International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Risk Factors of Early Childhood Caries

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Abstract: ***Early childhood caries (ECC) is a major health concern that continues to negatively affect the oral health of infants and children today. The aim of this study was to explore the association of ECC with maternal factors. This cross-sectional study was conducted for a period of six months, among the preschool children in Tirana district. Prior permission was obtained from the parents. In our study the prevalence of caries was higher among children whose mothers have a low education level (OR=5.3 95%CI 1.95-14.55 p<0.01), a low socioeconomic status (OR=4.2 95%CI1.73-10.3 p<0.01), primipara (OR=4.0 95%CI 2.25-7.19 p<0.01) illnesses (OR=5.3 95%CI 2.56-11.18 p<0.01), undernourished (OR=8.5 95%CI 1.38-11.54) and lack of vitamin D (OR=2.5 95%CI 1.32-3.41). the prevalence of caries was higher among children whose mothers had a cesarean birth (OR=2.1 95%CI1.18-3.64 p=0.01), and among children that were breastfed for a period less than 3 months (OR=4.4 95%CI 1.86-10.57 p<0.01).***

Keywords: caries, prevalence, risk factors, socioeconomic status

1. Introduction

Early childhood caries (ECC) is a major health concern that continues to negatively affect the oral health of infants and children today. Dental caries is a chronic disease that in children is five times more common than asthma and seven times more common than hay fever (1). Even with caries prevalence declining in the permanent dentition, decay prevalence in primary teeth is on the rise (2). Approximately 40% of children have dental caries by the age of five, and 8% of two year old children have some form of decay or previous restoration(s) (1-2). Left untreated, carious lesions can lead to expensive treatment, disruption of growth and development, pain, and life threatening infections. By definition, early childhood caries is the presence of one or more decayed, missing or filled tooth surfaces in any primary tooth in a child 71 months of age or younger (3). The multi-factorial nature of ECC encompasses but is not restricted to commonly used terms including "nursing caries", "baby bottle caries", and "baby bottle tooth decay" as inappropriate nursing and baby bottle use are often implicated but are not the sole etiological factors of this condition. In infants, ECC often follows a characteristic pattern of development: maxillary incisors are affected first followed by maxillary then mandibular molars, and due to the protective nature of the tongue, the mandibular incisors are often spared (4). Further progression of caries in infants depends on the child's eruption chronology and habit duration. The aim of this study was to explore the association of ECC with maternal factors

2. Material and Methods

This cross-sectional study was conducted for a period of six months, among the preschool children in Tirana district. Prior permission was obtained from the parents. Clinical examinations were performed by two examiners trained and calibrated for the dmf index, according to the diagnostic criteria described by the World Health Organization (WHO). The oral examination was performed in the dental consulting rooms of the two Basic Health Units of the city, one located in the urban and the other in the rural zone. The teeth were dried with an air syringe and examined under artificial light using a clinical mirror and exploratory probe only for removing debris. Before clinical examination, the child's oral hygiene was performed by means of tooth brushing. The various parameters used for the purpose of analysis were arithmetic mean, standard deviation, and chi-square test. The statistical package for social science (SPSS) version 17 was used.

3. Results and Discussion

The present study was carried out on a total of 217 children in age group of 0-6 years. 102(47%) were males and 115(53%) females. Prevalence of early childhood caries was 49.3%, (107/217).

Socioeconomic Status: In our study the prevalence of caries was higher among children whose mothers have a low education level (OR=5.3 95%CI 1.95-14.55 p<0.01), a low socioeconomic status (OR=4.2 95%CI1.73-10.3 p<0.01), primipara (OR=4.0 95%CI 2.25-7.19 p<0.01) illnesses (OR=5.3 95%CI 2.56-11.18 p<0.01), undernourished (OR=8.5 95%CI 1.38-11.54) and lack of vitamine D (OR=2.5 95%CI 1.32-3.41). the prevalence of caries was higher among children whose mothers had a cesarean birth (OR=2.1 95%CI1.18-3.64 p=0.01), and among children that were breastfed for a period less than 3 months (OR=4.4 95%CI 1.86-10.57 p<0.01). Other studies have found that children of low socio-economic status (SES) have higher caries risk than those of middle or high SES and are usually a priority group in dental research and prevention. However, those in all the other groups are also susceptible to dental caries (5-8). Additionally, children of moderate caries risk outnumber those who are of higher caries risk. There are a limited number of studies that have assessed caries risk factors in such population with lower caries rates. Studies assessing the relationships between dental caries and dietary intake in these populations are needed (9). Based on previous studies which have examined the relationships between dental caries and diet, it is not possible to draw simple, clear conclusions about these complex relationships. This is largely because of limitations and/or differences in the methods used (10). Thus, there are conflicting results

regarding the relationships between dietary variables and dental caries status (11,12). Evidence suggests an association between lower socioeconomic status and ECC. One Canadian survey demonstrated an association between parents with higher levels of education, higher incomes and dental insurance, with children who presented with lower incidence of and less severe caries. In contrast, children of parents with lower levels of education and lower incomes were at an increased risk of caries (13). In the United States, it has been reported that 80% of dental disease occurs in 20% of children of who were from low income families (14). Mutans Streptococci Transmission: A significant risk factor associated with ECC is the early acquisition of cariogenic bacteria. Mutans Streptococci (MS) are bacteria that adhere to enamel and metabolize fermentable carbohydrates producing acid. Consequently, acid produced by MS lowers the intraoral pH and promotes demineralization of tooth structure. Prolonged decrease in pH causes demineralization that eventually results in cavitation (15). Though MS is typically found on enamel surfaces, it has the ability to colonize intra-orally prior to the eruption of the first tooth and earlier acquisition of MS has been associated with increased caries risk (16,17) MS in infants is commonly acquired from the child's primary caregiver, most often the mother, via infected saliva. While the mechanism of transmission is unclear, contributing factors may include intimate contact, sharing of utensils or food, and poor oral hygiene and/or open carious lesions in the primary caregiver (18). Poor Dietary and Feeding Habits: Repeated exposure to fermentable carbohydrates lowers pH intra-orally for prolonged periods of time and thus increases the risk of caries. Therefore, *ad libitum* feedings, repetitive consumption of any liquid containing fermentable carbohydrates from a bottle or sippy cup and frequent snacking should be avoided.11 Of particular concern is the significant risk associated with feedings while the child is asleep due to a reduction in salivary flow. Feeding while the child is asleep allows any food or liquid present in the mouth to be in prolonged contact with tooth structure in the presence of MS (19). Clinical Findings: Developmental defects on tooth structure allow for additional plaque accumulation and increase the risk of caries. Enamel hypoplasia may form as a result of developmental disturbances related to pregnancy, such as preterm births, low birth weight or maternal smoking and complications during the pre- or postnatal period including illness, infection, malnutrition or under-nutrition (20). A detailed medical history is imperative in revealing these risk factors. It is important to be aware that in comparison to permanent teeth, enamel and dentin of primary teeth are inherently thinner and caries progression can more rapidly involve the pulp. In addition, teeth emerge with immature enamel that continues to mature throughout eruption by incorporating intra-oral minerals and ions, one of which includes fluoride. Thus, newly erupted teeth are at an increased risk of caries until complete maturation occurs (21). Systemic Disease and Medications: Congenital or acquired conditions may indicate an increased risk for caries. Special needs children may have decreased motor coordination and/or ability to cooperate limiting oral hygiene. Other risk factors include conditions (ie. cancer and radiation) that may reduce salivary flow or for which chronic use of sugar-containing oral liquid medications is indicated (22).

4. Conclusion

Prevention is best accomplished by the timely identification of risk factors and appropriate intervention.18 The Canadian Dental Association advocates that the first dental visit occur within six months of the eruption of the first primary tooth and no later than twelve months of age. The purpose of this early visit is to assess the risk of dental disease, initiate a preventive program and provide anticipatory guidance on issues concerning diet, oral hygiene and fluoride use. As well, this visit establishes a dental home for the child where future care may be provided to ensure good oral health. Dental disease can impact the total well-being of a child and is largely preventable; thus, a healthy mouth with a full dentition should be the goal for each and every child. Health care professionals, through everyday patient encounters, can provide understanding of risk factors, consequences, prevention approaches and appropriate referral information. Through early detection, proper counseling and the involvement of health professionals and caregivers, the consequences of this disease can be minimized and hopefully, in future, completely eliminated.

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Table 1: Association of ECC with maternal factors

Variables	*N (%)*	*OR*	*95%CI*	*P*
Education				
High	15 (26.7)	ref.		
Middle	76 (57.6)	1.3	0.53 - 3.17	0.5
Low	16 (60.0)	5.3	1.95 - 14.55	<0.01
Economic status				
High	11 (26.8)	ref.		
Middle	65 (52.0)	1.4	0.73 - 2.77	0.3
Low	31 (60.8)	4.2	1.73 - 10.30	<0.01
Parity				
Multipara	26 (29.5)	ref.		
Primipara	81 (62.8)	4.0	2.25 - 7.19	
Mothers' illness				
No	69 (39.2)	ref.		
Yes	38 (77.6)	5.3	2.56 - 11.18	<.0.01
Diet of mothers during pregnancy				
Healthy nutrition	31 (28.2)	ref.		
Lack of Vit. D	24 (72.7)	2.5	1.32 - 3.41	0.04
Undernourished	52 (70.3)	8.5	1.38 – 11.54	<0.01
Delivery				
Vaginal	59 (42.8)	ref.		
Cesarean	48 (60.8)	2.1	1.18 - 3.64	0.01
Breasfeeding				
> 6	59 (39.3)	ref.		
3-6	25 (71.4)	1.2	0.38 - 4.13	0.8
< 3 months	23 (74.2)	4.4	1.86 - 10.57	<0.01