Original Article

Evaluation 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 of de' Montmorency College of Dentistry/Punjab Dental Hospital Lahore from February, 2016 to August, 2016.
Materials and Methods: This was a descriptive case series study. A sample size 100 patients were selected by using nonprobability consecutive technique of sampling. All Patients of both genders having age of 10-16 years were involved in this research and patients with presence of fistula and patients having history of pain(VAS score 4-8) were excluded from the study. Papain based gel had been applied to the cavity and allows 30-40 seconds for the gel to work, and the patients had been followed up for 1 month for assessment of restoration.
Results: In this study among 100 patients, the average age of the patients was 13.06 ± 1.99 years. The success of restoration after chemo mechanical removal of caries by using papain based gel was present in 73.0% patients while it was absent in 27.0%.
Conclusion: Removal of caries after chemo mechanical by using papain based gel showed high efficacy of success of restoration.
Key Words: Chemo Mechanical, Papain based gel, Caries

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INTRODUCTION

Caries is one of the common occurrence in children around the world (about 50%). It should be addressed expeditiously, otherwise it not only have impact on the child's chewing function, their speech, smile, psychological wellbeing, and excellency of their life. Dental illnesses are at considerable cost to deal with in most of the world, and an unchallenging and efficient way to handle this problem is to prevent it. Dental caries involves the hard structures of the teeth that has been linked to a multi-factor aetiology.[1]

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Caries is a preventable illness that is widely known as primary reason of oral discomfort leading to tooth loss and become strenuous for people of all age groups to attain and sustain good oral care. Caries has a diverse microbial population, with bacteria of both facultative and obligatory anaerobes including Actinomyces, streptococcus mutans and Lactobacillus [2]. It is very prevailing and progressive disease, which have impact on 60% to 90% of school going age group and adults all over the world .In case of negligence dental caries can leads to mild discomfort to fistulas and abscess formation.[3]. The prevalence of this disease in the children of age seven to seventeen years is 40% to 85% respectively. Despite of this high ratio some documentation reports about 36% fall in caries incidence in age group of 5-17 years over a ten years period. Treatments for caries prevention may have a significant influence on preventing the development of caries. Fluoride application topically in form of gel and supplements are easy and economical way of reducing the incidence of tooth destruction by making the tooth surface more resistant to bacterial acid. Likely, pit and fissure sealants and varnishes containing flouride seems to be efficacious in decreasing the caries risk. Based on the available research, prevention and minimal interventions are appearing to be effective in managing dental cavities[4]. As an alternative to the traditional drilling approach, other caries eradication methods have been proposed and developed. In pediatric dental

treatment, chemo-mechanical caries removal (CMCR) emerges as a promising approach. It reduces patient anxiety, reduces the requirement for local anesthetic, and allows for more selective removal of carious tooth structure[5] .Chemo-mechanical methods (CMCR) are non-invasive alternatives to long established methods to deal with caries with application of a proteolytic material to dissolve carious dental tissue and make it easier to remove with manual instrument. Without the use of local anesthetic or burs, this approach can be used to preserve healthy dental tissue[6]. Papain based gel used for Chemo-mechanical caries removal that contains papain with the cleaning and wound curing properties and chloramine with disinfectant property. In year of 2003 in Brazil papain based gel (papacarie) was formulated first time and shown adequate clinical trials about its efficacy[7]. Papain based gel is selective and conservative in nature thus, it reduces the danger of pulp exposure. The uses of the gel for caries removal ameliorate the bond between tooth surface and restorative material thereby extends the life of a restoration since it prevents the formation of smear layer. So, bondings become strong, and it specifically targets the infected tooth area. Furthermore, using Papain based gel to remove caries chemically and mechanically minimizes patient concern and discomfort, allowing it to be accepted in clinical practice. [8]. Papain based gel comprises papain(papaya extract), an endoprotein with bactericide, bacteriostatic, and anti-inflammatory qualities, as well as chloramine (a mixture of chlorine and ammonia with antibacterial and disinfecting properties), toluidine blue, water, salts, and thickeners. The technique is based on the chemo mechanical removal of diseased dentin. It has antibacterial and anti-inflammatory properties, allowing for the maximal maintenance of healthy tooth structures. Papain based gel is a biomaterial that enables for the atraumatic removal of caries by chemo-mechanical means. Its use has the advantage of being simple to implement and not requiring the use of any special devices [9].Based on the available evidence, the presently available chemo mechanical caries eradication procedures are feasible alternative to traditional rotational methods. These techniques are particularly beneficial to patients who are extremely worried, disabled, or children[10].

The chemo mechanical caries removal system, which includes natural proteolytic enzyme to aid in the excavation of diseased dentin, is now accessible. This study was designed to assess the efficacy and efficiency of papain based gel for caries removal.

MATERIALS AND METHODS

This was a descriptive case series study, conducted at Operative Dentistry Department of de' Montmorency College of Dentistry/Punjab Dental Hospital Lahore after taking approval of institutional Ethical Review Committee. This study had been used with 100 patients calculated with level of confidence is 95%, margin of error is 9% and taking expected percentage of success 70% after using papain based gel for removal of caries in children[18]. An informed consent had been taken from parents. All 100 cases with inclusion criteria fulfilled had been enrolled by using nonprobability consecutive sampling technique. An informed consent had been taken from all patients for participation in this study. All Patients of both genders having age of 10-16 years, patients having frank carious lesion with extension into dentin, but without pulpal involvement assessed clinically (VAS score=0) and radio-graphically (presence of periapical radiolucency), patients with permanent molars and no proximal caries as evidenced by bitewing radiographs chosen for this study. Patients having fistula, compromised pulp with forked, 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 from the study.

Data Collection Procedure: After taking all information like name, age, gender and address, 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 30-40 seconds to allow the gel to work effectively. Gel makes the dentin soft that had been removed by sweeping the curette with non-cutting tip. An exploratory probe with a rounded 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 evaluate 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 restored with glass ionomer cement and dentin-bonded resin composite restoration. The patients had been followed up after 1 month for assessment of restoration. Frencken et al scale had been assessed and success had been labeled if score is zero (as per operational definition). All this information had been recorded through proforma.

Statistical Analysis: For statistical analysis SPSS version 20 was employed. All quantitative data, such as patient age and frequency, were given a mean standard deviation, and all qualitative variables, such as gender and restoration success, were given a percentage. P-value of 0.05 assume significant when chi square test was applied to all categories.

RESULTS

The results of the success of restoration was found in 73 patients while it was found to be absent in 27 patients and average age of the patients was noted 13.06 ± 1.99 years in table 1.

The Success of restoration in age was found to be in 41 patients, who were below 13 years, and 32 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-value ≤ 0.541 which shows statistically insignificant relationship between the variables is shown in table 2.

The relationship between Success of restoration and gender .Success of restoration in gender was found to be in 39 male patients and 34 female patients and was found to be absent in 27 patients. After application of chi square test to show the relationship of these two categorical variables, the p-value ≤ 0.394 which shows that there is insignificant relationship between these two variables is shown in table 3.

Success of restoration was found to be in 55 patients who had no malnutrition and 18 patients who had malnutrition and was found to be absent in 18 who had not malnutrition. Chi square test was applied to see the relationship between these two categorical variables, the p-value ≤ 0.386 which shows that there is no relationship between these two variables in table 4.

Table No.1: Age Variables

Variables	Mean ± SD
Age	13.06 ± 1.99
Success of Restoration	Frequency
Yes	73(73.0 %)
No	27(27.0%)

Table No.2: Success of restoration

		Group age		Total	P-Value
		Below 13 years	Above 13 years		
Success of restoration	No	17	10	27	0.541
	Yes	41	32	73	
Total		58	42	100	

Table No.3: Gender wise restoration of patients

		Gender		Total	P-Value
		Male	Female		
Success of restoration	No	17	10	27	0.394
	Yes	39	34	73	
Total		56	44	100	

Table No.4: Malnutrition

		Malnutrition		Total	P-Value
		No	Yes		
Success of restoration	No	18	9	27	0.386
	Yes	55	18	73	
Total		73	27	100	

DISCUSSION

The dental caries that were considered in this study is one of the most prevalent oral disease. This study was undertaken at de' Montmorency College of Dentistry's Department of Operative Dentistry to check the efficacy and efficiency of a restoration after Papain based gel use in Patients of both genders having age of 10-16 years.

In this study, the sample size was taken of 100 patients who were satisfying the mentioned criteria enrolled in the study. Sample size was carried by using nonprobability consecutive sampling technique. The mean age was as 13.06 ± 1.99 and success of restoration was found in 73 patients while it was found to be absent in 27 patients. There was statistically insignificant relationship of success of restoration with age, gender and malnutrition.

This present study concluded that the success of restoration after chemo mechanical removal of caries by using papain based gel in open carious lesions of permanent molars was present in 73.0% patients while it was absent in 27.0% of the patients and the effect modifier i.e. age, gender and malnutrition had no significant association with success of restoration.

The goal of an international trial conducted by Ericson et al [12] to assess the clinical success and assurance of chemo mechanical removal approach (Carisolv).of caries at four centres. In this study, all selected 137 patients with average age of 35±21years (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 al [11] conducted a study with 2 years follow-up on fourteen permanent molars in children aged 10 to 16. The finding of this study revealed that 13 of the 14 cases were successful. According to the findings of this study, in young children when molar treated with papain based gel and filled with ionomer cement considerable results were obtained and it is an option which provides patients with benefits.

In a study done by Caro et al[13] in 2012, the aim was to compare two caries removal strategies in terms of the amount of time it took to complete the procedure, total operating time, expenses, and pain complaints are all factors to consider while removing carious tissue. A randomized, controlled clinical experiment involving patients of 7 years with occlusal caries (n=30) in sixty Ist molars was done. The traditional technique and silver amalgam were used on half of the teeth; while the other half received Papain based gel preparation and repair with ionomer cement (GIC). In terms of operating time, expenses, and pain complaints, both sets of teeth were studied. In comparison to the traditional procedure for eliminating carious tissue, they discovered that utilizing Papain based gel and GIC resulted in much cheaper costs and operative time.

Kochhar et al [14] conducted a study to examine the effectiveness of caries removal, the duration of procedure, and pain as reported by the patient throughout different strategies. The total duration to eradicate caries with the Carisolv proved significantly longer than Papain based gel and hand instrument methods. The Airotor approach required the least

amount of time. Patients reported 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 Airotor. The chemo mechanical caries elimination by use of Papain based gel and Carisolv was proven successful and could be considered as a treatment option.

Pandit et al[15] compared the usefulness of different caries removal means, duration of different methods and evaluate the pain threshold reported by the patient during procedure and showed a comparison of mean success of different methods. Caries removal efficacy by hand instrument was determined to be 1.26 on average. Caries removal by airotor 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.

CONCLUSION

The use of papain based gel to remove caries after chemo mechanical treatment resulted in a high efficacy of restorative success. As a result, the use of papain based gel as an option for individuals seeking an alternative to standard procedures can be advocated. The removal of carious tissue using papain based gel was shown to be effective, simple, and painless for the patient. In the instance of very hesitant patients, the restoration matched functional needs and was a simple and economical option. Patients must, however, be advised about the possibility of failure and the need for regular follow-up sessions.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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