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<th><strong>Title</strong></th>
<th>Multilevel analysis of periodontal treatment response</th>
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INTRODUCTION

• Hierarchical data (or clustered data) are common in dental research as adults may have up to 32 teeth and measurements taken from different teeth of the same individual are possibly correlated or clustered.

• Conventional statistical methods, which assume observations being independent, are not appropriate in analyzing clustered data. Thus, special statistical analysis is required when data have a hierarchical structure.

• ‘Multilevel modelling’ (Goldstein, 1995) or equivalently ‘hierarchical linear modelling’ (Bryk and Raudenbush, 1992) is a class of techniques developed to analyze hierarchical data. Several studies using multilevel modelling in analyzing dental data have been published.

• In order to account for the hierarchical structure of periodontal disease measurements, i.e. sites measurements clustered around teeth and then teeth clustered within subjects, analyses using a multilevel approach were adopted in this study (Gillharps, 2000).

OBJECTIVE

• To investigate baseline factors which may predict non-surgical periodontal treatment response using multilevel multiple regression.

MATERIALS AND METHODS

• 32 non-smoking, chronic periodontitis patients participated in a single-blind, randomized controlled clinical trial of non-surgical periodontal treatments. Reductions in probing pocket depth (PPD) at 1-month, 3-months and 6-months (compared to baseline PPD) were analyzed using multilevel multiple regressions.

• A 3-level model was considered: site at level-1, tooth at level-2 and subject at level-3. Variance components models (with no independent variables included) were obtained initially to investigate the variance of the reduction in PPD across all the 3 levels.

• 12 independent variables were included in the multilevel multiple regression model.

RESULTS

• Altogether, 4836 sites distributed on 866 teeth (not including 3rd molars) in these 32 subjects were included for the analyses of reduction in PPD. Sites from subjects or subjects with higher % plaque at baseline were associated with significantly greater reduction in PPD at 1-, 3- and 6-months (p<0.05). Sites with the presence of plaque at baseline had significantly lower reduction in PPD at 1- and 3-months (p<0.05), but not for the reduction in PPD at 6-months. Sites from females subjects or subjects with higher % BOP at baseline were associated with greater reduction in PPD at 3- and 6-months.

• The variations at each level were reduced markedly with the inclusion of the significant variables. The total variance of the final models were reduced by 37%, 46% and 46% respectively for reduction in PPD at 1-, 3- and 6-months, when compared to the corresponding variance components models.

CONCLUSIONS

• The use of multilevel analysis enables researchers to incorporate in the same model predictor variables measured at different levels.

• Multilevel analysis appears to be a powerful statistical tool for the analysis of periodontal data.

REFERENCES


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