Does dental caries affect dental development in children and adolescents?

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ABSTRACT

Although a link between dietary changes, caries, and dental development has been observed, the literature provides little insight about this relationship. The aim of our study was to investigate the association between dental caries and dental development in a clinical sample of Albanian children and adolescents. In total, 118 children and adolescents, born between 1995 and 2004 and aged 6–15 years, were included. Dental caries in the deciduous dentition was assessed using the Decayed, Filled Teeth (dft) index and dental caries in the permanent dentition was assessed using the Decayed, Missing, Filled Teeth (DMFT) index. Dental development during the permanent dentition was determined using the Demirjian method. Linear and ordinal regression models were applied to analyze the associations of dental caries with dental age and developmental stages of each left mandibular tooth. Dental caries in the deciduous dentition, estimated as a median dft of 2.0 (90% range, 0.0–9.1), was significantly associated with lower dental age (β = -0.21; 90% CI: -0.29, -0.12) and with delayed development of the canine, both premolars, and the second molar. Untreated dental caries (dt) was associated with lower dental age (β = -0.19; 90% CI: -0.28, -0.10). Dental caries in the permanent dentition, estimated as a median DMFT of 1.0 (90% range, 0.0–8.0), was not significantly associated with dental age (β = 0.05; 90% CI: -0.04, 0.14). However, the DMFT was associated with the advanced stages of development of both premolars and the second molar. The untreated dental caries in the deciduous dentition delays the development of permanent teeth.

KEY WORDS: Tooth decay; dental maturity; dental age; deciduous dentition; permanent dentition; DMFT; caries; Decayed Missing Filled Teeth index

DOI: http://dx.doi.org/10.17305/bjbms.2018.2841

INTRODUCTION

Dental development is a complex process that starts with the differentiation of the dental lamina and ends with calcification of the permanent teeth [1]. For healthy dentition, each part of the tooth must complete all stages of the development [2].

Oral diseases that arise during dental development affect the dentition and the balance in the oral cavity [3,4]. Dental caries or tooth decay causes demineralization and destruction of the hard tissues of the teeth, due to bacterial activity [5,6]. It is one of the most common oral diseases in adults, and in the past few decades, tooth decay has become the most common disease of the oral cavity among children worldwide [7,8]. Moreover, severe dental caries affects not only oral but also general health of children and adolescents [7,9].

According to the Decayed, Missing, Filled Teeth (DMFT) index, the prevalence of dental caries varies between different regions of Europe, from 1.0 in Scotland to 5.8 in Kosovo [10,11]. Recent studies on the Albanian population showed a DMFT of 3.72 in 12-year-old children and of 4.9 in 17-year-old adolescents, putting the young individuals at a high risk of dental caries [12,13].

The increase in prevalence of dental caries is a result of dietary changes, including frequent consumption of high-energy, low-cost foods that are poor in nutrients and rich in sugar and fat [14]. Furthermore, the dietary changes, among other factors, led to longer duration of dental development in modern humans compared to their hominin ancestors [15]. A sufficient supply of nutrients such as calcium, phosphorus and vitamins is essential for proper dental development and reduces the risk of dental caries [16].

The dietary patterns in Albania are mostly based on the Mediterranean diet, which is generally rich in micronutrients.

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Submitted: 14 December 2017/Accepted: 19 January 2018

Nevertheless, different socioeconomic status of the countries around the Mediterranean Sea affects the quality of diet in individual populations and the amount of nutrient intake on a daily basis [17,18]. A very high prevalence of caries is observed among children and adolescents in Albania, however, the information on their nutrition is scarce in the literature. In addition, whether the presence of carious lesions affects the maturation of teeth in children is still not completely understood.

The aim of our study was to investigate the association between dental caries and dental development in a clinical sample of Albanian children and adolescents.

MATERIALS AND METHODS

Study sample

The study sample consisted of 118 children and adolescents of Albanian ethnicity (Figure 1), born between 1995 and 2004 and aged 6–15 years. All patients included in this study were referred to a dental specialist at a general dental practice located in Durrës, Albania. Patients were eligible to participate in the study based on the following selection criteria: 1) available dental panoramic radiograph (DPR) in individuals younger than 15 years, to accurately measure the development of the permanent teeth prior to the final stage of calcification; 2) no evidence of acute or chronic diseases in the anamnesis; and 3) no evidence of craniofacial trauma or surgery. The information was retrieved from the clinical records of children using a Child Health/Dental History Form (ADA, 2006). Signed parental consent was obtained for further oral examination, diagnostic tests, and treatment of children. The use of DPRs was in accordance with the general treatment protocol and regulations of the Albanian Medical Ethics Committee. This study was conducted in accordance with the World Medical Association Declaration of Helsinki (2008) and has been independently reviewed and approved by the Albanian Chamber of Dentistry.

Assessment of dental caries

Dental caries was evaluated by an oral physician (B. D.) based on DPRs taken with an I-MAX PLUS CEPH device (CCD resolution, 10.4/5.2 pixels/mm; OWANDY, Middlebury, USA) between 2008 and 2016 year. Moreover, for a better evaluation of dental caries, the information about lesions, and filled and extracted teeth was retrieved from the patient clinical records (including 2D images of the oral cavity). As 68% of the participants had a mixed dentition, the Decayed and Filled Teeth index for the deciduous dentition (dft) and the DMFT index for the permanent dentition were used to estimate dental caries. The "d/D" component is used to describe decayed teeth which include carious teeth, filled teeth with recurrent caries and instances in which only the root is present. The "M" component is used to describe missing teeth due to dental caries. We did not consider the "m" component for the missing teeth in the deciduous dentition, as it is difficult to distinguish between the exfoliation of a primary tooth and a missing tooth due to caries. The "f/F" component is used to describe filled teeth due to caries. Teeth are considered filled when one or more permanent restorations are present and there is no recurrent caries or any part of the tooth with primary caries. For the dft and DMFT indices, each affected tooth is counted as one for the three index components. The obtained values for the three index components are summed up to calculate the dft and DMFT for each participant. Third molars are not considered in the DMFT index.

Assessment of dental development during the permanent dentition

Dental development was defined using the Demirjian method [19]. The same examiner who evaluated dental caries (B. D.) determined the eight stages of development (1 to 8) for each of the seven permanent teeth located in the lower left quadrant, excluding the third molar. In case any permanent tooth in the left mandible was congenitally missing, the stage of development was assessed from the corresponding tooth in the right mandible. The obtained stages of development were weighted using three different standards for dental age (Dutch, French-Canadian, and Saudi standard) and summed separately for each standard to calculate gender-specific dental maturity scores. Finally, standard tables were used to convert the dental maturity score into dental age. Dental age calculated by the French-Canadian standard fitted the best the chronological age of participants ($R^2 = 0.75$; Figure 2), and was consequently used as a proxy of dental development in the statistical analysis.

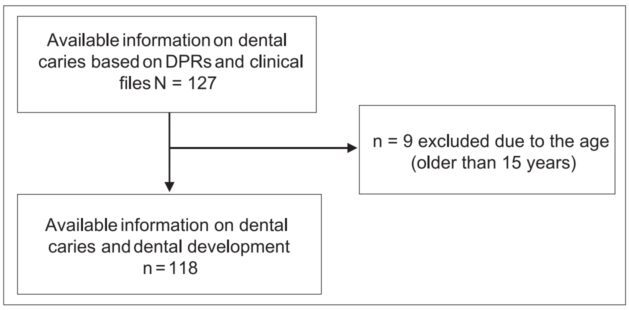

FIGURE 1. Inclusion and exclusion criteria used in the study. The final sample consisted of 118 children and adolescents of Albanian ethnicity, born between 1995 and 2004 and aged 6–15 years. Patients were eligible to participate in the study based on the following criteria: 1) available dental panoramic radiograph (DPR) in individuals younger than 15 years; 2) no evidence of acute or chronic diseases in the anamnesis; and 3) no evidence of craniofacial trauma or surgery.

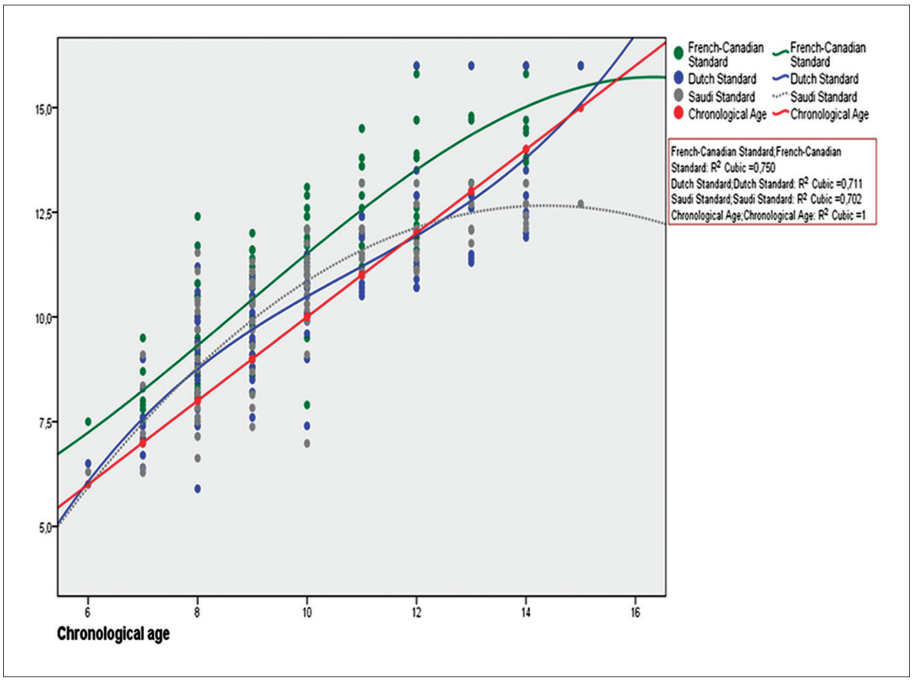

FIGURE 2. The schematic representation of dental age standards (Dutch, French-Canadian, and Saudi standard) used for the estimation of dental age in our sample. The dental age calculated by the French-Canadian standard best corresponded to the chronological age of the participants ($R^2 = 0.75$). The Y-axis represents dental age (years) calculated by each standard.

Statistical analysis

We used the intra-class correlation coefficient (ICC) to test the agreement between two independent examiners (B. D. and B. E.) who assessed dental caries and developmental stages (1 to 8) for each of the seven left mandibular teeth in a random subsample of 25 DPRs from the total sample.

The association of dental caries in the deciduous dentition (determined by the dft index) and dental caries in the permanent dentition (determined by the DMFT index) with dental development (dental age) was analyzed using two linear regression models. In Model 1, we analyzed the crude association of dft and DMFT indices with dental age of children and adolescents. In Model 2, the analysis was adjusted for the sex, age, hypodontia, and dft or DMFT index. The same analysis and models were applied to test separately the association of the deciduous decayed teeth (dt) and filled teeth (ft) with dental age, and the association of the permanent decayed (DT), missing (MT), and filled teeth (FT) with dental age.

The association between dental caries in the deciduous dentition (dft index) and development of each left permanent mandibular tooth was analyzed using an ordinal regression model, adjusted for the sex, age, hypodontia, and DMFT index. For this analysis, the severity of dental caries in the deciduous dentition (dft index) was categorized in tertiles as: 1 - no dental caries (dft = 0); 2 - mild dental caries ($1 \leq$ dft ≤ 3); and 3 - moderate to severe dental caries (dft ≥ 4) [20]. The first group of children with no dental caries (dft = 0) was used as the reference group. The same analysis was performed to assess the association between dental caries in the permanent dentition (DMFT index) and development of each left permanent mandibular tooth. In this case, the ordinal regression model was adjusted for the sex, age, hypodontia, and dft index. The same approach that was used to categorize the dft index results was also used to categorize the DMFT index results. The data analyzed with Mann–Whitney U non-parametric test for independent samples and Chi-squared test were considered statistically significant at $p \leq 0.05$. All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 21.0. (IBM Corp., Armonk, NY, USA).

RESULTS

Sample characteristics and inter-examiner agreement

The dental ages calculated from the Dutch standard (median 10.7 years, 90% range 7.4–16.0 years), French-Canadian standard (median 11.8 years, 90% range 7.9–16.0 years), and Saudi standard (median 11.1, 90% range 7.0–13.2 years) were higher ($p < 0.05$) compared with the chronological age at the time when the DPRs were obtained [median 10.0 years, 90% range 7.0–14.0 years] (Table 1). The frequency of hypodontia in the total sample was 5.9% and no individual had more than two missing teeth. The second lower premolars were the most common missing teeth (57.0%).

The inter-examiner agreement for the assessment of dental caries and stages of development for each left mandibular tooth was moderate to perfect (ICC = 0.67 to 1.00), providing a substantial agreement.

Dental caries in the deciduous dentition

Dental caries in the deciduous dentition was estimated as a median dft of 2.0 [90% range, 0.0–9.1] (Table 1). The dft was not significantly different between the boys and girls ($p = 0.95$). Overall, 59.0% of the children had at least one decayed, missing or filled deciduous tooth. Among the patients that had dental caries in the deciduous dentition (dft index), 94.3% had at least one decayed deciduous tooth (dt) and 24.3% had at least one filled deciduous tooth (ft). Among the patients that had at least one decayed deciduous tooth (dt), 37.9% also had at least one decayed permanent tooth. The most common decayed deciduous teeth were the lower and upper first molars (32.0%) followed by the lower and upper second molars (29.0%). The most common filled deciduous teeth were the second molars (10.0%).

Dental caries in the permanent dentition

Dental caries in the permanent dentition was estimated as a median DMFT of 1.0 [90% range, 0.0–8.0] (Table 1). The DMFT index was not significantly different between the boys and girls ($p = 0.73$). Overall, 56.0% of the participants had at least one decayed, missing or filled permanent tooth. Among the patients that had dental caries in the permanent dentition (DMFT index), 71.2% had at least one decayed permanent tooth (DT), 15.2% had at least one missing permanent tooth (MT), and 53.0% had at least one filled permanent tooth (FT). Among the patients that had at least one decayed permanent tooth (DT), 53.2% also had at least also one decayed deciduous tooth (dt). The most common decayed permanent teeth were the lower first molars (31.0%) followed by the upper first molars (19.0%) and upper incisors (8.0%). The lower first molars were also the most common filled (18.0%) and extracted (6.0%) permanent teeth.

TABLE 1. General characteristics of the study population

Descriptive characteristics	Overall (N=118)	Boys (n=54)	Girls (n=64)	*p*
Age	10.00 (7.0, 14.0)	10.00 (8.0, 14.3)	10.00 (7.0, 14)	0.56
Maturity score	94.50 (71.7, 100.0)	93.25 (71.7, 100.0)	92.28 (68.9, 100.0)	0.07
Measurements of dental development				
Dental age from Dutch standard	10.70 (7.4, 16.0)	10.75 (7.4, 16.0)	10.70 (6.8, 16.0)	0.44
Dental age from French-Canadian standard	11.75 (7.9, 16.0)	11.65 (8.1, 16.0)	11.90 (7.7, 16.0)	0.67
Dental age from Saudi standard	11.09 (7.0, 13.2)	11.08 (7.1, 13.2)	11.13 (6.5, 12.7)	0.96
Stage of development				
First incisor	8 (7.0, 8.0)	8 (7.0, 8.0)	8 (7.0, 8.0)	0.50
Second incisor	8 (6.0, 8.0)	8 (6.0, 8.0)	8 (6.0, 8.0)	0.82
Canine	7 (5.0, 8.0)	6 (5.0, 8.0)	7 (5.0, 8.0)	0.57
First premolar	6 (5.0, 8.0)	6 (5.0, 8.0)	6 (4.3, 8.0)	0.87
Second premolar	6 (4.0, 8.0)	6 (4.0, 8.0)	6 (4.0, 8.0)	0.88
First molar	8 (7.0, 8.0)	8 (7.0, 8.0)	8 (7.0, 8.0)	0.96
Second molar	6 (4.0, 8.0)	6 (4.0, 8.0)	6 (4.0, 8.0)	0.99
Dental caries indices and their components				
dft	2.00 (0.0, 9.1)	2.00 (0.0, 8.0)	1.50 (0.0, 11.8)	0.95
dt	1.00 (0.0, 8.0)	1.50 (0.0, 7.3)	1.00 (0.0, 8.8)	0.85
ft	0.00 (0.0, 2.1)	0.00 (0.0, 2.8)	0.00 (0.0, 3.5)	0.11
DMFT	1.00 (0.0, 8.0)	1.00 (0.0, 8.3)	1.00 (0.0, 7.8)	0.73
DT	0.00 (0.0, 5.0)	0.00 (0.0, 7.5)	0.00 (0.0, 4.0)	0.49
MT	0.00 (0.0, 1.0)	0.00 (0.0, 1.3)	0.00 (0.0, 1.0)	0.72
FT	0.00 (0.0, 4.0)	0.00 (0.0, 4.0)	0.00 (0.0, 3.8)	0.72
Hypodontia (n; %)	7 (5.9%)	4 (7.4%)	3 (4.7%)	0.41

Values are presented as medians and 90% range. dft: Decayed Filled Teeth index for the deciduous dentition; dt: Decayed deciduous teeth; ft: Filled deciduous teeth; DMFT: Decayed Missing Filled Teeth index for the permanent dentition; DT: Decayed permanent teeth; MT: Missing permanent teeth; FT: Filled permanent teeth

TABLE 2. Association between the dft index and dental age

dft component	Model 1			Model 2		
	β	95% CI	*p*	β	95% CI	*p*
dft	–0.56	(–0.67, -0.48)	0.00**	–0.21	(–0.29, -0.12)	0.00**
dt	–0.58	(–0.69, -0.47)	0.00**	–0.19	(–0.28, -0.10)	0.00**
ft	–0.46	(–0.78, -0.14)	0.01*	–0.08	(–0.25, 0.08)	0.31

Model 1 represents the crude association between dft and dental age. Model 2 was additionally adjusted for the sex, age, DMFT index, and hypodontia. β: Regression coefficient; CI: Confidence interval; dft: Decayed-Filled-Teeth index for the deciduous dentition; dt: Decayed deciduous teeth; ft: Filled deciduous teeth. DMFT: Decayed-Missing-Filled-Teeth index for the permanent dentition. * $p<0.05$, ** $p<0.01$

TABLE 3. Association between the DMFT index and dental age

DMFT component	Model 1			Model 2		
	β	95% CI	*p*	β	95% CI	*p*
DMFT	0.45	(0.30, 0.60)	0.00**	0.05	(–0.04, 0.14)	0.24
DT	0.35	(0.16, 0.55)	0.00**	–0.02	(–0.12, 0.08)	0.70
MT	1.35	(0.57, 2.13)	0.00**	0.35	(–0.02, 0.71)	0.06
FT	0.73	(0.37, 1.10)	0.00**	0.20	(0.03, 0.38)	0.03*

Model 1 represents the crude association between DMFT and dental age. Model 2 was additionally adjusted for the sex, age, dft and hypodontia. β: Regression coefficient; CI: Confidence interval; DMFT: Decayed-Missing-Filled-Teeth index for the permanent dentition.; DT: Decayed permanent teeth; MT: Missing permanent teeth; FT: Filled permanent teeth dft: Decayed-Filled-Teeth index for the deciduous dentition. * $p<0.05$, ** $p<0.01$

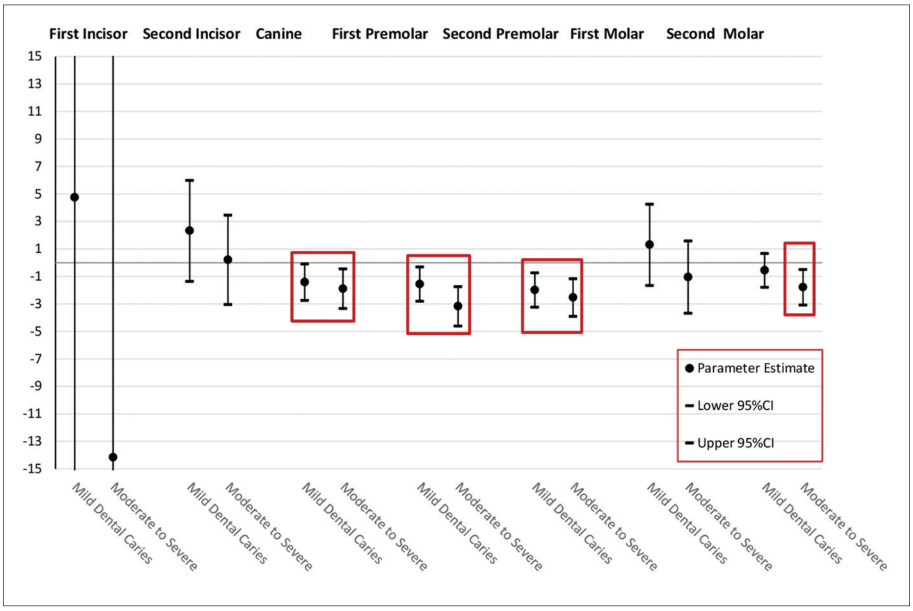

FIGURE 3. Association between dental caries in the deciduous dentition (dft index) and development of each left permanent mandibular tooth. The development of the canine, first premolar and second premolar was delayed in the group of children with mild dental caries compared to the reference group. The development of the canine, first premolar, second premolar, and second molar was delayed in the group of children with moderate to severe dental caries compared to the reference group. Mild dental caries: 1 ≤ dft ≤ 3; Moderate to severe dental caries: dft ≤ 4; Reference group: dft = 0. All parameter estimates and the corresponding 95% CIs were obtained from ordinal regression model adjusted for the sex, age, DMFT index and hypodontia. dft: Decayed-Filled-Teeth index for the deciduous dentition; DMFT: Decayed-Missing-Filled-Teeth index for the permanent dentition.

Association between dental caries in the deciduous dentition (dft index) and dental age

The Model 1 revealed statistically significant associations of the dft index, dt and ft with dental age (Table 2). After the confounding factors were taken into account (i.e., the sex, age, DMFT index, and hypodontia) in the Model 2, the effect of dft index and dt on dental age attenuated, whereas the effect of ft on dental age became statistically insignificant. Thus, dental caries (dft index) was associated with lower dental age (β = -0.21; 95% CI: -0.29, -0.12). The untreated dental caries (dt) was also associated with lower dental age (β = -0.19; 95% CI: -0.28, -0.10). The treated dental caries (ft) was not associated with dental age (β = -0.08; 95% CI: -0.25, 0.08).

Association between dental caries in the permanent dentition (DMFT index) and dental age

The Model 1 revealed statistically significant associations of the DMFT index, DT, MT and FT with dental age (Table 3). When the confounding factors were added (i.e., the sex, age, dft index, and hypodontia) in the Model 2, the effects of DMFT index, DT, and MT on dental age became statistically insignificant, whereas the effect of FT on dental age remained statistically significant (β = 0.20; 95% CI: 0.03, 0.38).

Association between dental caries in the deciduous dentition (dft index) and development of each left permanent mandibular tooth

As shown in Figure 3, the development of the canine, first premolar and second premolar was delayed in the group of children with mild dental caries (1 ≤ dft ≤3) compared to the reference group (dft = 0). The delay corresponded to 1.41 (95% CI: -2.73, -0.09) lower stages for the canine, 1.55 (95% CI: -2.80, -0.30) lower stages for the first premolar and 1.98 (95% CI: -3.23, -0.72) lower stages for the second premolar. The development of the canine, first premolar, second premolar, and second molar was delayed in the group of children

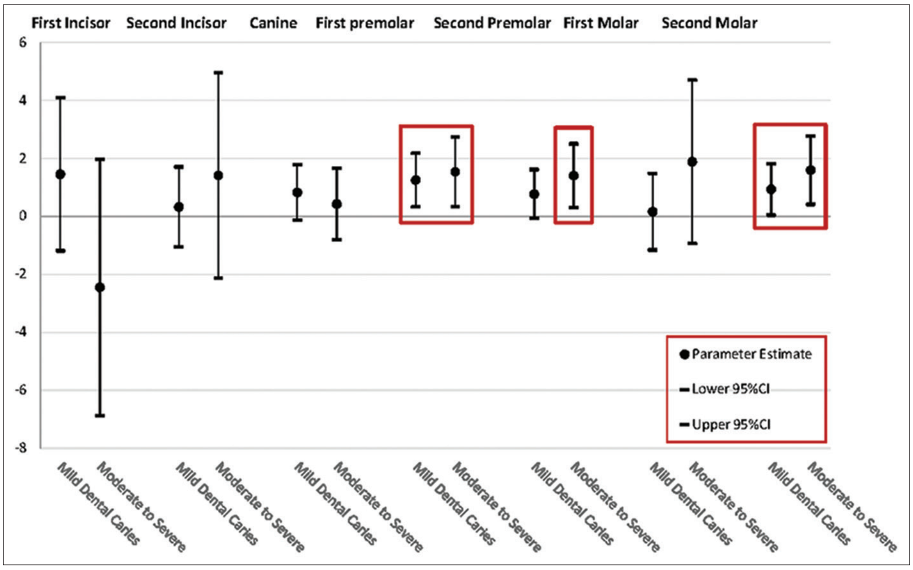

FIGURE 4. Association between dental caries in the permanent dentition (DMFT index) and development of each left permanent mandibular tooth. The first premolar and second molar were at the advanced stage of development in the group of children with mild dental caries compared to the reference group. The first premolar, second premolar, and second molar were at the advanced stage in the group of children with moderate to severe dental caries compared with the reference group. Mild dental caries: 1 ≤ DMFT ≤ 3; Moderate to severe dental caries: DMFT ≤ 4; Reference group: DMFT = 0. All parameter estimates and the corresponding 95% CIs were obtained from ordinal regression model adjusted for the sex, age, dft index and hypodontia. dft: Decayed-Filled-Teeth index for the deciduous dentition; DMFT: Decayed-Missing-Filled-Teeth index for the permanent dentition.

with moderate to severe dental caries (dft ≥ 4) compared to the reference group (dft = 0). The delay corresponded to 1.89 (95% CI: -3.33, -0.44) lower stages for the canine, 3.17 (95% CI: -4.60, -1.73) lower stages for the first premolar, 2.52 (95% CI: -3.89, -1.15) lower stages for the second premolar and 1.77 (95% CI: -3.06, -0.48) lower stages for the second molar. As the central incisors were mostly in the final stages of development, the ordinal regression analyses were not preformed due to the lack of sufficient variability.

Association between dental caries in the permanent dentition (DMFT index) and development of each left permanent mandibular tooth

As shown in Figure 4, the first premolar and second molar were at the advanced stage of development in the group of children with mild dental caries (1 ≤ DMFT ≤ 3) compared to the reference group (DMFT = 0). The advance corresponded to 1.25 (95% CI: 0.32, 2.17) higher stages for the first premolar and 0.93 (95% CI: 0.04, 0.82) higher stages for the second molar. The first premolar, second premolar, and second molar were at the advanced stage in the group of children with moderate to severe dental caries (DMFT ≥ 4) compared with the reference group (DMFT = 0). The advance corresponded to 1.53 (95% CI: 0.32, 2.74) higher stages for the first premolar, 1.40 (95% CI: 0.31, 2.50) higher stages for the second premolar and 1.59 (95% CI: 0.41, 2.77) higher stages for the second molar.

DISCUSSION

Delayed dental development is recognized as the main factor that postpones the timing of orthodontic treatment. Dental caries is considered to be a common local cause of delayed development in the permanent dentition. The findings of our study suggest that dental caries in the deciduous dentition is associated with 3- to 7-month delayed development of the permanent teeth. A higher dft resulted in the lower stages of development for the canine, first premolar, second premolar, and second molar. Delayed maturation of teeth affects the occlusion and can lead to complaints about eating, speaking, smiling, and appearance [21-23].

Most of our participants had large dental fillings that often included the root canals of permanent teeth. Considering the type of treatment intervention in such cases, i.e., apexogenesis or apexification, the closure of the apex before the predicted time is expected [24,25]. Therefore, in our study, the filled permanent teeth had already reached the final stage of development (stage 8), according to the DPR images. Consequently, the treatment of carious lesions in the permanent dentition by dental fillings (FT) was the only component of the DMFT index associated with an advanced dental age. Specifically, dental caries in the permanent dentition was associated with the advanced stages of development of the first premolar, second premolar, and second molar. This finding may be explained by the reaction of dentin and pulp to caries [26]. Dental caries causes demineralization of the enamel, which in turn stimulates odontoblasts to produce dentin. The hypermineralization precipitates the closure of the apex and initiates the final stage of dental development. However, the lack of similar studies limited the possibility of comparing our results with other findings. Nevertheless, it is well-accepted that the dissolution of hydroxyapatite is caused by acids derived from bacterial fermentation of dietary carbohydrates [27].

The velocity of matrix secretion in hard tissues of teeth determines which developmental stages will be distinguished on an X-ray image. In the case of mixed dentition, a higher bacterial activity will increase the demineralization of deciduous teeth [5]. In response to this phenomenon, the velocity of mineralization in the permanent dentition might be decreased. In our sample, most of the central incisors, lateral incisors and first molars had already reached the final stage of development, so we could not determine an association between dental caries in the deciduous dentition and the stages of dental development in this phase. For a better understanding of these associations, similar studies should be performed in children of younger age.

The DMFT index is the most common method for assessing the prevalence of dental caries [28]. However, the prevalence is considered to be underestimated when determined only by clinical examination, and without the use of X-ray imaging [29]. In dental practice, panoramic radiography has become one of the main tools for estimating dental age and for detecting caries [19,30]. Although the accuracy of DPR for the detection of carious lesions in the molar area was comparable to that of intraoral radiographs (i.e., periapical and bitewing radiographs), DPRs were less accurate in the detection of anterior carious lesions, compared to the intraoral radiographs [31,32]. Due to the lack of a gold standard in caries detection as well as a tool that would enable the assessment of both dental caries and dental development [33], in the current study, we used panoramic radiography as the main tool to measure developmental stages of mandibular teeth and also to estimate caries. In addition, for a more thorough analysis of the results, we retrieved the relevant information from the patient medical records.

We calculated the dental age using three standards, the French-Canadian, Dutch, and the Saudi standard [19,34,35]. The French-Canadian standard is applicable worldwide, however, overestimation of dental age by French-Canadian standard has been reported in different populations [36], and a similar trend was observed in our study. Because of the lack of a dental age standard specifically developed for the Albanian population, we applied the two other standards, the Dutch and Saudi standard. However, the French-Canadian standard provided a better estimation of dental development in our study sample, compared to the other two standards. Nevertheless, to achieve more accurate estimation of dental age, the French-Canadian standard should be specifically adapted for the Albanian population.

Severe dental caries in the deciduous dentition increases the risk of dental caries in the permanent teeth, due to the higher bacterial activity and vulnerability of permanent teeth 2 to 4 years after the eruption [37]. Moreover, severe dental caries in the deciduous and permanent dentition influences the quality of life of children causing pain, weight gain, and having negative effects on their psychosocial well-being [4]. The restorative treatment plan that follows the clinical examination should take into consideration not only the caries risk but also the development of the dentition [38]. We showed that dental caries, especially the untreated dental caries (dt), in the deciduous dentition, is followed by a delayed development of the permanent dentition. Additionally, there was an obvious discrepancy in treating dental caries during the deciduous dentition (ft = 24.3%) compared to the permanent dentition (FT = 53.0%) in our sample. New strategies that will increase the awareness of early detection and treatment of carious lesions during the deciduous dentition are required to prevent the delay of later dental development.

ACKNOWLEDGMENTS

The scientific research activity of B. D. was made possible by the ERAWEB project. The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data. The current study is part of the PhD thesis entitled "Dental development: Normal variations and disturbances of the developing dentition" conducted and defended by B. D. All authors thank the colleagues at the Department of Therapy, Dental Care and Orthodontics in Dent Ital Clinic for their commitment to this collaboration and their contribution in providing the necessary data for the study. We especially thank to all patients and their parents.

DECLARATION OF INTERESTS

The authors declare no conflict of interests.

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