

Evaluation the Effect of Swimming Time on Dental Erosion among Swimmers

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Abstract

Background and Aim: Erosion is a multi-factorial process that occurs during life and it happens by many external or internal factors. The current study aimed to evaluate the relation of swimming time and dental erosion among swimmers.

Materials and Methods: In this descriptive-analytical study, 84 women individuals were selected. The case group included 42 swimmers who swam more than 6 hours per week and the control group comprised of 42 swimmers who swam less than 6 hours. The information regarding dental erosions and other data was collected by questionnaires. The dental erosion evaluation was performed using Smith-Knight index. X^2 was utilized for statistical comparisons. The P-value of less than 0.05 was considered statistically significant.

Results: Findings revealed that the dental erosion proportions was similar among two groups and there was no relation between swimming time and dental erosion among swimmers ($p=0/6$, $X^2=0.26$).

Conclusion: There was no relation between swimming time and dental erosion among swimmers. Therefore, the role of swimming time on dental erosion was not proved.

Key Words: Dental erosion, Smith, Knight Index, Swimming

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Introduction

Dental erosion is defined as the pathologic loss of dental hard tissue chemically etched away from the tooth surface by acid and/or chelation without bacterial involvement. This lesion is irreversible and can change the appearance and function of the teeth [1].

Erosion is a multifactorial process that occurs during life and happens due to many external or internal factors. The extrinsic factors involved in dental erosion are acidic drinks, sodas, fruits like

orange and lemon and administration of medicaments such as effervescent tablets.

Major intrinsic factors are gastroesophageal reflux disease, chronic inflammation of gastrointestinal tract and eating disorders of psychosomatic origin, such as bulimia and anorexia that often cause vomiting [2].

Environmental acid exposure has also been associated with dental erosion and has been frequently documented in case studies. Most prevalence studies relating to occupational dental

erosion have been performed on workers at battery and galvanizing factories who are exposed to sulfuric acid and hydrochloric acid. However, several publications have indicated that competitive swimming may also constitute a risk factor for dental erosion [3].

In 1982, Savad first reported that swimmers in improperly maintained swimming pools may be susceptible to acid erosion of enamel [4]. In 2008 Boroditsky and Dawes reported a complete loss of enamel in a woman who swam daily for 2 weeks in an improperly chlorinated swimming pool in Cuba [5]. Gabai and Centerwall described the effect of pH levels in swimming pools on enamel of human teeth [6,7]. In contrast Lokin et al reported low level of erosion (14%) in Dutch swimming pool with a pH of about 5.5 in 2001 swimmers. These researchers described the effect of another factors in occurring and preventing erosion such as biological properties of saliva and tooth structure [8]. In 2001 Buczkowska-Radli'ska conducted a research on competitive and non-competitive swimmers. Result of their study showed the effectiveness of swimming time in occurring erosion but the method of erosion in competitive swimmers was different from non-competitive counterparts. They also indicated that males had more erosive tooth wear than did females and it is likely because of their aggressive method of swimming [9]. Regarding different ideas about the effect of water pH on erosion, the current study aimed to evaluate the effect of swimming time on dental erosion in Iranian swimmers.

Methods and Materials

After getting permission from The Physical Education Center and considering related regulations, six swimming pools in Tabriz were investigated and the related information was gathered. The water for the selected swimming pools had similar pH levels. In this descriptive-analytical study, 84 women were selected. The case group consisted of 42 swimmers who swam more than 6 hours per week and the control group included 42 swimmers who swam less than 6 hours per week.

Exclusion criteria included: gastroesophageal reflux disease, chronic inflammation of the gastrointestinal tract, bulimia, anorexia, having lemon, sodas, and acidic drinks, as well as effervescent tablets and hard brushing.

We examined all of the participants with standard dentistry mirror and artificial light. The dental erosion evaluation was performed using Smith-Knight index (Table 1). SPSS 16 and X^2 test was utilized for statistical comparisons. The $p < 0.05$ was considered statistically significant in this study.

Results

Eleven persons of the case group (26.2%) and 9 of control group (21.4%) had dental erosion. Findings revealed that the dental erosion proportions was similar between two groups and there was not a statistically significant relation between swimming time and dental erosion in swimmers ($p = 0/6$, $X^2 = 0/26$) (Table 2).

Discussion

The result of this study showed that 26.2 % of swimmers who swam more than 6 hours and 21.4% of those who swam less than 6 hours had dental erosion and there was no significant difference between two groups.

The aim of comparing this study with other studies is to confirm that standard levels of pH can prevent and decrease amount of erosion. For example Gabai and Centerwall indicated that acid concentration of water is the critical cause of dental erosion and they recommended pH of 7.2-8.0 for swimming pools [6-7]. On the other hand, Scheper described that in pH levels of more than 6.5, erosion can occur and it often appears as dental staining [10]. Also Amaechi and colleagues showed that occurring dental erosion is not only because of pH levels per se but also it depends to temperature of water, duration of swimming time, structure of hydroxyapatite of enamel and properties of saliva for neutralizing harmful agents [11]. Enamel erosion is a progressive and irreversible condition. This point can impose the necessity of restrictions on causative factors and recommend observation of preven

Table 1. Tooth wear index according to Smith and Knight

Criteria	Surface	Score
No loss of enamel surface characteristics No loss of contour	B/L/O/I/C	0
Loss of enamel surface characteristics Minimal loss of contour	B/L/O/I/C	1
Loss of enamel exposing dentine for less than one-third of the surface Loss of enamel just exposing dentine Defect less than 1mm deep	B/L/O/I/C	2
Loss of enamel exposing dentine for more than one-third of the surface Defect less than 1-2mm deep	B/L/O/I/C	3
Complete loss of enamel, or pulp exposure, or exposure of secondary dentine Pulp exposure or exposure of secondary dentine Defect more than 2mm deep, or pulp exposure, or exposure of secondary dentine	B/L/O/I/C	4

B = Buccal; C = cervical; I = Incisal; L =Lingual or Palatal; O = Occlusal.

Table 2. Dental erosion proportions in case and control group

Time of Swimming	Erosion	Have		Have not	
		%	Number	%	Number
More than 6 hours		26/2	11	73/8	31
Less than 6 hours		21/4	9	78/6	33

tive conservations. Finding causative factors is very complicated.

This study stressed on the evaluation of swimming time. Dissolution of enamel starts by contacting with the water of swimming pool. This process is affected by many factors such as amount of calcium and phosphorus in the enamel structure, protection system of saliva and contacting with acidic materials. Buczkowska-Radlinska investigated swimming time in 14- and 15-year-old adolescents. However, in that study duration of swimming was more than 19 hours in a week and both male and female swimmers were evaluated. They reminded the importance of early diagnosing of erosion and the effect of swimming time. The authors used a similar method for evaluating erosion in comparison with the current investigation [9].

Understanding causative factors of erosion is a prerequisite for providing preventive measures. Using fluoride, eating foods rich in calcium and phospho-

rus and attention to secretion of saliva are the preventive conservations.

Conclusions

There was no relation between swimming time and dental erosion in swimmers. Therefore, the role of swimming time on dental erosion is yet to be proved.

References

- 1- Imfeld T. Dental erosion. Definition, classification and links. *Eur J Oral Sci.* 1996 Apr;104(2): 151-5.
- 2- Lussi A .Dental erosion. Clinical diagnosis and case history taking. *Eur J Oral Sci.* 1996 April 109 (2):191-198.
- 3- Wiegand A, Attin T. Occupational dental erosion from exposure to acids – A review. 2007 May; 57(3):169-76.

- 4- Savad EN. Enamel erosion...multiple cases with a common cause (?).J N J Dent Assoc. 1982 Winter;53(1):32,35-7, 60.
- 5- Dawes C, Boroditsky CL. Rapid and severe tooth erosion from swimming in an improperly chlorinated pool:Case Report. J Am Dent Ass. 2008 May;74(4):359-61.
- 6- Gabai Y, Fattal B, Rahamin E, Gedalia I. Effect of pH levels in swimming pools on enamel of human teeth. Am J Dent. 1988 Dec;1(6):241-3.
- 7- Centerwall BS, Armstrong CW, Funkhouser GS. Erosion of dental enamel among competitive swimmers in gaschlorinated swimming pools. Am J Epidemiol. 1986, 123:641-647.
- 8- Lokin PA, Huysmans MC. Is Dutch swimming pool water erosive? Ned Tijdschr Tandheelkd. 2004 Jan; 111(1):14-6.
- 9- Buczkowska-Radli'ska J, Lagocka R, Kaczmarek W, Górski M, Nowicka A. Prevalence of dental erosion in adolescent competitive swimmers exposed to gas-chlorinated swimming pool water. J Clin Oral Investig. 2012 Apr 3.
- 10- Scheper WA, Van Nieuw Amerongen A, Eijkman MA. Oral conditions in swimmers. Ned Tijdschr Tandheelkd. 2005Apr;112(4):147-8.
- 11- Amaechi BT, Higham SM. Dental erosion: Possible approaches to prevention and control. J Dent. 2005 Mar; (3)33:243-252.