Correlation Between Caries Experience in Primary Molars and First Permanent Molars Among a Group of Egyptian Children: A Cross Sectional Study

Submitted for partial fulfillment of the master requirements in Faculty of Dentistry

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By

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Evidence based committee (Reviewers)

Name	Signature	Date
1.		
2.		

Research plan committee

Name	Signature	Date
1.		
2.		

- **Roles and responsibilities**

❖ **Supervisors**

➢ **Main Supervisor**

Dr. Amr Ezzat

Associate Professor of Pediatric Dentistry & Dental Public Health, Department of Dentistry, Cairo University

Role:

- Reference for medical and evidential consultation for the study.
- Supervising the protocol.
- Supervising the thesis.
- Regular monitoring on results and outcomes of the study.
- Supervising the work done by the candidate on the participants.

➢ **Co-supervisor**

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Role:

- Supervising the protocol
- Supervising the thesis.
- Regular monitoring on results and outcomes of the study.
- Dealing with participants in case of any negative feedback on the operator.
- Supervising the work done by the candidate on the participants**.**

- **Candidate:**

Dema Abdelhameed theyab

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Role:

- Formulating the protocol.
- Choosing and grouping candidates for the study according to the eligibility criteria.
- Explaining the aim of the study and providing verbal and written consents for the participants.
- Preparing files for each participant, to include personal, medical, past and chief complaint histories
- Oral examination
- Recording the results and outcomes.
- Formulating thesis.
- Archiving of all the data harvested from the study and ensuring its privacy.
- Providing statistician with all the information needed and collecting back statistical results.

- **Trial sponsor**

Pediatric Dentistry and Dental Public Health Department, Cairo University.

The sponsor shall provide for the dental units for the research work.

- **Steering committees**

1. Department board.
2. Research plan committee
3. Evidence based committee, Faculty of DENTISRTY, Cairo University
4. Ethics committee, Faculty of Oral and Dental Medicine Cairo University
5. Higher education and research committee
6. Faculty Board.

- ## Introduction

The marked global raise in Dental caries reported in various countries over the last two decades urges the attention of researchers to investigate newer approaches and methods for its diagnoses, prevention, and treatment for this common health problem worldwide **(MANDEL, 2017)**

Many researchers have reported that, the most critical period for the initiation and progression of occlusal carious lesions is at the time of eruption **(Feather, 2000)**. At the age of 6 years, occlusal surfaces of the permanent first molars are particularly vulnerable to caries development **(Welbury et al., 2004)**. Due to this many preventive strategies using sealants, fluoride varnish, and fluoride gel application was developed in an attempt to stop the caries progression. never less we need to categories the teeth which are at high risk for dental caries, several methods to identify children at increased risk of caries have been developed. These include bacterial and salivary tests in combination with oral hygiene scores and dietary factors. Those complicated prediction tests are considered time consuming and too costly for use in normal dental practice.

On the other hand, Studies on caries risk assessment in children have shown that past caries experience is the best indicator of future caries development ,this Past caries experience is a simple and effective method, as to consider caries in permanent teeth to be a reflective mirror for the past caries experience in primary teeth , **(Topaloglu-Ak & Eden, 2010)**.

This study will investigate whether data of past caries experience of the primary molars of 6-9 years old children can serve as an indicator for caries development in first permanent molars.as the first permanent molars is selected to represent the future caries status of the permanent dentition.

- ## Statement of the problem

One of the main clinical scenarios a pediatric dentist may meet is to extract or do a root canal treatment for the first permanent molars at a young age, which may lead to a serious problem in the occlusion, given that the first permanent molar is the key of occlusion ,many researches have been trying to investigate the underlying cause for the early decay of the first permanent molars including many expensive testes, all aiming to diagnose children at high risk for caries in permanent teeth , another controversy had suggest that caries in primary teeth is not only directly correlated to caries in permanent teeth, but also could be used as risk indicator for caries in first permanent molars, according to**(Topaloglu-Ak & Eden, 2010),** this study suggested the possibility of caries correlation between primary molars and first permanent molars, and that early preventive measures should be applied as early as possible in order to protect the first permanent molar from decay. But is this hypothesis reliable and is there a true correlation between caries in primary molars and first permanent molars?

- ## Rationale

➢ **Importance of the study trial**

To detect the Relation between caries in primary molars and the development of caries in first permanent molars among Egyptian children.

➢ **Benefits of practitioners and clinicians**

If this study proves that there is a correlation between caries in primary and permanent molars, practitioners and clinicians will have an indirect benefit. Therefore, they can advise their patients on the importance of early caries-preventive measures.

➢ **Benefits to patient & Population**

Increase the awareness of importance of implementing oral hygiene and caries-preventive measures among patients and parents.

- **Search Strategy**

The following databases were searched:

- PubMed database.
- Hand searching (Google scholars).

Keywords used in both databases:

- Primary and permanent molars
- Dental caries, Early childhood caries, prevalence of caries
- Children, preschool.

- **Inclusion Criteria**

Included articles should include all of the following criteria:

- Studies applied on normal children.
- Restricted to English language.
- Association between caries in primary and permanent teeth

- **Exclusion criteria**

Articles will be excluded if they include one of the following criteria:

- Other specialties.
- Studies conducted upon adults
- Studies conducted in languages other than English

- **List of included articles**

Author and year	Aim	Characteristics
Doneria et al. (2017)	Comparative evaluation of caries status in primary and permanent molars in 7–8-year-old schoolchildren of shimla using caries assessment spectrum and treatment index.	-Cross-sectional study -Caries assessment in primary and permanent molars
Baginsk et al. (2014)	Dental caries in primary and permanent molars in 7-8-year-old schoolchildren evaluated with Caries Assessment Spectrum and Treatment (CAST) index.	-Cross-sectional -Aimed to examine caries in primary and permanent molars
Topaloglu-Ak & Eden (2010)	Caries in primary molars of 6−7-year-old Turkish children as risk indicators for future caries development in permanent molars.	-Cross-sectional -Aim of study is to examine if past caries experience in primary molars can be used as a risk indicator for future caries experience in first permanent molars.
Chen et al. (2003)	Relationship of caries experience between primary teeth and the first permanent molars in 100 children of 6-year-old.	-Cross-sectional -Aimed to evaluate the association of caries between primary molars and first permanent molars.
Wang et al., (2003)	An eight-year longitudinal study for caries status on primary and permanent dentitions in Beijing children	- Case report. - Aim of this study is to evaluate the caries status in primary and permanent dentition.
Li and Wang (2002)	Predicting caries in permanent teeth from caries in primary teeth: an eight-year cohort study.	- Cohort study. - The study aimed to examine the correlation between caries in primary and permanent dentition.
Raadal and Espelid (1992)	Caries prevalence in primary teeth as a predictor of early fissure caries in permanent first molars	-Cross Sectional Study -The aim of this study is to evaluate whether caries in primary molars can be used as a predictor for early

		fissure caries in first permanent molars. Fissure caries in first permanent molars.

- **List of excluded articles with reasons**

Author and date	Aim	Reason for exclusion
Qiang and Zhi (2015)	Caries status of the first permanent molar among 6-7 years old and their correlation to caries in primary molars	Study in Chinese language.

- **Review of literature**

Several studies reported that caries in primary teeth is correlated with caries in permanent teeth. A study by **(Raadal & Espelid, 1992)** aimed to examine the validity of employing the caries experience of primary dentition for predicting early fissure caries in the permanent first molar. 192 children were examined, and after the children were grouped according to their dmft a statistically significant relationship was found between the dmft and the number of intact molars in each individual. It indicated that the dmft index of primary teeth should be used as an indicator for the use of preventive methods for fissure caries in permanent molars.

Similarly, **(Li & Wang, 2002)** mentioned in their eight years cohort study, that aimed to determine if caries in primary dentition can predict caries in the permanent dentition of the same individual, that there were statistically significant associations between caries prevalence in primary and permanent dentition ($p< 0.01$). Children who had caries in their primary teeth had three times higher rate of developing caries in their permanent teeth with the permanent molar at highest risk, this concluded that caries in primary teeth could be used as a risk indicator for predicting caries in the permanent teeth.

Furthermore, an eight-years longitudinal study was conducted by (**Wang et al., 2003)** to determine if the caries status in primary teeth can be used as a risk indicator for predicting caries in permanent teeth. A total of 362 children, 3-4 years old in the baseline study in 1992 were reexamined in 2000 based on WHO criteria and methods, the result of this study found a significant association between the caries prevalence in primary teeth and permanent teeth ($P<0.01$) and between DMFT(s) and dmft(s) ($P<0.01$). Children who had caries in their primary

teeth were nearly three times more likely to have caries in their permanent teeth (RR=2.6.95% CI = 1.4-4.7, P<0.001). Therefore, this study concluded clearly that caries in the primary teeth can be used as a risk indicator for caries in permanent teeth.

In addition**, (Chen et al., 2003)** examined a total of 100 school children 6 years old. The caries diagnosis criteria defined by WHO were employed. Fisher's exact test showed that there was association between the caries experience of primary teeth and that of the first permanent molars in those children. The average dmft of primary teeth was in positive correlation with DMFT of the first permanent molars (r=0.5629). The results were statistically significant, concluding that the primary tooth caries experience may play an important role in predicting permanent tooth caries.

Moreover, another study aimed to investigate whether the past caries experience in primary dentition can be tested to predict subsequent caries in first permanent molars. Clinical examinations were carried out in a school-based screening. 286 Turkish children aged 6-7 years old were examined and caries in the permanent first molars at the age of 10-11 years was then calculated. Caries experience of the primary dentition (dmft), primary molars (dmft molars), and primary second molars (dmft 2nd molars) showed a statistically significant correlation with caries (DMFT) 4 years later in the permanent first molars. Among the variables, the caries experience of the primary second molars was the most powerful caries predictor **(Topaloglu-Ak & Eden, 2010)**

On the other hand, dental caries in primary and first permanent molars among 7-8 years old school children were evaluated using caries assessment spectrum and treatment (CAST) index. On the contrary to previous studies, this study found weak correlation between caries in primary molars and first permanent molars in the same jaw, while the correlation was found moderate in teeth situated in opposite jaws **(Baginska et al., 2014)**

According to the study performed by (**Doneria et al., 2017)**, caries was assessed in 6.3%-12.3% of permanent molars in contrast to the primary molars, in which carries was near about 50%. The correlation was stronger for first and second deciduous molars for the right side of the mouth than the left side (r=0.293 and 0.257 in the maxilla and 0.503 and 0.319 in the mandible [P<0.001]), respectively, while correlation for teeth in the opposite jaws was moderate [r=0.20-0.47], so it concluded that the correlation between first permanent molars and primary molars regarding the caries status were weak while strongest correlation was present on the right side of the mouth for first and second deciduous molars.

- **Aim of the study**

To investigate the correlation between caries experience in primary molars and first permanent molars, among a group of Egyptian children.

- **PICOS**

(P)Population: Egyptian children aged 6 to 9 years old with present primary molars and erupted first permanent molars

(O) Outcome:

Outcome	**Outcome measuring**	**Outcome measuring unit**
Primary Outcome: Caries experience in primary molars. Secondary outcome: Caries experience in first permanent molars.	Numerical Numerical	deft index DMFT index

(S)Study design: Cross sectional study

- **Research question**

Is there a correlation between caries experience in primary molars and in the first permanent molars among a group of Egyptian children?

- **Hypothesis**

This research adopts null hypothesis; it assumes that there is no correlation between caries experience in primary molars and first permanent molars.

- **Participants and methods**

➢ **Ethics**

- All the procedures will be explained to the parents or guardians prior to the investigation.
- An informed consent will be signed by the parents **(Appendix 1)**
- Study design: cross sectional study design.

➢ **Setting & Location**

Data for this particular study will be collected from the clinic of Pediatric Dentistry and dental public health Department, Faculty of Dentistry, Cairo University.

➢ **Participants**

- **Eligibility criteria**

o **Inclusion criteria**

1. Children ages from six to nine years
2. Both sexes.
3. Parent and children cooperation.
4. Healthy children.
5. Children with sound and carious primary molars and erupted all of the first permanent molars.

o **Exclusion criteria**

1. Children age under 6 or more than 9 years.
2. Children had a complex metabolic or medical disorder.
3. Parents that will not sign the consent.
4. Children with missing or unerupted first permanent molars.

- **Variables**

To control other confounders for caries, additional independent variables will be considered including:

- Gender.
- Number between siblings.
- Only child.
- Socioeconomic status.
- Oral hygiene.
- Type of toothpaste used.

- **Data and sources measurements**

➢ **Methods**

- Clinical examination will be carried out while the child is sitting on dental unit, using sterile diagnostic set (mirror and explorer) in daylight. No diagnostic radiographs will be taken.

- A custom-made examination chart will be filled for each child including date, name, age, address, gender, medical history and previous dental treatment. Parents data includes: level of education and oral hygiene level.

- Prior to performing dental examination, the child will be asked to rinse his mouth with tap water and the teeth will be cleaned with sterile cotton.

- The examiner will carefully inspect all surfaces of the teeth, for proper diagnosis, the teeth were dried thoroughly with an air syringe. It will be important to see clearly and to use the air syringe to distinguish readily cervical or interproximal caries.

- All the primary teeth will be evaluated using deft index and permanent teeth will be evaluated using DMF index, both according to WHO criteria.

(WHO, 2003) criteria:

➢ **Clinical caries lesion shows the following criteria**

- Lesion in pit or fissure, or on a smooth tooth surface with cavitated undermined enamel, or a detectably softened floor or wall.
- Teeth with recurrent dental caries.
- In cases where the crown has been destroyed by caries and only the root is left, the caries is judged to be crown caries.

➢ **Lesions not considered as clinical dental caries**

- White or chalky spots (early carious lesion).
- Stained enamel pits or fissures without visible cavitation or soft floor or walls during examination by sharp explorer.
- Dark, shiny, hard, pitted areas of enamel in a tooth showing signs of moderate to severe enamel fluorosis.
- Each child and parents will be given two printed sheet translated into Arabic, after the end of the diagnosis, which will include his/her caries status, the right oral hygiene method to be followed in order to maintain a good oral health status and any caries

lesions that need treatment by restorative material or preventive measures **(Appendix 4).**

- **Bias**

Possible bias that can occur:

- Selection bias: can be avoided by including all the children fulfilling the inclusion criteria.
- Reporting Bias: All outcomes will be reported.
- Detection Bias: All outcomes will be detected.

- **Diagnostic chart: (Appendix:1)**

- **Sample size calculation**

Sample size will be determined by the Evidence-Based Dentistry committee in the faculty of Dentistry, Cairo University.

- **Statistical methods**

Statistical analysis will be done using statistical package for social sciences, version 21.0 (SPSS, IBM) for windows.

- **References**

Baginska, J., Rodakowska, E., Milewski, R. & Kierklo, A. (2014) Dental caries in primary and permanent molars in 7-8-year-old schoolchildren evaluated with Caries Assessment Spectrum and Treatment (CAST) index. *BMC Oral Health*, 14 (1), p.74. Available from: <https://doi.org/10.1186/1472-6831-14-74>.

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- **Appendix (1) :**

Examination chart

Date:

Patient Name: Age: Gander:

Address:

Medical history:

Parents level of education:

Dental history:

- Soft tissue examination……
- Hard tissue examination:

E	D	C	B	A	A	B	C	D	E

E	D	C	B	A	A	B	C	D	E

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

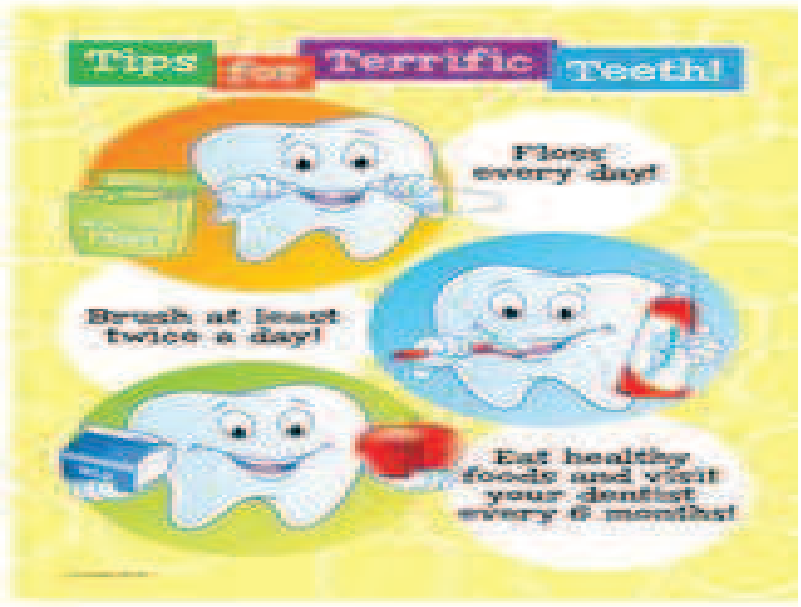
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

D=……, M=……. , F=……. DMFT=…….

d=……. , e=……. , f=……. deft=……..

- **Appendix (2):**

➢ **How to Clean Your Teeth:**



➢ **How to protect Your teeth from Caries:**