International Journal of Research in Health and Allied Sciences
Journal home page: www.ijrhas.com
Official Publication of "Society for Scientific Research and Studies" [Regd.]
ISSN: 2455-7803

Original Research

Study etching patterns of sodium hypochlorite pretreated hypocalcified Amelogenesis Imperfecta primary molars

Nimrah Kawoos

Post Graduate Student, Department of Pedodontics, Seema Dental College and Hospital Rishikesh.

***ABSTRACT*:**
Background: To study etching patterns of sodium hypochlorite pretreated hypocalcified amelogenesis imperfecta primary molars. **Materials and methods:** The present study was conducted in the Department of Pedodontics of the dental institutions. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, we collected 20 primary molars from children affected with hypocalcified AI near their time of shedding. Teeth were immediately washed under running water to remove any blood or adherent debris. The selected teeth were then preserved in distilled water at room temperature. Each tooth was sectioned buccolingually into two halves using high-speed double-sided diamond disc. The 20 specimens obtained were encoded for identification. **Results:** Type I etching is seen in 44 patients for Group 1 and 78 in group 2. Type II etching was seen in 19 patients. **Conclusion**: treatment of primary teeth affected by hypocalcified AI using 5.25% NaOCl prior to phosphoric acid etching significantly improves the etching pattern which is required for good resin bonding.
Key words: Amelogenesis imperfecta, etching, sodium hypochlorite

Received: 22 July, 2019 Revised: 19 September, 2019 Accepted: 20 September, 2019

Corresponding Author: Dr Nimrah Kawoos, Post Graduate Student, Department of Pedodontics, Seema Dental College and Hospital Rishikesh, India

This article may be cited as: Kawoos N. Study etching patterns of sodium hypochlorite pretreated hypocalcified Amelogenesis Imperfecta primary molars. Int J Res Health Allied Sci 2019;5(5):55-58.

INTRODUCTION:
Amelogenesis imperfecta (AI) is a hereditary defect of enamel affecting both the primary and permanent dentition.[1] By definition, AI includes only those cases where enamel defects occur in the absence of other syndromes or metabolic disorders. The incidence of AI ranges from 1 in 718 to 1 in 14,000 depending on the population studied.[2] Amelogenesis imperfecta presents large variability in its clinical expression. Mutations have been reported in different genes. Some of them encode for enamel proteins, either structural (amelogenin, enamelin, ameloblastin, c4orf26) or enzymatic (kallikrein 4, MMP20); some others encode for transcription factors (MSX2, DLX3), cellular proteins (WDR72, FAM83H, COL17A1), cellular receptor (ITGB6) and calcium carrier (SLC24A4).[3] Affected teeth, in particular first permanent molars, are susceptible to dental caries as they are not only more porous but also very sensitive making effective oral hygiene difficult.[4] Affected children require more dental treatment than their unaffected peers while also suffering greater pain and anxiety. Current clinical approaches focus on the placement of contemporary adhesive restorative materials onto the compromised tooth which in turn, fail, leading to premature loss of permanent molars with associated repercussions.[5,6] Hence, the present study was conducted to study etching patterns of sodium hypochlorite pretreated hypocalcified amelogenesis imperfecta primary molars.

MATERIALS AND METHODS:
The present study was conducted in the Department of Pedodontics of the dental institution. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, we collected 20 primary molars from children affected with hypocalcified AI near their time of shedding. Teeth were immediately washed under running water to remove any blood or adherent debris. The selected teeth were then preserved in distilled water at

room temperature. Each tooth was sectioned buccolingually into two halves using high-speed double-sided diamond disc. The 20 specimens obtained were encoded for identification. To get comparable samples, each tooth was sectioned into 2 parts, where one half of the crown acted as a control to the other one. Group I (Control Group): where enamel of the buccal surfaces were etched using 37% phosphoric acid gel, applied with a microbrush for 15 seconds, washed with water and then dried with oil-free compressed air for 10 seconds. Group II (Study Group): where enamel of the buccal surfaces were treated with 5.25% NaOCl, applied with a sterile cotton pellet for 60 seconds, rinsed with water for 20 seconds, and dried with oil-free compressed air for 10 seconds. Then the treated surfaces were etched following the same protocol as in group I.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

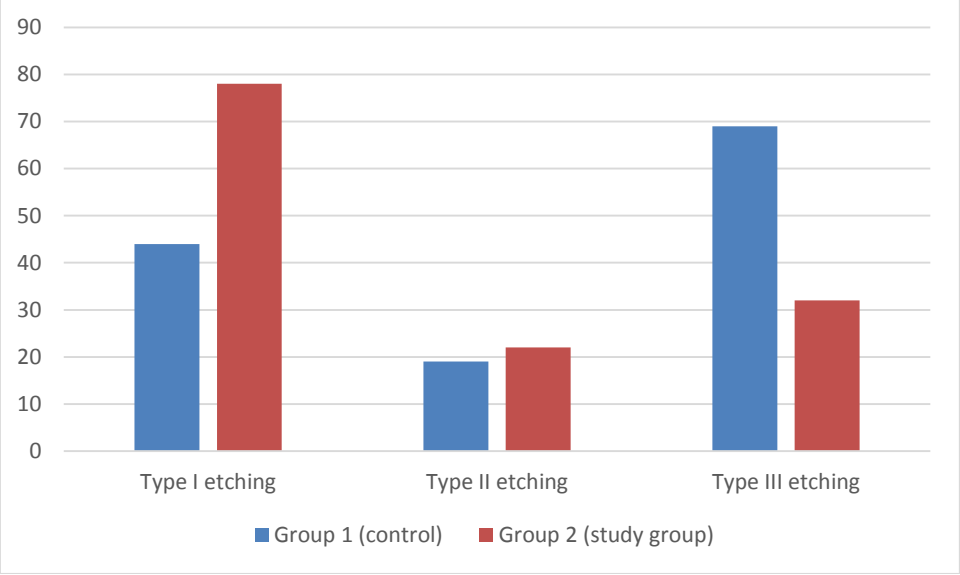
RESULTS:

Table 1 shows distribution of different etching patterns at 16 different sites from specimen. Type I etching is seen in 44 patients for Group 1 and 78 in group 2. Type II etching was seen in 19 patients in group 1 and 22 in group 2.

Table 1: Distribution of different etching patterns at 16 different sites from specimen

	Group 1 (control)	Group 2 (study group)
Type I etching	44	78
Type II etching	19	22
Type III etching	69	32

Fig 1:



DISCUSSION:

In the present study, we observed that mean fear score for children with primary teeth caries was 25.14. similarly, mean fear score for children with permanent teeth caries was 25.42. the results were compared with studies from the literature. Yaman BC compared the microtensile bond strengths (μTBS) of two different self-etching (SE) and etchand- rinse (ER) adhesive systems to enamel affected by hypoplastic amelogenesis imperfecta (HPAI) and analyzed the enamel etching patterns created by the two adhesive systems using scanning electron microscopy (SEM). Sixteen extracted HPAI-affected molars were used for the bond strength tests and 2 molars were examined under SEM for etching patterns. The control groups consisted of 12 healthy third molars for μTBS tests and two molars for SEM. Mesial and distal surfaces of the teeth were slightly ground flat. The adhesive systems and composite resin were applied to the flat enamel surfaces according to the manufacturers' instructions. The tooth slabs containing composite resin material on their mesial and distal surfaces were cut in the mesio-distal direction with a slow-speed diamond saw. The slabs were cut again to obtain square, 1-mm-thick sticks. Finally, each stick was divided into halves and placed in the μTBS tester.

Bond strength tests were performed at a speed of 0.5 mm/min. Data were analyzed with two-way ANOVA and Tukey's tests. There was no significant difference between the bond strength values of ER and SE adhesives ($p > 0.05$). However, significant differences were found between HPAI and control groups ($p < 0.05$). HPAI-affected enamel surfaces exhibited mild intra- and inter-prismatic enamel etching patterns after orthophosphoric acid application, while conditioning of HPAI-affected enamel with SE primer created a slightly rough and grooved surface. They concluded that SE and ER adhesive systems provide similar bond strengths to HPAI-affected enamel surfaces. Epasinghe DJ examined the effect of additional acid etching on microtensile bond strength of a self-etch adhesive to AI-affected dentine. Flat coronal dentine obtained from extracted AI-affected and non-carious permanent molars were allocated to two groups: (a) Clearfil SE Bond (control); and (b) Clearfil SE Bond and additional etching with 34% phosphoric acid for 15 seconds. The bonded teeth were sectioned into .8-mm2 beams for microtensile bond strength testing, and stressed to failure under tension. The bond strength data were analyzed using two-way analysis of variance (dentine type and etching step) and Student-Newman-Keuls multiple comparison test. Representative fractured beams from each group were examined under scanning electron microscopy. Both factors, dentine substrate ($P<.001$) and etching step, and their interactions, were statistically significant. Additional etching had an adverse effect on the bond strength of Clearfil SE Bond to normal dentine, and no significant improvement was found for AI-affected dentine. They concluded that additional acid etching does not improve the bond strength of a self-etch adhesive to AI-affected dentine.[7,8]

Seow WK et al determined, using scanning electron microscopy (SEM), the types of etching pattern achieved with 37% phosphoric acid on dental enamel of 5 clinical variants of AI, namely, pitted hypoplastic, smooth hypoplastic, X-linked (male), X-linked (female), and hypomineralized. A normal premolar and primary molar from two healthy patients were used as controls. The enamel was scanned before and after acid etching for 1 min. In the normal, control teeth, the three classical etching patterns were produced: type 1, in which the prism cores are preferentially removed; type 2, in which the prism peripheries are removed, and type 3 in which the removal of enamel does not relate to prism structure. In the normal primary molar, patterns of types 2 and 3 were generally produced. In the AI teeth, the effects of acid etching reflected the clinical variant of AI. All three etch patterns were observed in the enamel surrounding the pits in the pitted type of AI and in the bands of normal enamel in the female with X-linked AI, as well as in the hypomineralized variant. In contrast, no typical etch patterns could be detected in the enamel from the male patient with X-linked variant, as well as from the enamel affected by the smooth hypoplastic variant. They concluded that the lack of typical etching patterns in these variants may be the result of abnormal prism structure, or the standard etching time and/or acid concentration may be inappropriate for the abnormal enamel. The results of this study may have useful applications in the restoration of teeth affected by AI. Ahmed AM et a investigated the etching patterns of hypocalcified amelogenesis imperfecta (AI) in primary molars pretreated with 5.25% NaOCl prior to phosphoric acid application using scanning electron microscopy (SEM). Ten hypocalcified AI primary molars were collected, sectioned longitudinally into 2 parts and allocated into two groups of ten specimens each. The enamel surface in the first group (control group) was etched using 37% phosphoric acid gel for 15 seconds; while in the second group (study group), it was pretreated using 5.25 sodium hypochlorite(NaOCl) for 60 seconds prior to acid etching. Each specimen was examined at 16 different sites, and evaluated for the etching pattern (types I, II, and III) distribution using SEM. A total of 320 microphotographs at 1,500 magnification were obtained using Auto-Cad 2007 software. The etching pattern with phosphoric acid was not uniform with predominance of type III etching (65.63%), while the pretreated enamel surfaces showed a significant increase in type I and II(82.5%) etching patterns. They concluded that Treatment of primary teeth affected by hypocalcified AI using 5.25% NaOCl prior to phosphoric acid etching significantly improves the etching pattern which is required for good resin bonding.[9,10]

CONCLUSION:

Within the limitations of the present study, it can be concluded that treatment of primary teeth affected by hypocalcified AI using 5.25% NaOCl prior to phosphoric acid etching significantly improves the etching pattern which is required for good resin bonding.

REFERENCES:

1. Witkop CJ. Amelogenesis imperfecta, dentinogensis imperfecta and dentin dysplasia revisited: problems in classification. J Oral pathol. 1989;17(9–10):547–553. [PubMed] [Google Scholar]
2. Backman B, Holm AK. Amelogensis imperfecta: prevalence and incidence in a northern swedish county. Community Dent Oral Epidemiol. 1986;14(1):43–47.
3. Smith CEL, Poulter JA, Antanaviciute A, Kirkham J, Brookes SJ, Inglehearn CF, Mighell AJ. Amelogenesis Imperfecta; genes, proteins, and pathways. Front Physiol. 2017;8:435. doi: 10.3389/fphys.2017.00435.
4. Mackie IC, Blinkhorn AS. Amelogenesis imperfecta: early interception to prevent attrition. Dental update. 1991;18:79–80.
5. American Academy on Pediatric Dentistry Council on Clinical Affairs. (2008-2009). Guideline on oral heath care/dental management of heritable dental development anomalies. Pediatr Dent 30, 196–201. [PubMed]
6. Parekh S, Almehateb M, Cunningham SJ. How do children with amelogenesis imperfecta feel about their teeth? Int J

Paediatr D / Br Paedod Soc [and] the Int Assoc Dent Child. 2014;24:326–335.
7. Yaman BC, Ozer F, Cabukusta CS, Eren MM, Koray F, Blatz MB. Microtensile bond strength to enamel affected by hypoplastic amelogenesis imperfecta. J Adhes Dent. 2014 Feb;16(1):7-14. doi: 10.3290/j.jad.a30554.
8. Epasinghe DJ, Yiu CKY. Effect of etching on bonding of a self-etch adhesive to dentine affected by amelogenesis imperfecta. J Investig Clin Dent. 2018 Feb;9(1). doi: 10.1111/jicd.12276. Epub 2017 Jun 13.
9. Seow WK, Amaratunge A. The effects of acid-etching on enamel from different clinical variants of amelogenesis imperfecta: an SEM study. Pediatr Dent. 1998 Jan-Feb;20(1):37-42.
10. Ahmed AM, Nagy D, Elkateb MA. Etching Patterns of Sodium Hypochlorite Pretreated Hypocalcified Amelogenesis Imperfecta Primary Molars: SEM Study. J Clin Pediatr Dent. 2019;43(4):257-262. doi: 10.17796/1053-4625-43.4.6. Epub 2019 May 16.