

Original Article

# CLINICAL EVALUATION OF CHEMO-MECHANICAL CARIES REMOVAL USING CARIE-CARE SYSTEM AMONG SCHOOL CHILDREN

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## Abstract :

Dental caries is considered as one of the most serious dental diseases that results in localized dissolution and destruction of the calcified tooth tissues. As possible alternatives to conventional techniques of caries removal, chemo mechanical caries removal systems have emerged. AIM: To clinically observe the advantages of Chemo-mechanical method of caries removal over Conventional technique. MATERIALS AND METHODS: A total of 64 teeth of 32 children with class 1 open carious lesions were selected for the study from the school dental clinic after taking written consent. They were divided into two equal groups according to method of caries removal ( 32 chemomechanical and 32 conventional from both primary and permanent teeth respectively) . In Group I, caries was removed using the carie-care system and in Group II, with the conventional drill and were restored equally with amalgam and ketac molar respectively. The restored teeth were followed up after 1 week, 1 month, 6 months and 1 year respectively for its clinical success. RESULTS: The results were subjected to statistical analysis using students paired t-test and chi-square tests. It showed that though Chemomechanical technique took a marginal increase in time compared to the conventional technique, it was found to be more comfortable for all the children. Amalgam restorations showed better retention compared to ketac molar restorations in both the techniques. CONCLUSION: Chemomechanical technique though time consuming is definitely superior compared to conventional technique in pediatric dentistry, provided we use a less technique sensitive restorative material which retains in the oral cavity for longer period of time. It is definitely a better treatment protocol in school based dental treatment compared to conventional technique

Keywords : carie-care, caries, chemo-mechanical agent

## Introduction :

Dental caries is considered as one of the most serious dental diseases that results in localized dissolution and destruction of the calcified tooth tissues. Neglecting the treatment of this disease, could also endanger the tooth pulp.<sup>1</sup> However, caries treatment procedures are usually associated with unpleasant patients' sensation. Several approaches for removing and treating dental caries have been tried seeking for more comfort. Caries removal in decayed teeth has conventionally been performed using the mechanical cutting and

drilling system. However, these methods have some major disadvantages. First, mechanical preparation often induces pain, and local anaesthesia is thus needed. Second, it is often difficult to establish how much tooth material should be removed, which often leads to overextended cavities. As possible alternatives to conventional techniques, chemo mechanical caries removal systems have emerged.<sup>2</sup> It was introduced to dentistry as an alternative method of caries removal and is mainly indicated to overcome the inconvenience of using burs and local anesthesia, hence causing less discomfort to patients and preserving healthy dental structure, there by complying the concept of the minimal invasive dentistry (MID).<sup>3</sup> Caridex, carisolv are some of the chemomechanical organic caries removal agents. Latest material in this field being 'Carie -Care'

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		conventional/chemo * EFFECT Crosstabulation			EFFECT		Total
primary /secondary	amalgam /ketac			FAILED	INTACT		
PRIMARY	AMALGAM	CONVENTIONAL	Count	0	8	8	
			% within conventional/chemo	0.0%	100.0%	100.0%	
			% within EFFECT	0.0%	53.3%	50.0%	
		CHEMOMECHANICAL	Count	1	7	8	
			% within conventional/chemo	12.5%	87.5%	100.0%	
			% within EFFECT	100.0%	46.7%	50.0%	
	Total	Count	1	15	16		
		% within conventional/chemo	6.2%	93.8%	100.0%		
		% within EFFECT	100.0%	100.0%	100.0%		
	KETAC	CONVENTIONAL	Count	5	3	8	
			% within conventional/chemo	62.5%	37.5%	100.0%	
			% within EFFECT	50.0%	50.0%	50.0%	
CHEMOMECHANICAL		Count	5	3	8		
		% within conventional/chemo	62.5%	37.5%	100.0%		
		% within EFFECT	50.0%	50.0%	50.0%		
Total	Count	10	6	16			
	% within conventional/chemo	62.5%	37.5%	100.0%			
	% within EFFECT	100.0%	100.0%	100.0%			
PERMANENT	AMALGAM	CONVENTIONAL	Count	0	8	8	
			% within conventional/chemo	0.0%	100.0%	100.0%	
			% within EFFECT	0.0%	57.1%	50.0%	
		CHEMOMECHANICAL	Count	2	6	8	
			% within conventional/chemo	25.0%	75.0%	100.0%	
			% within EFFECT	100.0%	42.9%	50.0%	
	Total	Count	2	14	16		
		% within conventional/chemo	12.5%	87.5%	100.0%		
		% within EFFECT	100.0%	100.0%	100.0%		
	KETAC	CONVENTIONAL	Count	4	4	8	
			% within conventional/chemo	50.0%	50.0%	100.0%	
			% within EFFECT	80.0%	36.4%	50.0%	
CHEMOMECHANICAL		Count	1	7	8		
		% within conventional/chemo	12.5%	87.5%	100.0%		
		% within EFFECT	20.0%	63.6%	50.0%		
Total	Count	5	11	16			
	% within conventional/chemo	31.2%	68.8%	100.0%			
	% within EFFECT	100.0%	100.0%	100.0%			

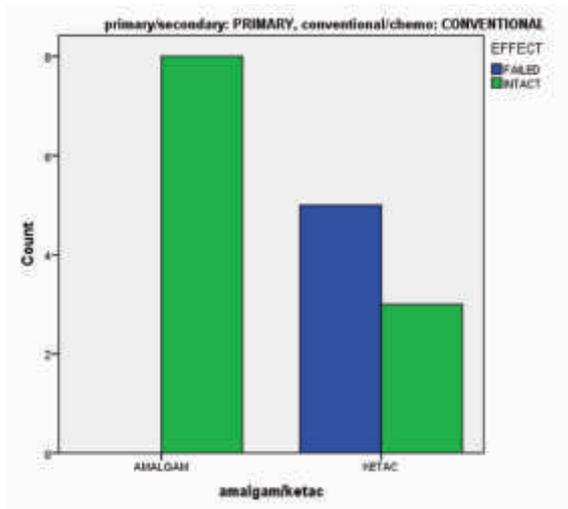
Table 2 : Comparison of the conventional and chemomechanical groups in each category

		Chi-Square Tests		Value	Exact Sig. (2-sided)
primary/secondary	PRIMARY AMALGAM	Pearson Chi-Square	1.067	1.000	
		N of Valid Cases		16	
	KETAC	Pearson Chi-Square		.000	1.000
		N of Valid Cases		16	
PERMANENT	AMALGAM	Pearson Chi-Square	2.286	.467	
		N of Valid Cases		16	
	KETAC	Pearson Chi-Square	2.618	.282	
		N of Valid Cases		16	

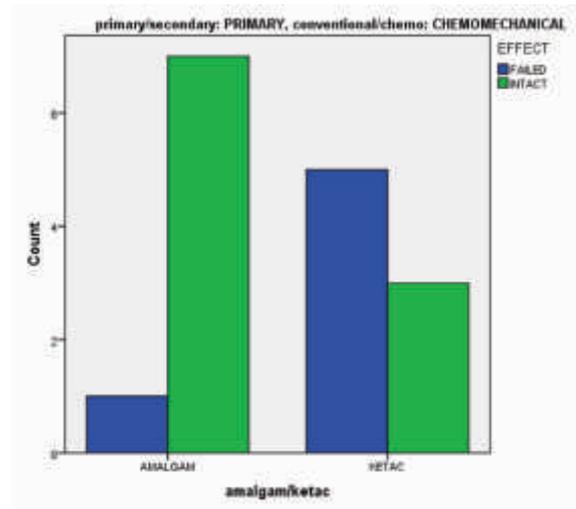
In Permanent teeth, amalgam showed 100% success in conventional technique and 75% success in chemomechanical technique. Ketac molar restorations showed 50% success in the conventional technique and 88% success in the chemomechanical technique. The same results were obtained after 1 year follow up also. However intact restorations were asymptomatic even after one

month, six months. After one year follow up also the restorations were observed to be intact. Hence this proves that amalgam showed better retention compared to ketac molar restorations in both primary and permanent teeth and Ketac molar restorations were more successful in chemomechanical technique.

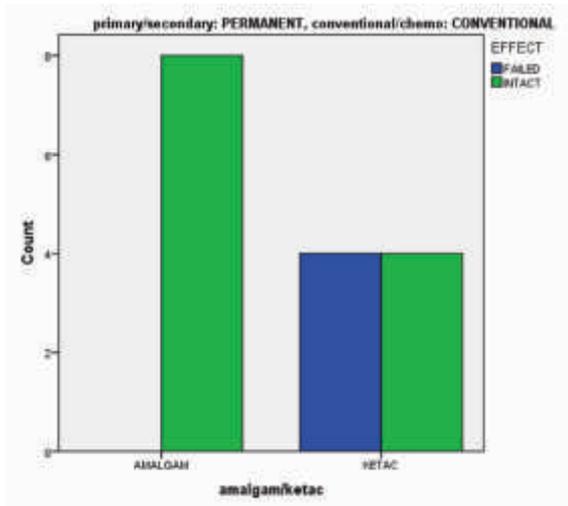
Graph 1 : Graph showing conventional preparation for amalgam versus ketac molar in primary teeth



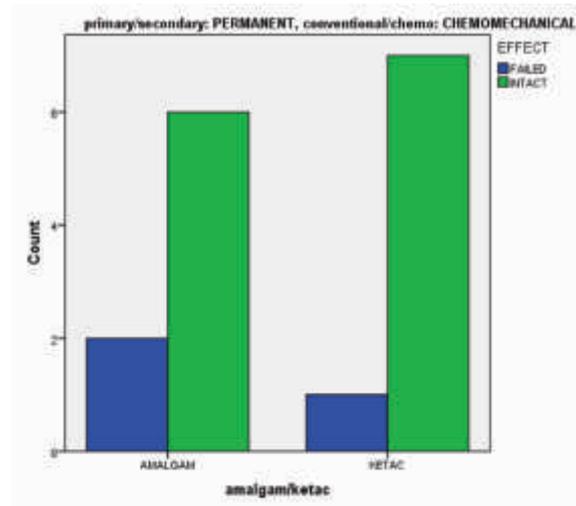
Graph 2 : Graph showing chemomechanical preparation for amalgam versus ketac molar in primary teeth



Graph 3 : Graph showing conventional preparation for amalgam versus ketac molar in permanent teeth



Graph 4 : Graph showing chemomechanical preparation for amalgam versus ketac molar in permanent teeth



Discussion :

Fear and anxiety are known barriers to the receptivity of dental treatment and in detriment to oral health. In children, it is difficult to differentiate between fear and anxiety-originated behaviour problems the conventional drilling techniques are associated with discomfort, 4

especially among children as was observed in the present study. In addition, it gets further triggered by factors like: a) local anesthesia, b) low and high speed rotary instruments, c) previous dental treatment.

The CMCR method is said to be 'very efficient' in soft caries

removal.<sup>5</sup> *In vitro* studies have shown chemomechanically treated dentin to have more surface energy, greater affinity for adhesive material, and better bonding than conventionally treated dentin. Moreover, morphological studies have shown Carisolv<sup>®</sup> treatment to consistently remove the carious lesion and open the dentinal tubules along with more irregular and rougher surface with modified smear layer.<sup>6</sup> However in the present study, retention was poorer with adhesive material like ketac molar compared to amalgam following chemomechanical caries removal technique. It may be because of the technique sensitivity of ketac molar in a school based programme.

The time taken for chemomechanical technique in cavity preparation was found to be slightly higher than conventional drilling technique. This may be due to the multiple application of the Carie care for complete removal of caries. However the children were very comfortable compared to conventional technique.

Amalgam restorations showed better retention as compared to ketac molar restorations. They were found to be more retentive in conventional preparations than chemomechanical preparations. It may be due to the inability to comply with the retentive principles of cavity preparation for amalgam in chemomechanical

preparation. Amalgam requires the cavity preparation principles like a) The parallelism or slight occlusal convergence of two or more opposing external walls, b) flat pulpal floor and 1/4th intercuspal distance provides the primary retention form. c) Undercuts and also due to larger surface area in the permanent teeth.

Ketac molar restorations were found to be dislodged equally in both the techniques in primary teeth. Ketac molar restorations require moisture proof environment during restoration for its better retention. It also fails particularly in approximal cavities where the cement is relatively unsupported. Because of the brittleness of glass ionomer cement, it requires support of the surrounding tooth structure, therefore the performance is better in single-surface cavities compared to multi-surface cavities<sup>7</sup> as was observed in the present study.

#### Conclusion :

Thus amalgam showed a better retention property in comparison with ketac molar in both the techniques. Hence chemomechanical technique though time consuming was found to be more comfortable and is definitely superior compared to conventional technique in pediatric dentistry, provided we use a lesser technique sensitive restoration which retains in the oral cavity for longer period of time.

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