

Estimation of Sugar Content in Various Brands of Paracetamol Syrups

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Abstract

Aim

To Analyse the sweetening agent and its concentration in various brands of paracetamol syrups and to determine the syrup with the lowest concentration of sweetening agent.

Methods

In this study, five different brands of paracetamol syrups were analysed to find the brand at least and maximum sugar concentration using lane Eynon general volumetric method.

Results

Sugar concentration was found to be in a range of (12.2%-18.3%), with Brand P-250 (Apex) containing least concentration, (12.2%) and Brand Pyregesic-DS containing a maximum concentration of (18.3%).

Conclusion

Dental caries is more prevalent in children. Factors contributing are candies as well as syrups prescribed during various infections. Reducing the cariogenic factors should be the primary concern, hence sugar substitutes which are not potentially cariogenic can be replaced in order to make it more safe and beneficial.

Keywords: Paracetamol, Syrups, Sugar, Lane-eynon, Children.

Introduction

Paediatric liquid medicaments have been widely used in the field of medicine. Most of the paediatric syrups available in the market are sweetened with sugars to improve palatability and children's compliance. They are very commonly prescribed, is far exceeded available, and are easily accepted by both parents and children. Young and chronically sick children receive a variety of oral liquid medications on a routine basis[1]. However, these sweeteners which are used in paediatric syrups are most prone to dental caries[2]. Dental caries is the result of the loss of tooth structure due to demineralization by bacteria in the presence of food fermentable carbohydrates. Sugars added in these preparations act as a preservative, a sweetener, a solvent, a demulcent and a bulking agent, resulting in dental caries[3]. Majority of brands do not reveal the total sugar content in the ingredients table.

Paracetamol is a medicine that is commonly used in children and is a drug which is available without a prescription. The main uses of paracetamol are for relief of pain and for reducing a fever. Most children are given paracetamol in syrup form and it is vital to check the strength of the brand used, because they vary. Paracetamol is also available in different strengths for different age groups. Some of the brands of paracetamol available in India as syrup include P-250, Pacimol-Ds, Pyregesic-Ds, Dolopar-250, Paracip.

While having a increased pain being a bad thing as it can make you feel very uncomfortable and can lead to disturbed nights. However, it's important to realise that although taking paracetamol can make people feel better, it makes no difference to the actual course of the underlying illness.

Paracetamol is one of the most commonly used 'over-the-counter' medicines, especially for the minor illnesses suffered by many children. But it is not always used in the correct dosage, which may make it less effective or dangerous.

The correct dose of paracetamol for a child depends on their weight. The usual dose is 15 mg per kilogram of weight. In other words, if a baby weighs 10 kg it should have 10 x 15mg, which is 150 mg. This dose can be taken once every 4 to 6 hours, up to 4 times in 24 hours if needed. No child should take a total of more than 60 mg per kilogram of their bodyweight in a day.

Problems can also arise because of confusion between the way things are measured. 'mg' is a measure of weight and 'mL' is a measure of fluid volume. So, for example, if the strength of a bottle of paracetamol syrup is 100 mg/mL a 10 kg baby needs 150 mg which is only 1.5 mL of syrup.

It's also important to check whether any other medicines your child has taken contain paracetamol, and to check whether another caregiver has already given your child a dose of paracetamol.

Used properly, paracetamol is a useful medicine for making children more comfortable when they have pain. Understanding and checking the correct doses is vitally important if parents are to use it safely and effectively. And remember that it may take up to 60 minutes for paracetamol to take effect.

Hence, the present study was carried out with the aim to estimate the percentage of sugar concentration in various brands of paracetamol syrups, using lane Eynon general volumetric method.

Materials and Methods

Five most commonly prescribed paracetamol syrups by dentists were selected for the study, and they were labelled as:

Sample A ~ **P-250** (APEX)

Sample B ~ **PACIMOL-DS** (IPCA)

Sample C ~ **PYREGESIC-DS** (EAST INDIA)

Sample D ~ **DOLOPAR-250** (MICRO)

Sample E ~ **PARACIP** (CIPLA)

Determination of sugar level was carried out in these 5 samples of paracetamol syrups using lane Eynon general volumetric method. All procedures were done at Department of Biochemistry 'Saveetha dental college and hospitals'. The preliminary qualitative analysis was carried out for the presence of sugar by Benedict's test.

Lane –Eynon General Volumetric Titration-Based Method

Estimation of reducing sugar was done by using Lane –Eynon general volumetric titration-based method. In the titration, assembly burette was used to add unknown sugar sample. In this method, all five brands were diluted in 1/20 dilution per 5 ml ratio with unionized water in 25ml of mixed Fehling's solution and methylene blue as an indicator. Titration begins, and the end point was indicated by a change in colour from blue to pink. Similarly, the estimation of total reducing sugar in aqueous extract of samples can be done by inversion method.

Calculation

$$1) \quad \text{Total sugar \%} = \frac{\text{Fehling factor} \times \text{dilution} \times 100}{\text{Weight of sample} \times \text{titre value}}$$

Results

SAMPLE	SYRUP BRAND	TOTAL SUGAR (%) / 5ml
A	P-250	12.2%
B	DOLOPAR	14.8%
C	PACIMOL-DS	13.3%
D	PARACIP	14.2%
E	PYREGESIC	18.3%

Table 1. Percentage of sugar present in different brands of syrup

The results of the present study show that Highest concentration of sugar was found in the brand Pyregesic-DS (18.3%) followed by Dolopar-250 (14.8%), Paracip (14.2%), Pacimol-DS (13.3%) and the least being Brand P-250 (12.2%) sugar. Intake of medicines in the form of syrups does not directly lead to dental caries. It's, due to addition the sugar for acceptability and palatability [Table 1].

Discussion

A study provided light for prescribing pattern of analgesics in a dental office as many new drugs are introduced and many are banned due to their side effects[4]. Another study showed that level of knowledge of drug prescription is also very important. These drugs were developed to be less damaging to the gastric mucosa, and the evidence supports this contention[5,6]. Dentists commonly prescribe paracetamol for the relief of mild to moderate acute dental pain or of postoperative dental pain and inflammation[7]. Syrups are prepared using sugar base with boiled water and then all the preservatives were dissolved in boiled and cooled water added into the sugar base. Now Paracetamol was dissolved in Propylene glycol at 400C-500C. After that Glycerine and Sorbitol were added and then sweetening, colouring and flavouring agent were added. Menthol was also dissolved in Propylene glycol. The final pH i.e. between 5.5-6.5 was adjusted with citric acid. Now volume was marked with boiled and cooled water.

Majority of all paediatric liquid medication contain sugars in varying amounts to make it palatable for children compliance. The use of Paediatric liquid medication is usually for a short duration, but for chronically ill children might need to take on the regular basis which might prone to cause dental caries[8]. The active ingredients in these medicines are necessary for improvement or maintenance of health; some inactive ingredients like sugars pose a risk to dental health[9]. Thus, these readily fermentable carbohydrates in thick liquid preparations may add significantly to the dental caries potential in the young and chronically sick children.

Dental caries is a dynamic disease involving the calcified tissues of the teeth and requires the presence of bacterial plaque, a dietary fermentable carbohydrate like sugar which results in acid production and subsequent demineralization of the tooth surface. The bacteria metabolize sugar which increases the local concentration of organic acid in the inner layer of plaque on the tooth surface, which lowers the pH resulting in a process of demineralization in which calcium and phosphate diffuse out of tooth enamel[10].

In our study, syrups contained sugars in a range of (12.2%) to (18.3%) which is similar to the studies conducted by (Rubin 1989 and Peres et al 2005)[11]. Thus, presence of high concentrations of fermentable carbohydrates in medicated syrups may facilitate the growth of *S. mutans*, by rapidly metabolizing sugars to acids, thus initiating enamel demineralization. Many brands marketed and consumed by children contain sugar that is far exceed. Hence, this study shows the importance of labelling of a concentration of sugars in the ingredients table both quantitatively and qualitatively, which many brands do not disclose it. Thus, Awareness of the complications such as dental caries posed by these medications should be promoted not only among prescribers, but also among pharmacists, manufacturers, and the public in order to bring about increased availability and use of sugar substituted liquid medications.

Recent studies with liquid paediatric medicines have shown sucrose concentrations (SC) ranging from 3.7% to 67.0% by weight (wt/wt)[12-14]. Higher SC (80%) in paediatric medicines have been reported. These SC in medicines are higher than in soft drinks (4.3%) and ice cream (15.1%)[15].

Many pharmaceutical companies argue that improving the palatability of liquid medicines with sucrose increases patient compliance. On the other hand, chronic administration of sweetened liquid medicines increases the risk for dental caries and gingivitis in children[16]. In general, this issue is neglected because the principal medical problem covers up the less obvious aspects of the child's health. Under such circumstances, parents' major focus is the medical problem. As a result, the child's regular routine is changed, and a condition of poor oral hygiene is likely to take place.

Given the importance of early infant nutrition in developmental programming and exposure to excess sugar in infancy being associated with adverse metabolic consequences in adolescence and adulthood, it is essential to limit added sugar consumption in infancy and for consumers to be aware of the sugar content in products for children. These findings provide further support for adding more comprehensive sugar labeling to food and beverage products, specifically those marketed to, or commonly consumed by, children.

Public health policies must be implemented in order to control the excessive amount of sugar in medicines[17]. This policy is valid for all countries where medicines in long-term use by children and adolescents are frequently used[18]. In the United States, the Food and Drug Administration (FDA) Modernization Act of 1997 (FDA's "paediatric rule"), which provided incentives for pharmaceutical manufacturers to perform studies in children, is particularly noteworthy. This incentive may be related to the fact that approximately 100 medicines received a paediatric indication between 1998 and 2005[19]. Pharmaceutical markets outside the United States may follow the same trend, and health professionals must be aware of these facts because many of these medications for children are sweetened to increase patient compliance.

Dental caries and dental erosion are not acute severe conditions to be regarded as an adverse event. Thus, these chronic oral conditions are not included in the FDA reporting system[20]. On the other hand, acidic and sweetened oral paediatric medicines for long-term use by children must be subjected to surveillance for localized intraoral conditions[21].

Conclusion

Reducing the cariogenic factors should be the primary concern, hence sugar substitutes which are not potentially cariogenic, can be replaced in order to make it more safe and beneficial. Individually it is possible to educate children and parents regarding brushing after each dose, to take medicine at meal times thereby avoiding potential caries.

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Conflict of interest

Nil

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