Medicinal Chemistry And Drug Discovery*, 2 (2): 610-616. Ottoboni A, Ottoboni F. 2004. The Food Guide Pyramid: Will The Defects Be Corrected. *Journal American Of Physician Surgeon* 9(4):109–113.
- xxiv. Rahman Ms. 2007. *Food Preservation: Overview: Handbook Of Food Preservation*. 2nd Edition, Pp. 3-7, London, Crc Press.
- xxv. Russell Ad, Hugo Wb, Ayliffe Gaj. 1999. *Principles And Practices Of Disinfection, Preservation And Sterilization*. Third Edition, 80-85 Blackwell Scientific Ltd., Oxford. Sabir Ms, Rajendra Cd, Amol S, Pournima Ss. 2016. A Review On: Preservatives Used In Pharmaceuticals And Impacts On Health. *Pharmatutor*, 4(5): 25-32.
- xxvi. Sharif Zim, Mustapha Fa, Jai J, Yusof Nm, Zaki Nam. 2017. Review On Methods For Preservation And Natural Preservatives For Extending The Food Longevity. *Chemical Engineering Research Bulletin*, 19:145-153.
- xxvii. Sharma S. 2015. Food Preservatives And Their Harmful Effects. *International Journal Of Scientific And Research Publication*, 4(5).
- xxviii. Smith Aa. 2011. Preservatives In Food Products—Review. *International Journal Of Pharmaceutical & Biological Archive*, 2(2):583-599.
- xxix. 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. 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.