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Therapy or damage usage of paracetamol syrup and its adverse dental effects in children of age 0-6 years

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Abstract

Aim: To evaluate the sweetening agent concentrations and pH in several brands of paracetamol syrups and identify the syrup that has the lowest pH and amount of sweetening agent.

Methods: In this study, 10 paracetamol syrups used in age group 0-3 years and 3-6 years were analyzed to find the brand at least and maximum sugar concentration using lane Eynon general volumetric method. pH of all the syrups were determined using pH paper.

Results: Sugar concentration was found to be in a range of (0.87%-11.18%) with brand P 125 drops (apex) 0.87% containing least concentration and brand Calpol 250 (GSK) containing a maximum concentration of 11.18%. pH of paracetamol syrups ranged from 5.33-6.68 with Calpol 250 (Dawaadost) containing lowest pH 5.33 and Dolopar 125 (Micro) had the highest pH of 6.68.

Conclusion: Children are more likely to suffer from dental caries and dental erosion. Candy and syrups prescribed for different infections are important factors. In order to make it safer and more advantageous, sugar substitutes that are not possibly cariogenic can be used in place of the original sugar in order to reduce the cariogenic aspects and syrups with lowest pH can be avoided to counteract its acidogenic potential.

Keywords: Paracetamol syrup, acidogenic potential, dental effects, sweetening agent

Introduction

In the medical field, paediatric liquid medications have been utilised extensively. To increase palatability and kids compliance, the majority of paediatric syrups on the market are sweetened with sugar. They are widely recommended, significantly more readily available, and well-liked by both parents and kids. Oral liquid drugs are routinely administered to unwell children, especially those who are young and chronically ill [1]. Nevertheless, dental caries is most commonly caused by these sweeteners, which are found in paediatric syrups [2].

Since sucrose is a cheap and easily processed material, it is the most often utilised sweetener for these kinds of drugs. Some of these drugs also contain glucose and fructose [3]. These sugars, in particular sucrose, serve as a substrate for the oral bacteria that ferment them, producing acids and lowering intraoral pH in the process [4].

Acids are added to medications as buffering agents to preserve the drug's physiological compatibility, maintain their chemical consistency, and regulate their tonicity. Acids are frequently employed to enhance flavour. They are required for the acid-base reactions that are applied to effervescent and dispersible tablets that are intended to be mixed with water. Additionally, pediatric liquid medications might encourage dental erosion because many of them have low pH, typically less than 5.5 [5].

For children, the appropriate dosage of paracetamol is determined by their weight. 15 milligram per kilogram of body weight is the standard dosage. If necessary, this dosage can be given up to four times in a 24-hour period, once every four to six hours. A child's daily dosage shouldn't exceed 60 mg per kilogram of body weight. When taken as directed, paracetamol is a helpful medication for relieving pain in kids. To use it safely and efficiently, parents must be aware of and double-check the recommended dosages.

Additionally keep in mind that paracetamol may take up to 60 minutes to start working.

Therefore, the purpose of the current study was to use the Lane Eynon general volumetric method to assess the percentage of sugar content and find out the pH in different brands of paracetamol syrups.

Methodology

Ten most commonly prescribed paracetamol syrups in age group 0-3 years and 3-6 years by dentists were selected for the study and divided into group I and group II respectively.

Group I	Group II
P 100 drops (apex)	P 250 (apex)
P 120 suspension (apex)	P 500 (apex)
P 125 drops (apex)	Crocin 240 (gsk)
Rocemol 124 (Medroots)	Calpol 250 (Dawaadost)
Dolopar 125 (Micro)	P 250 (Parawyn)

Table 1: Sugar concentrations in paracetamol syrups

Group I	Sugar concentration	Group II	Sugar concentration
P 100 drops (apex)	8.7%	P 250 (apex)	10.3%
P120 suspension (apex)	10.2%	P 500 (apex)	10.7%
P 125 drops (apex)	0.87%	Crocin 240 (gsk)	10.6%
Rocemol 124 (Medroots)	10.7%	Calpol 250 (Dawaadost)	11.18%
Dolopar 125 (Micro)	10.6%	P 250 (Parawyn)	9.5%

Table 2: pH of paracetamol syrups

Group I	pH	Group II	pH
P 100 drops (apex)	6.53	P 250 (apex)	5.38
P120 suspension (apex)	6.46	P 500 (apex)	5.42
P 125 drops (apex)	5.43	Crocin 240 (GSK)	6.21
Rocemol 124 (Medroots)	6.21	Calpol 250 (Dawaadost)	5.33
Dolopar 125 (Micro)	6.68	P 250 (Parawyn)	5.72

Discussion

In order to make paediatric liquid medications more pleasant and more likely to be taken by kids, the majority of them contain sugar in varied proportions. The Paediatric liquid medication is typically used for a brief period of time; however, children who are persistently sick may need to take it regularly, which may increase their risk of dental caries [6]. These medications active components are essential for the enhancement or preservation of health. Certain inert substances, such as carbohydrates, may be harmful to dental health. Therefore, the possibility for dental caries in young, chronically ill children may be considerably increased by these easily fermentable carbohydrates in thick liquid suspension forms.

Sugar content in syrups ranged from 12.2% to 18.3% in our investigation, which is comparable to research by Rubin (1989) and Peres *et al.* (2005) [7]. Therefore, high fermentable carbohydrate contents in medicinal syrups may promote *S. mutans* growth by quickly converting sugars to acids and starting the demineralization of enamel. Many brands that are sold to be eaten by kids have significantly higher sugar content. As a result, this study highlights the significance of identifying the quantitative and qualitative sugar concentration in the ingredients table a fact that many companies fail to reveal. Therefore, it is important to raise public awareness of the risks these drugs represent, such as dental caries, in addition to prescribing them to chemists, manufacturers, and other healthcare professionals. Numerous pharmaceutical businesses contend that making liquid medications more palatable by adding sugar boosts

Using the Lane Eynon general volumetric method, the sugar content of these ten paracetamol syrup samples was determined. Sathyabama Dental College and Hospitals, Department of Biochemistry performed all treatments. Benedict's test was used to do a preliminary qualitative analysis to check for the presence of sugar. Using the general volumetric titration method based on Lane-Eynon, the amount of sugar that was reduced was estimated. The unknown sugar sample was added to the titration using an assembly burette. Using unionised water in 25 millilitres of combined Fehling's solution and methylene blue as an indicator, all ten brands were diluted in this manner at a ratio of 1/20 dilution every 5 millilitres. When titration starts, a shift in colour from blue indicates the termination point pH of the paracetamol syrups were calculated using pH paper.

Results

patient compliance. Conversely, long-term use of liquid medications with added sugar raises the incidence of dental cavities and children's gingivitis [8]. The main medical condition tends to obscure the less evident parts of the child's health, therefore this issue is typically ignored. In these situations, the parents primary concern is the health issue. Thus, the youngster's regular routine is altered, and there's a chance that poor dental hygiene will develop.

Liquid drugs for children may have a significant erosive potential because of an acid component in their formulation. As a result, measuring their pH is an important consideration when researching dental erosion. The results of our investigation revealed that the pH values of the drugs under investigation varied from 5.33 to 6.68. This range matched the results of Gupta and Panda, who found that the pH of the drugs under study varied from 4.22 to 6.10 [8]. There are high chances that these medications can cause dental erosion when used for prolonged period of time.

Children using acidic and sweetened oral paediatric medications for an extended period of time need to have their localized intraoral conditions monitored.

Conclusion

To make it safer and more advantageous, sugar substitutes that are not possibly cariogenic can be used in place of the original sugar in order to reduce the cariogenic components in paracetamol syrups. On an individual basis, parents and kids can be taught to brush after every medication and to take their medications at mealtimes to prevent dental cavities.

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