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15728 ORAL COMMUNICATION CLINICAL RESEARCH - PERI-IMPLANT BIOLOGY

A prediction model for diagnosing peri-implant health and disease

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Background: The clinical parameters together with multifactorial origin indicate a challenge for clinicians to correctly diagnose peri-implant pathology and define a patientís risk for developing peri-implant diseases and management strategies against the occurrence of them. The identification of controlling risk factors combined with the assessment of multiple clinical parameters can be illustrated through prediction models in order to provide more accurate diagnostic information about peri-implant disease

Aim/Hypothesis: This study aimed to develop a predictive diagnostic model for peri-implant health and disease. For this purpose, predictor variables with the highest potential of impact were determined and implemented into three different data mining models. The models were compared to present the highest accuracy.

Material and Methods: This cross-sectional case-control study included a total of 216 patients previously treated with 542 dental implants. The patients and their implants were evaluated in the following six categories- patient-related health and behavioral factors, implant-site characteristics, surgery-, prosthesis- and esthetic-related factors and clinical and radiographic characteristics. The implants were classified into three groups (peri-implant health, peri-implant mucositis, and peri-implantitis) based on presence absence of bleeding on probing (BOP), with or without suppuration (SUP), increase in probing depths and levels of marginal bone loss. Prediction models were developed using clinical parameters combined with possible risk indicators for peri-implant mucositis and peri-implantitis. In that sense, three different data mining methods [decision-tree (J48), logistic regression and multilayer perceptron) were compared to provide a better predictive model.

Results: The prevalence of peri-implant mucositis and peri-implantitis was 40.2% and 35.3%,respectively. BOP, SUP, plaque index (PI), pink esthetic score (PES), maintenance therapy, medication use, active periodontal disease, the time between tooth extraction and implant placement, augmentation, type of prosthesis, implant function time, implant diameter, etiology of tooth loss, number of implants per patient and peri-implant soft tissue biotype were identified as potential predictor variables with the highest impact. J48 method, which is a decision-tree method, provided a better prediction of peri-implant health disease than the logistic regression and MLP methods for the present dataset. In the predictive model of J48, the top level node was the ‘BOP’ variable. For the next split-levels, ‘maintenance therapy’ and ‘medication use’ were observed as strong predictive factors for peri-implant diseases.

Conclusion and clinical implications: The present model created using the decision-tree method showed satisfactory predictive accuracy of peri-implant health, peri-mucositis and peri-implantitis. The model emphasized ‘BOP’ as a major predictive measure for peri-implant health and disease when evaluated with other possible risk indicators. The present outcomes highlight the importance of controlling patient-related factors such as maintenance therapy and medication use for preventing the development of peri-implant diseases.