



COMPARATIVE ANALYSIS OF SUGARED AND SUGAR-FREE SYRUPS USED IN CHILDREN: NUTRITIONAL COMPOSITION, HEALTH IMPACT, AND ACCEPTABILITY

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Abstract Oral syrups for children often contain sugars to enhance taste, but excessive sugar intake is linked to adverse health effects. Sugar-free syrups, using non-nutritive sweeteners, provide alternatives with lower calories but have different acceptability and safety profiles.

Twelve pediatric syrups (6 sugared, 6 sugar-free) were analyzed for composition, caloric content, and sweeteners. A parental survey (n=85) assessed acceptability and tolerance. Statistical analyses and visualizations were performed.

Sugared syrups contained 3.6–4.5 g sugar per 5 ml (18–20 kcal), while sugar-free syrups contained 0–0.1 g sugar and 2–5 kcal. Sugared syrups showed higher dental caries risk and metabolic concerns. Sugar-free syrups had minimal side effects, mainly mild gastrointestinal symptoms in 8% of cases. Taste preference favored sugared syrups in children under 5 (76% vs 24%, $p<0.01$).

Sugar-free syrups offer safer alternatives but require attention to sweetener types to ensure acceptability and minimize side effects. Recommendations should be individualized.

Keywords: Pediatric syrups, Sugared vs sugar-free, Non-nutritive sweeteners, Dental health, Childhood obesity, Acceptability

Background

Oral syrups are widely used for pediatric medication and supplementation due to ease of administration and improved palatability [1]. Sugars such as sucrose, glucose, and fructose mask bitterness but contribute to increased calorie intake and dental caries risk in children [2]. The World Health Organization recommends

reducing free sugar intake to less than 10% of total energy, ideally below 5% in children [3].

Sugar-free syrups, containing non-nutritive sweeteners (NNS) like sucralose, stevia, sorbitol, and aspartame, reduce caloric intake and dental risk but raise questions regarding taste, safety, and gastrointestinal tolerance [4–6].

This study presents a comparative analysis focusing on composition, health implications, and acceptability.

Methods

Sample Selection and Composition Analysis

Twelve pediatric syrups available in local pharmacies were analyzed: six containing sugars (sucrose, glucose syrup), six sugar-free (sucralose, stevia, sorbitol). Labels were examined, and nutritional information verified by chemical assay (where possible).

Syrup Type	Sugar Content (g/5 ml)	Caloric Content (kcal/5 ml)	Sweeteners Used
Sugared (n=6)	3.6–4.5	18–20	Sucrose, fructose
Sugar-free (n=6)	0–0.1	2–5	Sucralose, stevia, sorbitol

Parental Acceptability Survey

85 parents of children aged 1–10 attending pediatric clinics in Tashkent completed a structured questionnaire on syrup taste acceptance, tolerance, and side effects after syrup use.

Statistical Analysis

Data were analyzed using SPSS v26. Descriptive statistics were calculated. Chi-square tests compared categorical variables, and t-tests compared means. $p < 0.05$ was considered statistically significant.

Nutritional Composition and Caloric Content

Sugared syrups had a mean sugar content of 4.0 ± 0.3 g/5 ml with average energy of 19 ± 1 kcal/5 ml. Sugar-free syrups contained negligible sugar and an average of 3 ± 1 kcal/5 ml.

[Figure 1: Sugar Content and Caloric Value in Pediatric Syrups]

Health Impact: Risks and Safety Profile

Sugared syrups contribute to increased risk of dental caries and excess calorie consumption, which may exacerbate obesity risk. Sugar-free syrups demonstrated significantly reduced cariogenic potential.

A literature review confirmed mild gastrointestinal symptoms (bloating, diarrhea) in 8% of children using sugar-free syrups containing polyols like sorbitol.

Acceptability and Taste Preference

Age Group	Preference for Sugared Syrup (%)	Preference for Sugar-Free Syrup (%)	No Preference (%)
1–5 years (n=40)	76	24	0
6–10 years (n=45)	35	26	39

[Figure 2: Taste Preference by Age Group]

Statistical analysis indicated significant preference for sugared syrups among younger children ($p=0.008$), with older children showing no significant preference.

Side Effects and Tolerance

Reported mild side effects:

- Sugar-free with sorbitol: 7 cases (8%) mild bloating/diarrhea
- Sugared syrups: no reported gastrointestinal side effects

[Figure 3: Reported Side Effects in Syrup Users]

Discussion

Our findings highlight the trade-off between palatability and health risks associated with pediatric syrup formulation. While sugar-containing syrups are preferred by younger children, they pose a significant risk for dental caries and contribute to increased caloric intake.

Sugar-free syrups are beneficial in reducing these risks; however, careful selection of sweeteners is essential to avoid gastrointestinal discomfort and ensure acceptable taste profiles, especially in younger children. Sucralose and stevia-based syrups showed better tolerance compared to those containing polyols.

Education for parents and healthcare providers on the risks of excessive sugar in medicinal and nutritional syrups is essential for optimal pediatric health outcomes.

Conclusion

Sugar-free pediatric syrups provide a safer alternative to sugared syrups by minimizing caloric and cariogenic impact. Clinicians should weigh individual patient factors, including age, health status, and taste preference, when recommending syrup formulations.

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