



IMPACT OF AERATED DRINKS AND PACKED FRUIT JUICES ON THE METABOLIC ACTIVITIES OF MAN

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ABSTRACT

The pH is studied to determine whether the body is maintaining a normal acid-base balance for the functioning of enzymes and other biochemical systems. Our body fluids are normally alkaline, the pH being between 7.35 and 7.45. A pH above 7.8 or below 6.8 is generally fatal. Digestion is the process of breaking down the food we eat into components that are small enough for our body to absorb. The process starts with our teeth and saliva and then digestion and absorption of nutrients continue in the intestine, using enzymes made in the liver, gall bladder and pancreas. Different enzymes are found to be effective at different pH levels. If the pH levels are too high or too low for a particular enzyme, it might get denatured and will no longer perform its function. Pepsin enzyme in the stomach work best at pH around 2 while peptidases and maltase works best at pH around 7.5. The human body works best when it remains close to neutral 7. Soft drink can cause people to gain weight, weakening of teeth, and high number of cavities, malnutrition and insomnia. The present study investigates the pH of soft drink before and after mixing with chapati extract. An Increase in pH values was observed which suggest that soft drink increases acidity.

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INTRODUCTION

Soft drinks are packaged beverages that typically contain water and additives such as sweetener, flavouring agents and acid regulators. Soft drinks can be carbonated or non-carbonated and its consumption is a major public health issue today such as obesity, diabetes and fatty liver [3]. Clean water has a pH of 7 and our blood needs to maintain a pH balance of between 7.35 and 7.45 for cellular processes to function properly [6]. When blood has a pH below 7.35 it is considered to be acidic and blood acidosis may occur which may lead to health problems and diseases [8]; [5]. While a healthy digestive tract's buffering systems should prevent aerated-drink's acidity from directly reaching bloodstream, these counter-measures can be costly. Calcium phosphate are drawn upon by the phosphate buffering system in order to counteract strong acids like the phosphoric acid in soda [5]. Throughout the digestive system, that starts from the mouth and ends up at the anus (liver, gallbladder and pancreas play the role of accessory organs) only the stomach can resist an acidic environment up to pH 2.0. Before reaching the stomach the acidity of soft drink passes through the digestive system developing an abnormal acidic environment.

Present study was conducted on different soft drink mixed with chapatti extract to determine the acidity.

MATERIALS AND METHOD

The aerated drinks (Thumbs up, Nimbooz, Sprite) and juices (Maza, Slice) were procured from local market in Mumbai. The experiments were performed before the expiry date of test samples.

An individual pH value of all the drinks was measured with the help of pH meter and universal indicator. Wheat bread (Chapati) was soaked in water for half an hour and was grinded with mortar-pestle with amylase. This mixture was filtered using a muslin cloth and was collected in a beaker. Control was also run simultaneously. pH of the filtrate and control was measured and noted using pH meter. Statistical analysis of the data was carried out using SYSTAT for Windows software (SYSTAT for Windows Inc.26). Differences were considered significant where P was =0.05.

RESULTS AND DISCUSSION

The pH in stomach plays an important role in digestion. All the soft drinks tested showed acidic pH i.e., less than 4. The soft drink Thumps up showed the lowest pH of 2.54 while rest were in pH range of 3.1–3.5 (Table 1). The wheat bread (Chapati) is one of the most common food consumed across India. The major component of wheat bread is carbohydrate which is digested by enzyme amylase. The activity of amylase

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is dependent on pH. In acidic pH the activity of amylase start decreasing [2]. The chapati extract in water has a pH 5.88 which is ideal for enzyme activity. However, when the chapati extract was mixed with equal volume of packaged aerated drinks the pH decreases (Table 2, Figure 1). Since pH plays important role in activity of amylase the decrease in pH may lead to decrease in activity of enzyme amylase in humans. This may lead to disruption in digestion of wheat bread while consumed with soft drinks and hence may increase the health issues.

Table 1 pH value of soft drink before mixing with chapati extract

S. No.	Name of the aerated drink / fruit juice	Name of the Manufacturing company	pH value	Date of Manufacture	Expiry period
1	Thumbs up (Aerated)	Coca-cola	2.54±0.01	7/11/16	45 days
2.	Nimbooz	Pepsi	3.36±0.03	19/10/16	4 months
3.	Slice	Pepsi	3.43±0.01	4/8/16	6 months
4.	Sprite (Aerated)	Coca-cola	3.33±0.02	12/11/16	45 days
5.	Maaza	Coca-cola	3.48±0.01	18/10/16	4 months

Table 2 pH value of soft drinks extract after mixing with chapati extract

S. No.	Sample	pH
1.	Chapati Extract (CE)(Control)	5.88±0.06
2.	CE + Thumbs up (Aerated)	2.81±0.03
3.	CE + Nimbooz	4.12±0.02
4.	CE + Slice	4.30±0.01
5.	CE + Sprite (Aerated)	4.52±0.03
6.	CE + Maaza	4.45±0.05

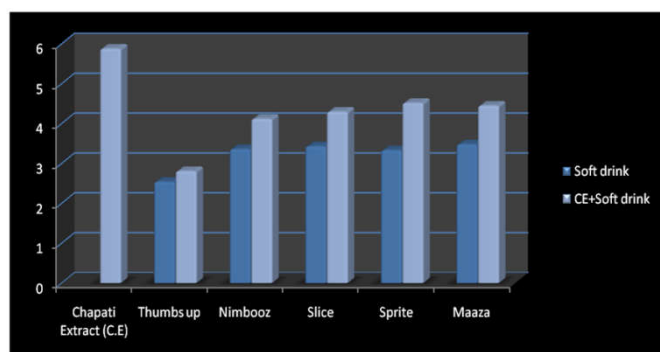


Figure 1 pH of different soft drinks before and after mixing with chapati extract

Further, over a period of time, with high consumption of acid drinks like thumbs up, calcium can actually be drawn from the bones and teeth to deal with the ongoing low pH onslaught to digestive system [7] and may lead to many health issues [4]; [1]. It is studied that because the hydrochloric acid in stomach is of a lower pH, at around 2 and less than pH of aerated drinks i.e., 2.5, its acidity should have no effect. Unfortunately, regular exposure to aerated drinks and juices and its acid appears to reduce the secretion of HCl in stomach over time. Poor hydrochloric acid secretion can also affect protein digestion in particular.

Mineral absorption is also impaired with low HCl. But even more relevant in the case of digestive problems, reduced hydrochloric acid in the gastric juices can allow potentially dangerous bacteria, yeasts and other parasites in food to survive the stomach where they are normally neutralized. These pathogens are then free to move on to the intestines where they can end up causing many long term health issues. The present study indicates towards undesirable effect of consumption of soft drinks and packed fruit juice and therefore needs further exploration to confirm the adverse effects.

References

1. Abid A., Taha O., Nseir W., Farah R., Grosovski M. and Assy N. (2009): Soft drink consumption is associated with fatty liver disease independent of metabolic syndrome *J. Hepatolo.* 51: 918-924.
2. Amutha K. and Jaya Priya K. (2011): Effect of pH, temperature and metal ions on amylase activity from *Bacillus subtilis* KCX 006. *Int. J. Pharm. Bio Sci.* 2 (2): 407-413.
3. Assy N., Nasser G., Kamayse L., Nseir W., Beniashvili Z., Djibre A. and Grosovski M. (2008): Soft drink consumption linked with fatty liver in the absence of traditional risk factors. *Can. J. Gastroenterol.* 22(10): 811-816.
4. Funtikova A.N., Subirana I., Gomez S.F., Fit'o M., Elosua R., Ben'itez-Arciniega A.A. and Schroder H. (2015): Soft drink consumption is positively associated with increased waist circumference and 10-year incidence of abdominal obesity in Spanish adults. *J. Nutr.* 145(2):328-334.
5. Kimmel S. (2012): Low-grade, chronic acidosis...what in the cell is going on? Building Balance Blog, thrive. <https://yourphlife.com/acidosis/>
6. Larkin B. G. and Zimmanck R. J. (2015): Interpreting arterial blood gases successfully. *AORN Journal*, 102(4): 343-54.
7. Maganur P. C., Prabahakar A. R., Satish V., Namineni S. and Kurthukoti A. (2013): Erosive effect of soft drink and fresh fruit juice on restorative materials. *World J. Dent.* 4 (1): 32-40.
8. Pizzorno J. (2015): Acidosis: An old idea Validated by new research. *Integr Med (Encinitas).* 14(1):8-12.

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