Effects of Periodontal Instrumentation on Quality Of Life and Illness in Patients with Chronic Obstructive Pulmonary Disease: A Pilot Study

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Abstract

Purpose: To assess if patients with chronic obstructive pulmonary disease (COPD) receiving periodontal debridement for treatment of chronic periodontitis with ultrasonic or hand instrumentation experienced changes in quality of life or incidents of illness following treatment or no treatment.

Methods: The study design was a 3 group, randomized, controlled pre– and post–test experimental pilot study. Volunteers with COPD and chronic periodontitis (n=30) were recruited from physician offices or fliers and randomly assigned to 1 of 3 groups. Of those, 2 groups had periodontal debridement using either magnetostrictive ultrasonic instrumentation (n=10) or hand instrumentation (n=10). A control group (n=10) received no treatment. Primary outcomes, quality of life and illness were measured by the St. George's Respiratory Questionnaire (SGRQ–A) and Illness Questionnaire, respectively. Subjects completed the questionnaires as pre–tests at baseline and as post–tests 4 weeks post–treatment/no treatment. Repeated measures ANOVA was used to compare groups on continuous variables ($p \leq 0.05$) measured by SGRQ–A total scores and symptoms, activities and impacts subscales. Percentages, frequencies and cross tabulations were calculated for categorical data.

Results: SGRQ–A and Illness Questionnaire scores showed no significant differences between groups in quality of life or illness following periodontal debridement. Total SGRQ–A scores decreased slightly for all groups with no significant difference among groups ($p=0.138$) and no interaction ($p=0.794$). Cross tabulations showed no relationship between indicators of self–reported illness before and after treatment/no treatment. No adverse events were reported.

Conclusion: Based on this small–scale study, it seems periodontal debridement for chronic periodontitis has no effect on quality of life and illness in patients with COPD, and it may be performed with ultrasonic or hand instruments without adverse events.

Keywords: Pulmonary disease, chronic obstructive (COPD), chronic periodontitis, quality of life, periodontal debridement, nonsurgical, scaling and root planing, randomized controlled trial

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Introduction

Chronic obstructive pulmonary disease (COPD) is the fourth leading cause of death in the world, and the World Health Organization predicts it will become third by 2030.[1] In 2007, the prevalence of COPD worldwide was reported to be 10.1%.[2] There are 2 main forms of COPD: chronic bronchitis and emphysema.[3] Researchers have identified a possible relationship between periodontal disease and COPD. Studies have suggested:

1. People with poor periodontal health are at increased risk for COPD[4–7]
2. Those with more advanced periodontitis have more severe COPD[7–9]
3. Individuals with COPD have greater alveolar bone loss and clinical attachment loss (CAL) than those without COPD[4,9,10]

Smoking may be a cofactor in the association between COPD and periodontal disease because it plays a significant role in the etiology of both diseases.[11] While an association between these 2 chronic diseases has been identified, a causal association has not been proven.[12,13]

In a systematic review published in 2007, Azarpazhooh et al reported that evidence existed to support an association between pneumonia (acute respiratory infection in the lung) and oral health.[13] However, little evidence existed supporting a weak association between COPD and

oral health with an odds ratio of less than 2.[13] Studies published since the review by Azarpazhooh et al indicate an association between poor periodontal health and respiratory disease. These findings support a trend toward a fair association between COPD and periodontal health.[4,7,9,10] One type of pneumonia studied is hospital–acquired, or nosocomial, pneumonia. Studies have concluded that inadequate oral hygiene resulting in accumulation of dental plaque biofilms may promote oropharyngeal colonization of respiratory pathogens, which increase the risk for lower respiratory tract infections, including pneumonia, in hospitalized patients with weakened host response.[14,15]

It is speculated that aspiration of these oropharyngeal secretions, containing respiratory pathogens, can result in acute respiratory infection known as aspiration pneumonia.[3] Additionally, studies have reported that microorganisms associated with denture plaque or periodontal disease may give rise to aspiration pneumonia in susceptible individuals, and prevalence of anaerobic bacteria in the oral cavity may increase the incidence and prognosis of aspiration pneumonia.[16–18] A longitudinal study of elders over age 80 found the adjusted mortality from pneumonia was 3.9 times higher in persons with 10 or more teeth with probing depths greater than 4 mm.[18] Other studies have shown professional oral health care (i.e., chemical and/or mechanical plaque control) reduced the prevalence of acute respiratory infections.[19,20] Population samples in these studies included only high–risk individuals in hospitals or long–term care facilities. A systematic review designed to assess the preventive effect of oral hygiene on pneumonia and respiratory tract infection indicated mechanical oral hygiene has a preventive effect on mortality from pneumonia and non–fatal pneumonia in hospitalized elderly or those living in nursing homes, reducing death from pneumonia by approximately 1 in 10 cases.[21]

In their systematic review, Azarpahzooh et al concluded there is good evidence that oral pharyngeal decontamination with antimicrobials reduces the incidence of pneumonia, and also concluded that frequent professional oral health care slows the progression or decreases occurrence of respiratory diseases in high risk elderly adults in hospitals and nursing homes.[13] Results from 2 randomized clinical trials revealed weekly oral hygiene care provided by dental hygiene professionals (scaling and mechanical plaque control), with and without tooth brushing after every meal with 1% povidone iodine, reduced frequency of pneumonia, respiratory tract infections and fatal pneumonia in dependent elders.[22,23] Studies utilizing data from National Health and Examination Surveys I and III, controlled for possible confounders, documented an association between oral hygiene and chronic respiratory disease.[6,24] Findings from a multicenter, case–control study of ambulatory patients with COPD concluded that promoting oral health knowledge and regular dental visits/supragingival scaling should be integrated components of strategies for prevention and treatment of COPD.[4] A recent study found that periodontal parameters (missing teeth and plaque scores) were significantly associated with lower quality of life in COPD patients, as measured by the St. George's Respiratory Questionnaire (SGRQ).[25] These results and findings of studies regarding aspiration pneumonia support the importance of oral hygiene for people with histories of acute and chronic respiratory diseases.

Mechanical debridement by ultrasonic or hand instruments has been shown to be equally effective in improving clinical parameters in periodontal therapy.[26–28] Ultrasonic devices create significant aerosols contaminated with oral bacteria.[29–31] A longitudinal study of U.S. veterans identified an association between number of functional dental units present, presence of Staphylococcus aureus, Streptococcus sobrinus and Porphyromonas gingivalis, and aspiration pneumonia in dentate patients with a history of lower respiratory tract infections.[17] Porphyromonas gingivalis is a well–known periodontal pathogen. There is documented concern in textbooks regarding use of ultrasonic instrumentation for patients with respiratory disease based on concern about possible aspiration of pathogenic bacteria during treatment.[32–34] Manufacturers (e.g., Cavitron® Jet Plus™, Dentsply International, York, PA) recommend physician consultation regarding disease status prior to air polishing for severe respiratory disease. Anecdotal evidence suggests dental practitioners routinely use ultrasonic devices to treat periodontal disease, despite presence of COPD. Little is known about patient safety and risks, such as post–treatment illness or treatment impacts on quality of life, associated with potentially aspirated bacteria during hand or ultrasonic instrumentation for these patients.

No studies were found in the literature that studied the effects of periodontal therapy on chronic lung diseases in high–risk individuals with periodontal disease, although these conditions commonly co–exist. The purpose of this study was to assess if patients with COPD and chronic periodontitis had a change in their health–related quality of life or self–reported illness following nonsurgical periodontal therapy with ultrasonic or hand instrumentation.

Methods and Materials

The study design was a 3 group, randomized, controlled pre– and post–test experimental pilot study. Human subject approval was granted from

the Idaho State University Human Subjects Committee institutional review board and the Portneuf Medical Center institutional review board. The study was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2000. All subjects gave informed consent to participate. The principal investigator, a licensed dental hygienist, performed the oral examination, informed consent process and treatment procedures.

Study Population

A convenience sample of 30 subjects was recruited from physician offices or by distributed fliers between January 2009 and February 2010. Recruitment included a diagnosis of COPD from medical databases. These patients were contacted by their medical provider via telephone calls or letters, depending on the preference of each participating physician office, to determine interest in the study and relay study contact information to interested individuals. In addition, fliers were posted in various approved medical and dental facilities. Once contacted, the principal investigator determined initial eligibility of sample participants based on predetermined criteria via telephone interview (e.g., presence of natural teeth, no dental treatment in preceding 6 months and/or no antibiotics preceding 3 months). Individuals meeting initial eligibility criteria were invited for an oral examination appointment to establish continued eligibility for participation.

Potential subjects signed HIPAA acknowledgement and release forms prior to oral examination. Assessment included medical history review, vitals (blood pressure, pulse, respirations and pulse oxygen saturation), radiographs (bitewings and anterior periapicals), oral cancer screening, dental and periodontal charting, plaque index (PI) and mean attachment loss (MAL). Inclusion criteria specified:

- Aged 20 years or older, willingness to voluntarily participate and ability to understand American English
- At least 6 natural teeth
- Chronic periodontitis, as manifested by ≥1.5 mm MAL

Exclusion criteria specified:

- Significant oral infection (e.g., rampant caries or abscesses)
- Antibiotic usage in the preceding 3 months
- Dental treatment in the preceding 6 months
- Institutionalized individuals (e.g., hospitalized, nursing home, assisted living or home bound)
- Pregnancy
- Current cancer or cancer treatment
- Conditions requiring antibiotic prophylaxis prior to dental treatment

Periodontal Parameters

The PI was assessed utilizing Silness et al's criteria.[37] Comprehensive periodontal examination included probe depths and recession using a UNC–12 periodontal probe (Hu–Friedy®, Chicago, IL) at 6 sites on each tooth (partially–erupted teeth excluded), furcation and mucogingival involvement, mobility and bleeding on probing (allowing for a 10 second delay). MAL was calculated by summing all CAL measurements (probe depth plus recession) and dividing by the number of sites recorded.[6,36] PI and MAL scores were not needed for hypothesis testing of quality of life or illness outcomes; they were used to determine eligibility and analyzed as possible covariates. Intrarater reliability for the principle investigator/clinician was established for the PI (r=0.95) and MAL (r=1.0) utilizing 7 patients presenting with CAL. Measurements were recorded 1 week apart.

Questionnaires

All subjects completed a demographic and oral habits questionnaire at baseline. Two dependent variables were measured using survey instruments as pre–test at baseline and post–test 4 weeks after treatment in the experimental groups. The control group was administered the same pre–test questionnaires at the oral examination appointment and 6 weeks following no treatment to compensate for the 1 to 2 weeks between treatment sessions of experimental groups.

The primary outcome measure, quality of life, was measured using the SGRQ–A (American English modified version of the SGRQ), a questionnaire developed to correlate with medical measurements of chronic airflow limitation to determine if patients perceive improvements or deterioration in status. The SGRQ–A U.S. English version was obtained and used with permission from P. W. Jones, PhD, FRCP, Professor of Respiratory Medicine, St. George's Medical School, University of London. It is an established valid and reliable tool designed to measure impaired health and quality of life in chronic airway disease.[37–44] The SGRQ–A includes 76 weighted items scored 0 to 100 with 3 subscales: symptoms of respiratory problems (frequency and severity of cough, sputum, wheeze), daily activities (limited by breathlessness or troubled breathing) and impacts (influence of breathing problems on social or psychological functioning). A decrease of 4 units or greater in the SGRQ–A total score indicates a clinically significant improvement in HRQL.[39] A change of 4 units (or points) in the mean total score of the

SGRQ–A indicates a clinically significant change in disease status should be observed. This guideline is only applicable to the total score, not the individual subscales. An additional question at the beginning of the SGRQ–A (scored separately and not considered part of the SGRQ–A) ranks self–assessment of overall health status on a 5 point Likert scale from very poor to very good.

A study published in 2011 utilized SGRQ to assess and correlate quality of life in COPD patients with periodontal parameters.[25] Findings indicated number of missing teeth and PI were significantly associated to the scores of quality of life, but periodontal treatment was not provided. To the authors' knowledge, this is the first study to use of the SGRQ–A as an instrument to measure quality of life in relationship to dental treatment.

The second dependent variable (self–reported incidents of illness) was measured by the Illness Questionnaire, developed by the principal investigator. The Illness Questionnaire had 7 yes/no response questions regarding illness in the 4 immediately preceding weeks (respiratory or other), doctor visits, antibiotic usage, usage of respiratory medication and past dental experiences. Face validity was determined by a panel of 3 physicians with expertise in research methods and treatment of COPD patients.

Randomization and Blinding in Research Design

Eligible subjects were randomly assigned by a research assistant to 1 of 3 groups (ultrasonic, hand instruments or control) using a table of random numbers from a random number generating website (Research Randomizer®, Social Psychology Network) until each group had 10 subjects. When a group reached 10 participants, that group was skipped on the random number table until another group was selected. The principal investigator, as treatment provider, could not be blinded to group allocation. However, to ensure the treatment provider was blinded to outcome measures (i.e., answers to questionnaires) a research assistant assigned each participant a confidential code for the questionnaires and administered in a private location.

Treatment Protocol

Subjects in the treatment groups were scheduled for 2 independent periodontal debridement sessions in which half–mouth was treated at each appointment. Local anesthetic was used as needed for pain control and recorded. Both treatment appointments were completed for each subject within a 1 to 2 week time period. Length of appointment was determined by completion of instrumentation until all clinically–detectable deposits in the designated half mouth were removed and varied depending on number of teeth, pocketing and amount of deposits. Treatment for the ultrasonic instrumentation group was performed with a magnetostrictive ultrasonic unit (Cavitron® Jet Plus™, Dentsply International, York, PA) using standard thin tips (30K™ Slim Line Inserts, Dentsply International, York, PA). Treatment for the hand instrumentation group was performed with curettes (Gracey 1/2, 11/14 and 12/13 curets, Hu–Friedy®, Chicago, IL).

To decrease exposure to other aerosols, treatment was provided on a day when the clinic was not being used for other patient care, and there were 30 minutes between treatment sessions. Infection control procedures recommended by the CDC were followed.[31] Water, ventilation and sterilization systems at the clinic met standards recommended by the CDC. The ultrasonic was connected to a closed water system with distilled water treated with waterline maintenance tablets (BluTab™, ConFirm Monitoring Systems, Inc., Englewood, CO). Conventional dental suction was used for evacuation. All subjects pre–rinsed for 30 seconds with 15 ml of 0.12% chlorhexidine gluconate (Peridex®, 3M ESPE, St. Paul, MN) prior to treatment.

Data Management and Statistical Analyses

A power analysis was undertaken to determine sample sizes needed to detect differences between groups based on the SGRQ–A data using the statistical software PASS.[45] A power of 80% was used to detect a large effect size (Cohen's d=0.80) as defined by Cohen.[46] A large effect size was chosen due to anticipated subject recruitment challenges, due to exclusion criteria precluding participation by individuals who were edentulous, taking antibiotics or requiring antibiotic prophylaxis for periodontal treatment.

Data were entered into spreadsheets formatted for SGRQ–A or a statistical software package (SPSS, Version 17.0), proofed for data–entry errors and analyzed in consultation with a statistician. Descriptive statistics were calculated for demographic data. Percentages and frequencies were calculated for categorical data, and means and standard deviations were calculated for continuous data. Statistical tests appropriate to the measurement level of the data were performed to assess additional hypothesized relationships. In order to compare the 3 groups on continuous variables, repeated measures of ANOVA were performed. When statistical significance was detected between groups, post hoc tests (Tukey HSD) were run. To assess the relation-

ship between group and categorical variables, chi–square (x^2) tests of independence were performed. Due to the small sample size the chi–square test was not valid.

The assumptions of normality and homoscedasticity were tested (Kolmogorov–Smirnov test, Levene's test). Nonparametric tests (Wilcoxon Signed Ranks test) were used as appropriate when violations of the parametric assumptions were found. Repeated measures of ANOVA were used for the SGRQ–A total and subscale data. For each of the scale measurements means ± standard deviations were reported. Cross tabulation was used for Illness Questionnaire, demographic and oral habits data and reported as frequencies or percentages.

Results

Thirty subjects were enrolled in the study; 20 received periodontal debridement with ultrasonic instrumentation (n=10) or hand instrumentation (n=10), and the control group (n=10) had no treatment during the study (treatment was offered following study completion). A total of 462 patients with COPD were informed of the study by their medical care provider via mail (n=246) in one practice or telephone (n=216) in the remaining offices. Subject recruitment presented difficulty, as many potential subjects with COPD did not respond to the letter from their provider informing them of the study (n=235). Others did not meet inclusion criteria for the study or were not interested (n=215). Thirty subjects were recruited: 11 by mail, 7 by phone and 12 from fliers.

Subject characteristics are depicted in Table I. Most subject characteristics were ordinal data, with aggregate results reported as frequencies and/or percentages (n/%). There were no significant differences between groups with regards to age, education, race, smoking status, steroid use, oral habits or PI. Age, PI and MAL data met tests of normality (Kolmogorov–Smirnov test), therefore, ANOVAs were calculated. Means and standard deviations were reported.

Mean age of all subjects was 64 years with no differences between groups (p=0.257). The sample had unequal distribution of sex in the 3 groups, however, sample size was too small to determine if differences were statistically significant. The majority of the sample consisted of current and former smokers (26/30, 86.7%). Extent of plaque biofilm, as measured by the PI, did not differ significantly between groups (total mean PI 1.9±0.49, p=0.672). The mean MAL was 3.9 mm±0.95. A significant difference between groups was found in MAL (p=0.001). Post hoc Tukey HSD test found the ultrasonic group had significantly more MAL than the hand instrument group (4.63±0.88, 3.20±0.45, respectively). However, the control group MAL (3.86±0.88) did not differ significantly from either the ultrasonic or hand instrument groups. There were no notable differences between groups with regards to oral habits (e.g., type and frequency of toothbrush, toothpaste, interdental aid and antimicrobial or fluoride mouth rinse).

Local anesthesia was used for 4 ultrasonic and 3 hand instrument subjects. Total instrumentation time varied between 40 and 215 minutes (101±50.65 min) but did not vary significantly between the 2 treatment groups as determined by the Mann–Whitney test (p=0.123). This nonparametric test was used because the data violated normality based on one outlier in the ultrasonic group (e.g., 215 minutes) as determined by the standardized residual for total treatment time.

SGRQ–A total scores, overall self–assessment of health scores and Illness Questionnaire responses showed no significant differences between groups with no significant improvements from pre– to post–test for all groups. All SGRQ–A statistics met the assumption of normality (Kolmogorov–Smirnov test). Therefore, ANOVA repeated measures were used to analyze data. Mean scores are displayed in Figure 2. There were no differences between groups on total SGRQ–A scores at pre–test (p=0.422). The total SGRQ–A scores decreased (i.e., improved quality of life) slightly for all 3 groups, although not significantly (p=0.138) and between group interactions (p=0.794) were not observed. There were no main effects of group (p=0.333). With regards to SGRQ–A subscales (Table II), no significant differences were detected between groups for symptoms (p=0.158), activities (p=0.815) or impacts (p=0.286), and no group interactions were observed. The symptoms and impacts scores showed no significant difference from pre– to post–test for all groups combined (p=0.707 and p=0.703, respectively). The activities score decreased significantly from pre– to post–test (improved activities) for all 3 groups combined (p=0.023). However, no interactions between the groups for activities were detected (p=0.702).

Overall current health, a secondary outcome measure not considered part of the SGRQ–A, was measured by a single question at the beginning of the SGRQ–A (5 point Likert scale ranked very poor to very good). Pre– and post–test results were compared separately for each group (Wilcoxon Signed Ranks test). All groups rated their health as slightly improved following treatment/no

Table I: Subject Characteristics

Variables	Total (n=30)	UI* (n=10)	HI** (n=10)	Control (n=10)	p–value
Age (years; mean ± SD)	64±7.90	62±7.76	68±7.20	62±8.33	0.257
Gender (male/female; n)	20/10	9/1	5/5	6/4	
Race (n)					
Non–Hispanic White	25	7	8	10	––
Non–Hispanic Black	1	0	1	0	––
Other	4	3	1	0	––
Education (n)					
Less than high school	1	1	0	0	––
High school	11	3	6	2	––
Some college	9	4	1	4	––
College degree	9	2	3	4	––
PI*** (mean ± SD)	1.90±0.49	1.93±0.45	1.78±0.40	1.96±0.64	0.672
MAL# (mean ± SD)	3.90±0.95	4.63±0.88	3.20±0.45	3.86±0.88	0.001
Smoking status (n)					
Never smoked	4	0	1	3	––
Former smoker	15	6	5	4	––
Current smoker	11	4	4	3	––
Current steroid use (n=29) (yes; n)	3/29##	2/10	1/10	0/9	0.360
Treatment groups only	n=20	n=10	n=10	––	––
Instrumentation time (n=20; mean ± SD)	100.85±50.65	87.20±51.47	114.50±48.50	––	0.496
Use of local anesthetic (yes; n)	7/20	4/10	3/10	––	0.639

*UI= ultrasonic instrumentation
**HI= hand instrumentation
***PI= plaque index
#MAL= mean attachment loss
##One person in the control group did not answer the question about current steroid use

treatment, however, changes were not statistically significant (Table III). The mean self–assessment score in the hand instrumentation group was 3.9 at pre–test and 4.0 at post–test, with no significant difference (p=0.564). For the control group, mean self–assessment scores were 3.3 at pre–test and 3.6 at post–test, with no significant difference (p=0.317). The mean pre–test self–assessment score for the ultrasonic instrumentation group was 3.1 and 3.6 at post–test, approaching statistical significance (p=0.059).

Cross–tabulation showed no difference in yes responses related to self–reported illness (Illness Questionnaire) before and after treatment/no treatment (Table IV). Results were reported as yes responses indicating some degree of self–reported illness. Items assessing respiratory problems, other sickness, doctor visits, antibiotic usage and additional respiratory medications 4 weeks prior to pre– or post–questionnaires were used to determine degree of self–reported illness. The hand instrumentation group (n=10) had 6 yes responses at pre–test with 3 at post–test. The control group (n=10) had 7 yes responses at pre–test with 6 at post–test. The ultrasonic instrumentation group (n=10) had 14 yes responses at pre–test with 5 at post–test.

At pre–test, the control group had the only subject in the study reporting history of respiratory problems after dental treatment (n=1). At post–test, one subject in the hand instrumentation and control groups reported having avoided dental care due to respiratory disease. No adverse events occurred during the study period.

Table II: SGRQ–A* Total and subscale p–values for 3 effects in the ANOVA**

Source	Total	Symptoms	Activities	Impacts
Group***	0.333	0.158	0.815	0.286
Pre–post#	0.138	0.707	0.023*	0.703
Pre–post Group##	0.794	0.124	0.702	0.926

*SGRQ–A = St. George's Respiratory Questionnaire
**p<0.05 (Repeated measures ANOVA)
***Effect 1: Change in score all groups combined.
#Effect 2: Change in score from pretest to post-test.
##Effect 3: Interactions between groups from pre– to post–test

Table III: Self–assessment of overall current health* (mean±SD)

	Pre–test	95% CI**	Post–test	95% CI	p–value
UI***	3.1±0.74	2.84 to 4.26	3.6±0.52	3.34 to 4.49	0.059
HI#	3.9±0.32	3.71 to 4.49	4.0±0.47	3.69 to 4.89	0.564
Control	3.3±1.23	2.78 to 5.35	3.6±1.01	3.08 to 5.38	0.317

*p≤0.05 for within group comparison (Wilcoxon signed–rank test)
**CI=confidence interval
***UI=ultrasonic instrumentation
#HI=hand instrumentation

Discussion

Few studies have evaluated quality of life following periodontal therapy utilizing otherwise systemically healthy individuals,[47–49] whereas this study was the first to evaluate quality of life changes in patients with periodontitis and chronic respiratory disease. Considering the small sample size, variability in responses and careful interpretation of the findings, a few important conclusions can be drawn.

Subjects had moderate to advanced periodontitis, which is consistent with findings from larger scale studies involving patients with COPD.[4,6,9,11] Age, smoking status, PI and MAL measurements agreed with previous findings of patients with COPD.4

In this study, quality of life and self–reported illness were measured by 2 separate survey instruments (SGRQ–A and Illness Questionnaire, respectively). Adverse events were monitored, though none occurred. The SGRQ–A is a standardized measure to quantify the impact chronic air flow limitation has on health, well–being and daily activities, and potentially show changes in disease activity.[37] Some authors of periodontal and dental hygiene texts contraindicate use of ultrasonic instrumentation in patients with respiratory disease.[32–34] The underlying assumption has been aerosols contribute to post–treatment complications. This study evaluated quality of life and illness following periodontal instrumentation with ultrasonic and hand instrumentation in ambulatory patients with COPD and chronic periodontitis and found no indication of such problems. Improvement in self–assessment of their overall health by subjects in the ultrasonic instrumentation group approached significance. Although several of these subjects reported illness and/or doctor visits prior to treatment, very few reported such experiences post–treatment. The same pattern was seen in the hand instrumentation group, although reports of illness and doctor visits were fewer at both pre– and post–test. The control group indicated fewer doctor visits at the post–test but showed no improvement in reported illness, respiratory or other, at the post–test. Based on these results, albeit a small sample, it appears the contraindication for ultrasonic instrumentation may be unnecessary in patients who are not infirm.

Age, sex, degree of airflow limitation and differences in interpretation of quality of life questions all affect the SGRQ–A score, producing a high degree of variability in mean scores with large standard deviations.[38,39,41,42] Jones interpreted thresholds for clinical significance of SGRQ–A in patients with COPD.[42] He reported that patients differ in their perception of the importance of how chronic lung disease affects their daily living. This variability would influence findings in this study. The small sample size and high degree of variation in mean SGRQ–A total scores and subscales made it difficult to detect any potential differences or interactions between mean scores of the 3 groups. SGRQ–A questionnaires are population based, so inferences from individual scores should not be made.[42]

A significant improvement in all subjects' ratings of their activities pre– to post–test indicates these patients had less trouble with daily events (e.g., those requiring walking or chores) following treatment. This finding most likely is unrelated to the independent variable of periodontal instrumentation because no differences in ratings of activities were found between groups.

The SGRQ–A is well documented as a valid and reliable measure of quality of life and changes following a variety of therapies for patients with COPD.[38–42] It was anticipated SGRQ–A scores would be high at baseline because of the mean age (64±7.9) and COPD diagnosis, as quality of life is affected by age, sex and disease status.[38] Higher scores occur in older subjects and those with COPD. These scores were not signifi-

Table IV: Illness Questionnaire (reported yes answer; n*)

Question	UI** (pre/post)	HI*** (pre/post)	Control (pre/post)	Total (pre/post)
1. Respiratory problems last 4 weeks	4/2	0/0	1/2	5/4
2. Other sickness last 4 weeks	3/0	1/0	2/2	6/2
3. Doctor visit last 4 weeks	5/2	3/2	4/1	12/5
4. Antibiotics last 4 weeks	0/0	0/1	0/1	0/2
5. Additional/extra respiratory medications last 4 weeks	2/1	2/0	0/0	4/1
6. Any past respiratory problems after dental care	0/0	0/0	1/1	1/1
7. Ever avoided dental appointment because of respiratory disease	0/0	0/1	1/1	1/2

*Reported frequencies per group pre/post out of 10)
**UI=ultrasonic instrumentation
***HI=hand instrumentation

cantly higher following treatment in either group of treated subjects.

No significant differences between groups in self–assessment of overall health indicates that the 20 subjects who received treatment continued to perceive their health as fair and did not perceive any significant improvement or deterioration in health status following treatment. In fact, the ultrasonic instrumentation group perceived a nearly significant improvement in health (from fair towards good). It appears that these subjects' quality of life was not impacted by either form of instrumentation. Illness Questionnaire findings indicated fewer subjects in each treatment group experienced self–reported illness, respiratory problems, other sickness, doctor visits or medication usage within 4 weeks following treatment compared to 4 weeks prior to treatment. This same reduction in post–treatment illness, doctor visits and medication use was not observed in the control group.

These findings cannot be generalized to other patients with COPD and periodontitis because a non–probability sample was used. Due to the small sample in this study, additional research is needed with this population to determine if the lack of effect is found consistently.

Because no adverse events occurred during the study and patients did not perceive a decline in quality of life, health status or illness following treatment, issues related to patient safety were not identified in this small–scale clinical trial of patients with COPD.

Conclusion

In this study, periodontal debridement performed using ultrasonic or hand instrumentation had no effect on quality of life and illness in ambulatory COPD patients, thereby dispelling any safety concerns. The small sample size, however, decreased the power to detect within/between group differences. Further research with larger sample sizes is required to assess impacts of nonsurgical periodontal therapy on quality of life and self–reported illness in patients with respiratory disease.

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