



RELATIONSHIP BETWEEN LOW BIRTH WEIGHT IN CHILDREN AND EARLY CHILDHOOD CARIES – A SYSTEMATIC REVIEW

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ABSTRACT

WHO defined low birth weight (regardless of the gestational age) as weighing less than 2500g.. Low birth weight neonates are further subdivided into very low birth weight infants, with birth weights less than 1500g and extremely low birth weight infants, with birth weights less than 1000g. Early childhood caries due to malnutrition is still a common dental health problem in developing countries. Dental caries can gradually reduce a child's ability to gain weight, which may get reversed after complete oral rehabilitation. The aim of this systematic review was to analyze the existing literature on the relationship between the low birth weight in children and the early childhood caries. The databases of PubMed, Cochrane, LILACS, Science direct, Metapress and SIGLE and hand search were done upto January 2016 for the related topic. Clinical studies which evaluated the relationship between low birth weight in children and the early childhood caries were included in this review. The systematic search revealed eighty seven articles of which four met inclusion criteria. With the available of evidence in literature, four studies were found to have relationship between ECC and the low birth weight in children. Among the four studies included, three studies were of good quality and in the three studies, two studies stated there is statistical significance in the relationship between ECC and lowbirthweight in children. Therefore it is concluded that there is a need of clinical studies on the relationship of ECC and the low birthweight in children.

KEY WORDS: Early childhood caries, Birthweight, Low birthweight



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INTRODUCTION

WHO defined low birth weight as weighing less than 2500g, regardless of the gestational age. Low birth weight neonates are further subdivided into very low birth weight infants, with birth weights less than 1500g and extremely low birth weight infants, with birth weights less than 1000g. Low birth weight is mostly found with preterm birth.¹ Studies showed that premature birth and low birth weight are one of the causes of developmental defects of enamel.^{2,3,4} Developmental defects of enamel may be a risk factor of early childhood caries.^{5,6} Developmental enamel defects, such as hypoplasia, have been speculated to increase the risk of dental caries in the affected teeth.^{7,8,9} Teeth with enamel defects have retentive areas that lead to the bacterial plaque colonization, facilitating the progression of carious lesions.⁶ Children with developmental defects of enamel have a greater amount of *streptococcus mutans*,¹⁰ which is one of the etiology of dental caries. Factors influencing the early acquisition of *mutans streptococci* in infants includes high maternal *s. mutans* levels, maternal caries status, low infant birth weight, obturators for management of cleft palate, early tooth emergence and low salivary IgA antibody levels.^{11,12,13,14,15,16,17} *Streptococcus mutans* and *Streptococcus sobrinus* are the main microbial agents involved in early childhood caries.^{18,19,20,21} Studies showed the influence of developmental defects of enamel on the occurrence of early childhood caries among preschool children.^{22,15,23,24,25} The malnutrition due to early childhood caries is still a common dental health problem in developing countries. Dental caries can gradually reduce a child's ability to gain weight, which may get reversed after complete oral rehabilitation. Rampant dental caries inhibits adequate nutrition, adversely affecting the growth of the body, specifically weight.^{26,27} Casamassimo PS suggested that the children with chronic dental pain 1) are malnourished and overweight; 2) cannot eat balanced diet and depends on liquids; 3) appears normal in weight but their diet provides inadequate nutrition for optimum growth; 4) has effects on catecholamines and regulation of growth hormone.²⁸ Acs et al, reported that, following completion of comprehensive dental rehabilitation, children with ECC demonstrated the "catch up growth" phenomenon (weight gain).²⁹ Hence this study is carried out to analyze the relationship between the low birth weight in children and the early childhood caries.

MATERIALS & METHODS

STRUCTURED QUESTION

To analyze the relationship between the low birth weight in children and the early childhood caries.

PICO ANALYSIS

- ❖ Population – Children less than or equal to 71 months of age; children with Early Childhood Caries; children without Early Childhood Caries.

- ❖ Intervention – Early Childhood Caries.
- ❖ Outcome – Low birth weight children.

INCLUSION CRITERIA

- Studies on children with ECC and the low birth weight of children.

EXCLUSION CRITERIA

- Studies on children more than or equal to 6 years of age
- Studies on children with any systemic conditions
- Studies with enamel hypoplasia as outcome
- Animal studies

SEARCH METHODOLOGY

DATA COLLECTION AND ANALYSIS STUDY SELECTION

Electronic search was carried out upto 10th January 2016 using the keywords in the search engines - PubMed, Science Direct, Cochrane, LILACS, SIGLE, and Metapress which yielded a total of 87 articles. Hand search (random search) was done in International Journal of Pediatric Dentistry (IJPD) by one of the authors [Anitha J (AJ)], which yielded no article. Based on preset inclusion and exclusion criteria, the titles of the studies identified from the search were assessed independently by two review authors [Anitha. J (AJ) and Deepa Gurunathan (DG)]. Conflicts concerning inclusion of the studies were resolved by discussion. Five titles were identified from the search after excluding duplications. Abstracts of selected articles were reviewed independently. Articles were selected following discussion and one article was eliminated. Full text articles were retrieved for four relevant studies. Discussion was held to resolve conflicts concerning inclusion of a study. The reference list of the full text articles were reviewed for identifying additional studies. Titles of four articles relevant to the review were selected. Abstracts of the four selected article were read and were found to be relevant to this review. Difference of opinion concerning inclusion of a study was resolved by discussion and no article was eliminated after reviewing abstracts. Full text articles were retrieved for selected studies.

RESULTS

The systematic search from Pubmed, Cochrane library, Science direct, Medline and hand search revealed a total of 87 studies. On examination of the titles and abstracts, 4 were found to be potentially relevant and the full paper was obtained. All the 4 papers met the inclusion criteria and were selected for the area of intended research. The four studies which were addressing the relationship between the early childhood caries and the low birthweight in children. These studies were screened thoroughly for a quality assessment (Table.1).

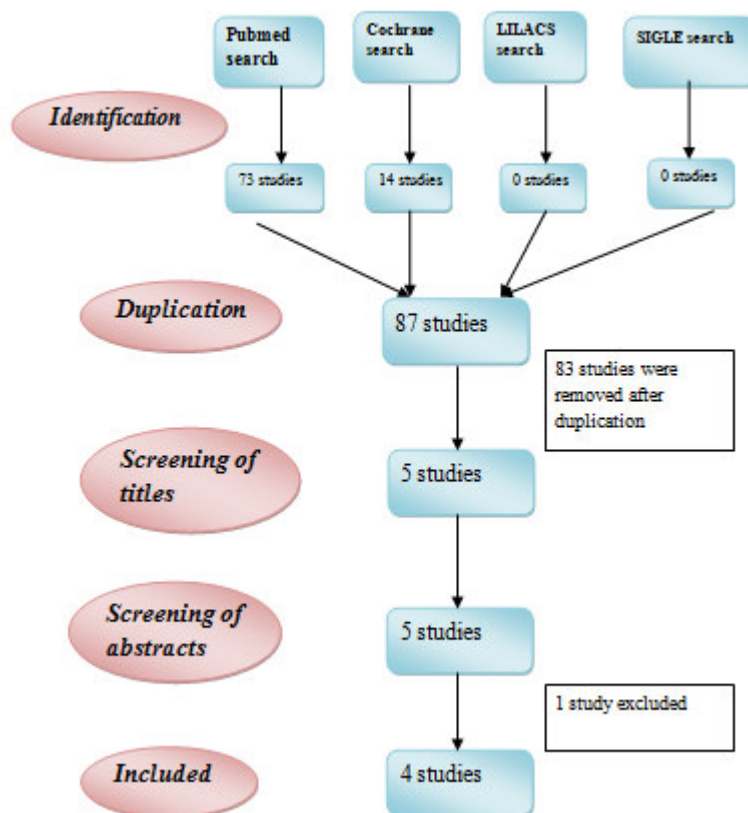
Table 1
Criteria for assessing the risk of bias in the included studies

Sl. No	Author, Publication Year	Description about the participant	Sample size	Validated the occurrence of caries	measurement tool for	Assessment of birth weight	Risk of bias
1	Prashanth Prakash et al., 2012	Yes	Yes	Yes		Yes	Good
2	dos Santos Junior et al., 2014	Yes	Yes	Yes		Yes	Good
3	Masumo R et al., 2014	Yes	Yes	Yes		Yes	Good
4	Nelson et al., 2013	Yes	No	Yes		Yes	Moderate

Table 2
Study characteristics of the included study

Sl. No	Author, Publication Year	Validated measurement tool for the occurrence of caries	Assessment of birth weight	Interpretations
1	Prashanth Prakash et al., 2012	WHO criteria	Yes	27% of low birth weight children were affected with ECC, which was not statistically significant.
2	dos Santos Junior et al., 2014	ECC Classifications (Drury et al)	Yes	Perinatal factors such as low birth weight and gestational prematurity are the risk factors of ECC
3	Masumo R et al., 2014	WHO criteria	Yes	Both LBW (low birth weight) and ECC were associated with current underweight. Enamel defects were associated with ECC. There were no clear association between LBW and ECC
4	Nelson et al., 2013	ICDAS criteria	Yes	ECC was similar between the VLBW(very low birth weight) & NBW(normal birth weight) groups, the VLBW group needs continued monitoring for ECC, due to the presence of enamel hyperplasia.

SEARCHFLOW CHART



DISCUSSION

The birthweight in children can help in the prevention of the ECC at the earlier stage. Therefore a comprehensive review was carried out addressing the relationship between early childhood caries and the low birthweight in children. Low birth weight and preterm births, predisposes to high levels of streptococcal colonization, in addition to favoring the development of enamel hyperplasia and salivary disorders.³⁴ Low birth weight children tend to develop enamel and dentine defects, which facilitates the adhesion and colonization of cariogenic bacteria in poorly calcified tissues.³⁵ Studies have demonstrated that children who are malnourished have low birthweight and are likely to have hypomineralized or hypoplastic primary teeth. These teeth are at higher risk of becoming carious as they are more susceptible to mutans streptococci colonization than the normally developed teeth. Thus they are at risk of ECC.³⁶ Studies by Prashanth Prakash et al., and Shulman JD, stated that there was no statistical significant difference between the low birth weight and early childhood caries, however the low birthweight were affected with ECC.^{30,37} With the

available of evidence, the children with low birth weight are found to have ECC. However in few studies it was found that there is no significant difference in the relationship of ECC and the low birth weight. Therefore there is a more need of clinical studies on the relationship of ECC and the low birthweight in children.

CONCLUSION

There were only four studies showing the relationship between ECC and the low birthweight in children. Among the four studies included, three studies were of good quality and the other one was moderate quality as the sample size was not explained. Among that three studies, two studies stated there is statistical significance in the relationship between ECC and low birth weight in children. Hence, it was found that there is more need of clinical studies on the relationship of early childhood caries and the low birthweight in children.

CONFLICTS OF INTEREST

Conflict of interest declared none.

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