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# The First Permanent Molar Most Affected by Dental Caries - A Longitudinal Study

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## To cite this article:

Canga Mimoza, Malagnino Antonio Vito. The First Permanent Molar Most Affected by Dental Caries - A Longitudinal Study. *International Journal of Dental Medicine*. Vol. 4, No. 2, 2018, pp. 36-41. doi: 10.11648/j.ijdm.20180402.12

**Received:** September 28, 2018; **Accepted:** October 12, 2018; **Published:** November 7, 2018

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**Abstract:** The cost effectiveness of this study was achieved within a two year time period, which confirmed that tooth number 26 is the most affected by caries. The relative effectiveness of this study are the observations done every 0-6-12-18-24 months. To identify, which of the teeth number 16, 26, 36 and 46 is affected more by caries within a two year time period in permanent dentition. The study only aimed at observing caries process, it had not any intention to intervene and show the effect of intervention. This is a longitudinal study, with a controlled sample for a period of 24 months. The present study included 488 children who were observed every 6 months in a 24 months' time period. The population comes from a coastal city and the economic level had no significant deviations. The sample was chosen randomly. The data collected showed that tooth number 16 has been affected 37.62% by caries. Tooth number 26 has been affected 40.51% by caries. Tooth number 36 and 46 have been affected by dental caries 14.47% and 7.40%, respectively. This research proved that time 6-24 months influences more caries manifestation with a p-value=0.034, rather than the time 12-24 months which has a p=0.037. Based on, Anova test, the relation between groups of teeth and time is significant  $P < 0.05$ . This study proved that tooth number 26 is the most affected by caries. First molars in the lower jaw have higher caries prevalence than the first molars in the upper jaw, this was another finding proved by the results obtained in this research. Clinical significance: The present study, which is performed in a two year time period with controls done every 6 months, proved that tooth number 26 is the most affected by dental caries.

**Keywords:** First Permanent Molar, Caries Disease, Children, Age

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## 1. Introduction

Dental caries is a major oral health problem [1]. Childhood caries is the most common disease of childhood and often is accompanied by serious comorbidities affecting children, their families, the community and the health care system [2-3]. The consequences of caries are: pain, suffrage and lower quality of life among children. Dental caries is the most common and the most prevalent disease of oral health of people worldwide [4-5]. It depends on age and geographical distribution. Other factors include poor oral hygiene, social economic status, especially low maternal education presence of high counts of *Streptococcus mutans* in dental plaque and geographic location [6-8]. Beside from the factors mentioned dental caries is highly prevalent and increase with augmented

sugar consumption [9].

More than 95% of developed countries are affected by dental caries. Different studies aimed at defining caries etiology and its prevalence. Epidemiological data can be used for improved public oral health service, planning and resource allocation within the region [5].

The parents in the high caries communities were reported to have higher proportions of social and financial problems, were less likely to form parent-teacher associations, their children had poorer attendance and punctuality records, worse behavior and greater consumption of confectionery after school [10]. Epidemiological studies have been conducted in different countries of the world and they enabled population monitoring in order to evaluate the role of indicators in oral health, also they proved a direct relation between caries and other factors such as: economic, social

and clinical ones [11]. These studies emphasized that oral hygiene and nutrition play an important role in caries spread [12]. Some studies concluded that the prevalence of caries increments if age increases [4].

Socio-economic factors influence the development of caries [13]. There are enough evidences, which prove that caries prevalence for this age range in developed countries has been significantly reduced in the last two decades. Fluoridation usage is the main reason why dental caries has been reduced [14].

## 2. Materials and Methods

This is a longitudinal study, with a controlled sample for a period of 24 months. The period of the study was January 2016-May 2018. The carious status of the first permanent molar was studied in 488 children. The children in the study had different economic and social backgrounds. The sample was selected through the "Random Clustering" method. The teeth controls were done by the dentists who work at the hospital of the city.

The inclusion criterion was: patients need to have completely or half gained tooth number 6, if not they will be excluded from the study. Another exclusion criteria was: children must not have orthodontic brackets. Children entered the study at the age 7-8 years old when they had gained the first four permanent molars. After 24 months they left it at the age 9-10 years old. The study had no dropouts.

Only first permanent molars of the children were taken in consideration. During the study we elicited information about: how frequent children visit the dentist, the role of the parents about cleaning children's teeth and the consumption

of sugary food.

The present study was conducted in accordance with Helsinki declaration [15]. Based on the *Declaration of Helsinki* issued by the World Medical Association, this research, which was on human participants, was clearly formulated in experimental protocols. The benefits and the potential risks, were anticipated to the sample and after that the consents of children's parents were taken. Permissions were obtained in written form, which allowed us to perform the observations. Parents had the right to withdraw their children at any time. Also, the present study was reviewed and approved by the institutional review board of the University of Vlora.

## 3. Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics 23.0. Data were analyzed by Post Hoc LSD test in analysis of variance (ANOVA). The significance level ( $\alpha$ ) was set at 0.05 with a confidence interval (CI) of 95%.

## 4. Results

Based on the results, there are no major deviations between molars number 16 and 26. Data are comparable, whereas for molars number 36 and 46 the values are 3-4 times lower than the values of molars number 16 and 26. In molars number 16 there were 49 children with caries, in molars number 26 there were 57 children with caries, while in molars number 36 and 46 there were 24 and 15 children with caries, respectively (Figure 1).

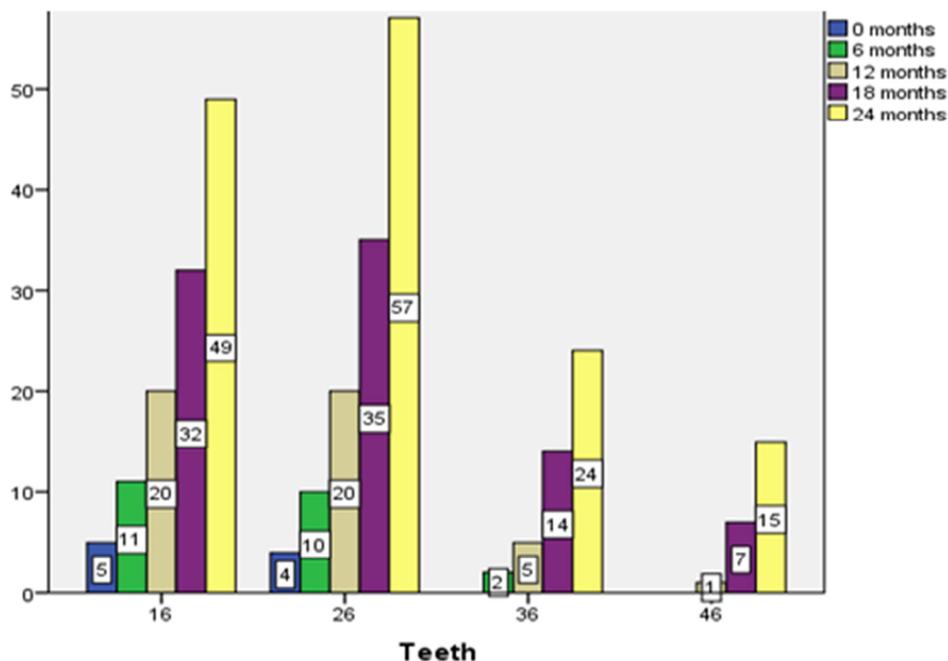


Figure 1. Shows the progress of dental caries in permanent molars 16, 26, 36 and 46 in a time period from 0-24 months.

The deviation seen in the destruction of the first mandibular molars and the ones in the maxilla is not related

with oral hygiene or nutrition, but merely with the position and the role of the molars number six.

Data about caries development in the teeth taken under observation are presented in percentages. Tooth number 26 is the most affected by dental caries with 40.51%, while the

other teeth had lower values such as: the tooth number 16 with 37.62%, the tooth number 36 with 14.47% and the tooth number 46 with 7.40% (Figure 2).

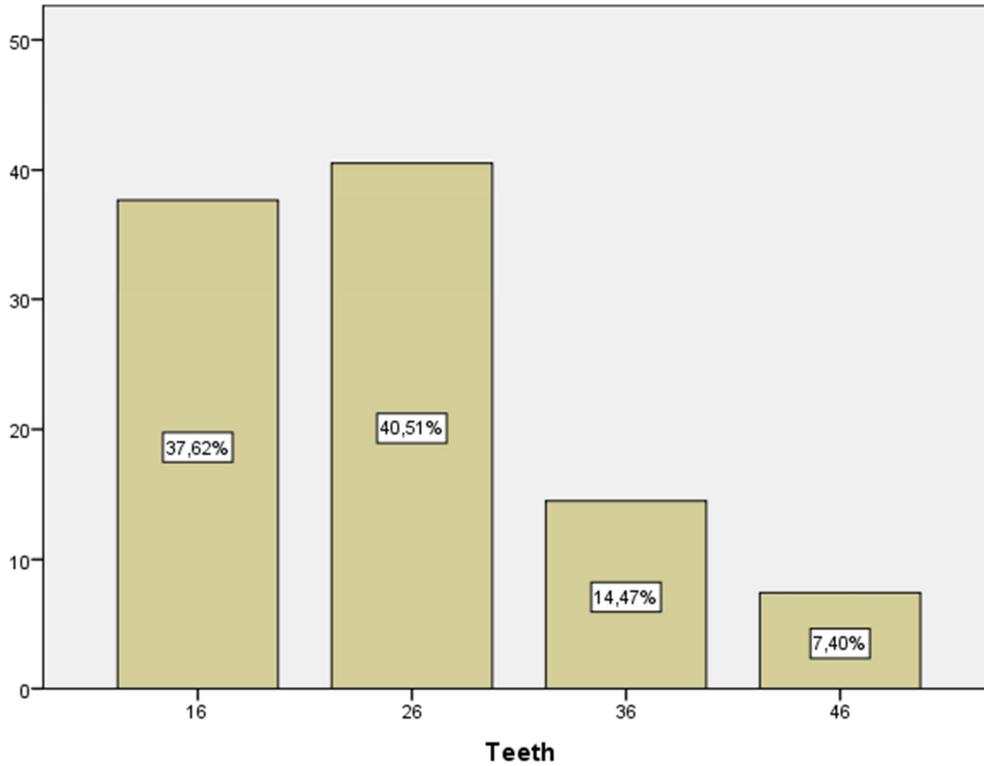


Figure 2. Shows in percentages the caries status of each permanent molar.

At the beginning of the study the percentage of caries was 2.89%, while after 24 months this percentage increased in

46.62%. The data collected showed that dental caries incremented during the period 0-24 months (Figure 3).

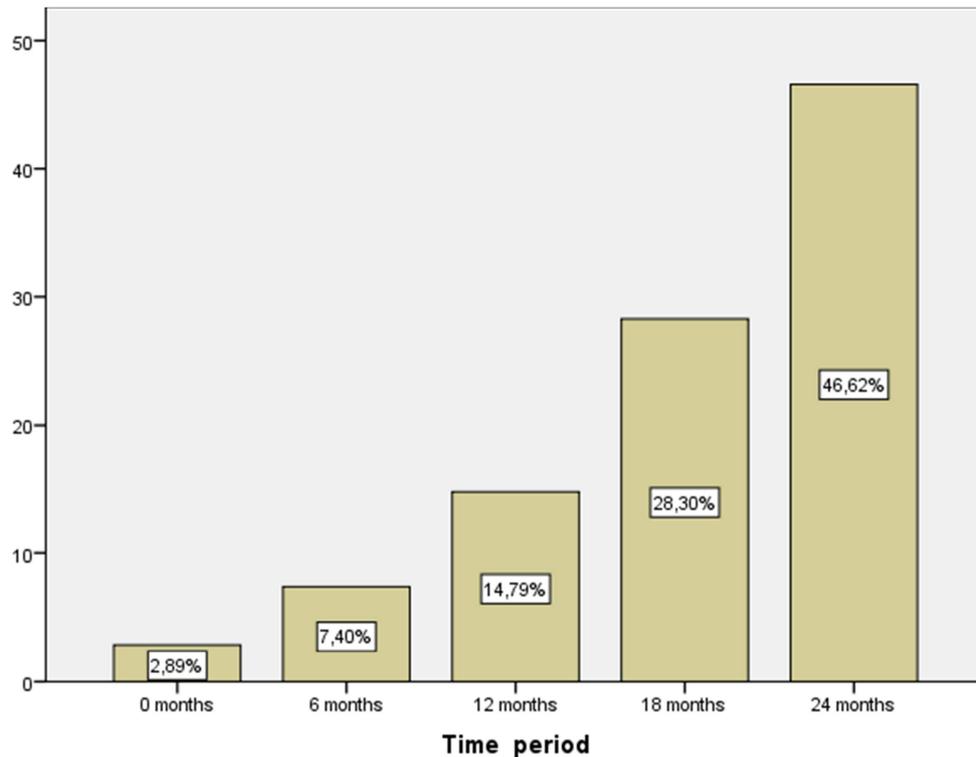


Figure 3. Shows the increasing of caries percentage from 0 up to 24 months.

According to Post Hoc LSD test, the time 6-24 months influences more caries manifestation with a p-value=0.034, rather than the time 12-24 months which has a p=0.037 (Table 1).

**Table 1.** Shows the relation between time period 6-24 months, 12-24 months and caries manifestation<sup>1</sup>.

Time period	Sign	CI 95%	
6 months - 24 months	.034	-.82	-.03
12 months - 24 months	.037	-.61	-.02

Based on Anova test, the relation between groups of teeth and time is significant  $P < 0.05$  (Table 2).

**Table 2.** Describes the relation between time period 0-24 months and caries manifestation<sup>2</sup>.

Time period	Mean	F	P
0 -24 months	4.03	3.53	0.01

## 5. Discussion

Dental caries is a multifactor disease in which different individual and contextual factors interact. Although there have been continuous efforts to reduce its prevalence, it is still widespread, especially in lower socio-economic classes [16-17].

First permanent molars are the most important teeth in the mouth in order to evaluate the oral health status of individuals. Despite of their importance they are the most vulnerable teeth to dental caries because of their functional and morphological characteristics.

This study was conducted on first permanent molar teeth because they play a key role in the dental health of people. First permanent molars are the first to erupt and have a greater control over other teeth that erupt later, they also carry the maximum occlusal load and have aesthetic features.

The objective of this work was to determine the frequency of dental caries in the teeth number 16, 26, 36 and 46 in the city of Vlora, Albania. The prevalence of caries was 46.62%. One of the reasons of caries manifestation is the lack of fluoridation in the drinking-water. But, that there are other reasons too, which affect caries manifestation, such as: bad oral hygiene, the consumption of sweets as dessert, irregular dental check-ups controls.

The observations done proved that the tooth most affected by caries is *the tooth number 26 with 40.51%*. The results of this work are lower than the results obtained by Noronha et al. and Wyne who found that the permanent first molar is affected by caries at levels 87% and 86%, respectively [18-19]. The results of this research are proved by the study done by Ana A. Vallejos-Sanchez et al., who cited that caries problem increases as people get older [20].

First permanent molars, like all other teeth, have higher concentrations of carbohydrates in their enamel, causing changes in the crystal network of hydroxyapatite, making the

enamel surface more acidic. Furthermore, teeth while come out do not have functional occlusion contact, increasing in this way the possibility of food storage in teeth and obstructing their wash [21]. High levels of caries in the first permanent molars can also be influenced by other factors such as: tooth positioning in the last part of the mouth during the period of permanent dentition, insufficient childhood agility, irregular teeth brushing during the period that these teeth come out, the presence of the cavity and deeper fissures [21].

This study came at the conclusion that the first molars in the lower jaw have higher caries prevalence than the first molars in the upper jaw. Similar findings were obtained by the study conducted by Chen et al., who emphasized that mandibular molars had a higher caries prevalence rate than maxillary molars [22].

The present study gives a clear overview about the prevalence of dental caries in the first permanent molars in children, in Albania. It proved a high percentage of caries morbidity (46.62%), which is similar to caries prevalence in other countries like China (41%), South Africa (39.7%) and United States (41%) [23-26].

The evidence suggests that children are most likely to develop caries if *Streptococcus mutans* is acquired at an early age, although this may be partly compensated by other factors such as good oral hygiene and a non-cariogenic diet. Diet and good oral hygiene may interact by maintaining a good plaque control so the development of caries may be controlled [27].

The present paper proved an increase of caries prevalence in children, which was already stated by previous studies. These studies noticed that over 80% of children in this age group require either dental restorations or extractions. This will be extremely costly and emphasizes the need and importance for preventive programmes [28-29]. An early preventive programme like application of fissure sealants, the use of fluoride, meticulous home care, could help reduce the prevalence of caries in these teeth [30-31].

Based on the results, it is recommended that children of this age range should have periodic dental visits, daily tooth brushing, a decrease of carbohydrates consumption and taking fluoride tablets. Also, it is advisable that a systematic oral health promotion should be part of the school programmes.

## 6. Conclusion

The tooth number 26 is the most affected by caries and caries increment more while children get older. First molars in the lower jaw have higher caries prevalence than the first molars in the upper jaw, this was another finding proved by the results obtained in this research.

## Clinical Significance

The present study, which is performed in a two year time period with controls done every 6 months, proved that tooth number 26 is the most affected by dental caries.

<sup>1</sup> Sign (significance of test); CI (Confidence Interval)

<sup>2</sup> F (Fisher test)

## Financial Support and Sponsorship

Nil.

## Conflicts of Interest

All the authors do not have any possible conflicts of interest.

## Acknowledgements

I want to thank professor Malagnino and the dentists of Vlora hospital, in Albania, for their support, contribution and the time that they dedicated to this study.

## Informed Consent

Informed consent of the patients was obtained for the conduction of this study. A copy of the written consent is available, at any time, for review by the editor of this journal.

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