

## Original Article

### **Atraumatic restorative treatment versus chemomechanical removal related pain perception of children after restorative treatments- A randomized clinical trial**

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#### **ABSTRACT:**

**Background-**ART is considered as a patient- friendly treatment because of no use of local anesthetics, rubber dam, and hand instruments. The current literature lacks well-designed studies comparing which technique results in less pain in pedo patients during restorative procedures as there is very less systematic review has been shown which supports that this reduces anxiety among patients compared to conventional treatments. **Materials and methods-** The screening was performed using a mouth mirror, a WHO probe by three examiners who were previously trained and calibrated for the caries diagnosis. Children in good general health and cooperative to the exam, with at least one primary carious molar with a medium or shallow lesion on occlusal surfaces, were included in the study. **Results-**One hundred children were screened over a period of 6 months and 30 children were selected and randomly allocated in two groups. Table 1 represents the characteristics of included participants. Most children were female(53.33%), between 6 and 7 years old with high caries experience (66.66%). In the ART group, 52% of patients reported the absence of pain during the procedure. **Conclusion-** Patients who underwent chemomechanical caries removal presented lower heart rate compared to those who underwent ART. However, both the techniques showed minimal or absent perceived pain.

**Keywords-** Anxiety, Atraumatic restorative treatment, chemomechanical

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#### **INTRODUCTION**

In pediatric dentistry anxiety and discomfort associated with dental procedures are the essential aspects.<sup>[1]</sup> Anxiety and pain are directly related to more invasive restorative treatment in children and it has been shown in systematic review focused on patient- reported outcome.<sup>[2]</sup> Fear associated pain is

often related to the use of rotating instruments which causes patients to avoid seeking treatment.<sup>[3]</sup> To manage dental caries, several treatment options can be used which includes atraumatic restorative treatment (ART)<sup>[3,4]</sup> and chemomechanical removal.<sup>[5- 8]</sup> Due to the less difficulty in removing carious tissue Chemomechanical removal is an alternative to

decrease anxiety among patients.<sup>[5]</sup> This includes the use of papain/chloramine- based gel (Papacárie®) to dissolve the contaminated carious tissue and causes the facilitation of minimally invasive removal in combination with hand tools.<sup>[6]</sup> But on the same time this technique could be unfavorable to anxiety as this could be more time- consuming<sup>[7,8]</sup> ART is considered as a patient- friendly treatment because of no use of local anesthetics, rubber dam, and hand instruments.<sup>[4]</sup> The current literature lacks well- designed studies comparing which technique results in less pain in pedo patients during restorative procedures as there is very less systematic review has been shown which supports that this reduces anxiety among patients compared to conventional treatments.<sup>[3]</sup> Thus, our study was aimed to compare the pain perception of the children during caries removal using two restorative treatments that is chemomechanical removal and ART and it was hypothesized that the use of chemomechanical caries removal is not inferior to ART in the pain perception of the child patients.

#### MATERIALS AND METHODS

A randomized clinical trial was conducted in a private dental college and the ethical clearance was obtained from the ethical committee of the institution. The informed consent forms were obtained from all parents or guardians before the evaluations. A sample size of 30 children between the age group of 4-9 years old were invited to participate in the study over the time period of 6 months. The screening was performed using a mouth mirror, a WHO probe by three examiners who were previously trained and calibrated for the caries diagnosis. Children in good general health and cooperative to the exam, with at least one primary carious molar with a medium or shallow lesion on occlusal surfaces, were included in the study while the teeth with pulp exposure, spontaneous pain, mobility, swelling or fistula next to the tooth, furcation or cervical lesion, and teeth with restorations, sealants or enamel defects were excluded.

Teeth included were divided into two parallel groups and 15 teeth were allotted in each groups.

1. ART Group
2. Chemimechanical Removal Group with Papacarie®

Teeth were randomly assigned according to a sequence of random numbers and distributed in opaque and sealed envelopes by an external researcher. The operator only became aware of the technique to be used at the time of execution.

#### STATISTICAL ANALYSIS

A one-way ANOVA was conducted to compare time spent in intervention, heart rate, and peripheral oxygen saturation during restorative treatment. Significance level was set at 5%, and CI (95%) was calculated. All the data were analyzed using SPSS version 21.

#### RESULTS

One hundred children were screened over a period of 6 months and 30 children were selected and randomly allocated in two groups. Table 1 represents the characteristics of included participants. Most children were female(53.33%), between 6 and 7 years old with high caries experience (66.66%). In the ART group, 52% of patients reported the absence of pain during the procedure, 42% reported mild pain, and only 6% reported moderate pain. In the Papacarie® Group, 51% reported no pain, 43% reported mild pain and 6% reported intolerable pain. Table 2. Unadjusted analysis showed only children's cooperation was associated with pain perception. For this reason, adjusted analysis was not conducted, and only this variable was maintained in the final model. Cooperative participants reported lower pain compared to those that showed no cooperation. Table 3 No statistically significant differences between the groups regarding time spent on restorative procedures and oxygen saturation during treatment were observed. However, chemomechanical caries removal resulted in statistically significant lower heart rate when compared to ART (P = 0.01).

**Table 1: Baseline characteristics of participants through the groups**

Characteristics	ART	Chemomechanical caries removal
<b>Sex</b>		
Female	11	5
Male	4	10
<b>Caries experience</b>		
ceo-d < 3	9	11
ceo-d ≥ 3	6	4
<b>Age</b>		
4-5	5	4
6-7	10	11

**TABLE 2: Poisson regression analysis between pain perception reported by children and independent variables**

Variables	n (%)	Pain perception	
		Unadjusted RR (95% CI)	P
<b>Groups</b>			
ART	15 (50)	1.201 (0.647-3.219)	0.342
Chemomechanical caries removal	15 (50)	Reference	
<b>First attendance at dental office</b>			
Yes	20 (66.6)	1.116 (0.623-3.343)	0.432
No	10 (33.3)	Reference	
<b>Anesthesia</b>			
Yes	11 (36.6)	0.618 (0.541-1.523)	0.312
No	19 (63.3)	Reference	
<b>Children' cooperation reported by the dentist</b>			
Yes	28 (93.3)	0.163 (0.046-0.538)	0.006*
No	2 (6.6)	Reference	
Time spent in the intervention, mean±SD	7.10±2.4	0.825 (0.630-1.060)	0.325

**Table 3: Mean and standard deviation of oxygen saturation, heart rate and the time of intervention for experimental groups**

	ART	Chemomechanical caries removal	P
Oxygen saturation	95.11 ± 3.12	92.05 ± 4.10	0.255
Heart frequency	93.10 ± 16.29	81.35 ± 14.53	0.01
Time spent in the intervention	7.30±3.45	8.21±2.21	0.213

## DISCUSSION

The perception of sensitivity associated to the pulp chamber and the vibration and sounds derived from the rotating instruments produces dental fear and anxiety which leads to the avoidance of dental care<sup>[2,3]</sup>. Therefore, various carious tissue removal methods, such as those studied in the present study, are tested for broader acceptance of procedures among children. We observed no statistically significant differences between ART and Papacarie<sup>®</sup> groups on pain perception but the children in the Papacarie<sup>®</sup> group showed lower heart rate when compared to the ART group. Both ART and chemomechanical methods are based on minimally invasive dentistry with the aim of

minimal removal of dental tissue<sup>[9]</sup>. Our results, differ from the previous studies. Abdul Khalek *et al.*<sup>[10]</sup> in their study stated that the group treated with gel showed a lower pain perception and discomfort; however, the procedure took, on average, 1 min longer than ART. The meta-analysis performed by Deng *et al.*<sup>[11]</sup> analyzed several outcomes, including the pain perception according to the Wong-Baker Scale and they found reduced pain perception on using gel however, the Papacarie<sup>®</sup> technique was compared to conventional caries removal using a rotating instrument. Dental anxiety in children is frequently associated with previous negative experiences.<sup>[1]</sup>

However, it is important to mention that the patients selected in this study had a low caries experience, so there is a possibility that the participants have never experienced previous invasive treatments. Further studies comparing both techniques as the first intervention can help to give more evidences in the benefits of using both the techniques.

One hurdle for assessing pain in infants is the misperception that they do not know how to express themselves. However, several methods to measure pain and discomfort with the use of scales such as the Wong-Baker Faces Pain Rating Scale, which consists of a series of faces with different expressions ranging from “no hurt” to “hurts worst” have been proposed and validated.<sup>[12]</sup> For this reason, we opted to use this tool to measure the pain perception of the children. Another way of measuring the pain felt by children is by evaluating physiological variables using a pulse oximeter,<sup>[13]</sup> which allows reading of pulse rate and oxygen saturation level during procedures. However, patient-reported outcomes have been suggested as the most important variable to be considered, especially in evidence-based dentistry. The reduction of pain perception in children is particularly important to dental anxiety and behavior management during dental care. Thus, even though chemomechanical removal can reduce the pain perception of the restorative procedures, dentists do not widely use it. For this reason, both ART and chemomechanical removal could be used in caries lesion treatment of primary teeth to improve the dentist–patient relationship.

## CONCLUSION

Patients who underwent chemomechanical caries removal presented lower heart rate compared to those who underwent ART. However, both the techniques showed minimal or absent perceived pain.

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