

Risk Factors Associated To Early Childhood Caries among Indigenous and Refugee Children of District Nowshera (Rural) Pakistan

Syed Sohaib Daud Gilani* and Ruqyya Sana

Department of Dental Surgeon, Sardar Begum Dental Hospital, Peshawar, Pakistan

*Corresponding author: Syed Sohaib Daud Gilani, Department of Dental Surgeon, Sardar Begum Dental Hospital, Peshawar, Pakistan, E-mail: sohaib876@hotmail.com

Received date: July 26, 2021; Accepted date: August 9, 2021; Published date: August 16, 2021

Copyright: © 2021 Gilani SSD, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Early Childhood Caries, (ECC) is an aggressive form of dental caries that begins on tooth surfaces, which are usually spared such as labial surfaces of maxillary incisors. American Academy of Pediatric Dentistry (AAPD) has defined ECC as the presence of one or more carious, missing (due to caries), or filled tooth surfaces in any primary tooth in a child up to 71 months of age. In children younger than 36 months of age, any sign of smooth-surface caries is suggestive of severe early childhood caries.

Keywords: Analgesics; Radiographs; Dental decay

Introduction

ECC is a multi-factorial disease. There is a strong corroboration that early childhood caries are correlated with active risk factors involved in its rapid progression [1,2]. It has been speculated that ECC is associated to social determinants of health like demographic characteristics, parental practices, educational status of parent's specifically mother, socio-economic status, temperament of the child, number of siblings, feeding habits of child and use of medications [3]. Even ethnicity has been identified as a factor, as the prevalence of tooth decay in children remains high among ethnic minorities.

American Dental Association has recognized ECC as a serious public health problem of very young children, which if left untreated may lead to pain, bacteremia, chewing dysfunction, excessive use of analgesics and irrational use of anti-microbial (administered during the early stages), permanent occlusal dysfunction, phonetic problems, deficient health, lower self-esteem [4]. ECC can be a medical problem, because children with ECC continue to grow at a stunted pace compared to caries-free infants. Moreover, children with severe ECC often require costly treatment with hospitalization under sedation or general anesthesia [5].

The prevalence of early child hood Caries (ECC) is variable and has been reported to be 44.4% in urban areas of Pakistan [6], 26% in Saudi Arabia [6] and 10.5% in Africa [7]. The distribution and severity of oral diseases vary in different parts of the world and within the same region. The epidemiological studies help in assessment of need for planning of oral health services or organization of public health intervention programs.

Nowshera, being a district mainly comprising of rural population (1.3 Million approx.) has scarcity of data about prevalence of dental caries among pre-school children [8]. Several groups in Nowshera are at high risk, including Indigenous children and refugees those experiencing poverty and those living in rural regions where there is reduced access to care [9]. ECC is endemic in disadvantaged children, regardless of race, ethnicity, or culture. Refugees face unique challenges, including maintaining health and accessing health

services, as a result of many factors, such as language barriers, cultural differences, and lack of awareness, limited family finances and restrictive government policy. Because of these barriers, refugees are considered to be at higher risk of dental caries [10]. In recent revisions of the American Academy of Pediatric Dentistry's Caries-Risk Assessment tool, a question about recent immigrant status has been included, confirming that children from these groups are considered to be at moderate to high risk for caries [10,11].

Studies suggest that awareness of the importance of early childhood oral health among refugee parents is low and that they are less likely to seek preventive dental care. In addition, surveys report that children from disadvantaged groups, including refugees, have higher rates of caries and lower rates of dental visits than locals [10-12]. No Current evidence has been published on the prevalence and burden of ECC among preschool children from refugee groups to district nowshera, although the district has one of the highest rates of refugee immigration. In addition, the greatest proportions of refugees are women in their childbearing years followed by young children, including those under 5 years of age [10-12].

The most tragic fact about ECC is the measures, which could render the condition entirely preventable, have not been implemented due to the multi-factorial origin of this disease. Hence, knowledge on prevalence and associated factors of ECC is necessary to develop targeted interventions for prevention of subsequent tooth decay, and to decrease the number of children that require emergency treatment. So, the aims of this study were to determine the frequency of ECC in children aged between 8 and 48 months in rural district Nowshera, Pakistan and to determine possible associations of ECC with factors such as chronological age, socio-economic status, and educational status of the mother, feeding habits, and oral hygiene practices.

Materials and Methods

This cross-sectional descriptive study was conducted at rural health center Khairabad which is the sub tehsil of District Nowshera Pakistan. Estimated population of district nowshera is up to 1.4 million.

Sample size of 600 was calculated using formula

$$n = N \times \frac{E^2}{(N-1)E^2 + x}$$

Where

n=Sample size

N=Population size=1.4 Million

E=Margin of error=4%

Confidence level of 95% and response distribution of 50%

91% of questionnaires/responses were included as they were complete in all aspects (546/600). The age group selected for this study was 8–48 months because by 8 months of age at least 2 central incisors erupt and it has been established that *streptococci* mutants can be found in the mouth from as early as 6 months of age. All participants included in the study were enrolled after obtaining informed consent from mother, father or guardian. The parents of children attending out patients department of the hospital were informed of the nature of the study. Participation involved dental examination of the child followed by interview with parents/guardian. A dental health questionnaire which included a series of questions regarding the child’s age, birth weight, socio-economic status, education of mother/guardian, feeding method, oral hygiene habits, feeding on demand, bottle feeding at night, use of nutritional supplement was furnished.

Clinical examination was performed by a principal examiner using mouth mirrors for indirect vision of lingual areas of the teeth, and torch light. The community periodontal index (CPI) probe was used to confirm visual evidence of caries on the occlusal, buccal and lingual surfaces. During the examination, the older children were seated on a chair and infant were examined with assistance of their mothers. Gauze pads were used to clean and dry teeth surfaces before examination. Radiographs were not taken due to practical reasons. The WHO criteria (1997) for carious lesions were used to diagnose caries. The questionnaire data were analyzed using Microsoft excels. The percentage of caries-affected and caries-free children within each variable category was compared using cross-tabulation procedure.

Results

The frequency of ECC in preschool children was 68.62%, while ECC increased significantly with age 43%, 93%, 95% and 93% in different age groups (Table 1). Children whose mothers had no schooling and those who belonged to low socioeconomic group showed higher frequency of caries (Table 2). A significant increase in caries frequency was found in children accustomed to the practice of on-demand breast feeding and bottle feeding at night (Tables 3 and 4). The incidence of ECC increased with increase in number of siblings. ECC was found more commonly among female children. Children who were supplemented nutritionally were less prone to ECC (Tables 5 and 6).

Age groups	Caries effected	Caries free	Grand total
8-15 months	37.80%	62.20%	100.00%
16-23 months	42.64%	57.36%	100.00%
24-31 months	93.62%	6.38%	100.00%
32-39 months	95.71%	4.29%	100.00%
40-48 months	93.02%	6.98%	100.00%
Grand Total	68.62%	31.38%	100.00%

Table 1: Frequency of early childhood caries and distribution in age groups.

Educational status of mother	Caries effected	Caries free	Grand total
Higher secondary	6	15	21
Illetrate	247	71	318
Middle	46	34	80
Primary	45	31	76
Secondary	11	7	18
University graduate	19	13	32
Grand total	374	171	545

Table 2: Maternal education levels and ECC in their children.

Modes of feeding	Caries effected	Caries free	Grand total
Bottle	88.24%	18.13%	66.24%
Breast feeding and complementary	3.74%	19.30%	8.62%
Exclusive breast feeding	8.02%	62.57%	25.14%
Grand total	100.00%	100.00%	100.00%

Table 3: Mode of feeding and frequency of early childhood caries.

On demand feeding	Caries effected	Caries free	Grand total
No	117	165	282
Yes	257	6	263
Grand total	374	171	545

Table 4: On demand feeding and early childhood caries.

Use of nutritional supplements	No	Yes	Grand total
Caries effected	67.16%	1.47%	68.62%
Caries free	0.55%	30.83%	31.38%
Grand total	67.71%	32.29%	100.00%

Table 5: Use of nutritional supplement and early childhood caries.

Row labels	Caries effected	Caries free	Grand total
Child cleaning under supervision	9	12	21
Mother cleaning	36	23	59
No cleaning	329	136	465
Grand total	374	171	545

Table 6: Modes of oral hygiene maintenance and early childhood caries.

Discussion

Dental decay is a global public health challenge, particularly amongst young children. Early childhood caries (ECC) is a consequential public health concern in both developing and industrialized countries. ECC begins early in life, progresses very swiftly in those who are at high risk, and often goes untreated. Its consequences are both immediate and long-term on quality child's life as well as the family. It can have significant social and economic consequences beyond the immediate family. The frequency of ECC in current study was 68.62% n=546 which is higher than those reported in European and some Middle Eastern countries, such as Palestine (76%) and the United Arab Emirates (83%) but lower than the levels among several native North-American communities [13]. According to UNHCR there are 1.7 Million legal afghan refugees and a Million illegal refugees settled across Pakistan, out of which 72,000 legal refugees are registered at Nowshera [14]. The report, however, does not contain statistics of illegal Afghan refugees at Nowshera; the number of which might actually exceed the total. The high prevalence rates of current study might be due to the number of settled refugees which can be attributed to poverty, Pre arrival conditions, minimal living standards, Illiteracy, Being new to health care system, low emphasis on oral health care and education during resettlement period, Low utilization of oral health service by refugees.

Measuring prevalence of early childhood caries is a complex process as no separate criteria has been established for diagnosis and extent of caries in children up to three years of age because of several reasons which includes un-cooperativeness, inaccessibility, variability in number of erupted teeth more over a detailed examination of oral cavity is difficult [15]. In the present study caries frequency increased significantly with age. The children of [40–48 months] demonstrated higher caries frequency 93.02% (160/172) compared to younger age groups. The conclusion that the number of confirmed cases of ECC increased with increasing age was expected and is logical because there is an increase in the number of erupted primary teeth with increasing age which becomes exposed to the oral environment and cariogenic challenge. Age related changes in the dietary habits and hygiene practices also contribute to it [16].

Oral health care in infancy is dependent on parents who play primary role in child health. Mothers being primary caregivers of a child, low maternal education are related to higher caries prevalence in their children [17], in the present study (247/318) 77.66% children whose mothers were illiterate got affected with caries. This was significant when compared to those children whose mothers had received higher education (28.57%). The results of this study are similar to other studies, which show a strong association between mother's education and poor oral health in their children. This may be attributed to the lack of information and education about the oral health care for children in uneducated mothers. However, recent research has shown a lack of any association between ECC and education level of the mother [18].

Dental caries occur frequently in children with improper feeding patterns like bottle feeding beyond one year, prolonged breast feeding and in children being put to bed with bottle are instrumental in increasing exposure of primary dentition to fermentable carbohydrates.

This increases the probability of an early colonization by oral mutant's *streptococci*, which poses the risk of developing caries [19]. In the current study, 25.14% children were exclusively breast fed and 66.24% children exclusively bottle fed. The remaining 8.62% of the children were both breast and bottle fed. The caries frequency was significantly higher in exclusive bottle fed. A systematic review of the relationship between breastfeeding and ECC has suggested that a definitive conclusion cannot be drawn due to the inconsistent methodological approach in the research which makes it difficult to compare findings [20]. Therefore, exclusive breastfeeding should be encouraged up to the sixth month, and maintained at least up to the second year, with flexibility in schedules or shifts, and complemented appropriately with weaning food.

On-demand feeding was practiced by 263 mothers, of whom 257 (97.7%) children had caries. Of the 282 children whose mothers' did not practice on-demand feeding 117 (41.42%) children had caries. Thus, there was significantly high caries frequency in children whose mothers practiced on-demand feeding. Ad libitum breastfeeding or breastfeeding for longer durations decreases plaque pH, thereby increasing the risk of ECC. Therefore mothers should be informed of how they can reduce the probability of ECC by discouraging feeding on demand, transitioning to use of a regular cup at 12 months of age, and cleaning the child's mouth regularly once the first primary tooth has erupted as suggested by American Academy of Pediatric Dentistry guidelines.

Diet has a profound and lasting effect on developing and developed dentition. It has also been suggested that pre-natal and peri-natal malnutrition are often the causes of tooth structure anomalies, reduced salivary flow and decreased buffering capacity. Furthermore, it has been shown previously that nutritional supplementation is one of the effective strategies for the prevention and control of dental caries. In the present study, nutritional supplementation included vitamins, iron, calcium and fluorides. Those children who consumed supplements 1.47% had caries vs. 67.6% who did not consumed nutritional supplements hence lesser caries in those consuming supplements.

Regular maintenance of oral hygiene may neutralize the effects of a cariogenic diet. Studies have shown that preschool children do not understand or have no manual adeptness to maintain good oral hygiene. Hence, parental support and guidance is essential to reduce the risk of developing caries. Tooth brushing by parents or caregivers has the potential of limiting dental plaque more effectively. In the present study, frequency of caries in those children who practiced tooth brushing by themselves was significantly higher than in those children who brushed under parental supervision. The result of this study is in accordance with another recent study which showed that children brushing without help by the mother were at high risk of developing ECC. Parental assistance and daily frequency of tooth brushing have been shown to be major determinants of declining dental caries experience in European countries.

The present study showed that 465 (85.32%) of the children did not clean their teeth. These children had significantly higher caries frequency, when compared to those children who cleaned their teeth. In a similar study, it was found that 60% of the children who used tooth brush to clean their teeth were free of caries.

Some of the limitations in the present study were deriving detailed and accurate information from the parents regarding the feeding

practices, contents of the feeding bottle, composition of snacks consumed and weaning. Further data collection is necessary for these factors to be put under statistical evaluation.

Conclusion

Data obtained provides a guideline for evaluation and planning of oral health promotion programs. Community initiatives are instrumental in increasing community knowledge of ECC; the ultimate challenge will be perpetuating long term behavioral change among parents. The prevalence of dental caries in this population reveals the need for effective preventive programs. Thus, both medical care providers and those working with pregnant women must play an integral role in the prevention and early detection of ECC. It is important for pediatricians, GPs and other health service providers encountering expectant mothers and very young children to be aware of ECC and its repercussions, as they represent the first line of defense. Public funded oral health programs need to target children from lower socio-economic status and develop effective strategies to promote breast feeding and discourage inappropriate bottle feeding.

References

1. Colak H, D ülgertil CT, Dalli M, Hamidi MM (2013) Early childhood caries update: A review of causes, diagnoses, and treatments. *J Nat Sci Biol Med* 4: 29-38.
2. Douglass JM, Douglass AB, Silk H (2004) A practical guide to infant oral health. *Am Fam Physician* 70: 2113-2120.
3. Grindefjord M, Dahllöf G, Modeer T (1995) Caries development in children from 2.5 to 3.5 years of age: a longitudinal study. *Caries Res* 29: 449-454.
4. American Academy of Pediatrics (2003) Oral health risk assessment timing and establishment of the dental home. *Pediatr* 111: 1113-1116
5. Marshall TA, Eichenberger-Gilmore JM, Broffitt BA, Warren JJ, Levy SM, et al. (2007) Dental caries and childhood obesity: Roles of diet and socioeconomic status. *Community Dent Oral Epidemiol.* 35: 449-458.
6. Awais F, Khan AA (2016) Frequency of early childhood caries. *J Pak Dent Assoc.* 25: 70.
7. Gushulak BD, Weekers J, MacPherson DW (2009) Migrants and emerging public health issues in a globalized world: Threats, risks and challenges, an evidence-based framework. *Emerg Health Threats J.* 2: 7091.
8. Baggio S, Abarca M, Bodenmann P, Gehri M, Madrid C et al. (2015) Early childhood caries in Switzerland: A marker of social inequalities. *BMC Oral Health.*15: 1-9.
9. Malik MS, Afzal M, Farid A, Khan FU, Mirza B, et al. (2019) Disease status of Afghan refugees and migrants in Pakistan. *Front Public Health.* 7: 185.
10. Faheem S, Maqsood S, Shaikh F (2018) Parental Influence on Early Childhood Caries. *J Pak Dent Assoc.* 27: 196.
11. Alkhtib A, Ghanim A, Temple-Smith M, Messer LB, Pirotta M, et al. (2016) Prevalence of early childhood caries and enamel defects in four and five-year old Qatari preschool children. *BMC Oral Health.*16: 1-7.
12. Wang X, Wei Z, Li Q, Mei L (2017) A longitudinal study of early childhood caries incidence in Wenzhou preschool children. *BMC Oral Health.* 17: 1-5.
13. Kenney MK, Kogan MD, Crall JJ (2008) Parental perceptions of dental/oral health among children with and without special health care needs. *Ambul Pediatr.* 8: 312-320.
14. Al-Ayed IH (2010) Mothers' knowledge of child health matters: are we doing enough? *J Family Community Med.*17: 22.
15. Burt BA, Loesche WJ, Eklund SA, Earnest RW (1983) Stability of *Streptococcus mutans* and Its Relationship to Caries in a Child Population over 2 Years. *Caries Res.*17: 532-42.
16. Valaitis R, Hesch R, Passarelli C, Sheehan D, Sinton J, et al. (2000) A systematic review of the relationship between breastfeeding and early childhood caries. *Can J Public Health.* 91: 411-417.
17. Sheiham A (2001) Dietary effects on dental diseases. *Public Health Nutr.* 4: 569-591.
18. Kabil NS, Eltawil S (2017) Prioritizing the risk factors of severe early childhood caries. *Dent J.* 5:4.
19. Al-Darwish MS (2016) Oral health knowledge, behaviour and practices among school children in Qatar. *Dent Res J.*13: 342.
20. Dixit LP, Shakya A, Shrestha M, Shrestha A (2013) Dental caries prevalence, oral health knowledge and practice among indigenous Chepang school children of Nepal. *BMC Oral Health.* 13:1-5.