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COMPARATIVE EFFICACY OF MICROABRASION AND RESIN INFILTRATION TECHNIQUE OF ESTHETIC IMPROVEMENT ON FLUOROSED TEETH: AN IN-VIVO STUDY

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ABSTRACT

Introduction- Dental fluorosis is a tooth malformation that becomes a cosmetic concern particularly if it affects the anterior teeth. There is a need to correct the smile and esthetics of the patient which may be compromised due to fluorotic stain discoloration.

Objective- To evaluate and compare the efficacy of micro abrasion using 18%HCl and pumice and ICON resin infiltration techniques on esthetic improvement and post-operative sensitivity in fluorosed teeth.

Material & Method- A total of 28 subjects with 56 teeth were categorized into 4 Subgroups of Mild fluorosis+Microabrasion,Mild Fluorosis+Resin infiltration, Moderate fluorosis+microbrasion and Moderate fluorosis+Resin infiltration.Esthetic improvement and post-operative sensivity was assessed using VAS scale and Sciff scale respectively.

Results- The resin infiltration technique had shown significantly better Visual Analogue Scale (VAS) scores than microabrasion technique in teeth with mild fluorosis wheraeas microabrasion was found to be better in teeth with moderate fluorosis.

Conclusion- The resin infiltration technique can be considered as a conservative treatment option for mild fluorosis.

KEYWORDS : Enamel micro abrasion, Esthetic Improvement, Resin Infiltration

INTRODUCTION

Dental fluorosis is a malformation of teeth due to excessive ingestion of fluoride in water supply (> 2 to 8 ppm) during the period of tooth development.[1]. It causes an unsightly appearance of the teeth.

One of the most popular technique currently in use for the improvement of cosmetic appearance of fluorosed teeth is enamel micro abrasion. Micro abrasion is a procedure in which a microscopic layer of enamel is simultaneously eroded and abraded with a special compound, leaving a perfectly intact enamel surface behind. In addition to Micro abrasion, teeth discolored by fluorosis can also be managed by bleaching and veneering, or with artificial crowns.

Fluorosis is an endemic condition which requires an ideal treatment option. For teeth affected with fluorosis, the treatment selected should be simple, cost-effective, less time consuming and minimally invasive. Enamel micro abrasion and resin infiltration technique are two techniques, which satisfy these criteria. Thus, the present clinical study was conducted to compare and evaluate, the relative efficacy of enamel micro abrasion (using 18% Hydrochloric acid) and Resin infiltration technique for the esthetic improvement of fluorosed teeth and also to check the post-operative sensitivity[2].

MATERIALS AND METHODS:

The present *in-vivo* study was carried out in the Department of Paediatric and Preventive Dentistry in collaboration with Department of Orthodontics and Dentofacial Orthopaedics, Hitkarini Dental College and Hospital, Jabalpur (M.P).

A total of sixty (N=60) human permanent maxillary central incisors in 30 healthy children (age range 9-14 years) were selected. Out of 30 subjects, 2 subject's parents did not give the written consent for the treatment, thus, we excluded 2 subjects from the study. A total of 28 subjects with 56 teeth who gave their written consent for treatment and children who had both maxillary central incisors affected with mild or moderate grade of fluorosis were included in the study while those with teeth with non-fluoride opacities and tetracycline-stained teeth were excluded from the study.

A complete dental examination was conducted in a relatively humid condition and under an undirected artificial light, for the assessment of degree of fluorosis. The 28 subjects were categorized into:

Group 1: Teeth with mild grade fluorosis according to Dean's fluorosis index:
Subgroup 1A: Enamel microabrasion in mild fluorosis (n=14).

Subgroup 1B: Resin infiltration technique in mild fluorosis (n=14).

Group 2: Teeth with moderate grade of fluorosis according to Dean's fluorosis index:
Subgroup 2A: Enamel microabrasion in moderate fluorosis (n=14).
Subgroup 2B: Resin infiltration technique in mild fluorosis (n=14).

Subgroup 1A and Subgroup 2A: Enamel microbrasion procedure

It was performed on maxillary right permanent central incisor in the subjects with mild and moderate grade of fluorosis. Teeth which were to be treated were cleaned using prophylactic paste and were isolated using rubber dam. A mixture of freshly prepared 18% Hydrochloric acid and fine pumice powder was prepared in a dappen dish to form a thick moist paste for each patient each time before starting the procedure. This paste was applied on the tooth over the area of fluoride discolouration for a duration of 5 seconds using a rotating rubber cup in slow speed hand piece then rinsed for 15 seconds continuously, with a water stream and dried with compressed air. the end of the procedure, GC tooth Mousse was applied for a duration of 4 minutes in order to reduce the post-operative sensitivity.

Subgroup 1b And Subgroup 2b: Resin Infiltration Technique

It was to be performed on maxillary left permanent central incisor in the same subjects with mild and moderate grade of fluorosis.

Step 1:

The application of 15% Hydrochloric acid gel (ICON Etchant) was done for two minutes.using the special applicator tip.Subsequently, the etching gel was washed away with water spray for 30 seconds continuously.

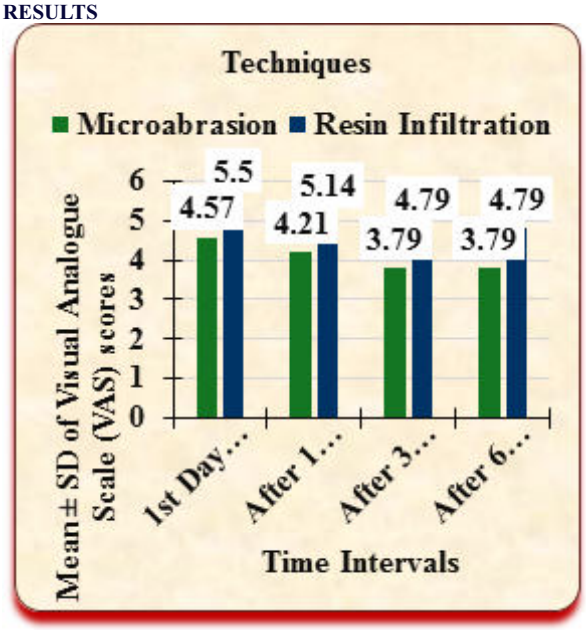
Step 2:
The application of ethanol (ICON Dry) on the etched teeth was done followed by air drying of the tooth surfaces.

Step 3:
Application of low viscosity resin infiltrant (ICON Infiltrant) was done on the tooth surface. The infiltrant was left for 3 minutes to allow its pe netration deep into the lesion.

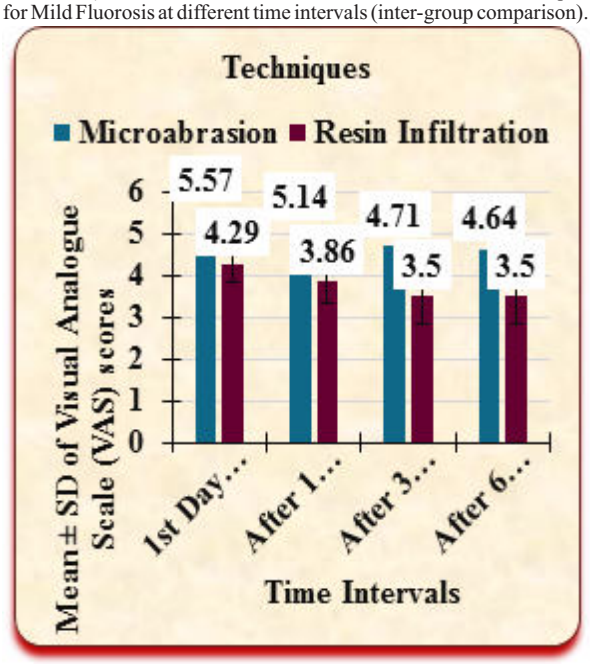
Post-operative photographs (P1) and sensitivity recording (S1) were taken immediately after the completion of the procedure of each patient. Subsequently, these recordings were also taken in the follow-up after 1 month (P2, S2), after 3 months (P3, S3) and after 6 months (P4, S4) respectively.

Esthetic improvement assessment was done using VAS Scale while sensitivity was assessed using Sciff scale.

RESULTS



Graph 1: Comparison of Esthetic Improvement (Visual Analogue Scale/VAS) between Microabrasion and Resin Infiltration techniques for Mild Fluorosis at different time intervals (inter-group comparison).



Graph 2: Comparison of Esthetic improvement (Visual Analogue Scale/VAS) between Microabrasion and Resin Infiltration techniques for Moderate Fluorosis at different time intervals (inter-group comparison).

DISCUSSION

Dental fluorosis can be explain as developmental disturbance of enamel which is caused by excessive fluoride intake and systemic overexposure to fluoride during the first six years of life, when the enamel of the crowns of permanent teeth is being formed.[3] Thus, a conservative esthetic approach for the correction of dental fluorosis not only improves the smiles, but also greatly enhances the self-esteem of the affected individuals.[4,5]

In the present study, the aesthetic improvement was assessed for enamel microabrasion in the teeth with mild and moderate fluorosis immediately after the procedure, after 1 month, 3 months and 6 months interval suggests that microabrasion is producing best results in moderate fluorosis as compared to the mild fluorosis. The microabrasion technique masks and removes the stained tooth structure thereby improving tooth colour, but the surface layer created on the tooth during treatment is a highly polished, densely compacted, mineralized structure.[6] Similar results were seen in a previous study done by **Price *et al.* (2003)**[7] who found the mean improvement in esthetics for enamel microabrasion to be 5.38 in mild-to severe enamel stained teeth. The microabrasion technique using 18% HCl can be effective in removing intrinsic enamel stains [8,9] as demonstrated by **Scherer *et al.* (1991)**[10] **,Croll *et al.* (1986)**[11] and **Allen *et al.* (2004).**[12]

On the contrary, **Train *et al.* (1996)**[13] suggested that the mildly stained teeth achieved better esthetic results.Also, **Bharath *et al.* (2014)**[2] found that enamel microabrasion is not effective in removing stains of even moderate grade of fluorosis which were contradictory to the results of our study.

In the present study, the aesthetic improvement assessed for resin infiltration in the teeth with mild and moderate fluorosis immediately after the procedure, after 1 month, 3 months and 6 months interval suggests that resin infiltration can predictably and significantly improve the esthetics of most teeth in mild fluorosis as compared to the moderate fluorosis. The variation in outcomes for fluorosed teeth treated with resin infiltration may have been due to differences in lesion anatomy, with the thickness of the superficial remineralized layer likely being the biggest factor as suggested by **Senestraro *et al.* (2013),**[9] **Gray *et al.* (2002)**[14] and **Munoz *et al.* (2013)** [15].

In the present study, few subjects showed post-operative sensitivity in teeth with moderate fluorosis treated with microabrasion while none of the subjects showed post-operative sensitivity after resin infiltration technique in the mild or moderate fluorosis immediately after the procedure, after 1 month, 3 months and 6 months interval. Similar results were seen by **Perdigao *et al.* (2017)**[16] who reported no post-operative sensitivity due to the presence of a coating of resin infiltrant on the labial surfaces after treatment of fluorotic enamel discolorations in maxillary anterior teeth.

Within the limitations of the present study, it was found that microabrasion technique can be effective for the treatment of teeth with moderate fluorosis and resin infiltration with DMG Icon can improve the esthetics in mild fluorosis.

CONCLUSIONS

Thus, resin infiltration can be considered as noninvasive, painless procedure for esthetic enhancement without loss of tooth structure and postoperative sensitivity which can be achieved in single visit. However, further *in-vivo* long-term research with a larger sample size and other treatment methods like McInnes bleaching and at-home bleaching using the advanced evaluation techniques of quantifying the discrepancy between the two colors like spectrophotometers (VITA Easy Shade), spectroradiometers, digital subtraction radiography (DSR), colorimeters and image analyzing softwares are needed to validate the results of the present study.

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