



COMPARATIVE A STUDY AND QUALITATIVE ANALYSIS OF SOFT DRINKS DIFFERENT BRANDS AVAILABLE IN MARKET

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Abstract

To provide information regarding the different types of soft drinks and critically reviewing their risk on the dental and general health of children and adolescents. The consumption of soft drinks was found to have increased dramatically over the past several decades. The greatest increase in soft drink consumption has been among children and adolescents. Some commercial soft drinks are high in sugar content and acidity. In addition, they supply energy only and are of little nutritional benefit and lack micro-nutrients, vitamins and minerals. Conclusions The consumption of soft drinks with high sugar content and acidity can contribute to detrimental oral health and may also affect general health. Therefore, it is necessary to educate patients about the harmful effects of different types of soft drinks as it is not always easy for individuals to identify from drink labelling the ingredients which they contain.

1. Introduction:

Soft drinks are complex mixtures containing variety of substance such as coloring compounds, flavoring agents, acidifiers, sweeteners, preservatives and caffeine. The era of cold drinks began in 1952 but with the industrialization in India soft drinks marked its beginning with launching of Limca and Gold Spot by Parley group of Companies. Since then, the business was highly profitable and so many multinational companies like Pepsi and Coke launched their brands India. Now-a-days, it is observed, in general that majority of people viewed Sprite, Fanta and Limca to give feeling of lightness, while Pepsi and Thumsup to activate pulse and brain.

1.1 Definition of Soft Drink

The term soft drink-more commonly known as soda refers to non alcoholic beverages that are usually (though not always carbonated. By contrast, the term "hard drink" (or sometimes just "drink") is used for beverages that contain alcohol. Common soft drinks include colas, sparkling water, lemonade, squash, and

fruit punch. Drinks such as hot chocolate, coffee, tea, milk, tap water alcohol and milkshakes do not fall in this classification. Soft Drinks can be classified into major heads namely carbonated and non-carbonated drinks on the basis of their composition. A Soft Drink carbonated beverage is a non-alcoholic beverage that typically contains water, a sweetener and a flavour of agent.

1.2 DIS-ADVANTAGES OF COLD DRINKS:

- Soft drinks are little more harmful than sugar solution. As they contain sugar in large amount which cause problems in diabetes patients.
- Soft drink can cause weight gain as they interfere with the body natural ability to dissolve the calcium so they are also harmful for our bones.

1.3 Advantages of Cold drinks:

- Cold drinks can be used as toilet cleaners. They can remove rust spots from chrome car humpers.
- They clean corrosion from car battery terminals. Soft drinks are used as an excellent 'detergent to remove grease from clothes.
- They can loose rusted bolt. Advantages of Pro-biotic Drinks: Anything if consumed in excess will be harmful to our body.

1.4 Impact on Health

A. Phosphoric Acid

1. **Tooth Corrosion:** - In addition to loss of calcium, the acidity and corrosive nature of phosphoric acid negatively impacts the protective covering on teeth called enamel. The pH measure of most Soft Drink is below 3. Sugar and other acids in Soft Drink contribute to acidity, but phosphoric acid is the primary factor. Phosphoric acid oxidizes or corrodes the tooth enamel on contact, although exposure time and dental hygiene are obviously important factors.
2. **Bone Loss:** - Phosphoric acid, present in carbonated drinks is violently poisonous, it deoxidizes blood. In detergent manufacturing industries, phosphoric acid is used to produce water softener. Water softener removes Ca^{2+} and Mg^{2+} ion from hard water. In human body, the function remains the same by removing Ca^{2+} from bones causing osteoporosis (porous bones)
3. **Effect on Gastro-Intestinal System:** - When you open the bottle of a soft drink, bubbles and fizz are immediately emitted out. This is due to phosphoric acid and carbon dioxide (CO_2) content, which make these drinks highly acidic. The pH of soft drink ranges from 2.5-3.4 which generates a highly acidic environment in the stomach.
4. **Effect on Kidneys:** - Kidneys are less able to excrete phosphoric acid when it is in excess. Thus, there is extra work for kidney. Soft drinks remove Calcium from the body, causing an excess amount of Calcium that tend to be deposited in kidney, resulting in nephrolithiasis (kidney stones).
5. **Effect on Skin** Acidic blood affects the action of glutathione, which is an antioxidant enzyme. In addition, these drinks lack vitamins and minerals. By taking these drinks, people cut their intake of fresh juices, milk and even water and deprive themselves from essential

6. **Type -2 Diabetes:** - High glucose consumption rapidly elevates blood glucose and insulin. This may affect brain function, including mood and fatigue. Because high blood glucose is linked to diabetes, consumption of high-glucose drinks may also raise the risk of diabetes and cardiovascular (heart) disease. Sweetened beverages and diabetes. Sweetened, sugary drinks can cause sharp rises in blood sugar levels for people with diabetes or glucose intolerance (including prediabetes and gestational diabetes) and so it's usually best to avoid drinking sugary drinks.

7. **Liver Diseases:** When high amounts of sugar enter into the stomach, pancreas have to produce more insulin, which sends more fat to fatty cells, muscle cells, liver, which leads to different liver diseases. ^[5]

2. RATIONAL (PURPOSE)

In recent days soft drinks brands have been put in to various questions regarding their quality, news flashed that they contain harmful pesticides which aroused interest in knowing about the composition of these drinks consumed highly world-wide. I wished to investigate if these claims were true. I am in touch with the Quantitative analysis and so, chose this project on determination of contents of cool drinks out of concern for public health. ^[26]



3. Material and Method:

Apparatus:-

- Test Tubes
- Test Tube Holder
- Test Tube Stand
- Stop Watch
- Beaker
- Burner
- PH Paper Tripod Stand
- China Dish
- Wire Gauge

Chemical Required:-

- Iodine Solution
- Potassium Iodide
- Sodium Hydroxide
- Lime Water
- Fehling's A&B Solution

- Concentrated Nitric Acid
- Benedict Solution
- Ammonium Molybdate

3.1 Detection of ph: -

Small samples of cool drinks of different brands were taken in a test tube and add few drops of ph indicator (Qualigens Universal Indicator). The change in colour of sample was noticed and it was compared with standard ph scale.^[28]

Sl.No	Name Of the Drink	Quantity of Drink Taken	Colour Change	pH Value
1	Coca Cola	5ml	Red	1.0
2	Sprite	5ml	Pinkish	2.0
3	Limca	5ml	Orange Pink	3.0
4	Fanta	5ml	Light Orange	3.0
5	ThumsUp	5ml	Dark Orange	3.0



Fig. No. 2 Detection of Ph

Result:-

P H values of different brands are different and all are acidic in nature. Almost all the brands tested are showing PH values in the range of 2-3 on 14 point

3.2 Test for Carbon Dioxide (CO₂): -

Experiment: - As soon as the bottles were opened, one by one the sample was passed through lime water. The lime water turned milky.

Sl.No	Name Of the Drink	Time Taken	Conclusion
1	Coca Cola	28	CO ₂ is Present
2	Sprite	22	CO ₂ is Present
3	Limca	38	CO ₂ is Present

4	Fanta	36	CO2 is Present
5	ThumsUp	26	CO2 is Present

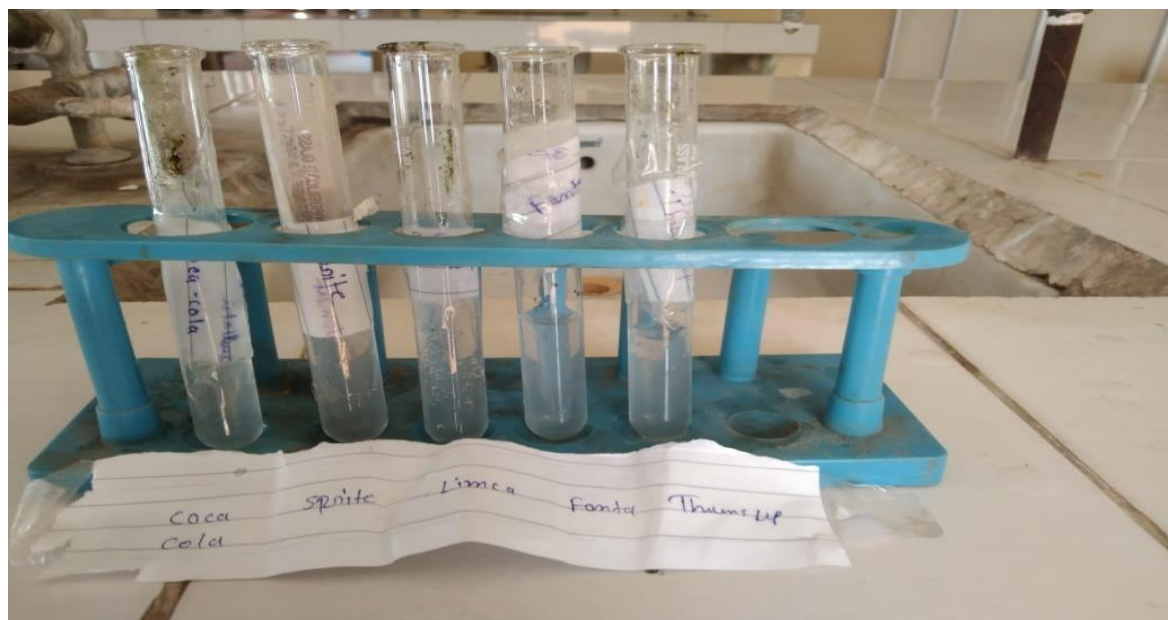


Fig. No.3 Test of Co2

Result:-

All the soft drinks turned lime water milky suggesting all of them contain dissolved carbon dioxide in Water. The carbon dioxide (CO₂) dissolves in water to form carbonic acid, which is responsible for its tangy taste. Lime water turns milky as the Calcium hydroxide (chemical name for limewater) reacts with carbon dioxide to form Calcium Carbonate which is insoluble in water and thus forms a milky white precipitate.

3.3 Test for Glucose: -

Glucose is a reducing sugar acid. Its presence is detected by the following test

A. Benedict's Solution Test: -

A small sample of Soft Drink of different brands was taken in a test tube and a few drops of Benedict's reagent were added. The test tube was heated for few seconds. Formation of reddish color confirms the presence of glucose in cold drinks.

Sl.No	Name Of the Drink	Quantity of Drink Taken	Reagent used for testing	Observation	Conclusion
1	Coca Cola	5ml	Benedict's Reagent	reddish color precipitate	glucose is present
2	Sprite	5ml	Benedict's Reagent	reddish color precipitate	glucose is present
3	Limca	5ml	Benedict's Reagent	reddish color precipitate	glucose is present
4	Fanta	5ml	Benedict's Reagent	reddish color precipitate	glucose is present

5	ThumsUp	5ml	Benedict's Reagent	reddish color precipitate	glucose is present
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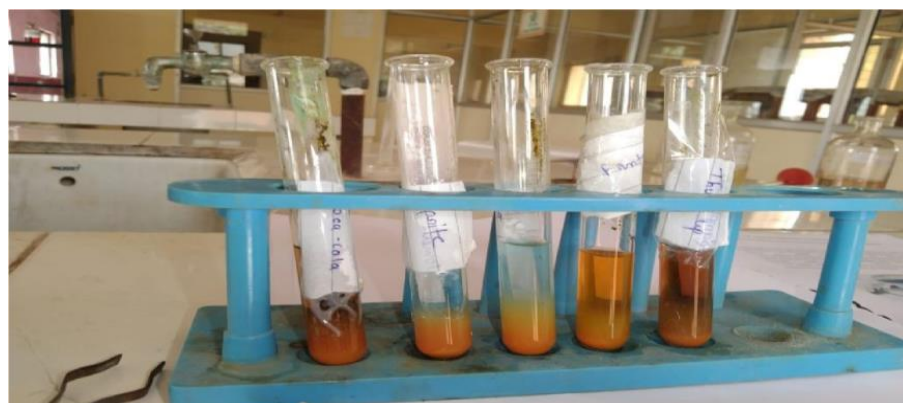


Fig. No. 4 Test of Glucose

B.Fehling Reagent Test:

Small samples of cold drinks of different brands were taken in a test tube and a few drops of Fehling's A Solution and Fehling's B Solution was added in equal amount. The test tube was heated in water bath for 10 minutes. Appearance of brown precipitate confirmed the presence of glucose in cold drinks.

Sl.No.	Name Of the Drink	Quantity of Drink Taken	Reagent used for testing	Observation	Conclusion
1	Coca Cola	5ml	Fehling reagent	reddish color precipitate	glucose is present
2	Sprite	5ml	Fehling reagent	reddish color precipitate	glucose is present
3	Limca	5ml	Fehling reagent	reddish color precipitate	glucose is present
4	Fanta	5ml	Fehling reagent	reddish color precipitate	glucose is present
5	ThumsUp	5ml	Fehling reagent	reddish color precipitate	glucose is present

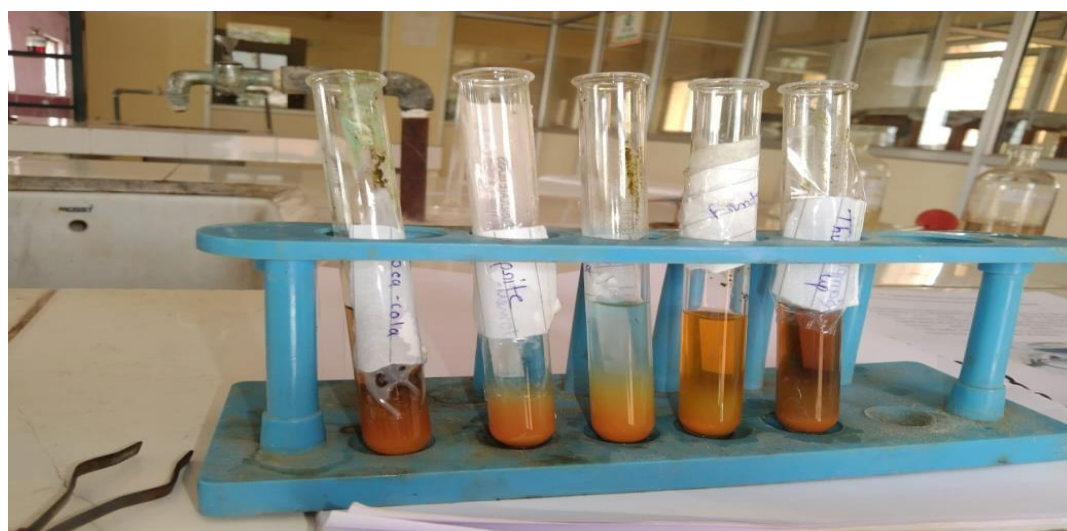


Fig. No.5 Test of Fehling Reagent

Result:-All sample gave positive test for Glucose with Fehling's(A&B) Solutions. Hence, all the cool drinks contain glucose. Different brands gave different gms of ppt when the same portions of reagent and samples are used indicating glucose level is more in Fanta and least in Limca of the samples studied.

3.4 Test for Phosphate:-

Experiment: -

Small samples of each brand of cold drinks were taken in separate test tubes and Ammonium Molybdate followed by concentrated Nitric Acid was added to it. The solution was heated [29].

Sl.No	Name Of the Drink	Quantity of Drink Taken	Chemicals used for testing	Observation	Conclusion
1	Coca Cola	5ml	Ammonium molybdate & Con.nitric acid	Canary yellow precipitate	Phosphate is Present
2	Sprite	5ml	Ammonium molybdate & Con.nitric acid	Canary yellow precipitate	Phosphate is Present
3	Limca	5ml	Ammonium molybdate & Con.nitric acid	Canary yellow precipitate	Phosphate is Present
4	Fanta	5ml	Ammonium molybdate & Con.nitric acid	Canary yellow precipitate	Phosphate is Present
5	ThumsUp	5ml	Ammonium molybdate & Con.nitric acid	Canary yellow precipitate	Phosphate is Present

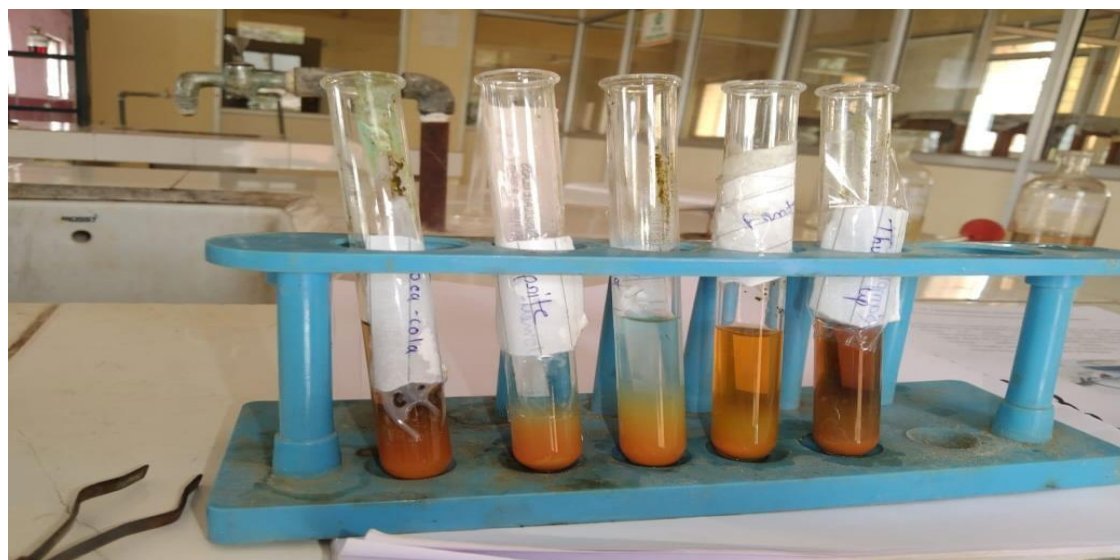


Fig. No.6 Test of Phosphate

Result:- All the soft drinks samples gave test for phosphate ions. Appearance of canary – yellow confirmed the presence of phosphate ions in all soft drinks.

3.5 Test for Alcohol:

Experiment:

Small samples of each brand of cold drinks were taken in separate test tubes and Iodine followed by KI and NaOH Solution was added to each test tube. Then the test tubes were heated in hot water bath for 30 minutes. Appearance of yellow colored precipitate confirmed the presence of alcohol in cold drinks. The tests suggest that the alcohol levels are as low as 10mg in every litter and this works out around 0.001% alcohol. Small amount of alcohol may be present in a soft drink but, alcohol content must be less than 0.5% of the total volume of the drink.

Sl.No	Name Of the Drink	Observation	Conclusion
1	Coca Cola	yellow precipitate	Alcohol is Present
2	Sprite	yellow precipitate	Alcohol is Present
3	Limca	yellow precipitate	Alcohol is Present
4	Fanta	yellow precipitate	Alcohol is Present
5	ThumsUp	yellow precipitate	Alcohol is Present



Fig. No.7 Test of Alcohol

Result

All the Cool drinks samples gave positive test for alcohol. Hence, all the cool drinks contain alcohol but the percentage of content could not be verified.

4. CONCLUSION:-

Sl.No	Name Of the Drink	Quantity of Drink Taken	Glucose	Sucrose	Phosphate
1	Coca Cola	5ml	Present	Present	Present
2	Sprite	5ml	Present	Present	Present
3	Limca	5ml	Present	Present	Present

4	Fanta	5ml	Present	Present	Present
5	ThumsUp	5ml	Present	Present	Present

After conducting several tests, it was concluded that the different brands of cold drinks namely: Coca Cola, Sprite, Limca, Fanta, Thumsup all are contains glucose ,alcohol, sucrose, Phosphate and Carbon dioxide. All cold drinks are acidic in nature on comparing PH value of different brands.

- Coca cola is the most acidic and Limca is least acidic of all the five brands taken.
- Among the five samples of cold drinks taken, Sprite has the maximum amount of dissolved CO₂ and Fanta has the minimum amount of dissolved CO₂.
- Most of the soft drinks contain one or more of three common acids –citric acids, carbonic acids and phosphoric acid.
- for example, Fanta drinks are not good for our body at all .because they contain very high levels of sugar and fooding colour,excess citric acid ,phenylalanine as well as a host of artificial preservatives.

5. DISCUSSION:-

The purpose of this study was to look at the factors those impact public health soft drink consumption habits. The findings revealed that while the majority of youngsters do not use soft drinks on a regular basis, two-thirds did. There were no differences between males and females or between individuals in the 'healthy weight' and 'at risk of overweight' groups, when it came to the soft drink factors and both behaviors. Soft drink and sports drink ingredients have been demonstrated to have negative consequences. Both beverages are best enjoyed during the summer, although excessive use can be harmful to one's health. In compared to sports drinks, soft drinks are more damaging. Carbonated soft drinks were discovered to have greater harmful impacts on health. In comparison to soft drinks, which are expensive and hazardous, natural local beverages are incredibly healthful, affordable, and easy to get.

6. SUMMRY:-

The consumption of soft drinks was found to have increased dramatically over the past several decades with the greatest increase among children and adolescents. Excessive intake of soft drinks with high sugar and acid content both regular and diet could cause detrimental impacts on dental and general health including dental caries, dental erosion, overweight, obesity and increased risk of type 2 diabetes. The sugar tax has raised the level of awareness; however, it is necessary to educate patients about the harmful effects of diferent types of soft drink as it is not always easy for individuals to know from drink labelling what they actually contain.

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