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## ORIGINAL RESEARCH

## COMPARISON OF PEDIATRIC SYRUPS ON MICROHARDNESS AND SURFACE ROUGHNESS OF DIFFERENT RESIN RESTORATIONS: AN IN-VITRO STUDY

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## ABSTRACT

**Objective:** The study objective was to compare the alterations in microhardness and surface roughness (SR) of three distinct resin-based restorations commonly employed in pediatric dentistry under continuous exposure (at baseline, 7, 14, and 21 days) to frequently utilized pediatric syrups.

**Materials and methods:** In this in vitro study, three pediatric syrups used as immersion agents were amoxicillin+clavulanic acid, paracetamol, and haematinic syrup. The materials evaluated were Compomer, Microhybrid, and Nanofill composite resin restorations. The study included 180 caries-free, non-restored deciduous molar teeth without developmental anomalies that were extracted due to pre-shedding mobility. The surface microhardness and SR were measured with a Vickers microhardness durometer and a contact profilometer respectively. ANOVA was used for intra- and inter-group data comparisons at a 5% significance level using SPSS software.

**Results:** On day 21, the antibiotic-micro-hybrid group had the highest microhardness ( $52.95 \pm 0.62$ ). The compomer-hematinic group had the lowest microhardness ( $13.22 \pm 0.33$ ). The SR of the compomer-paracetamol group was the highest ( $1.47 \pm 0.43$ ), while the micro-hybrid-antibiotic group had the lowest ( $0.83 \pm 0.07$ ). Intragroup comparisons showed significant differences ( $p < 0.01$ ), showing a decrease in material microhardness with an increased exposure period. The compomer subgroups exposed to paracetamol and haematinic and the nanofill composite exposed to haematinic syrup exhibited a significant difference ( $p < 0.01$ ).

**Conclusion:** The microhardness of compomer-paracetamol, compomer-antibiotic, and nanofill-paracetamol subgroups increased over the study period. The SR of the compomer and nanofill materials treated with haematinic syrup and compomer-paracetamol subgroup increased considerably.

**Keywords:** Microhardness, Pediatric syrups, Resin-based restorative materials, Surface roughness, Vickers hardness number.

## 1. INTRODUCTION

The utilization of resin-based restorative materials (RRM) has surged in prominence owing to the rising

need for minimally invasive procedures and aesthetically appealing restorations for the teeth. The long-standing efficacy of these restorations is contingent upon numerous pivotal aspects, including microleakage, water solubility,

polymerization shrinkage, cavity morphology, application method, and surface topography.<sup>[1]</sup> The desire for aesthetic appearances concerning diverse dental materials is progressively expanding in pediatric dentistry.<sup>[2]</sup> The pediatric population generally receives treatment with glass ionomer cement, compomers, and RRM, with specific recommendations based on the special needs of children.<sup>[3,4]</sup> The main goal in treating teeth afflicted by dental caries is to regain their aesthetics and functioning, ensuring smooth, plaque-resistant restoration devoid of porosity.<sup>[5]</sup> RRM exhibits a success percentage of around 90% in restoring class I and II cavities in primary dentition under local anesthesia and using a rubber dam.<sup>[6]</sup> On the contrary, compomers, despite demonstrating inferior durability to wear relative to RRM, have the benefit of prolonged fluoride delivery. Nonetheless, they are linked to certain constraints, such as diminished resistance to masticatory stresses relative to composite restorations, heightened vulnerability to moisture as opposed to conventional glass ionomer cement, and heightened surface roughness (SR).<sup>[7]</sup> Research initiatives to improve resin matrices predominantly concentrate on improving physical, mechanical, and aesthetic characteristics. Concurrently, there are endeavours to diminish SR to augment wear resistance and facilitate polishing by modifying the framework of inorganic fillers, thereby attaining an effectively smooth surface to preserve the general characteristics of restorations. A rough surface, on the other hand, may result in concerns such as plaque buildup, bacterial adhesion, discolouration, gingival disorders, and the emergence of secondary caries. The longevity of restorations is greatly influenced by microhardness, which is intimately related to the material's rigidity and durability. Restorations exhibiting lower surface hardness are vulnerable to abrasions, resulting in a diminished longevity rate.<sup>[7]</sup> In addition to meeting aesthetic standards, RRM should possess good fracture or abrasion resilience and clinical endurance. Consequently, new materials are consistently manufactured, while current materials are being improved on an ongoing basis.<sup>[8]</sup> Nonetheless, convincing evidence addressing the supremacy of any particular material for restorations employed in dentistry is lacking.<sup>[9]</sup> Consequently, clinical judgments concerning the choice of materials must consider criteria that include caries activity, the application of minimally invasive procedures, cavity form, and aesthetic considerations.<sup>[10]</sup> Pediatric liquid medications are typically provided for children for various chronic needs, including analgesics, antibiotics, antiepileptics, vitamin supplements, and

antitussives. Consequently, the application of these preparations over a brief duration could potentially be regarded as having extended effects. Their sugar content may lead to cariogenic effects and also exhibit erosive potential due to heightened acidity.<sup>[11-13]</sup> Acidic formulations are regarded as essential for the distribution of medication, chemical durability, physiological adaptability, and flavor improvement.<sup>[14]</sup> However, aspects such as acidic constituents, frequency and length of use, use of medicine before bedtime, intake of food, excessive viscosity, and elements that diminish salivary flow contribute to tooth erosion.<sup>[15,16]</sup> Paediatric syrups with low pH levels have already been demonstrated to induce imperfections on enamel surfaces and dental restorations, eventually leading to diminished hardness of restorations and teeth.<sup>[7]</sup> Henceforth, the study objective was to compare the alterations in microhardness and SR of three distinct RRM commonly employed in pediatric dentistry (compomer, microhybrid, and nanofill composite resins) under continuous exposure (baseline, 7, 14, and 21 days) to frequently utilized and pediatric syrups (antibiotics, analgesic, and hematinic syrups).

## MATERIALS AND METHODS

### Pediatric syrup and restorative materials

The present in vitro research utilized three distinct pediatric syrups as immersion agents: an antibiotic (amoxicillin 200 mg + clavulanic acid 28.5 mg per 5 ml), Paracetamol (250 mg/5 ml), and hematinic syrup (Ferrous ascorbate (30 mg), Zinc sulfate (8 mg), Folic acid (140 mcg) per 5 ml). The medications utilized were chosen from long-term and routinely prescribed medications that pediatricians often recommend for acute or chronic conditions. The restorative materials assessed were Compomer (Dyract XP), Microhybrid composite (Ivoclar Te-Econom plus), and Nanofill composite (Filtek Supreme XT). The characteristics of pediatric pharmaceuticals and RRM utilized in this investigation are illustrated in Tables 1 and 2.

### Sample Size and Selection of Teeth

Utilizing G\*Power version 3.1 software (Heinrich Heine University, Germany) for power analysis, we established that a minimum of 180 samples was necessary, with 20 samples within each subset, to attain an error margin of 0.05, an effect size of 0.30 (derived from the pilot study), and a power of 0.80 at the 5% significance level. The investigation included 180 caries-free, non-restored deciduous molar teeth, devoid of developmental abnormalities, necessitating extraction due to pre-shedding mobility. After collecting the teeth, they were preserved in a 0.5% chloramine T solution. Before application, the teeth were cleansed with pumice slurry utilizing a polishing brush attached to a low-speed handpiece.

**Table 1. Summary characteristics of the composite resin restorations evaluated**

| Materials and their type                                 | Composition  | Manufacturer                     | Filler percentage     |
|--|--|----------------------------------|-----------------------|
| Polyacid-modified composite resin - Compomer (Dyract XP) | UDMA, TEGDMA, TMPTMA, Carboxylic acid modified dimethacrylate, butylated hydroxyl toluene, Strontium-alumino-sodium-fluorophosphor-silicate glass, strontium fluoride, titanium and iron oxide | Dentsply DeTrey, GmbH, Germany   | 47 wt%<br>50 vol%     |
| Microhybrid composite (Ivoclar Te-Econom plus)           | Dimethacrylate and TEGDMA, barium glass, ytterbium trifluoride, silicon dioxide and mixed oxide  | Ivoclar, Vivadent, Liechtenstein | 76 wt%<br>60 vol%     |
| Nanofill composite (Filtek Supreme XT)(23)               | Bis-GMA, UDMA, TEGDMA, Bis-EMA, zirconia/silica nanoclusters   | 3M ESPE AG, Seefeld, Germany     | 78.5 wt%<br>63.3 vol% |

**Table 2. Pediatric syrups evaluated in the study**

| Pediatric syrup | Generic name  |
|-----------------|---|
| Antibiotic      | Amoxicillin+clavulanic acid (200 mg/28.5 mg per 5 ml)                           |
| Analgesic       | Paracetamol 250 mg/5 ml   |
| Hematinic       | Ferrous ascorbate (30 mg), Zinc sulfate (8 mg), Folic acid (140 mcg) (per 5 ml) |

**Preparation of Specimens**

For each medication, 20 specimens (8mm x 2mm) were made using use moulds. A complete set of 180 restorative materials (n=60 for each) was made following the manufacturers' specifications. Light-polymerized was employed for 20 seconds utilizing an LED (Guilin Woodpecker, Guangxi, China) with a wavelength of 420 to 480 nm and a power level of 1400 mw/cm<sup>2</sup>. Sample surfaces were secured with a Mylar strip band to ensure uniformity across each material. Each specimen was polished with the Super-Snap Rainbow Technique Kit (Shofu Inc., Japan) and the One Gloss Polishing Kit (Shofu Inc., Japan). Subsequently, samples were preserved in sterile water at 37°C for 24 hours.

**Specimen immersion cycles**

The samples generated in each RRM were thereafter categorized into three distinct groups (n=20) according to the pediatric medication preparations to be analyzed. After the initial microhardness and SR assessments, acrylic blocks were randomly allocated to the respective medications for immersion of the specimens. Throughout the immersion sessions, the specimens were immersed for one minute, three times daily, in 10 mL of undiluted syrup preparation. To ensure that the medication solutions were homogeneous, the solutions were mixed just before immersion in each cycle. After every immersion session, the specimens were cleaned with sterile water and kept in 10 mL of artificial saliva at ambient temperature till the subsequent immersion session, following the protocol established by McKnight-Hanes and Whitford,<sup>[17]</sup> as amended by Amaechi et al.<sup>[18]</sup> The treatment was conducted for 21 days, resulting in 63 immersion cycles. The solutions and artificial saliva were replaced every day for every specimen. The surface microhardness and SR were evaluated at 7, 14, and 21 days following continual systematic repetitions of regular immersion sessions.

**Microhardness Examination**

The surface microhardness measurements were obtained using a Mitutoyo HV-1000 Vickers microhardness durometer, and the results were documented as Vickers hardness number (VHN). Three notches were created at various locations on every sample, maintaining a minimum distance of one mm from the proximal notch, using a weight of 100 grams for 15 seconds. The mean of the recorded triplicate readings was denoted as VHN in Kg/mm<sup>2</sup>.

**Surface Roughness Examination**

SR measurements were obtained using a contact profilometer (SJ-201P, Mitutoyo, Japan) and were performed with a 0.8 mm cutoff point, 0.25 mm/s speed, and 0.01 µm resolution. Before evaluation, the exterior specimen surface was dried out with tissue paper, and a surface profilometer's contact guide was placed at the center of the surface. Three distinct readings in the same direction were obtained from the central area of the topmost layer of every specimen, and the average of these readings was computed. The average of the data was regarded as the mean SR of the specimens. A calibration of the profilometer was performed before every subsequent measurement cycle.

**Statistical analysis**

The data evaluation was performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, USA). The analysis of variance (ANOVA) was employed for both intra-group and inter-group comparisons of the collected data at a 5% significance level.

**RESULTS**

This study assessed the microhardness and SR of three RRM's during prolonged exposure to three pediatric syrups. Table 3 illustrates the comparative impact of pediatric syrups (antibiotic, analgesic, and hematinic syrups) on the microhardness of the materials (Compomer, micro-hybrid, and nanofill composite resins) throughout specified intervals (0, 7, 14, and 21 days). On day 21, the micro-hybrid-antibiotic group exhibited the highest microhardness (52.95±0.62 Kg/mm<sup>2</sup>), subsequently followed by the micro-hybrid-paracetamol group (51.35±0.12 Kg/mm<sup>2</sup>). The compomer-hematinic group demonstrated the lowest microhardness (13.22±0.33 Kg/mm<sup>2</sup>) on day 21 (Table 3).

**Table 3. Comparison of the influence of pediatric syrups on the microhardness (Kg/mm<sup>2</sup>) of the evaluated materials**

| Resin materials               | Pediatric syrup (n=20 in each group) | Days       |            |            |            | p-value |
|-------------------------------|--------------------------------------|------------|------------|------------|------------|---------|
|                               |                                      | Baseline   | 7          | 14         | 21         |         |
| Compomer (n=60)               | Antibiotic syrup                     | 26.47±0.93 | 26.01±0.74 | 25.22±0.83 | 24.96±0.37 | 0.000** |
|                               | Paracetamol syrup                    | 24.55±1.43 | 22.49±1.81 | 21.38±0.23 | 19.79±1.05 | 0.000** |
|                               | Hematinic syrup                      | 21.47±1.71 | 17.73±1.08 | 15.42±1.72 | 13.22±0.33 | 0.000** |
| Micro-hybrid composite (n=60) | Antibiotic syrup                     | 53.16±0.48 | 53.0±0.58  | 53.0±0.63  | 52.95±0.62 | 0.686   |
|                               | Paracetamol syrup                    | 51.49±0.18 | 51.44±0.22 | 51.41±0.41 | 51.35±0.12 | 0.38    |
|                               | Hematinic syrup                      | 49.07±0.17 | 48.27±0.27 | 48.0±0.20  | 48.12±0.32 | 0.000** |
| Nanofill composite (n=60)     | Antibiotic syrup                     | 42.73±0.11 | 42.7±0.02  | 42.66±0.31 | 42.64±0.12 | 0.373   |
|                               | Paracetamol syrup                    | 42.74±1.29 | 42.66±0.79 | 42.57±1.28 | 41.03±0.23 | 0.000** |
|                               | Hematinic syrup                      | 39.52±1.76 | 38.39±0.84 | 38.07±1.14 | 37.86±0.73 | 0.000** |
|                               |                                      | 0.000**    | 0.000**    | 0.000**    | 0.000**    |         |

\*\*Highly significant

The compomer-paracetamol group exhibited the greatest SR (1.47±0.43 µm), whereas the micro-hybrid-antibiotic group demonstrated the lowest SR (0.83±0.07 µm), then followed by the nanofill-antibiotic group (0.9±0.57 µm) on day 21 (Table 4).

The subgroup of micro-hybrid resin subjected to antibiotics (p=0.686) and paracetamol (p=0.38), and the subgroup of nanofill resin exposed to antibiotics (p=0.373), demonstrated statistically insignificant differences, indicating no reduction in the microhardness of the restorations during the assessed time intervals. The intragroup comparisons of the remaining subgroups exposed to the assessed pediatric syrups revealed statistically significant differences (p<0.01), indicating that as the duration of exposure increases, a reduction in the microhardness of the materials was observed (Table 3).

In the comparison of the role of syrups on the SR of the materials being evaluated, the compomer subgroups exposed to paracetamol and hematinic exhibited a statistically significant difference (p<0.01); similarly, the nanofill composite exposed to hematinic syrup also displayed a significant difference in SR across the evaluated time intervals which illustrates that the prolonged exposure to these syrups markedly increased the SR of restorative materials (Table 4). Nonetheless, statistically significant differences were observed for each time period (p < 0.05) when contrasting the intergroup impact of the pediatric syrups on the microhardness (Table 3) of the materials; on the other hand, an intergroup comparison of the SR revealed statistically significant differences only at days 14 and 28 (p < 0.05) (Table 4).

**Table 4. Comparison of the influence of pediatric syrups on the SR (µm) of the evaluated materials**

| Resin materials               | Pediatric syrup (n=20 in each group) | Days      |           |           |           | p-value |
|-------------------------------|--------------------------------------|-----------|-----------|-----------|-----------|---------|
|                               |                                      | Baseline  | 7         | 14        | 21        |         |
| Compomer (n=60)               | Antibiotic syrup                     | 0.88±0.53 | 0.91±0.94 | 0.94±0.03 | 1.04±0.07 | 0.804   |
|                               | Paracetamol syrup                    | 0.97±0.47 | 1.11±0.17 | 1.39±0.3  | 1.47±0.43 | 0.000** |
|                               | Hematinic syrup                      | 1.07±0.21 | 1.24±0.13 | 1.31±0.17 | 1.44±0.29 | 0.000** |
| Micro-hybrid composite (n=60) | Antibiotic syrup                     | 0.73±0.28 | 0.77±0.48 | 0.79±0.55 | 0.83±0.07 | 0.879   |
|                               | Paracetamol syrup                    | 0.82±0.07 | 0.83±0.11 | 0.9±0.97  | 1.13±0.6  | 0.292   |
|                               | Hematinic syrup                      | 1.09±0.09 | 1.11±0.73 | 1.12±0.74 | 1.14±0.73 | 0.996   |
| Nanofill composite (n=60)     | Antibiotic syrup                     | 0.84±0.78 | 0.86±0.84 | 0.87±0.8  | 0.90±0.57 | 0.996   |
|                               | Paracetamol syrup                    | 0.91±0.73 | 0.93±0.07 | 0.97±0.89 | 1.04±0.28 | 0.905   |
|                               | Hematinic syrup                      | 1.02±0.26 | 1.13±0.34 | 1.26±0.47 | 1.37±0.35 | 0.019*  |
|                               |                                      | 0.185     | 0.066     | 0.02*     | 0.000**   |         |

\*\*Highly significant; \*Significant; SR – Surface roughness

## DISCUSSION

The microhardness and SR of the materials under investigation were significantly affected by the interactions between the material and the solution being studied. Notably, the micro-hybrid materials demonstrated the greatest microhardness, while the compomer displayed the highest SR among the restorative materials analyzed. Several research studies have yielded conflicting results about the association between enhanced microhardness and the quantity of inorganic fillers in RRM. Few studies have indicated a positive association between elevated microhardness measurements and greater inorganic fillers in RRM,<sup>[19,20]</sup> whereas other studies have found no significant relationship between filler quantity and the mechanical characteristics of these composite materials.<sup>[21,22]</sup> Furthermore, Yesilyurt et al.<sup>[23]</sup> emphasized that these RRM may demonstrate substantial variations in hardness when subjected to diverse chemical conditions. Nonetheless, the outcomes of the investigation by Karatas et al.<sup>[7]</sup> did not demonstrate any correlation between the microhardness of the various RRM examined and the quantity of inorganic filler. Our findings were in line with the prior studies<sup>[7,24]</sup> which documented statistically significant variations in the mean microhardness of the evaluated specimens.

The assessment of SR is a crucial technique for evaluating surface modifications, especially in the field of dentistry.<sup>[25]</sup> Various tools, including electron microscopes and profilometers, have been commonly employed to evaluate SR in dentistry. Over the past few decades, atomic force microscopy has emerged as a significant instrument for such purposes, providing several benefits over other techniques, such as enhanced resolution evaluations at the nanoscale, the capability to produce three-dimensional images, and greater appropriateness for assessing restorations and dental tissue.<sup>[26]</sup> Surface microhardness is a crucial measure in assessing the properties of restoration materials. It is crucial in multiple facets of dental restorations, encompassing their resistance to masticatory forces, vulnerability to abrasion, propensity for fracture and fissure formation, maintenance of matrix integrity, and likelihood of plaque deposition.<sup>[27]</sup>

The Vickers hardness tester is a widely utilized tool in dentistry for determining surface microhardness. This assessment is supported by the short tip framework of the instrument, facilitating evaluation and enabling the examination of surface hardness in an array of materials.<sup>[28]</sup> Given these benefits, Vickers hardness tester was used in this investigation. The vulnerability of RRM to roughness is directly associated with the resin phase. RRM formulated using urethane dimethacrylate (UDMA) exhibit diminished surface

hardness and decreased roughness relative to those formulated with bisphenol A-glycidyl methacrylate (Bis-GMA). The micro-hybrid materials displayed the lowest SR measurements owing to the disparity in the amount of filler per volume of RRM. The inclusion of pre-polymerized fillers in the micro-hybrid composite materials, together with the inclusion of fillers like glass, ceramic, and zirconia, may further substantiate this observation.<sup>[7]</sup>

The choosing of suitable restorative materials is crucial, especially when treating young children who may have issues during treatments, as choosing the right material can prevent the necessity for additional expensive and intricate interventions.<sup>[7]</sup> Composite resins and compomers are often utilized for addressing dental caries that cannot be reversed or remineralized in permanent or primary dentition. Chung et al.<sup>[29]</sup> indicated that the SR, measured using two-dimensional profilometry, was below 1  $\mu\text{m}$  when the RRM surfaces seemed outwardly smooth. If the two-dimensional SR surpasses 0.2  $\mu\text{m}$ , it violates the therapeutically permissible limit for RRM.<sup>[30]</sup> In the investigation by Doğu Kaya et al.,<sup>[31]</sup> following 30 days of exposure to multivitamins, the evaluated composite did not achieve an acceptable level of SR. The resin composites submerged in the multivitamin exhibited variations in SR. Nonetheless, several resin composite samples of the current study lacked acceptable SR even at the outset which was congruent with the prior study.<sup>[30]</sup> Moreover, the resin composites within the same group exhibited varying initial SR values. This may result from the chosen region of the specimen or the presence of cavities in the material, despite adherence to conventional sample preparation protocols.<sup>[31,32]</sup>

Additionally, micro-hybrid resin composites are among the most favoured materials for direct resin restorations.<sup>[31]</sup> Additionally, nanofill composite materials incorporate submicrometer particles to augment the optical and physical characteristics of the resins.<sup>[33]</sup> Similarly, Doğu Kaya et al.<sup>[31]</sup> and Veček et al.<sup>[34]</sup> demonstrated that the immersion of various RRM and hybrid restorative materials in acidic beverages influenced the micromechanical characteristics, including their microhardness and SR. Both experiments demonstrated that exposure to acidic chemicals results in degradation, which varies significantly among materials based on the resin compound composition. Consequently, the choice of restorative materials is crucial for patients who frequently consume acidic beverages, as such an environment leads to the breakdown of RRM through matrix disintegration, surface erosion, and dissolution.<sup>[35,36]</sup> This investigation revealed a substantial difference in microhardness and SR between paracetamol and hematinic syrups and the restorative materials.

Investigators have mostly concentrated on the impact of effervescent multivitamins on dental hard tissues, establishing that these medications possess erosive potential owing to their acidic composition. Nonetheless, their influence on RRM has not been sufficiently investigated. Moreover, these materials are typically the preferred choice for restorations, and various research has examined the characteristics of these materials. While restorative materials exhibit greater resistance to erosion compared to enamel, their clinical efficacy is nonetheless influenced by erosion. Acids adversely affect the physical and chemical properties of restorative materials, and their SR and microhardness.<sup>[31]</sup> Consequently, assessing microhardness and SR is crucial for comparing the efficacy of dental restoration materials, enabling professionals to make informed selections during dental treatment.<sup>[24]</sup>

The assessment of specimen surface characteristics in the present study was confined to SR and microhardness. Further research could use other criteria, including energy-dispersive X-ray examination, to evaluate the influence of pediatric syrups on the structural makeup of RRMs. The choice of restorative materials in this investigation was also constrained. Further studies may investigate the impact of pediatric syrups on a wider array of RRMs. Ultimately, the study was an in-vitro investigation, necessitating clinical trials to evaluate the impact of liquid pediatric medications on various restorative materials and enamel in practical applications.

## CONCLUSION

The findings of this study indicate that increased exposure to haematinic syrup correlates with a reduction in the microhardness of RRM; a similar effect is observed in the microhardness of compomer and nanofill materials when subjected to paracetamol syrup, and also in compomer treated with antibiotic solution. The SR of the restorative material increased significantly for compomer and nanofill materials treated with haematinic syrup, in addition to for compomer exposed to paracetamol syrup.

## DECLARATIONS

### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

### ABBREVIATIONS

Bis-GMA: Bisphenol A-glycidyl methacrylate;  
TEGDMA: Triethyleneglycol dimethacrylate;  
TMPTMA: Trimethylopropane trimethacrylate resin;

RRM: Resin-based restorative materials; SR: Surface roughness; UDMA: Urethane dimethacrylate; VHN: Vickers hardness number.

### Ethical approval and consent to participate

Not Applicable

### Availability of data and material

All data generated or analyzed during this study are included in the published article.

### Competing interest

The authors declare that there are no competing interests.

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## SUMMARY

Low-pH pediatric syrups have been shown to cause enamel surface defects and weaken dental restorations and teeth. The study examined the microhardness and SR of three RRMs used in pediatric dentistry (compomer, microhybrid, and nanofill composite resins) after continuous exposure (at baseline, 7, 14, and 21 days) to antibiotic, analgesic, and haematinic syrups. The three pediatric syrups employed as immersion agents were amoxicillin+clavulanic acid (200 mg/28.5 mg per 5 ml), paracetamol (250 mg/5 ml), and haematinic syrup (Ferrous ascorbate (30 mg), Zinc sulphate (8 mg), Folic acid (140 mcg)). The RRMs utilized were Compomer (Dyract XP), Microhybrid composite (Ivoclar Te-Econom plus), and Nanofill composite. The surface microhardness and SR were measured with a Vickers durometer and a contact profilometer respectively. The micro-hybrid materials had the highest microhardness and the compomer the highest SR among the evaluated RRMs. Contrasting the intergroup impact of the pediatric syrups on the microhardness of the RRMs showed statistically significant differences for each time, but the SR showed significant differences only at days 14 and 28.

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