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Evaluation and Comparison of Plaque Detection with Novel Fluorescent Plaque Detector and Disclosing Agent: A Clinical Study

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ABSTRACT

Background: Plaque detection and control are extremely important for maintaining individual's oral hygiene. Initially disclosing agents were used to detect plaque, which is time consuming. To overcome the disadvantages of disclosing agents, many newer methods have been introduced for easy and simple plaque detection method. The use of fluorescence spectroscopy is a fast and effective way to monitor oral health condition and for plaque detection.
The purpose of this study is to evaluate the efficacy of newly arising plaque detector device and compare with Disclosing agent.
Methodology: A Comparative Study with a sample size of 100 was taken and plaque was examined using plaque detector (50 patients) and disclosing agent (50 patients) respectively on the anterior teeth facial surfaces. The disclosing dye solution was applied on a fresh cotton swab till the swab was fully saturated and then gently applied on the tooth surfaces. Excess solution was washed away by allowing the participants to rinse with tap water once. Fluorescence photographs were taken of the vestibular aspect of the teeth in the upper and lower jaw using fluorescent plaque detector. Plaque scores were recorded using Quigley-Hein Plaque Index. Independent t test is used to determine the significant differences between both the groups.
Results: Clinical assessment and statistical analysis showed that fluorescent plaque detector is more significant and efficient than Disclosing agent.
Conclusion: It can be concluded that fluorescent plaque detector is simple, easy to use, and convenient when compared to Disclosing agent.

Keywords: Dental plaque; Plaque detection; fluorescent plaque detection; autofluorescence; Oral hygiene;

INTRODUCTION

Dental plaque is defined clinically as structured, resilient, yellow-grayish substance that adheres tenaciously to the intraoral hard surfaces, including fixed and removable prosthesis. It is a sticky, colourless film of bacteria that constantly forms on the teeth and gingiva. Dental plaque is primarily composed of bacteria that naturally inhabit the mouth.[1] When left undisturbed, plaque bacteria multiply and thrive, leading to an increase in bacterial population. Proper oral hygiene practices, including brushing and flossing, are essential for removing plaque and preventing its buildup.[2,3]

Early detection of plaque allows for timely intervention to prevent the development of

gingivitis, which further progresses to periodontitis. Dental plaque can be detected by various methods. Some of them are visual inspection, use of disclosing agents, X rays, and UV light. Disclosing agents are conventional methods for detecting plaque. They are available in form of toothpastes, gels and chewable tablets. Disclosing agents can be used in oral health prevention programs, both for more effective guidance on the use of oral hygiene tools and for their evaluation.[1,4,5]

A fluorescence plaque detector is a diagnostic tool designed to identify and visualize dental plaque on teeth. It provides a real-time assessment of plaque accumulation, enabling timely intervention and preventive measures to maintain oral health. It allows both dental professionals and patients to identify the areas where plaque is present on the teeth. This visual feedback helps individuals understand the importance of thorough oral hygiene practices and effective tooth brushing to remove plaque.[4,5,6] The purpose of this study is to evaluate the efficacy of newly arising plaque detector device and compare with Disclosing agent.

MATERIALS & METHODS

After getting ethical approval from the IEC, Drs S&NR SIDS this Comparative Study with a sample size of 100 was taken and plaque was examined using plaque detector (50 patients) and disclosing agent (50 patients) respectively on the anterior teeth facial surfaces. The disclosing dye solution was applied on a fresh cotton swab till the swab was fully saturated and then gently applied on the tooth surfaces. Excess solution was washed away by allowing the participants to rinse with tap water once. Fluorescence photographs were taken of the vestibular aspect of the teeth in the upper and lower jaw using fluorescent plaque detector. Plaque scores were recorded using Quigley-Hein Plaque Index. Independent t test is used to determine the significant differences between both the groups.

STATISTICAL ANALYSIS

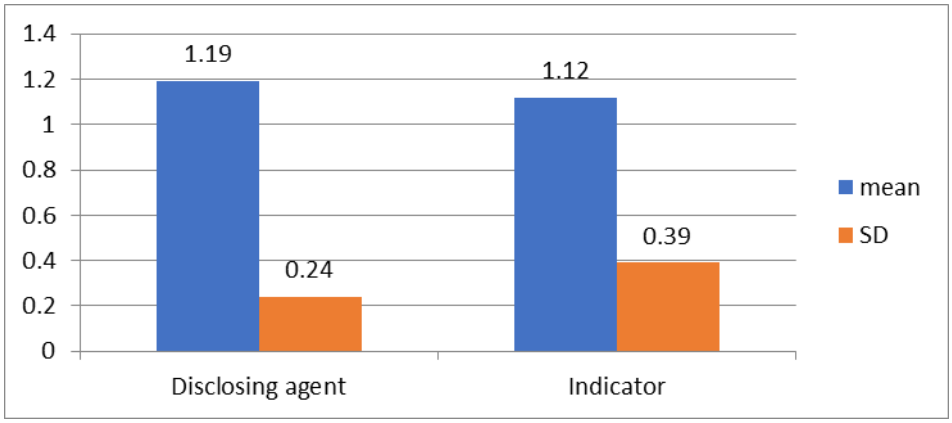
The collected data is entered into Microsoft excel and subjected to statistical analysis using SPSS version 21.0. The data is checked for normality using Shapiro – Wilk test ($p<0.32$) and it showed the data is normally distributed. Descriptive statistics and inferential statistics such as independent t test was performed to compare the plaque scores between the groups. The level of significance set as $p < 0.05$

RESULT

Group	N	Mean	Std. Error Mean	95% Confidence Interval		p Value
				Lower	Upper	
Agent	50	1.19±0.24	0.03	-0.059	0.201	p<0.281
Indicator	50	1.12±0.39	0.05			

Table 1: Inter Group Comparison of plaque scores in agent and indicator groups
Independent t –test, statistical significance set as p<0.05*

From the table, it is observed that the plaque scores are slightly higher in the disclosing agent group than the indicator group. There is no statistical significance observed between the groups.



DISCUSSION

The Present study was attempted to find alternative to plaque detection with disclosing agent.

A cross-sectional study was conducted to assess the correlation between dental plaque scores determined by the measurement of red autofluorescence or by visualization with a two-tone solution. Overnight plaque from the anterior teeth of 48 participants was assessed for red fluorescence on photographs (taken with a QLF-camera) using a modified Quigley & Hein (mQH) index. A two-tone disclosing solution was applied. This study concluded that plaque, as scored on white-light photographs, corresponds well with clinically assessed plaque. A weak to moderate correlation between red fluorescing plaque and total disclosed plaque or blue disclosed plaque was found.[2]The results of the present study were in agreement with the other studies.[7,8,9]

A study was conducted to assess whether the newly arising plaque detecting techniques are better over the traditional technique i.e disclosing agents and check their efficacy. A sample size of 520 under graduate students were taken and plaque has been examined using Q scan plus and disclosing agent. Then a questionnaire has been prepared based on the ideal properties of plaque detection and asked the subjects to fill after the examination. This study concluded that the fluorescent plaque detection technique is superior to disclosing solution in every aspect and it's very easy to use, without any residual stains, faster and also known to have higher specificity according to this study based on the responses. The findings of this study were in agreement with the clinical results of the present study.[3] Patients were comfortable with the usage of plaque detector and can be recommended for easy detection of dental plaque.[10,11]

The relationship between oral health and general health was proven. Educating the importance and promoting the oral health maintenance provides significant improvement in wellness of the individual.[12] Further studies are recommended with large sample size and different age groups for early detection of plaque.

CONCLUSION

The present study demonstrate that the fluorescent plaque indicator is easy to use, sensitive, economical, carriable and detects the plaque easily with in less time than disclosing agents.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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