

Assessment of Success of Restoration after Chemo Mechanical Caries Removal by Using Papain Based Gel

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ABSTRACT

Objective: To assess the restoration's success after chemo mechanical caries removal by using papain based gel.

Study Design: Descriptive case study

Place and Duration of Study: This study was conducted at the Operative Dentistry Department from March, 2019 to August, 2021.

Methodology: Two hundred patients were selected. All Patients of both genders having age of 8-16 years were included and patients with presence of fistula and patients having history of pain were excluded. Papain based gel had been applied to the cavity and allows 40-50 seconds for the gel to work, and the patients had been followed up for 30 days for evaluation of restoration.

Results: The average age was 14.07±1.88 years. The success of restoration was present in 82.0% while it was absent in 18.0%.

Conclusion: Removal of caries after chemo mechanical by using papain based gel showed high efficacy of success of restoration.

Keywords: Chemo-mechanical caries removal (CMCR), Chemo mechanical, Papain based gel

INTRODUCTION

Caries is one of the most common incidences in youngsters around the world (about 60%).¹ It should be addressed quickly; else it will not only have effect on the child's speech, chewing function, psychological wellbeing and smile.² Dental complaints are at significant cost to compact around the world, and an easy and efficient way to knob this problem is to prevent it.³ Dental caries contains the hard structures of the teeth that has been associated to a multi-factorial etiology. Caries is an avoidable disease that is broadly known as key cause of oral uneasiness leading to tooth loss and become vigorous for people of all age clusters to accomplish and withstand good oral maintenance.⁴

Caries has a varied microbial populace, with microorganisms of both facultative and obligatory anaerobes including *Streptococcus Mutans*, *Lactobacillus* and *Actinomyces*.⁵ It is very dominant and progressive disease, which have impact on 50% to 80% of school going age cluster and grownups all over the world.⁶ Managements for caries prevention may have a noteworthy effect on preventing the growth of caries.⁷ Fluoride application topically in form of gel and supplements are easy and economical way of dipping the occurrence of tooth demolition by making the tooth surface more resilient to bacterial acid.^{1,6,7} Pit and fissure sealants and varnishes comprising fluoride seems to be valuable in decreasing the caries risk. Grounded on the available studies, prevention and minimal interferences are performing to be helpful in handling dental cavities.^{3,5,7,8} As a substitute to the old-style drilling method, other caries abolition approaches have been projected and established.⁹

In paediatric dental treatment, chemo-mechanical caries removal (CMCR) appears as an encouraging method. It decreases patient concern, decreases the necessity for local anesthetic, and permits for more discerning elimination of carious tooth structure. CMCR are non-invasive substitutes to elongated recognized approaches to deal with caries with application of a proteolytic material to soften carious dental tissue and make it easier to eliminate with manual gadget.^{10,11} Without the use of burs or local anesthesia, this approach can be used to preserve healthy dental tissues. Papain based gel used for Chemo-mechanical caries removal that contains papain with the cleaning and wound curing properties and chloramine with disinfectant property.¹¹

In year of 2004 in Brazil papain based gel was articulated for first time and it showed satisfactory clinical results about its efficacy. Papain based gel is selective and conservative in nature

therefore, it decreases the danger of pulp exposure. The uses of the gel for caries removal improve the bond between tooth surface and restorative material thus prolongs the life of a restoration as it prevents the development of smear layer. Therefore, bonding becomes sturdy and it precisely aims the infected tooth area.¹² Besides using Papain based gel to remove caries chemically and mechanically minimizes patient concern and discomfort, allowing it to be accepted in clinical practice. Papain based gel contains papain (papaya extract), an endo-protein with anti-inflammatory qualities, bacteriostatic, and bactericide, as well as chloramine, toluidine blue, water, salts, and thickeners. The procedure is based on the chemo mechanical elimination of unhealthy dentin. It has antibacterial and anti-inflammatory properties, allowing for the maximal care of healthy tooth structures.^{12,13} Papain based gel is a biomaterial that permits for the a traumatic elimination of caries by chemo-mechanical methods.¹³ Its use has the benefits of being simple to implement and not demanding the use of any special instruments.¹⁴

Grounded on the available resources, the currently accessible chemo mechanical caries abolition measures are possible substitute to outdated rotational approaches. These methods are mainly helpful to patients, who are tremendously concerned, incapacitated, or children.¹² This study was designed to evaluate the effectiveness and competence of papain based gel for caries removal.

MATERIALS AND METHODS

This descriptive study was conducted at Operative Dentistry Department of Bacha Khan College of Dentistry, Mardan after taking approval of institutional Ethical Review Committee. A total of 200 patients were calculated with level of confidence is 95%, margin of error is 5% and taking expected percentage of success 60% after using papain based gel for removal of caries in children.¹⁵ An knowledgeable consent had been taken from parents or guardian. All patients of both genders having age of 8-16 years, patients having frank carious lesion with extension into dentin, but without pulpal involvement assessed clinically (VAS score=0), patients with permanent molars, radio-graphically (presence of periapical radiolucency), and no proximal caries as evidenced by bitewing radiographs were included. Patients having compromised pulp with forked, fistula, teeth exhibiting pulp exposure on clinical assessment (absence of pain VAS score 4-8)

and radiographically (absence of periapical radiolucency) and patients having history of pain (VAS score 4-8) were excluded

After taking bio-data, children had undergone procedure by researcher herself. Teeth had been isolated by using cotton pellets and using slow speed suction. Papain based gel had been applied on the carious tooth and after delay period of 40-50 secs to allow the gel to work efficiently. Gel makes the dentin soft that had been detached by sweeping the curette with non-cutting tip. An exploratory probe with a round tip was used to apply the gel a second time in cases where there had been evidence of diseased dentin. Exploratory probe had been used to clinically assess the texture of remaining dentin. Cavity had been cleaned with 2% chlorhexidine digluconate and calcium hydroxide had been placed for pulp protection. Cavity had been reinstated with GIC and dentin-bonded resin composite restoration. The patients had been followed up after 30 days for valuation of restoration. Frencken et al¹⁶ scale had been evaluated and success had been labelled if score is zero. All this information had been recorded through proforma. For statistical analysis SPSS-22 was used. P-value of 0.05 assume significant when Chi square test was applied.

RESULTS

The results of the success of restoration was found in 165 patients while it was found to be absent in 35 patients and average age of the patients was 14.07±1.88 years (Table 1).

The Success of restoration in age was found to be in 93 patients, who were below 13 years, and 72 patients who were above 13 years of age. After application of chi square test which shows a relationship of these two categorical variables, the $p \leq 0.632$ which shows statistically insignificant relationship between the variables (Table 2).

Success of restoration in gender was found to be in 89 male patients and 76 female patients and was found to be absent in 35 patients. After application of chi square test to show the relationship of these two categorical variables, the $p \leq 0.431$ which shows that there is insignificant relationship between these two variables (Table 3).

Table 1: Descriptive statistics of the patients

Variable	No.	%
Age (years)	14.07±1.88	
Success of restoration		
Yes	165	82.0
No	35	18.0

Table 2: Comparison of success of restoration according to age (n=200)

Success restoration	Age (years)		P value
	<13	>13	
Yes	93	72	0.632
No	15	20	

Table 2: Comparison of success of restoration according to age (n=200)

Success restoration	Gender		P value
	Male	Female	
Yes	89	76	0.431
No	12	13	

DISCUSSION

The dental caries considered in the current study is one of the most widespread oral diseases. The mean age was as 14.07±1.88 and success of restoration was found in 165 (82%) patients while it was found to be absent in 35 (18%) patients. The non-traumatic characteristics and action of the agent on bacteria make Papacarie an effective alternative for the treatment of caries, especially deep lesions.^{6,8} This likely occurs due to the presence of papain in its formulation, which is a biocompatible agent that facilitates the cleaning of necrotic tissue and secretions, thereby reducing tissue repair time and causing no harm to the healthy tissue surrounding the lesion.^{11,12,16}

The goal of an international trial conducted by Ericson et al¹⁷ to evaluate the clinical success and assurance of chemo

mechanical removal approach of caries at four centers. In this study, all selected 137 patients with average age of 35±21 years (64 females and 73 males), range 3–85) were chosen. However, procedure was performed on 125 patients and results shows 106 cases with complete caries removal using gel and bur was used in 19 cases.

Bussadori et al¹⁸ carried out a study with 2 years follow-up on 14 permanent molars in children aged 10 to 16. The outcome of this study exposed that 13 of the 14 cases were successful. Conferring to the findings of this study, in young children when molar treated with papain based gel and filled with glass ionomer cement significant results were found and it is an option which provides patients with benefits.

Kochhar et al¹⁹ associated the worth of different caries removal means, duration of different approaches and assess the pain threshold reported by the patient during procedure and showed a comparison of mean success of different approaches. Caries removal efficacy by hand instrument was determined to be 1.26 on average. Caries removal by airtor had an average efficacy of 0.38, while caries removal by the papain based gel had an average efficacy of 0.42. Our study shows that following chemo mechanical elimination of caries using papain based gel; there is a high efficacy of restoration success.

Kochhar et al¹⁹ also carried a study to inspect the efficiency of caries removal, the length of procedure, and pain as reported by the patient throughout different policies. The total duration to eliminate caries with the Carisolv proved significantly longer than Papain based gel and hand instrument approaches. Patients stated the least amount of pain during caries removal when using the Papain based gel, followed by Carisolv and hand excavation. Pain was significantly higher with Airtor. The chemo mechanical caries elimination by use of Papain based gel and Carisolv was proven successful and could be measured as a treatment option.

CONCLUSION

The use of papain based gel to remove caries after chemo mechanical management resulted in a high efficacy of restorative success. As a result, the use of papain based gel as an option for persons looking for a substitute to typical procedures can be encouraged. The removal of carious tissue using papain based gel was shown to be simple, effective and painless for the patient. In the occurrence of very cautious patients, the restoration harmonized functional needs and was a simple and cost-effective option. Patients must, still, be counselled about the prospect of failure and the need for regular follow-up sessions.

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