

Original Research Article

Esthetic and functional rehabilitation of hypomineralized first permanent molars using prefabricated versus custom made zirconia crowns: a 12-month follow-up study

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ABSTRACT

Background: Molar incisor hypomineralisation is defined as “hypomineralisation of systemic origin, presenting as demarcated, qualitative defects of the enamel of one to four first permanent molars frequently associated with affected incisors. MIH is also considered as a public health issue since it leads to pain, poor esthetics and has a negative impact on the quality of life. Thus, managing patients with MIH requires a variety of patient management approaches, materials, and techniques ranging from Intracoronal to extracoronal full or partial coverage restorations. To evaluate the efficacy of prefabricated zirconia crowns and custom-made zirconia crowns used on hypomineralised molars and to compare their efficacy in terms of gingival health, surface integrity, retention, parental satisfaction, time and cost over a time period of baseline (1day), 3, 6, 9 and 12 months.

Methods: Twenty-six hypomineralized first permanent molars from children aged 7-12 years indicated for full coverage restorations were randomly selected from the Out Patient Department. The selected teeth (molars) were then randomly allocated into two groups (13 each) according to the type of crown used, namely Group A-prefabricated zirconia crowns (n=13) and group B-custom-made zirconia crowns (n=13). Tooth preparation was done according to the crown selected and all the crowns were cemented using resin-based cement. Patients were recalled and the follow-up was done by single trained examiner.

Results: Clinical success for both the crowns were similar with no statistical difference between them.

Conclusions: Both the crowns proved to be clinically successful.

Keywords: Molar incisor hypomineralisation, First permanent molars, Developmental defects of enamel

INTRODUCTION

The developmental defects of the enamel (DDE) may be defined as the alteration of enamel that may affect an area of one surface or all the surfaces throughout its full thickness. These developmental defects can be quantitative in nature that are manifested as a deficiency in adequate thickness of enamel or qualitative that is enamel with a poor quality.¹

These defects can involve both primary as well as permanent dentition and are termed as hypomineralisation and hypoplasia. Enamel hypomineralisation is a qualitative defect of enamel because of a disturbance during initial calcification or maturation identified as a clearly demarcated area in the translucency of the enamel of varying degree resulting in white, yellow or brown discoloration of enamel involving one to four first permanent molars.²

Various terminologies associated with MIH are non-endemic mottled enamel, cheesy molars, enamel hypoplasia, non-fluoride enamel opacities, opaque white spots, and idiopathic enamel opacities but currently the term MIH is being used which was first cited by Weerheijm et al in 2001 who defined MIH as the clinical appearance of morphological enamel defects involving the occlusal and/or an incisal third of one or more permanent molars or incisors as a result of hypomineralisation of systemic origin.^{3,4}

Hypomineralized enamel can be soft, porous or resembling discolored chalk or old Dutch cheese.⁵ These defects can vary in color changes from white to yellow to brownish, affecting first permanent molars and incisors.^{5,6} In severe MIH, post eruptive enamel breakdown occurs leading to crown destruction and dental sensitivity. Hypomineralized molars are also associated with dental caries, high dentinal sensitivity, and poor oral hygiene making it difficult to be managed both by the individual and clinician. To prevent further complications associated with hypomineralized molars, full coverage restorations are the treatment of choice for primary as well as permanent dentition which include stainless steel crowns, veneered crowns, polycarbonate crowns and strip crowns etc.⁷ Stainless steel crowns are one of the most commonly used full coronal restorations in paediatric dentistry and are used to restore primary as well as permanent teeth. These are considered to be durable, economical and less technique sensitive but despite of their favourable qualities, the major drawback is poor aesthetic appearance.⁸ Increase in aesthetic concern draws the attention towards the full coverage aesthetic restorations which include Prefabricated and Custom-made Zirconia Crowns. These are new to the dental world and one of the most aesthetically pleasing and high strength dental ceramics. Zirconia is a crystalline dioxide of zirconium (ZrO_2), having good chemical properties, biocompatibility, dimensional stability, toughness, Young's modulus (210 Gpa) similar to that of stainless-steel alloy (193Gpa), and color similar to natural teeth.⁹ They also have the added advantage of being gingival friendly. Presently, passive fit Prefabricated zirconia crowns are available for primary as well as first permanent teeth molars. Prefabricated zirconia crowns for permanent first molars are designed to restore the normal function as well as the anatomy of the teeth. These crowns are available in different shades and sizes which are not only aesthetic, but also provide durability and allow easy placement in a single appointment with no impression and laboratory cost, that saves a lot of chairside time.⁹ Custom made zirconia crowns on the other hand, are formed by conventional methods, which provide good marginal adaptation, but multiple steps are involved in this method such as extensive tooth preparation, impression making, laboratory procedures and multiple dental visits.¹⁰

Management of MIH-affected teeth is obligatory, not only to address the aesthetic demands but also to address

the functional and psychological needs of the child patients.¹¹ It is also recognized that MIH is of increasing concern to clinicians worldwide. Thus, it is relevant to increase the knowledge on the clinical impact of MIH on the oral health. Hence, the aim of this study was to compare the commercially available and custom-made zirconia crowns with regards to gingival health, surface integrity, retention, parental satisfaction, time and cost over a time period of baseline (1day), 3, 6, 9 and 12 months.

METHODS

The present prospective clinical study was conducted in the department of pediatric and preventive dentistry, (from December 2020 to December 2021), Subharti Dental College, Swamivivekanand Subharti University, Meerut. Informed consent was taken from the parents/guardians of the children participating in the study. Sample size calculation considering a two-group was calculated using ANCOVA model for the number of subjects per group n_{ANCOVA} (assuming equal sample sizes and equal standard deviation, at baseline and post randomisation per group). Twenty-six hypomineralized first permanent molars from children aged 7-12 years indicated for full coverage restorations were randomly selected from the OPD for the study. The selected teeth (molars) were then randomly allocated using table of numbers into two groups (13 each) according to the type of crown being luted, namely group A prefabricated zirconia crowns (n=13) and group B custom-made zirconia crowns (n=13).

Inclusion criteria

Inclusion criteria for current study were; healthy children of 7-12 years of age without any systemic diseases, hypomineralized first permanent molars (maxillary and mandibular), cooperative children (Frankel behaviour rating scale positive and definitive positive), teeth without pulpal involvement.

Exclusion criteria

Exclusion criteria for current study were; teeth with any pulpal involvement and medically compromised patients.

Procedure

Prior to the study detailed treatment plan was explained to the parents and written consent for treatment was obtained from them prior to the clinical procedure. A brief history was taken followed by thorough clinical examination as well as radiographic examination. In group A, firstly, size selection was done by using pink "try-in" crowns provided by Nusmile company on the indicated tooth, then 2% lignocaine was administered followed by placement of braided gingival retraction cord (size 3). Tooth preparation for the zirconia crown was done as conservatively as possible which consisted of

occlusal reduction of approximately 1-1.5 mm; and circumferential reduction of 1-1.5mm, removing all surface convexity, with a gingival feather-edge margin extending approximately 1.5 mm subgingivally.¹² (as per the manufacturer's instructions.) Only two shades of prefabricated zirconia crowns were provided by the company i.e., Lighter shade and Darker shade. The more appropriate shade was selected keeping in mind the patients tooth colour. Prefabricated zirconia crown was placed and checked for passive fit before cementation. While maintaining isolation, Prefabricated zirconia crown was cemented by using resin -based cement. (BioCem; NuSmile, Ltd, Houston, TX. USA) following the manufacturer's instructions and excess resin-based cement was removed before setting and final occlusion was checked. In group B, Firstly, local anaesthesia was administered then, shade selection was done by using vita shade guide followed by placement of braided gingival retraction cord (size 3). Tooth preparation for the zirconia crown was done as conservatively as possible.

Table 1: Criteria for surface integrity.

Score	Interpretation
1	Crown appear normal, no crack, no chipping.
2	Small but noticeable area of loss of material
3	Large loss of crown material
4	Loss of crown material along with wearing of opposing tooth structure.

This consisted of occlusal reduction of 1-1.5mm; and circumferential reduction of 0.5-1.25 mm, with a shoulder margin extending approximately 1.5 mm subgingivally.¹³⁻¹⁶ Then, vinyl polysiloxane putty (heavy body and light body) impression was taken and cast was

poured and sent to the laboratory for the preparation of crown. Another, Impression was taken by using alginate for the fabrication of acrylic temporary crown which was delivered in the same dental visit. During second dental visit, temporary crown was removed and tooth was cleaned properly with water spray and air dried. While maintaining isolation, custom made zirconia crown was cemented by using resin-based cement and excess resin-based cement was removed before setting. The initial light-cure was done for 2 seconds and then for final set, light cure each surface for 20 seconds, according to the manufacturer's instructions and final occlusion was checked. Patients were recalled to evaluate gingival health, surface integrity, parental/patient satisfaction, time, cost and retention, over a time period of baseline (1 day), 3, 6, 9 and 12 months. The follow-up was done by single trained examiner (Table 1).

Statistical analysis

Data collected was calculated, compared and statistically analysed using the SPSS 19.0 software. The following formulas were employed to calculate the results: Friedman test, Mann-Whitney test, Cochran Q test, Chi-square test, independent t test.

RESULTS

Twenty-six patients were randomly selected from the OPD and the mean age of the patient included in the study was 9.54±1.76 years in group A and 10.08 years±1.38 years in Group B. And out of the total children (n=26), 53.8% (n=7) and 61.5% (n=8) were males whereas, 46.2% (n=6) and 38.5% (n=5) were females in group A and group B respectively (Table 2).

Table 2: Demographic details of the study subjects.

Variable	Category	Group A (Prefabricated zirconia crowns) N (%)	Group B (Custom-made zirconia crowns) N (%)	Total N (%)
Age (years)	7	1 (7.7)	1 (7.7)	1 (3.9)
	8	4 (30.8)	2 (15.4)	6 (23.1)
	9	2 (15.4)	3 (23.0)	6 (23.1)
	10	2 (15.4)	2 (15.4)	5 (19.2)
	11	1 (7.7)	3 (23.0)	5 (19.2)
	12	3 (23.0)	2 (15.4)	5 (19.2)
	Mean±SD	9.54±1.76	9.77±1.59	9.66±1.65
Gender	Male	7 (53.8)	8 (61.5)	15
	Female	6 (46.2)	5 (38.5)	11

On intragroup and intergroup comparison of retention between two groups (group A and group B) at different time intervals. In Group A, two crowns were dislodged one (7.7%) at 3 months and other (15.4%) at 9 months. However, in group B, none of the crowns were dislodged till the follow-up period of 12 months. However, the differences were statistically non-significant at baseline (1 day), 3, 6, 9 and 12 months of follow-up intervals (Table 3-4).

On intragroup and intergroup comparison of gingival health between group A (prefabricated zirconia crowns) and group B (custom made zirconia crowns). In group A mild inflammation (score 1) was observed around the crown of only one case at 3 month and in another case at 9 months follow-up, whereas, in group B, no gingival inflammation at baseline (1 day). 3 months, 6 months, 9 months and 12 months was seen. The difference was statistically non-significant between both groups at 1 day, 3, 6, 9 and 12 months follow-up intervals.

Table 3: Intergroup comparison of retention at different time intervals.

Crown Retention (%)	Baseline (1 day)		3 months		6 months		9 months		12 months	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Crown present N (%)	13 (100)	13 (100)	12 (100)	13 (100)	12 (92.3)	13 (100)	11 (84.6)	13 (100)	11 (84.6)	13 (100)
Crown lost N (%)	0 (0)	0 (0)	1 (7.7)	0 (0)	1 (7.7)	0 (0)	2 (15.4)	0 (0)	2 (15.4)	0 (0)
P value	-		1.000 (NS)		1.000 (NS)		0.480 (NS)		0.480 (NS)	

Table 4: Comparison of retention of crowns at baseline, 3, 6, 9 and 12 months interval.

Interval pair	Group A (Prefabricated zirconia crowns)	Group B (Custom-made zirconia crowns)	Overall
1 day vs. 3 months	1.000 (NS)	--	1.000 (NS)
1 day vs. 6 months	1.000 (NS)	--	1.000 (NS)
1 day vs. 9 months	0.500 (NS)	--	0.500 (NS)
1 day vs. 12 months	0.500 (NS)	--	0.500 (NS)
3 months vs. 6 months	1.000 (NS)	--	1.000 (NS)
3 months vs. 9 months	1.000 (NS)	--	1.000 (NS)
3 months vs. 12 months	1.000 (NS)	--	1.000 (NS)
6 months vs. 9 months	1.000 (NS)	--	1.000 (NS)
6 months vs. 12 months	1.000 (NS)	--	1.000 (NS)
9 months vs. 12 months	1.000 (NS)	--	1.000 (NS)

Table 5: Inter group comparison of gingival health at different time intervals.

Gingival inflammation	Baseline (1 day)		3 months		6 months		9 months		12 months	
	Gp A	Gp B	Gp A	Gp B	Gp A	Gp B	Gp A	Gp B	Gp A	Gp B
0-normal gingiva	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)
1-mild inflammation	0 (100)	0 (100)	1 (90)	0 (100)	0 (100)	0 (100)	1 (90)	0 (100)	0 (100)	0 (100)
2-moderate inflammation	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)
3-severe inflammation	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)
Mean	0.00	0.00	0.08	0.00	0.00	0.00	0.08	0.00	0.00	0.00
SD	0.00	0.00	0.28	0.00	0.00	0.00	0.28	0.00	0.00	0.00
Difference	-		0.08		-		0.08		-	
P value	-		0.317(NS)		-		0.317(NS)		-	

It is obvious from the table that Group B (custom made zirconia crowns) were better in terms of gingival health as compared to the Group A (prefabricated zirconia crowns) (Table 5-6). The Intergroup comparison of surface integrity between the two groups at different time intervals. Both the groups showed no change in surface integrity of crowns as all the crowns appeared to be normal without any cracks and signs of chipping from baseline (1 day) to 12 months intervals (Table 7). On intergroup comparison of parental satisfaction between

the two groups. At baseline (1 day), parent satisfaction was higher in Group A (prefabricated zirconia crowns) as compared to the Group B (custom made zirconia crowns) and this difference was statistically significant (p value 0.001%) between two groups at baseline (1day). At 3 months parent satisfaction was similar in both the groups and thus, non-significant difference (0.904) was seen. At 6 months, custom made zirconia crowns (Group B) showed more parental satisfaction as compared to the prefabricated zirconia crowns (Group A).

Table 6: Comparison of gingival health at different time interval.

Interval pair	Group A (Prefabricated zirconia crowns)	Group B (Custom-made zirconia crowns)	Overall
1 day vs. 3 months	0.317 (NS)	1.000 (NS)	0.317 (NS)
1 day vs. 6 months	1.000 (NS)	1.000 (NS)	1.000 (NS)
1 day vs. 9 months	0.317 (NS)	1.000 (NS)	0.317 (NS)
1 day vs. 12 months	1.000 (NS)	1.000 (NS)	1.000 (NS)
3 months vs. 6 months	0.317 (NS)	1.000 (NS)	0.317 (NS)
3 months vs. 9 months	1.000 (NS)	1.000 (NS)	1.000 (NS)
3 months vs. 12 months	0.317 (NS)	1.000 (NS)	0.317 (NS)
6 months vs. 9 months	0.317 (NS)	1.000 (NS)	0.317 (NS)
6 months vs. 12 months	1.000 (NS)	1.000 (NS)	1.000 (NS)
9 months vs. 12 months	0.317 (NS)	1.000 (NS)	0.317 (NS)

Table 7: Inter group comparison of surface integrity at different time intervals.

Score	Baseline (1 day)		3 months		6 months		9 months		12 months	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
1	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)	13 (100)
2	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)
3	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)
4	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)

Table 8: Intergroup comparison of parental satisfaction at different time intervals.

Score	Baseline (1 day)		3 months		6 months		9 months		12 months	
	A	B	A	B	A	B	A	B	A	B
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	0 (0)	0 (100)	1 (7.7)	0 (0)	0 (0)	0 (0)	1 (8.4)	0 (0)	0 (0)	0 (0)
2	0 (0)	0 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	7 (53.8)	0 (0)	0 (0)	4 (33.3)	0 (0)	2 (16.6)	0 (0)	1 (9.1)	0 (0)
4	9 (69)	6 (46.2)	7 (53.8)	9 (69.2)	7 (58.3)	10 (76.9)	3 (25)	10 (76.9)	6 (54.5)	9 (69.2)
5	4 (30.8)	0 (0)	5 (38.5)	4 (30.8)	1 (8.4)	3 (23.1)	6 (50)	3 (23.1)	4 (36.3)	4 (30.8)
P value	0.001		0.904 (NS)		0.021		0.978 (NS)		0.433 (NS)	

There was a significant difference (0.021) in parent satisfaction between two groups after 6 months of follow-up. At 9 months of follow-up, non-significant difference was found (p value=0.978) between both the groups. However, at 12 months of follow-up parental satisfaction was similar for both the groups, thus non-significant difference (p value=0.433) was found between the two groups (Group A and Group B). Thus, the results signify that both the crowns were clinically accepted by the parents (Table 8).

DISCUSSION

A total of 26 hypomineralized first permanent molars from children aged 7-12 years indicated for full coverage restorations were included in the study. A brief history was taken followed by thorough clinical and radiographic examination to assess MIH. Patients were randomly

divided into two groups on the basis of full coverage restoration given i.e., Group A (prefabricated zirconia crowns) and Group B (custom made zirconia crowns). The age group of 7-12 years was selected because it is necessary to prevent post eruptive breakdown of hypomineralized first permanent molars as soon as they erupt into the oral cavity. Moreover, this particular age group met the inclusion criteria of the study which showed the clinical efficacy of full coverage restoration in permanent hypomineralized molars teeth only. In the present study, the gingival health in both the groups were assessed by using gingival index given by Loe and Silness (1963). The gingival index was used to evaluate gingival health because it is a simple and accurate method in epidemiological and clinical research.¹⁷ On Intergroup comparison of gingival health between both the groups i.e., Group A (prefabricated zirconia crowns) and Group B (custom made zirconia crowns) at different time

interval of baseline(1day), 3 month, 6 month, 9 month and 12 months, only two cases of mild inflammation (Score 1) were observed in Group A, one at 3-months (Mean =0.08) and another 9-months (Mean =0.08) follow-up. The reason for gingival inflammation could be because of Prefabricated zirconia crowns have a passive fit on placement, thus they have a more open margins; which act as a plaque reservoir and may induce gingivitis. Another reason for gingival inflammation could be because of poor oral hygiene maintained by the patients.^{1,8}



Figure 1: a) Hypomineralized 26, b) tooth preparation wrt 26, c) prefabricated zirconia crown, d) after 1 year follow up.

The results of the present study are in accordance with a meta-analysis conducted by Dhanraj et al which stated that, teeth with sub-gingivally placed crown margins had higher mean scores of plaque and gingival indices.¹⁹ They also concluded that the subgingival crown margins can contribute to localized periodontal inflammation because these margins provide a protected environment in which the indigenous microbes mature into more periodontopathic flora which reside as a biofilm in supragingival and subgingival plaque. Whereas, in Group B (Custom made zirconia crowns) no gingival inflammation till 12months of follow up was seen. It could be because of custom made zirconia crowns have adequate marginal fit and the inflammatory response can be directly related to the standard of marginal fit of the crown rather than its level as stated by Jones et al in their study.^{16,20}



Figure 2: a) Hypomineralized 46, b) tooth preparation wrt 46, c) custom made zirconia crown, d) after 1 year follow up.

Zirconia crowns derive their retention from primary and secondary factors. Primary factor includes the morphology of the tooth (buccal prominence), surface area and height of tooth preparation, axial wall convergence and texture of the prepared surface while the secondary factor includes the use of various luting agents.²¹ On Intergroup comparison of retention of zirconia crowns between two groups at different time intervals. In Group A, two crowns were dislodged one at 3 months (7.7%) and another at 9 months (15.4%) interval. The reason for the failure of Prefabricated zirconia crowns could be microleakage, due to passive fit on placement, and as they have more open margins; therefore, their retention relies solely on the cement.²² Prefabricated Zirconia crowns cannot be crimped to provide a tight marginal seal, and rely on chemical bonding between the crown and cement.^{23,24} However, in Group B, none of the crowns dislodged for the follow-up period of 12 months due presence of both primary and secondary retentive factors i.e ideal tooth preparation and luting cement.²¹ On comparison of Gingival health and retention between both the groups i.e. Group A and Group B, statistically non-significant differences was found at different time interval of baseline (1 day), 3 months, 6 months, 9 months and 12 months. It revealed that both the zirconia crowns were effective for maintaining gingival health and retention. On intergroup comparison of surface integrity between group A (prefabricated zirconia crown) and group B (custom made zirconia crown) at different time interval of baseline (1 day), 3 months, 6 months, 9 months and 12 months, both the groups showed 100% success i.e., there was no change in surface integrity of crowns, as all the crown appeared to be normal with without any cracks and signs of chipping from baseline to 12 months of follow up. The reason for the success could be attributed to the fact that, glazing dental restorations produces a smooth aesthetic and hygienic surface and is considered as a process that reduces the amount of wear of the opposing teeth. Therefore, roughened ceramic surfaces must be polished to prevent or at least minimize rapid wear of the opposing teeth, enhance aesthetics and restoration longevity, by removing the defects produced after surface grinding.²⁵ In the present study, patient satisfaction was assessed in both the groups by using Likert 5-point scale as patient acceptability. Likert-type scale has been used in most patient satisfaction studies because it is a simple tool with adequate reliability and validity.²⁶ As satisfied patients tend to show better compliance with prescribed treatments, patient satisfaction should be of prime concern. On intergroup comparison, parent satisfaction was higher in Group A (69% were satisfied and 30.8% were very satisfied) as compared to the Group B (53.8% were neutral and 46.2% were satisfied). It could be because Prefabricated zirconia crowns have less number of cumbersome clinical steps such as impression making and can be placed in a single visit, which reduces number of appointments and saves chairside time. At 3 months, there was non-significant difference observed between the two groups. At 6 months, Custom made zirconia

crowns (i.e., in Group B, 76.9% were satisfied and 23.1% were very satisfied) showed more parental satisfaction as compared to the prefabricated zirconia crowns (i.e. in Group A 33.3% were neutral, 58.3% were satisfied and 8.4% were very satisfied). There was a significant difference in parent satisfaction between two groups after 6 months of follow-up. However, at 9 months and 12 months of follow-up, non-significant difference was found (p value=0.978) between both the groups (Group A and Group B). Such a variation in parental satisfaction over a due course of time could be ascribed to the fact that when parents express their overall satisfaction, they often include many factors of treatment that the clinical evaluation may not include. Parents may critically construct their experience with their child's treatment in different distinct ways and might have evaluated psychosocial outcomes, clinical outcomes, and the overall treatment process. This may explain the results of the present study in which parents might have been dissatisfied with their child's prefabricated zirconia crowns due to development of mild gingival inflammation and loss of retention.²⁷⁻²⁹ Time taken by both the zirconia crowns preparation were recorded by using the stop watch from initiating the tooth preparation till the completion of tooth preparation. The present study revealed that the time taken by Prefabricated zirconia crowns (Group A) was 1hr 20min and time taken by custom made zirconia crowns was 49 minutes because, in Group A, tooth preparation was done according to the available prefabricated zirconia crown. Whereas in group B, the fabrication of crown was done on the basis of tooth preparation. On comparing the Cost between the group. It was found that Prefabricated zirconia crowns (Rs. 2100) was cost effective as compared to the custom-made zirconia crowns (Rs. 3100). The reason was prefabricated zirconia crowns only required additional charges of Resin based cement (Relyx U200), whereas custom made zirconia crowns required laboratory charges, multiple dental materials such as alginate material, vinyl polysiloxane putty (heavy body as well as light body), acrylic temporary crown, as well as zinc phosphate cement to cement the acrylic crown and at last Resin based cement for a final cementation. Though the present study gave promising results, further studies needed to be conducted on a larger sample size with long term follow up to evaluate and compare the clinical efficacy of prefabricated zirconia crowns and custom-made zirconia crowns used on hypomineralised molars.

Limitations and clinical significance

Limitations of the study were; the conservative tooth preparation for both the crowns can preserve the vitality of the tooth and also open a new avenue towards the minimally invasive dentistry. Though the present study gave promising results, further studies are needed to be conducted on a larger sample size and with long term follow up to evaluate the efficacy of prefabricated zirconia crowns and custom-made zirconia crowns.

CONCLUSION

Based on the results of the study, the following conclusions were drawn; both prefabricated and custom-made zirconia crowns proved to be clinically successful in terms of gingival health, surface integrity, retention, parental satisfaction, time and cost, used as extra coronal restoration in hypomineralized first permanent molars. In terms of gingival health, mild inflammation was seen only in 20% of prefabricated crowns. Whereas, no gingival inflammation was seen in any of the cases restored with custom made zirconia crowns. At the end of 12 months follow up, 20% cases of Prefabricated zirconia crowns failed while 100% custom made crowns retained till the end of the follow-up. In both the groups, there was no change in surface integrity of crowns, as all the crown appeared normal over a following period of 12 months. Both, prefabricated zirconia crowns as well as custom made zirconia crowns were clinically acceptable by the parents. The time taken in custom- made zirconia crown group, from initiating the tooth preparation till the completion of tooth preparation was less as compared to prefabricated zirconia crowns (Group A). In terms of cost, prefabricated zirconia crowns (Group A) were found to be more cost effective compared to custom made zirconia crowns.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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