DOI: 10.15386/cjmed-1017

DENTAL EROSION IN GASTRO-ESOPHAGEAL REFLUX DISEASE. A SYSTEMATIC REVIEW

ANDREI PICOS, MÂNDRA EUGENIA BADEA, DAN LUCIAN DUMITRASCU

Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania

Abstract

The growing interest reflected in the studies on dental erosion is justified by the severe health problems it entails, i.e. esthetic, phonetic, masticatory disturbances and pulp complications. Most studies investigate the prevalence of dental erosion in adults and children, the severity of lesions and etiopathogenetic factors.

Background and aim. *Dental erosions (DE) are one of the extraesophageal complications of gastroesophageal reflux disease (GERD). An increasing amount of papers shed light on this topic. We carried out a systematic review on the association between GERD and DE.*

Methods. *We studied the association between DE and GERD in adults and children. The search for published studies was performed in PubMed using search terms "dental erosion" and "gastro-esophageal reflux disease". References published since 2007 were included and a systematic review was carried out. Articles not assessing DE in GERD patients were excluded, and also case presentations and articles in languages of limited circulation. The prevalence of DE in patients with GERD, extrinsic and intrinsic etiological factors of DE and the severity of dental erosion lesions were analyzed.*

Results. *A total of 273 articles were found, 10 studies being retained for analysis. Correlations between DE and GERD, namely the prevalence and severity of dental erosion in GERD patients, were investigated. DE prevalence was between 10.6% - 42%, median 25.5%. Mean values of DE prevalence were 48.81% in GERD patients, compared to 20.48% in non-GERD controls. Comparative values of DE frequency in adults with GERD was 38.96%, compared to 98.1% in children with GERD.*

Conclusions. *DE is a condition associated with GERD. DE prevalence is higher in GERD patients. Intrinsic pathogenetic factors with direct action on the hard dental tissues are GERD, while extrinsic factors are represented by diet. Among the patients diagnosed with GERD, youth under the age of 18 had a higher frequency compared to adults.*

Keywords: dental erosion, gastroesophageal reflux, GERD, prevalence, intrinsic factors

Introduction

Dental erosion is defined as a loss of hard dental tissue by a chemical process without bacterial involvement [1]. In the last years this mechanism has been recognized as a major cause of tooth decay (TD) both in children and adults [2]. Differential diagnosis with other TD mechanisms is difficult given the intricacy with attrition, abfraction, abrasion, and it is established based on the specific aspect of injury locations [3].

Early injuries may be barely visible to the dentist or patient when located in the enamel, being no major alterations in color or morphology; a detailed patient history, questions about diet, medication, diseases, is important for etiopathogenesis; medium and advanced lesions are recognized by the exposure of dentin as yellowish round islets at a lower level than the thin surrounding

Manuscript received: 11.03.2018
Received in revised form: 09.04.2018
Accepted: 11.04.2018
Address for correspondence: mebadea@umfcluj.ro

enamel layer [4], and it may determine esthetic, phonetic, mastication disturbances, as well as dental sensitivity and pulp complications.

Dental wear may be caused by intrinsic or extrinsic factors and a combination of these. Intrinsic factors are represented by gastroesophageal reflux disease (GERD), vomiting, bulimia, anorexia, medication reducing saliva flow, acid saliva, poor salivary buffering capacity; extrinsic factors are mainly represented by acid foods such as sodas, fruit (apples, lemons, oranges), natural citrus juices, regular swimming in pools (chlorine in water) and drugs. Social-economic factors may also increase the risk of acid erosion [5].

Prevention is important in patients with DE risk, and it involves the minimization or arrest of tissue loss, reduction of tooth sensitivity by application of fluorized protective gels, dental polish, lowering risk factors and adequate dental hygiene [6,7].

DE treatment depends on the stage of injury, and it is simple at early stages with enamel loss (BEWE 3-8), when it is treated with minimally invasive direct reconstructions with composites and fluorized polish. At medium stages, when dentin is exposed (BEWE 9-13) therapy includes direct and indirect crown restorations, while at advanced stages, with over 50% destruction of dental surface (BEWE 14-18), treatment consists only of indirect prosthetic reconstruction [8,9].

The aim of this study is to analyze published literature in the last ten years that correlate DE with GERD, in order to obtain a complex view on the subject and see the differences between the risk and the frequency of dental erosion in patients with and without GERD.

Material and method

The database for our review included articles found in PubMed since 2007 to the present, searched using "dental erosion" and "gastro-esophageal reflux disease". Inclusion criteria of studies into the database were the assessment of DE in patients with and without GERD, etiopathogenetic factors, assessment of erosive lesions, mention of the patients' age. Articles not assessing DE in GERD patients, case presentations, or written in languages with limited circulation were excluded. Each study was evaluated by the three authors.

We analyzed the prevalence and severity of DE lesions in the patients with GERD, confirmed by clinical methods such as endoscopy or esophageal Ph-metry, and in controls without GERD. The parameters analyzed were age, intrinsic and extrinsic etiological factors.

Quantification of DE was made using BEWE [10], the most used method. This may range between 1 – 18 and expresses the patient's risk for DE, at the same time orienting therapeutic and prophylactic strategies.

Results

The database includes 273 articles selected as described above. Ten papers were considered to correspond to the inclusion criteria, shown in Table I. The total number of patients included in these 10 studies was 7289 [10-19].

In 6 of the studies assessing in total 1130 patients [11,13,16-19], a correlation between DE and GERD was demonstrated. Analyzing the reports we found the mean value of DE frequency in GERD patients to be 48.81%, as compared to 20.48% in controls.

An ample study carried out in 2251 patients [10] reported a mean value of BEWE score of 9.4 in GERD patients, as compared to 6 in controls. This confirms the suspicion that the severity of dental tissue loss prevails in the GERD group compared to controls.

Regarding the patients' age, 6 studies included this parameter [10-13,15,19], one study being carried out in patients under the age of 18 years [11]. The comparative values regarding the frequency of DE in adults with GERD was 38.96%, compared to 98.1% in children with GERD [11]. In controls there was no significant difference between adults (mean DE 20.85%) and children (mean DE 19%).

The mean frequency of DE reported in 4 studies including 4566 patients with and without GERD was 25.5% [10,15,16,17].

Table I. Characteristics of included studies regarding dental erosion.

Author	No. of patients studied	Mean age	Intrinsic factor associated with dental erosion	Extrinsic factors associated with erosion	BEWE in GERD patients	BEWE in controls	No. of patients diagnosed with GERD	No. of controls	% din of GERD patients with DE	% of controls with DE	Year	% of the total patients studied with DE
Correa et al.	60	32.2 years	GERD								2012	
Farahmand et al	112	7.5	GERD				54	58	98.1	19	2013	
Alavi et al	140	40	GERD				69	71	22.6	7	2014	
Holbrook et al	2251	10.5	GERD		9.4	6					2014	30.3
Alaraudanjoki et al	1962		GERD	alcohol							2016	
Struzycka et al	1886	18	GERD	diet							2016	42
Vinesh et al	250		GERD				142	108	44		2016	19.2
De Oliveira et al	179		GERD				43	136	25.6	5.9	2016	10.6
Milani et al	419		GERD				143	274	25.9	17.2	2016	
Stojsin et al	30	50	GERD						76.7	53.3	2010	

One study reported a statistically significant difference of DE prevalence between men (45.7%) and women (39%) [15]. The same study showed that the percentage of advanced DE (BEWE 2 and 3) was higher in men than women, 16.6% and 10.4% respectively. Soda drinks or fruit juices were considered an important risk factor for the development and aggravation of dental wear.

Alcohol is also considered a high risk factor for DE, either in large amounts for short periods of time, or small amounts over long term.

Discussion

Our systematic review identified 10 papers which described the association between GERD and DE in the last decade. In another systematic review [20] the prevalence data of ED in adults ranged between 7% and 100%, compared to our paper that shows a prevalence of 10.6% and 42%, with males presenting more erosive tooth wear than females in both studies.

In the last year a large number of prestigious publications in the field of dental medicine paid special attention to the diagnosis, prevention and treatment of tooth erosion associated with gastro-esophageal reflux disease (GERD), demonstrating a correlation between them, and even considering DE a co-morbidity of GERD. The prevalence of dental wear is high especially on the maxillary palatal and mandibular lingual surfaces [6], the areas most exposed to gastric reflux [7-9]. Other authors do not agree with this correlation, mainly in the case of children.

DE appears differently in the different dentitions. Deciduous teeth are more snsitive to acid attack than the permanent ones and, according to Holbrook et al [10], they present more than twice as high BEWE scores. This draws the attention on the higher risk of dental tissue loss in children with GERD who have deciduous and mixed dentition. Dental examination becomes mandatory in order to start timely preventive treatments.

The DE / GERD correlation is evidenced in the 6 studies in which the DE frequency in GERD patients is double as compared to controls.

Minimally invasive therapy is ideal, but it can only be applied in cases diagnosed at early or average stages of tooth wear. Detection of DE at advanced stages causes loss of crown retention, which prompts for classical invasive treatments. At advanced stages of DE, opening of the pulp chamber may be necessary, followed by endodontic treatment, exposing the tooth to an increased risk of fracture due to altered dental metabolism and loss of vitality. The mean DE incidence of 39.59% shows the major risks to which these patients are exposed. Given the high DE percentage in GERD patients, a direct cooperation between dentist and gastroenterologist is very important, and patients diagnosed with GERD should be immediately referred for dental consultation.

Few studies assess the severity of DE, Holbrook's study used the BEWE index which evidenced more severity of tooth wear in GERD patients. Literature search yielded ample studies that do not assess the DE severity by specific scales (BEWE, Smith & Knight, etc).

Current studies assess the links between acid dental wear and diet, mainly sodas, at young ages under 18, which makes differential diagnosis easier to establish, though raising the issue of the age of symptoms onset in GERD patients, taking into account that most of these patients are adults.

Conclusions

Current studies have found a constant correlation between DE and GERD, even if incidence varies among authors.

Most authors agree that tooth wear in deciduous dentition predicts a higher risk of dental erosion in permanent teeth.

References

1. Picos AM. Eroziunea dentara in boala de reflux gastroesofagian [Dental erosion in gastroesophageal reflux disease]. Cluj-Napoca: Edit. Med. Univ. "Iuliu Hatieganu"; 2014:11-9.
2. Picos AM, Picos A, Nicoara P, Craitoiu MM. Dental erosion in a partially edentulous patient with gastroesophageal reflux disease: A case Report.Clujul Med. 2014; 87(4): 284–287.
3. Picos AM, Poenar S, Opris A, Chira A, Bud M, Berar A, et al. Prevalence of dental erosions in GERD: a pilot study. Clujul Med. 2013;86(4): 344–346.
4. Berar AM, Lasserre J-F, d'Incau E, des Varannes SB, Picos A, Chira A, et al. Factors associated with localization of dental erosion in patients from two French medical centers. HVM Bioflux. 2015;7(2):55-59.
5. Colon P, Lussi A. Minimal intervention dentistry: part 5. Ultra-conservative approach to the treatment of erosive and abrasive lesions. Br Dent J. 2014;216(8):463-8.
6. Picos AM, Chisnoiu AM, Lasserre JF, Spinei A, Chisnoiu MR, Picos A. Dental erosion - literature update. HVM Bioflux. 2013;5(3):135-141.
7. Picos AM, D'Incau E, Bonafos C, Berar A, Chira A, Dumitrascu D. Erosion dentaire d'origine intrinseque. Revue d'odonto stomatologie. 2014;43:56-67.
8. d'Incau E, Saulue P. Understanding dental wear. J Dentofacial Anom Orthod. 2012;15(1):104..
9. Lussi A. Erosive tooth wear - a multifactorial condition of growing concern and increasing knowledge. Monogr Oral Sci. 2006;20:1-8.
10. Holbrook WP, Árnadóttir IB, Hlöðversson SO, Arnarsdóttir E, Jónsson SH, Sæmundsson SR. The Basic Erosive Wear Examination (BEWE) applied retrospectively to two studies. Clin Oral Investig. 2014;18(6):1625-1629.
11. Farahmand F, Sabbaghian M, Ghoudousi S, Seddighoraee N, Abbasi M. Gastroesophageal reflux disease and tooth erosion: a cross-sectional observational study. Gut Liver. 2013;7(3):278-281.
12. Corrêa MC, Lerco MM, Cunha Mde L, Henry MA. Salivary parameters and teeth erosions in patients with gastroesophageal reflux disease. Arq Gastroenterol. 2012;49(3):214-218.
13. Alavi G, Alavi A, Saberfiroozi M, Sarbazi A, Motamedi M,

Hamedani Sh. Dental Erosion in Patients with Gastroesophageal Reflux Disease (GERD) in a Sample of Patients Referred to the Motahari Clinic, Shiraz, Iran. J Dent (Shiraz). 2014;15(1):33-38.
14. Alaraudanjoki V, Laitala ML, Tjäderhane L, Pesonen P, Lussi A, Ronkainen J, et al. Influence of Intrinsic Factors on Erosive Tooth Wear in a Large-Scale Epidemiological Study. Caries Res. 2016;50(5):508-516.
15. Strużycka I, Rusyan E, Bogusławska-Kapała A. Epidemiological study of prevalence and risk factors for dental erosions among Polish young adults. Pol Merkur Lekarski. 2016;40(239):308-313.
16. Vinesh E, Masthan K, Kumar MS, Jeyapriya SM, Babu A, Thinakaran M. A Clinicopathologic Study of Oral Changes in Gastroesophageal Reflux Disease, Gastritis, and Ulcerative Colitis. J Contemp Dent Pract. 2016;17(11):943-947.
17. De Oliveira PA, Paiva SM, De Abreu MH, Auad SM. Dental Erosion in Children with Gastroesophageal Reflux Disease. Pediatr Dent. 2016;38(3):246-250.
18. Milani DC, Venturini AP, Callegari-Jacques SM, Fornari F. Gastro-oesophageal reflux disease and dental erosions in adults: influence of acidified food intake and impact on quality of life. Eur J Gastroenterol Hepatol. 2016;28(7):797-801.
19. Stojsin I, Brkanić T, Slavoljub Z. Reflux disease as an etiological factor of dental erosion. Srp Arh Celok Lek. 2010;138(5-6):292-296.
20. Jaeggi T, Lussi A. Prevalence, incidence and distribution of erosion. Monogr Oral Sci. 2014;25:55-73.