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Software modality to detect dental color changes in an adult population with possible diagnostic of gastrointestinal diseases

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Gastrointestinal diseases refers to diseases involving the gastrointestinal tract, namely the esophagus, stomach, small intestine, large intestine and rectum, and the accessory organ of digestion, the liver, gallbladder, and pancreas. Lesions within the jaws and perioral tissues are sometimes seen as a manifestation of gastrointestinal diseases. Sometimes oral lesions are similar to gastrointestinal lesions, or are completely different during systemic alterations caused to primary condition. Not often, oral lesions occur before the primary condition onset, may be present during the progression of the condition, and not at least, may persist even after the primary gastrointestinal condition has resolved. On spite of its common occurrence, dental color changes are little reported in the literature on the gastrointestinal health in adult population. The majority of published reports deal with the prevalence of the dental color changes in pediatric population or caries experience, and dental erosions. There is a large amount of literature of dental color changes during esthetics interventions for teeth and implant construction. The present study highlights need for knowledge regarding gastrointestinal disorders and associated dental color changes, and dentist's role in monitoring patients with recommended medical therapy for gastrointestinal disorders. The present thesis is structured as follows: first chapter comprises review of the literature, definitions and description of 6 different types of gastrointestinal disorders: inflammatory bowel condition as Crohn's disease, gastro esophageal reflux disorder, eating disorder as bulimia and anorexia, Peutz- Jegher's syndrome as a genetic disorder. In this chapter it is presented the etiology, how to recognize, diagnose and which are the most important manifesting oral lesions associated with selected gastrointestinal diseases.

In the second chapter of the thesis it is presented the conceptual framework of color, contextual factors impacting color detection, and methods used in dentistry practice for assessing colors.

In the third chapter of my thesis it is presented the conceptual framework and different application of models to assess, subtracts and processes color and their applicability in medicine.

The fourth chapter (personal contributions, first part) presents the results of a transversal study and the aim was to evaluate the incidence of dental caries in adult population with chronic gastric reflux conditions such as gastro esophageal reflux disease. Gastro esophageal reflux disease is one of the most

occurring disease affecting the upper gastrointestinal tract and the gastric content passively move from the stomach into the esophagus. Thus, the present study examined the caries experience in a group of GERD adult subjects compared to healthy controls. Study showed that, compared to healthy controls, GERD subjects were more likely to experience dental caries, even after correction for the age, sex and for the oral hygiene practices.

The fifth chapter of my thesis (personal contribution, second part) presents the results of a prospective case-control study approved by the Ethical Committee of University of Medicine and Pharmacy Tirgu Mures, and written informed consent was obtained from each subject.

Aim: To test in a case-control study the sensibility and specificity of two different methods to evaluate presence of dental erosions and tooth color changes occurrence.

Method: One hundred and fifty subjects were selected from patients admitted in the public hospital, Department of Gastroenterology, University Hospital, Tirgu Mures, 75 were included in GERD group and 75 were included in the study as the control group. All cases and controls were evaluated by the recording of structured questionnaire; endoscopic exam, routine dental exam, and their tooth color were evaluated by Color Detection Software. For each subject I recorded followed details: demographic characteristics, age, sex, results of the gastroscopy exam, 15 items questionnaire about oral hygiene practices, presence and severity of dental erosions using BEWE scoring system and the color of the tooth. The primary outcome, dental erosions was measured by the BEWE score and teeth color change was assessed by the Color Detection Software. Chi-square or the Fisher exact test was used for the analysis of the categorical variables. Logistic regression models were used to estimate the odds ratio of which variables contributed to the variance of dental erosions and color changes. The statistical level of significance for the difference was <0.05.

Results: There were statistical significant differences between groups, within the tooth color changes and also dental erosions more frequent among subjects included in GERD group. Tooth color changes were detected more frequent among subjects included in GERD group (OR 3.45 (95% CI 1.74 to 6.82). AUC of clinical dental exam to detect dental erosions was 0.633 (95% CI 0.544 to 0.723) and AUC for tooth color changes by Color Detection Software was 0.862 (95% CI 0.802 to 0.922) for those included in GERD group and AUC 0.620 (95% CI 0.528 to 0.713) for those included in control group.

Conclusions: The sensitivity and specificity of Color Detection Software it is higher if the analysis is performed at the same time or right after routine dental exam among adult population with gastrointestinal disease.

Key words: Color Detection Software, dental erosions, gastrointestinal disease, tooth color changes