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Reviews

Mother-to-child transmission of *Streptococcus mutans*: A systematic review and meta-analysis

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ABSTRACT

Objectives: A systematic review was performed with the aim of determining whether there is scientific evidence of the transmission of *Streptococcus mutans* from mother to child.

Data: The eligibility criteria, based on the *PECO* strategy, were the following: observational human studies whose subjects were mother and child pairs (*P*) contaminated by *S. mutans* (*E*); comparison according to the presence or absence of *S. mutans* (*C*); and whether there is transmission (*O*). The qualitative analysis was performed by assessing the risk of bias of the included studies, while quantitative synthesis was performed through comprehensive Meta-Analysis software ($p < 0.05$).

Sources: Two reviewers performed the database search of studies published between January 1950 and May 2014. The strategy included observational studies that assessed the vertical transmission of *S. mutans* from mothers to children through analyzing genetic strains.

Study selection: It was found 166 non-duplicated studies. However, after reviewing the articles in full and applying the eligibility criteria, 36 papers were selected for qualitative analysis and 19 for quantitative analysis. The cumulative meta-analysis demonstrated vertical transmission of *S. mutans* from mother to child ($p < 0.001$).

Conclusions: The present systematic review and meta-analysis demonstrated evidence of vertical transmission of *S. mutans* from mother to child because there was an association between *S. mutans* n mothers and their respective children.

Clinical significance: The knowledge of the *S. mutans* strains is important because the virulence of the microorganisms is varied; also, the virulence affects the dental caries evolution rate, being more or less aggressive.

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1. Introduction

The source from which an uninfected infant acquires cariogenic pathogens has been the subject of intense investigation. Determining how children become colonized with cariogenic microorganisms and whether this colonization occurs is important for understanding bacterial transmission.[1–4] With respect to the mechanism of *Streptococcus mutans* transmission, intimate contact, such as sharing food or utensils, contributes to vertical transmission from mother to child.[3]

It would be intuitive to expect vertical transmission from mother to child; this question began to be explored over 30 years ago and has received significant attention since then.[1] It is well established in the literature that dental caries is a multifactorial disease that depends substantially more on other factors besides the presence of *S. mutans* for its development.[1,2,4] However, knowledge about the *S. mutans* strains is important because the virulence of the microorganisms is varied, and the virulence (more or less aggressive) will determine the dental caries evolution rate.[5]

The transmission of cariogenic microorganisms between mother and child, which has been shown by matching strains, has been reported in many studies.[6–19] Innovative methods, such as PCR and DNA fingerprinting, which are currently at our disposal, provide reliable results, as demonstrated in many previous studies.[14,20–29] In spite of the large number of studies on *S. mutans* transmission, there are no previously published systematic reviews on this topic. This systematic review and meta-analysis were conducted to determine whether there is scientific evidence of mother-to-child *S. mutans* transmission.

2. Materials and methods

2.1. Data collection

A systematic search of the literature published between January 1950 to May 2014 was conducted on PubMed using the MeSH terms ''dental caries'' [MesH Major Topic] AND ''transmission'' [subheading] and ''dental caries'' [title/abstract] AND transmission [title/abstract]; in the Cochrane Library databases, we searched for ''dental caries'' AND ''transmission'' in the title/abstract/keywords and in the Virtual Health Library (VHL), we used the terms ''dental caries'' AND ''transmission'' (Table 1).

We did not place any restrictions on the study language. We excluded duplicate papers, case reports, case series, descriptive studies, review articles, opinion articles, and letters as well as studies on children with oral defects, children with ongoing preventive/restorative treatment, and mothers who used antimicrobial substances, such as chlorhexidine and xylitol gum.

2.2. Study selection

All electronically identified records were scanned by title and abstract. Two authors (VASB and TKSF) independently read the articles to determine the methodological quality of the trials and retrieved data. In case of discrepancy, a decision was made by consensus with a third author (LCM). Full texts were obtained for all articles identified and judged as being potentially relevant. A manual search was performed of the references in the included studies.

Table 1 – The search strategy is depicted in according to each database selected in this study.

Base	Search strategy
PUBMED	((("dental caries" [MeSH Major Topic]) AND transmission [MeSH Subheading])) OR (("dental caries" [title/abstract]) AND transmission [title/abstract])
Cochrane Library	"dental caries" AND transmission [title/abstract/keywords]
VHL	"dental caries" AND transmission AND db: ("LILACS" OR "BBO" OR "IBECS")

2.3. Eligibility criteria

The following eligibility criteria were based on the *PECO* strategy[30]: observational human studies whose subjects were mother and child pairs (*P—participants*) contaminated by *S. mutans* (*E—exposure*); comparison according to the presence and absence of *S. mutans* (*C—comparison*); and the molecular analyses used to identify the presence of *S. mutans* transmission (*O—outcome*) included bacteriocin typing, serotyping, ribotyping, AP-PCR, multilocus sequence typing (MLST), chromosomal DNA fingerprinting, and chromosomal DNA restriction fragment length polymorphism (RFLP).

2.4. Data analysis

An assessment of the quality and risk of bias of the included studies was carried out according to the guidelines described by Fowkes and Fulton[31] and Fidalgo et al.[32] The checklist includes questions on the study design, study sample, control group characteristics, quality of the measurements and outcomes, completeness, and distorting influences. When evaluating the criteria for each study, we assigned problems for each criterion as major (++) or minor (+) in terms of their expected effect on the results, and a decision was made as to whether the methods were adequate for producing useful information. When the question did not apply, the category was characterized as ''NA''. To make a judgement and determine the value of the study, we posed questions about bias, confounding, and chance. The answer to each question was ''Yes'' or ''No''. If the answer was ''No'', the paper was most likely sound.

Two researchers (VASB and TKSF) extracted data on the methods, participants, and outcomes. The study authors were contacted when it was necessary to clarify otherwise unclear details. We evaluated the percentage of transmission before and after the year 2000 as well as the type of technique of analysis, applying the *t* test and ANOVA, respectively. The percentages of transmission were included in the SPSS program (SPSS Inx, IL, USA); for the intervals of transmission, we chose the lower value. A cumulative meta-analysis based

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