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Relationship between noncarious cervical lesions, cervical dentin hypersensitivity, gingival recession, and associated risk factors: A cross-sectional study

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ABSTRACT

Objectives: The aim of this study was to evaluate the risk factors associated with noncarious cervical lesions (NCCLs), cervical dentin hypersensitivity (CDH), and gingival recession (GR), besides the relationship among these conditions in a specific Brazilian sample population.

Methods: 185 patients who attended the "Ambulatory Program for Rehabilitation of Patients with Noncarious Cervical Lesions and Cervical Dentin Hypersensitivity" were evaluated, and 5180 teeth were analyzed. The subjects filled out a form and a calibrated examiner performed the clinical exams to determine the presence of NCCLs, CDH, and GR. NCCLs were classified according to their morphology and depth, CDH levels were evaluated according to air stimuli response, and GRs were categorized according to Miller's classification. The association of the risk factors with NCCLs, CDH, and GR was determined with the Mann-Whitney U test and multiple linear regression. For the correlations, the Spearman test was used with a 95%-confidence level.

Results: The NCCLs, CDH, and GR distributions within the study were 88.1%, 89.1%, and 59.4%, respectively. Maxillary premolars were the most affected by all three conditions. A positive correlation was found between age, NCCLs, and GR; between NCCLs and CDH; CDH and GR; GR and NCCLs. Age, gender, oral hygiene, gastroesophageal diseases, and occlusal trauma were significantly associated with the presence of all three conditions.

Conclusions: The NCCLs and GR distributions increased with age; NCCLs, CDH, and GR had positive correlation; the lesions' depth and morphology contributed to high levels of sensitivity and severity of recessions; age, gender, gastric disease, and occlusal trauma were relevant factors for the occurrence of NCCLs, CDH, and GR.

Clinical significance: The increasing distribution of NCCLs, CDH, and GR is closely associated with people's lifestyles. Thus, it is important for the clinicians to recognize the etiological factors and their most relevant associations to prevent and control such alterations, in order to improve the population's quality of life.

1. Introduction

The tooth structure loss at the cementum-enamel junction that is not associated to the presence of caries has been identified as noncarious cervical lesions (NCCLs) [1], with 5%–85% prevalence rate variation [2]. Current studies suggest that the formation and/or progression of NCCLs have multifactorial etiology [3,4], i.e. the association between factors such as erosion (chemical or electrochemical dental tissue degradation), friction, attrition (endogenous mechanical wear), and abrasion (exogenous mechanical wear) (4–6), besides occlusal stress [7].

However, the different lesion morphologies are usually related to

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the prevalence of a specific etiological factors in the cervical area [5,8], resulting in wedge-shaped or concave lesions [9].

The increased prevalence of cervical tooth wear with aging implies that NCCLs are probably a result of a time-dependent progression process [1]. In addition, considering the combined effects of all potential etiological factors, the NCCLs presence may contribute to dentin exposure and biofilm accumulation in the cervical site. As a consequence, NCCLs has been associated with other conditions, such as cervical dentin hypersensitivity (CDH) [10] and gingival recession (GR) [11] affecting the same tooth.

Still, epidemiological studies that correlate the presence of NCCLs, CDH, GR, and risk factors are not common, due to the difficulty in obtaining and comparing data from different populations [12]. Even within the same population, the differences in clinical characteristics and risk factors involving these conditions have to be further explored.

Therefore, the aim of this study was to evaluate the risk factors associated with NCCLs, CDH, and GR, apart from the relationship amongst these conditions in a specific Brazilian sample population.

2. Materials and methods

2.1. Subjects

The research protocol for the present study was first submitted to the Ethical Committee of the Federal University of Uberlândia (#1.373.058). After approval, the details of the investigation and procedures were explained to each subject. The population included in the current study were patients from the "Ambulatory Program for the Rehabilitation of Patients with Noncarious Cervical Lesions and Cervical Dentin Hypersensitivity", located at the Dental Hospital of the Federal University of Uberlândia, Brazil. The investigation occurred from August 2013 to August 2016. To be considered for this study, the subjects should be more than 18 years old and present at least one of the three alterations (NCCLs, CDH and/or GR), isolatedly or combined. Patients with any missing teeth (except for third molars), diseases requiring analgesic drugs or anything that could mask the sensitivity symptoms were excluded. In addition, teeth with or under endodontic treatment (only for CDH), under orthodontic treatment, with marginal restorations that could interfere in the evaluation, with marginal leakage, pulpitis, dental caries, and fractures were also excluded.

2.2. Assessments

The form and clinical examination data sheets were designed for data collection and included about the following queries: participant's name, place of birth, medical history, hygiene quality evaluated by the examiner, and tooth-brushing type according to the patient's self-perception. Then, a sheet of paper was delivered to each patient so that they could fill out with a description of what their eating habits would be for one week. The diet would be considered acidic when the number of acidic drinks and/or food incidence was greater than two. Participants were also questioned about the presence of parafunctional habits and gastroesophageal diseases. Patients that were previously diagnosed with gastroesophageal diseases were only accepted if under controlled stage or when the disease was excluded by the specialist.

A clinical examination was individually performed. Occlusal trauma was accessed with the use of carbon tape (*AccuFilm II* - Edgewood, NY, USA), to identify patients' premature contacts in centric relation, in all movements.

NCCLs were classified according to their morphology type, in concave [1] or wedge-shaped [2]. Then, the depth of each lesion was evaluated through NCCL impression with polyvinyl siloxane (PVS) elastomeric material. The impressions were measured by means of a digital caliper and the lesions were classified as shallow (00.9 mm), medium (1–1.9 mm), or deep (greater than 2 mm).

The subjects who reported sensitivity were clinically evaluated for confirmation of CDH presence. An evaporative stimulus (controlled air blast) generated by an air-water syringe was used to determine the tooth sensitivity level. The air jet was perpendicularly directed to the cervical buccal surface of the hypersensitive tooth for two seconds at approximately 1 cm-distance. The adjacent teeth were protected with a polyester strip to avoid false-positive results. The operator requested the participants to rate their pain according to a 10-point visual analog scale (VAS) and the value was recorded. The recorded values were distributed according to their level: 0 – no pain; 2 – mild pain [1–4]; 3 – moderate pain [5–7]; 4 – severe pain [8–10].

GR presence was also checked and classified according to Miller [13] in I, II, III or IV Class, considering the amount of keratinized tissue, the mucogingival junction location related to the recession and the presence or absence of interproximal bone loss.

2.3. Data analysis and statistical tests

Data collected at the anamnesis questionnaire and clinical examinations were classified per patients and per number of teeth. As data did not present normal distribution, the bivariate analysis of dependent variables (NCCL, HD, GR) and the risk factor analysis were performed by Mann-Whitney U test. To verify the study hypothesis, all independent variables that showed association (p-value < .25) were subjected to a multivariate (multiple linear regression) model, following a backward technique. The Spearman correlation test was used to analyze the correlation between the morphology and the depth of NCCLs with CDH level. All analyses were performed with 95%-significance level.

3. Results

3.1. Age

185 individuals (age19 - 7, mean: 41.9 years old) were included in the present study. The male:female ratio was 0.68:1. After clinical examination, 163 out of the 185 subjects were diagnosed with NCCL, 165 with CDH, and 110 with GR, resulting in a distribution of 88.1%, 891%, and 59.4%, respectively. From the 163 subjects with NCCLs, 161 (98.7%) also presented CDH, and 106 (57.2%) presented all three conditions, concomitantly. 5180 teeth were examined. 1308 (25.2%) were diagnosed with NCCLs, 1613 (31.1%) with CDH, and 1334 (25.7%) with GR. Within the teeth with NCCLs, 810 (61.9%) also presented CDH, and 479 (36.6%) exhibited all three conditions, concomitantly.

The distribution of the conditions within different age groups is shown in Fig. 1. NCCLs, CDH, and GR showed similar distribution increase, the higher the age. A larger number of subjects with NCCLs, CDH or GR was found in the > 50 age group, whereas concentration smaller number was found within the 19–30 age group. The trend of NCCLs curve presented faster increase than the CDH or the GR curves

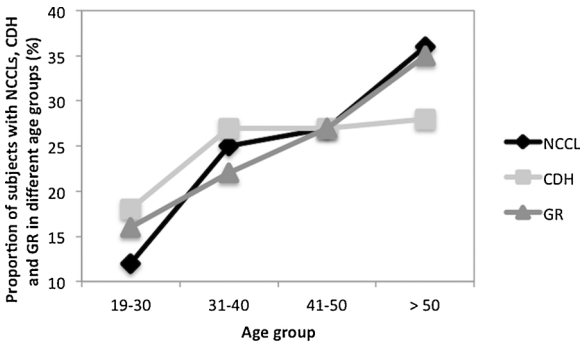

Fig. 1. Subjects distribution per age with isolated incidence of NCCLs, CDH and GR.