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RESEARCH ARTICLE

EFFICACY OF ULTRASONIC SCALING USING MAGNIFICATION LOUPES – A SPLIT MOUTH RANDOMISED CONTROLLED CLINICAL TRIAL

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ABSTRACT

Background: Magnification system is a popular practice in the dental procedures in the last 3 decades. A magnified view of a tooth surface may facilitate detection and removal of calculus that is located on the subgingival surface. **Aim and Objective**: The aim of this study was to assess the efficacy of magnification loupes as an adjunct to scaling procedure for the treatment of gingivitis or Periodontitis. The primary objective is to compare the results of ultrasonic scaling by with and without the use of Magnification loupes. Posture assessment was our secondary objective. **Methods**: The 26 patients who were selected for the study were subjected to non surgical treatment by ultrasonic scaling. The quadrants were divided equally between right and left sides. On one side ultrasonic scaling was performed with naked eye. On contralateral side ultrasonic scaling was performed with the use of Magnification loupes. Clinical baseline data including probing depths, oral hygiene index and Bleeding index were recorded before treatment and at 4 weeks. **Results**: At 4 weeks, compared with the control group, there were statistically significant difference in OHI and Bleeding Index. **Conclusion**: The use of magnification loupes for scaling did not significantly improve clinical outcomes as compared to scaling without any visual aid.

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INTRODUCTION

Dentistry is a sophisticated subject that requires finest motor skills. Modern dentistry has tried to analyse different ways of enhancing skills for clinical work and improve visual acuity; and one way to achieve is by Magnification (Apothekar, 2012). The field of magnification incorporates the use of loupes and surgical operating microscope.

Since loupes are more affordable, they are most commonly used in every field of dentistry especially in restorative and periodontics. Use of magnification may improve the ability of the dentist to perform scaling and root planing procedures compared to naked eye scaling (Dentino, 2000). Conventional scaling is considered to be the gold standard in periodontal therapy and is a prerequisite for a successful treatment

outcome. Along with improving the visual acuity the use of magnification also maintains better clinical posture. Using loupes the dentist can better associate a tactical sensation of calculus detection and better color contrast between calculus and normal tooth structure (Christensen, 2003). There are very few studies which has compared efficacy of scaling with and without loupes and with regard to improvement of posture. Hence the present study was carried out with the objective to evaluate and compare the efficacy of Ultrasonic scaling with and without Magnification. Posture assessment during the use of Loupes was another objective of this present study.

MATERIALS AND METHODS

The Study was conducted in The Department of Periodontics at Dayananda Sagar College of Dental Sciences, Bangalore, India, for a period of 6 months. The patients were selected from the out-patient department of the hospital who required full mouth scaling. Inclusion criteria were: 1. systemically healthy patients aged between 18-50 years diagnosed with moderate to severe gingivitis or mild periodontitis. 2. At least 15 teeth to be present in one half of the mouth. 3. Patients who did not undergo scaling in the last one year. 4. Patients who agreed to participate in the study with signed informed consent. Exclusion criteria- 1. Smokers and history of alcoholism; 2. Any systemic disorders and patients on any kind of medication. 3. Probing depth more than 6 mm were excluded from the study.

The study design was a spilt mouth single blind randomised controlled clinical trial and conducted for a period of 6 months. For patients who were selected, a thorough case history was recorded on a case history proforma. Oral hygiene index (OHI) by Greene and Vermillion 1964; and Bleeding Points Index (BPI) by Lenox JA and Kopczyk RA 1973, was recorded as per the criteria given. The site for scaling with magnification was described by Coin toss method. The person who chose 'head' was scaled on right side using Magnification loupes (2.5x). The subjects who chose 'tail', was scaled on left side with loupes. Supra and subgingival scaling was performed by EMS ultrasonic scaler using tapered and surface tips. The study design comprised of 2 groups which were categorised as follows.

Test group X: Supra and subgingival scaling with loupes on one half

Control group Y: Supra and subgingival scaling without loupes on the other half. (i.e without any visual aid)

All the patients were instructed to use preprocedural mouthrinse with 10 ml of chlorhexidine 0.2%, 30 minutes before the start of the procedure. The area to be scaled was anesthetised using lignocaine spray for the comfort of the patient. The scaling was done until smooth tactile sensation was felt by explorer which was performed by 3 trained professionals. The scaling procedure was done on 2 consecutive appointments by the examiner since the posture-related concerns needed to be assessed. The experience of the examiner was documented by asking the following questionnaire.

- Was there any difference in pain with or without use of magnification?
- What was the clinician's opinion regarding his own posture with and without use of loupes?
- Whether the quality of work improved or reduced?

STATISTICAL ANALYSIS

SPSS (Statistical Package for Social Sciences) version 20. (IBM corp. Armonk, NY, USA released 2011) statistics was used to perform the statistical analysis

- Data was entered in the excel spread sheet.
- Descriptive statistics of the explanatory and outcome variables were calculated by mean, standard deviation, median for quantitative variables, frequency and proportions for qualitative variables.
- Inferential statistics like
- Mann-whitney test was applied to compare the OHI scores and Bleeding scores between the groups
- Wilcoxon sign test was applied to compare the OHI scores and Bleeding scores within the group (before and after comparison)
- The level of significance is set at 5%

RESULTS

The study comprised of 26 patients. But 4 of them did not report for the follow up after 4 weeks and they were excluded. Hence the study comprised of 22 patients, 11 males and 11 females , aged between 19 to 49 years (mean age 29.46). The information about OHI and BPI at baseline and at 4 weeks after treatment and the relevant statistical analysis are shown in Table 1 and 2. Data was subjected to normalcy test. Since the data didn't follow normal distribution, Non-parametric tests were applied and median values were considered for interpretation. The median baseline OHI score in the test group was 2.8 and median baseline score in control group was 2.95 with P value of 0.37 and it was not statistically significant. The median OHI score 4 weeks after intervention in test group was 0.85 and 0.80 in control group (with P =0.8) and it was not statistically significant. The BPI score at baseline was 45% (median) in test group and 42% in control group. The Bleeding Points Index after scaling (at 4 weeks) reduced to 8% and 16% respectively in the Test and Control group, but it was not significant. But comparison of the OHI scores within the test group showed statistically significant (P =0.00) result with 2.8 (median) at baseline and 0.85(median) after treatment.

Similarly comparison of OHI score in control group showed statistical significance (P=0.00) with median value of 2.9 at baseline and 0.9 after scaling. (Table 3, figure1). Intra group Comparison of Bleeding points index score in test group showed highly significant (P 0.00) with value of 45% at baseline and 8% after treatment. The bleeding index score within the control group was also highly significant with value of 42% at baseline and 16% after treatment. (Table 4, figure2)
The study also analysed the posture related problems among the examiners and results were as follows:

The quality of work was increased due to the use of loupes.
There was a positive change in the operator posture due to the use of loupes. The working area was clearer due to the use of loupes. All the examiners rated improvement in posture and low incidence of pain in lower back and neck region.

Table 1. Comparison of The OHI Scores Between The Groups Using Mann-Whitney Test

		Minimum	Maximum	Mean	S.D	Median	Mean diff	P value
Before	Group X (Test)	1.6	4.1	2.782	.7506	2.80	-0.20	0.37
	Group Y control)	1.7	4.4	2.982	.7551	2.95		
After	Group X (Test)	.2	2.0	.864	.4746	0.85	-0.04	0.80
	Group Y (control)	.5	1.8	.907	.3960	0.80		

Table 2: Comparison of The Bleeding Index Scores Between The Groups Using Mann-Whitney Test

		Minimum	Maximum	Mean	S.D	Median	Mean diff	P value
Before	Group X (Test)	25.0	81.0	48.727	18.1428	45.0	-0.81	0.94
	Group Y (control)	22.0	95.0	49.545	19.9397	42.0		
After	Group X (Test)	3.0	36.0	12.091	8.6625	8.0	-2.09	0.27
	Group Y (control)	2.0	32.0	14.182	8.0631	16.0		

Table 3 : Comparison Of The OHI Scores Within The Group Before And After Intervention Using Wilcoxon Sign Test *significant

		Minimum	Maximum	Mean	S.D	Median	Mean diff	P value
Group X (Test)	Before	1.6	4.1	2.782	.7506	2.80	1.91	0.00*
	After	.2	2.0	.864	.4746	0.85		
Group Y (control)	Before	1.7	4.4	2.982	.7551	2.95	2.07	0.00*
	After	.5	1.8	.907	.3960	0.80		

Table 4: Comparion of The Bleeding Index Scores Within The Group Before And After Intervention Using Wilcoxon Sign Test *significant

		Minimum	Maximum	Mean	S.D	Median	Mean diff	P value
Group X (Test)	Before	25.0	81.0	48.727	18.1428	45.0	36.63	0.00*
	After	3.0	36.0	12.091	8.6625	8.0		
Group Y (control)	Before	22.0	95.0	49.545	19.9397	42.0	35.36	0.00*
	After	2.0	32.0	14.182	8.0631	16.0		

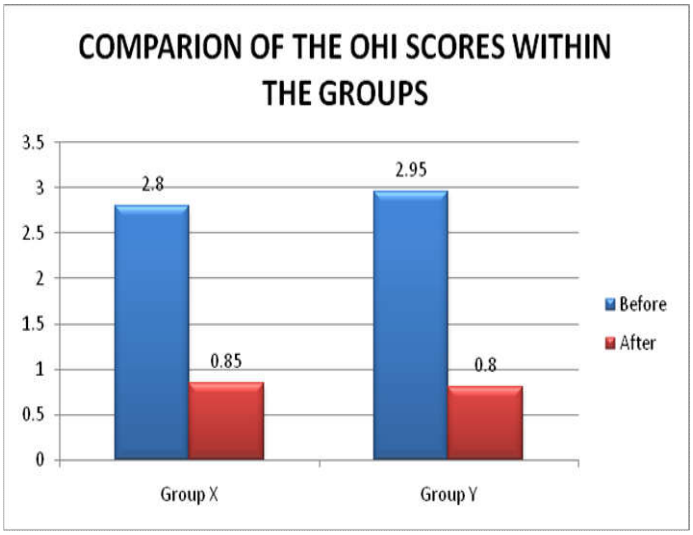

Figure 1

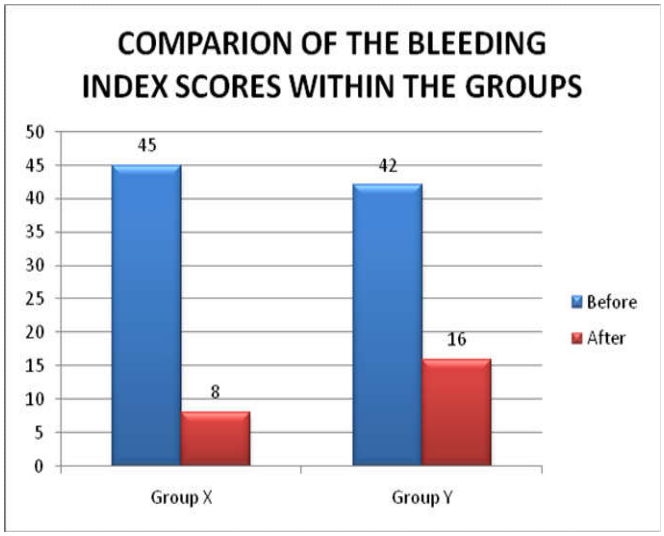

Figure 2

DISCUSSION

In the present study no significant difference was observed among the groups before and after treatment, both in OHI score and BPI score. But when comparison within the groups before and after scaling showed highly significant difference in both OHI and BI with P=0.00. The results of the present study showed that adjunctive use of magnification loupes can improve the short term clinical results of conventional scaling as a non surgical treatment of gingivitis and mild to moderate periodontitis. Conventional scaling and root planing is a prerequisite for a successful treatment of periodontal disease. Currently various adjuvant methods are available to improve the treatment outcomes like host modulation (Kirkwood, 2007), low level laser therapy (Georgios Romanos, 2015) and local drug delivery (Killoy, 1998). But most of these treatments are expensive and also associated with side effects. Hence the present study was designed to evaluate the efficacy of ultrasonic scaling with magnification loupes. In addition assessment of the clinician's (operator) posture improvement was also done. The split mouth design was employed in order to avoid inter-subject variability and it also requires fewer subjects than parallel group design (Nikolaos Pandis, 2013).

Both the treatment groups in this study showed significant improvements in clinical parameters at 4 weeks compared to baseline. However on comparison among the groups there was no significant difference in the clinical outcomes. The study by Corbella et al. (2018) and Parvez et al. (2018) also showed similar results , where no difference among the group were seen before and after scaling with regard to patient related outcomes. However the study by Dadwal et al. (2018) showed improved results after scaling and root planing. The difference in the results could be that additional root planing with curettes were employed which might have given favourable results. Whereas in our study only ultrasonic scaling were used. Further studies are required to validate these results.

The positive aspect of the study was that, overall body posture improved when wearing magnification loupes. The examiners revealed that forward flexion of the head and shoulder bending was minimal while using loupes. They also reported that several adjustments needed to be made like adjusting the lens position, prevent fogging of the lens and practising oneself to find a comfortable depth of field. But all expressed satisfaction in the work environment since they had clear view of the working area. Thus the magnification loupes are useful for larger number of dental professionals.

Conclusion

The use of magnification loupes for scaling did not significantly improve clinical outcomes as compared to scaling without any visual aid.

But the use of magnification loupes definitely improved the posture for dental clinicians.

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