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Full Length Research Paper

Effect of birth rank on the caries experience of children from a suburban population in Nigeria

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The study aims to explore the possible impact of biological factors such as birth rank, age and sex on the severity of caries experienced by a population of Nigerian children with caries. Specifically, it explores the impact of a child's birth rank on the severity of caries and the effect of other biological variables such as the age and sex on this risk. Information were collected from the 497 children from 135 families. Information collected included the age of the child, the gender and the birth rank. The age of the child was the age at the last birthday. The dmft/DMFT was also assessed for each child recruited as well as that of his or her siblings. The model uses the first child as the reference. It compares the first and the second child and so on. The trend of association was also tested. The strong risk factors identified for caries in this study are the age, having older siblings with caries and sex. The dmft/DMFT reduced by 0.072 for every year increase in age. Also, the dmft/DMFT is less by 0.25 in females compared with males. Finally, the dmft/DMFT of a child increases by 0.48 for every older sibling having caries. While there was an associated established between birth rank and caries, only age, sex and having older siblings with caries were established as risk factors for caries in the children in this study population. The finding of this study helps to provide clinicians an additional evaluation tool for identifying caries risk of children seen in the dental clinic. Patients with older siblings who have caries should be managed as a high caries prone child.

Key words: Nigeria, caries, birthrank, children, siblings.

INTRODUCTION

The prevalence of caries in children in most developed countries appears to have decreased, whereas prevalence is on the increase in many developing nations (Du et al., 2000; Hensaw and Adenubi, 1975). This is especially true in urban areas where socio-economic development has been greater (Du et al., 2000; Hensaw and Adenubi, 1975; Brown et al., 1995) . This report is however, in conflict with an earlier report by Ismail et al. (1997) who performed a MEDLINE search for a period of 1967 to 1997 to assess the dental caries trend in Africa. They noted that the trend of dental caries rates in developing countries is not clear. They concluded that a general decline in dental caries noticed in their review is pleasing but they could not attribute it to any particular factor. They found that fluoridation was not present in Africa, poverty predominates and so the likelihood of wide use of toothbrushes and fluoride toothpaste is low. Sugar consumption is also low (Ismail et al., 1997; Van Palenstein Helderman et al., 1997) and the influence of oral health education programmes was weak (Ojofeitimi, 1984).

The importance of the socio- economic factor in the aetiology of caries in developing countries also conflicts with reports from the developed countries. In industrialized population a positive correlation has been established between the occurrence of dental caries and lower socioeconomic status (Sayegh et al., 2002; Milnes, 1996). In many developing countries a high prevalence of dental caries was reported amongst children of higher socio-economic class than children from lower social

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class and this was attributed to dietary factors (Henshaw, 1974; Serwint et al., 1993). The weight of scientific evidence today indicates that children from socially deprived backgrounds experience higher caries levels (Seow and Amararunge, 1999; Sulliva et al., 1994).

While the aetiological factors for caries are well established and the role of the socio-demographic and geographic inequalities in dental caries incidence understood, the various social and biological context that may increase the predisposition of a child to dental caries has been studied very little. Studies by Nicolau et al. (2003, 2005) however, pointed to the integral role of biological, behavioural, socio-economical and psychological variables in the caries experience of children. They equally noted that the birth rank had a significant role to play in the DMFT level of their study sample with children who were second or later children likely to have higher DMFT.

While these observations corroborated the report of Primosch (1982), he however, cautioned that the difference in caries experience of the children observed in the various family models in their study might actually be the result of family socioeconomic status and its influence on the child's dietary habits.

This study aims at exploring the possible association between biological factors such as birth rank, age and sex on the severity of caries experienced by a population of Nigerian children. Specifically, it explores the possible association of birth rank as a risk factor with other biological variables such as age and sex. The findings of the study may help with the early identification of children who are at high risk of caries within the study population.

METHODOLOGY

A cross sectional study design was utilized. The study population, a convenient sample, consisted of all children who visited the Child Dental Health Clinic of the Obafemi Awolowo University Teaching Hospital, Ile-Ife, Nigeria over a period of one year. All children who had caries were enlisted in the study. Verbal consent was received from the parent of the child for inclusion in the study. Any child accompanied by the guardian or whom parental consent could not be received for study participation was excluded from the study.

Information collected included the age of the child, the sex and the birth rank. The age of the child was the age as at last birthday. The number of decayed, filled and missing teeth (dmft/DMFT) was noted for each child. The dmft/DMFT was determined based on the World Health Organization (WHO) Oral Health Survey methods (1997).

The examination for dental caries was conducted with a plane mirror using a light source from the overhead lamp of the dental chair. The teeth were not dried before examination but gross debris was cleared with gauze where necessary. The examination of the teeth was done in an orderly manner from one tooth or tooth space to the adjacent tooth or tooth space. Examination for dental caries included all surfaces. Radiographs were taken to confirm the diagnosis of caries in all cases. The parent of the child was then encouraged to bring all the other siblings for dental examination where the child had other siblings. Where a dental visit for other siblings could not be arranged, home visits for the other siblings were then arranged. For children identified to have possible carious lesions, a visit to the dental hospital was arranged. A diagnosis of caries was equally confirmed with the use of radiographs. The birth rank, age and sex of other siblings were also noted as well as their dmft/DMFT.

Statistical analysis was done using the Intercooled STATA (release 9) for windows. Simple proportions were computed. A general linear model (Poisson) was used to determine the effect of being an only child, last child and caries in other siblings on the dmft/DMFT score of each study subject. Adjustment was made for age, sex, and family size. The model uses the first child as the reference. It compares the first and the second child and so on. The dmft/DMFT was used as the measure of the outcome of the variable, dental caries.

A test of heterogeneity and a test of trend were also carried out to determine the effect of the position in the family on dmft/DMFT score. Standard techniques were employed to check the fit of the regression model. Statistical significance was inferred at $p < 0.05$.

RESULT

Four hundred and ninety seven children from 135 families were recruited for this study. The 497 children were contacted through their 135 siblings. Of the 135 initial contacts, 72 (53.3%) were females. The birth rank of these children varied from only child to the 8th position in a family of eight children. The mean number of children per family was (3.6 ± 1.5). The age of the children ranged from 1 to 16 years with a mean of (7.8 ± 3.8) years. The dmft/DMFT of these children ranged from 1 to 12 with the mean been (1.7 ± 2.6). The total number of children examined the contact children and their siblings were 497. Family size ranged from 1 to 8 (Table 1).

The dmft/DMFT was higher in subjects who were only children compared with other children by 0.44 (95% CI 0.17, 0.72), $p = 0.002$. However, after adjusting for sex, family size and age, the effect of being an only child was no longer significant, (95% CI -0.05, 0.52) $p = 0.24$. Females had lower dmft/DMFT, - 0.21 (95% CI -0.39, -0.04) $p = 0.016$. The dmft/DMFT is reduced by 0.25 in females compared with males (95% CI -0.43, -0.007) $p = 0.007$ (Table 2).

Similarly, being a last child was also associated with a higher dmft/DMFT, 0.21 (95% CI 0.04, 0.38) $p = 0.017$. However this was no longer significant after adjusting for age, family size and sex, (95% CI -0.07, 0.28) $p = 0.245$. The dmft/DMFT of a child was increased by 0.48 if older siblings had caries (95% CI 0.01, 0.85), $p = 0.013$ after adjusting for age, family size and gender.

P value for the test of heterogeneity was 0.018 which points to an association between birth rank and the caries experience. However the test of trend was not significant at $p = 0.95$ showing that increasing birth rank been associated with increasing dmft/DMFT cannot be established. The result also showed that the dmft/DMFT reduced by 0.07 for every year increase in age (95% CI -0.10, -0.05) $p < 0.001$ (Table 2).

DISCUSSION

This study points to the possible importance of birth rank

Table 1. Distribution of siblings within family units.

Family size	Frequency
1	10
2	21
3	37
4	32
5	20
6	11
7	2
8	2
Total	135

Table 2. Effect of birth rank on the dmft/DMFT of the child.

Birthrank	Coefficient	Confidence interval	P value
2nd child	-0.22	-0.47 – 0.03	0.09
3rd child	0.25	-0.01 – 0.50	0.06
4th child	-0.21	-0.48 – 0.07	0.14
5th child	0.004	-0.31 – 0.32	0.98
6th child	0.17	-0.18 – 0.52	0.33
8th child	-0.80	-2.20 – 0.60	0.26
Age	-0.07	-0.09 –0.05	0.000*
Sex	-0.25	-0.43 - -0.07	0.007*

*Statistically significant.

as a possible biological factor that may increase the predisposition of a child to caries. Being an only child or a last child was found to be associated with increased caries risk. This may not be unconnected to the increase tendencies of these children to been pampered by family members. These groups of children may tend to have increased access to confectioneries as well as less stern monitoring of their habits, including oral habits. However, the significance of these risk factors in increasing the dmft/DMFT was modulated by the overriding effect of age and sex thereby loosing their significance.

Unlike many other epidemiological studies that noted increase females prevalence of dental caries (Mattos-Graner et al., 1998; Grinderjford et al., 1993) this study noted that the dmft/DMFT of female children decreased by 0.25 compared to their male counterparts. While previous studies alluded to the fact that females had more teeth erupting earlier when compared to males of the same age group and that females consumed more refined carbohydrates than males (Mattos-Graner et al., 1998; Grinderjford et al., 1993) as reasons for its observations, the observation in this study may be explained by reports of other studies in the study environment. Previous studies had reported on that female children had better oral hygiene (Esan et al., 2002; Jeboda and Ogunbodede, 1995; Curzon, 1995; Varga et al., 1998; Ramos -Gomez et al., 1999; Salako, 1985). There are existing evidence to support the fact that better oral hygiene levels are associated with lower caries levels in children (Ismail, 1984; Tanzer, 2001; Ramos-Gomez et al., 2002; Cleaton-Jones et al., 2006).

The caries experience of older siblings had a significant impact on the dmft/DMFT in this study with the dmft/DMFT increasing by 0.37 when older siblings have caries when compared with those whose older siblings did not have caries. This indicates a need to focus on prevention promotion efforts that targets the family as a whole and not just the individual. This is because this finding point to the possibility of families exposed to factors that increase caries risks.

While association between birth rank and caries was noted as shown by the significance of the test of heterogeneity, a trend in that associated could however, not be established: the study did not establish an increase in risk for caries as the birth rank increases or decreases.

It was equally interesting to note that the dmft/DMFT decreases with increasing age. Though many had postulated that the caries experience is related to the length of time a tooth is exposed to the oral environment (the longer the exposure the greater the risk), this study however, points to the possibility that children who are predisposed to caries have lesions occurring at a younger age in this environment with the dmft/DMFT of these children higher than those seen at an older age.

The authors do note that there are a number of other confounding variables for caries risk other than age and sex. This study is however, limited to evaluating for the impact of these biological factors that may impact on the children's caries experience.

Conclusion

Having older siblings with caries appear to be a significant risk factor for caries in this study population. In addition, female children experience less caries than males. Also, the dmft/DMFT of the child significantly decreases with increasing age. The finding of this study helps to provide clinicians an additional evaluation tool for identifying caries risk of children seen in the dental clinic. Patients with older siblings who have caries should be managed as high caries risk patients.

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