Rural and Remote Health
MEDLINE listed
ARHEN
FRAME
ISSN 1445-6354
The International Electronic Journal of Rural and Remote Health Research, Education, Practice and Policy

ORIGINAL RESEARCH

Oral health of pre-school children in rural and remote Western Australia

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Submitted: *21 July 2011;* ***Revised:*** *20 September 2011;* ***Published:*** *4 December 2011*

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Rural and Remote Health **11: 1869. (Online) 2011**

Available: http://www.rrh.org.au

ABSTRACT

Introduction: Dental decay (caries) is a common condition affecting preschool children in Western Australia (WA). Severe dental decay can have significant consequences as indicated by previous data reporting decay as the fifth most common cause of hospitalisation among preschool children in WA.

Methods: This study examined the prevalence and severity of decay in preschool children in rural and remote WA and considered some of the factors associated with these rates.

Results: The study reports on the dental health of 253 children aged between 2 and 4 years within five rural and remote communities in WA. Over 40% of these young children already had one or more decayed teeth with 19% having severe early childhood caries (s-ECC) and 15% having already suffered toothache. The disease burden was far higher among Indigenous children, who comprised one-third of the study group, in comparison with the non-Indigenous children in the study. Among the Indigenous children, decay was far more widespread (69% had decay compared with 25% of non-Indigenous children), and was more severely experienced (34% had s-ECC) and 28% having suffered toothache (vs respective rates of 10% and 7% for the non-Indigenous children). Only half of the Indigenous children brushed their teeth on a daily basis and one-third had never brushed at all (vs rates for non-Indigenous children of 85% and 2%, respectively).

Conclusion: Action to improve the prevalence and severity of decay among this group of Indigenous children is linked with promoting core messages for good oral health. A systemic approach to addressing the needs of remote dwelling people, and in particular remote area Indigenous children, must include a sustained, evidence based, primary health focus that is inclusive of oral health.

Key words: Australia, child dental health, Indigenous children, oral health, preschool dental health.

Introduction

Dental decay (caries) is a common condition affecting preschool children in Western Australia (WA)[1]. Decay has been reported as the fifth most common cause of hospitalisation for preschool children in WA[2], with rural preschool children being 1.3 times more likely to be hospitalised for decay than their metropolitan counterparts[2]. Most of the children living in rural and remote areas of WA do not access a dental service before the year in which they turn 5 years of age, when all children in WA become eligible to register with the publically funded School Dental Service program[1].

According to previous data from WA, only 5% of children attend a dental service before they start school[3]. Although the reasons for the late age of first dental visit in pre-school children are not known, many factors such as cost, access issues and lack of awareness on the part of parents are believed to contribute to the problem. Although there is very little published data concerning the oral health issues of Australian preschool children, similar trends in late age of first dental visit have been reported in other studies from other Australian states[4,5]. Access issues have been previously reported as a reason for the low rate of dental care for children living in remote communities such as those in the Kimberley and Pilbara regions of WA[6]. Although the prevalence of dental decay has decreased in Australia in past years, significant variations are known to exist among children in different geographic locations[3].

Low socioeconomic status and Indigenous and ethnic backgrounds have been reported as independent risk factors for decay[3,7-9]. The present study examined the prevalence and severity of decay in preschool children in several regions of rural and remote WA and considered some of the factors associated with these rates.

Methods

Ethics approval was obtained from the Ethics Committee of The University of Western Australia. This study was a retrospective cross-sectional analysis of oral health data from preschool children aged 2-4 years, within five rural and remote communities in WA. The survey sample was an opportunistic sample collected during provision of visiting oral health services for the communities of Carnarvon, Wiluna, Roebourne, Kalgoorlie and Esperance. Children were examined as a structured process within pre-schools and on an opportunistic basis within Aboriginal Health Services. The pre-school aged child population (census 2006) of these places is presented (Table 1)[10].

Each child's parent/caregiver completed a short questionnaire regarding aspects of the child's dental and medical histories, diet, infant feeding patterns and dental hygiene practices. A dentist examined each child using a mouth mirror and dental light or torch light with the support of an assistant and with access to documented procedures for examination. Children were examined lying in a lap-to-lap position or seated facing the examiner. World Health Organisation (WHO) criteria were used to diagnose dental caries. Four examiners were used, all of whom were trained to follow the WHO guidelines during examinations[11].

Decay experience, expressed as a dmft score[1], the commonly accepted and widely used epidemiological measure of decay experience in children's teeth was assessed in this study. It represents the total mouth count of deciduous teeth affected by decay and includes teeth with untreated decay (d), teeth missing as a result of decay (m) and decayed teeth which have been treated with fillings (f). In this study, to be consistent with other previous studies, the carious involvement of two or more upper front (maxillary anterior) teeth was the diagnostic criteria applied for severe early childhood caries (s-ECC)[1].

All data analysis for the present study was completed using SPSS v16 (**www.spss.com**).

Results

There were 253 participants (15% of the total preschool population in the communities involved). Two-thirds of the children involved in the study were non-Indigenous (n=174, 69%) and one-third identified as Aboriginal or Torres Strait Islander (Indigenous, n=79, 31%); Table 1. More than one-third of the children (n=98, 39%) had teeth affected by decay.

Dental history

Overall, 13% (n=34) of the children had suffered toothache at some time and 16% (n=41) had previously attended a dental service (Table 2).

Toothache was more commonly experienced among the Indigenous children (30% of Indigenous children had suffered toothache compared with 7% of the non-Indigenous children); Table 3.

Overall 15% of children (n=37) did not have a toothbrush at home at the time of the study and 25% (n=64) never brushed their teeth or did so less than once daily (Table 2).

In comparison with the non-Indigenous children, less Indigenous children had toothbrushes (62% vs 97%), less brushed at least once daily (50% vs 84%) and more had never brushed at all (33% vs 2%); Table 4. The mean number of decayed, missing or filled teeth (dmft) of those who never brushed (2.7, standard deviation [sd] 3.1) was statistically higher (p<0.05, χ^2) than for those who brushed once daily (1.39, sd 2.7) and those who brushed twice daily (1.36, sd 2.6).

Bottle and dummy use

Approximately one-third of children fell asleep with a feeding bottle in their mouth (mostly reported to contain milk). The rate of this practice was not significantly different in children with and without decay. Dummy use was common among non-Indigenous children (86%) and very uncommon among Indigenous children (14%) (Table 2).

Diet

More than one-third of children (39%) consumed soft drink; however, in the group of children suffering from decay, this increased significantly (p<0.05, χ^2) to 56%.

Oral health status

More than one-third (39%) of children had teeth affected by decay (dmft >0) with no significant difference in decay levels between males and females (Table 2). Most children with decay had several teeth affected (Fig 1), and more than 85% of these children had teeth with untreated decay (Table 3). The specific diagnosis of s-ECC applied to 18% of the overall group of children and the average dmft among this group was 6.4 (sd=3.4). This condition was more common among the Indigenous children (n=27, 34% vs n=18, 10% for non-Indigenous children) and occurred in more than half of children who had suffered toothache (58%) and half of those reporting frequent soft drink intake (51%).

A depiction of the wide variation in dmft scores and an analysis of this distribution according to Indigenous status is provided (Fig1). Whereas 75% of non-Indigenous children had no decay, only 25% of Indigenous were disease-free, and Indigenous children were increasingly disproportionately represented at all disease levels exceeding dmft = 1.

Overall the dmft scores for children suffering decay were higher for Indigenous children, those who did not have toothbrushes at home, those who had experienced toothache previously, and those who frequently consumed soft drinks (Table 1).

Table 1: Sample size and population data for the residential locations of Indigenous and non-Indigenous children. It is evident that the highly mobile population associated with Wiluna (as measured at the census[10]) does not represent the children present at the time of review

Location	Population†				Sample		
	Non-Ind	Ind	NS	Total	Non-Ind	Ind	Total
Carnarvon	231	134	44	409	39	31	70
Esperance	545	75	33	653	43	1	44
Kalgoorlie	1845	269	265	2379	86	13	99
Roebourne	12	40	11	63	0	5	5
Wiluna	3	3	0	6	6	29	35
Total	2636	521	353	3510	174	79	253

Ind, Indigenous; NS, not stated.
† Population is 0-4 year olds.

Table 2: Patient parent/guardian reported outcomes for the total population and for those who are suffering some level of decay (ie dmft >0)

Variable	Category	Total population		With caries experience (dmft>0)	
		n (%)	dmft M (sd)	*n* (%)	dmft M (sd)
Sex	Male	137 (54)	1.8 (3.2)	52(53)	4.7 (3.6)
	Female	116 (46)	1.4 (2.4)	46 (47)	3.5 (2.7)
Toothbrush at home	Yes	216 (85)	1.4 (2.7)	76 (78)	4.0 (3.3)
	No	37 (15)	2.8 (3.3)	22 (22)	4.7 (3.1)
Brush frequency	1 x daily	93 (38)	1.2 (2.4)	31 (33)	3.6 (2.9)
	2 x daily	90 (36)	1.3 (2.6)	32 (34)	3.8 (3.2)
	< 1x daily	36 (15)	2.4 (3.7)	14 (15)	6.1 (3.6)
	Never	28 (11)	2.5 (2.8)	18 (19)	3.9 (2.6)
Help with brushing	Yes	161 (64)	1.3 (2.6)	52 (53)	4.0 (3.3)
	No	91 (36)	2.2 (3.2)	46 (47)	4.3 (3.3)
Previous toothache	Yes	34 (13)	3.9 (4.3)	23 (23)	5.8 (4.0)
	No	218 (87)	1.3 (2.4)	75 (77)	3.6 (2.9)
Previous dental visit	Yes	41 (16)	2.3 (3.7)	19 (20)	5.1 (3.9)
	No	210 (84)	1.5 (2.7)	78 (80)	4.0 (3.1)
Sleep with bottle	Yes	80 (33)	2.1 (3.2)	37 (41)	4.5 (3.3)
	No	159 (67)	1.3 (2.5)	53 (59)	3.8 (3.1)
Dummy use	Yes	113 (46)	0.8 (2.1)	29 (30)	3.2 (3.2)
	No	135 (54)	2.2 (3.2)	66 (70)	4.4 (3.3)
Snacking	Yes	112 (44)	2.0 (3.1)	54 (56)	4.2 (3.2)
	No	140 (56)	1.2 (2.7)	43 (44)	4.1 (3.4)
Soft drinks	Yes	98 (39)	2.6 (3.5)	54 (56)	4.8 (3.5)
	No	154 (61)	0.9 (2.1)	43 (44)	3.2 (2.8)

dmft, Number of decayed, missing or filled teeth.

Table 3: The mean number of decayed, missing or filled teeth and the proportion of this index contributed by untreated decay for Indigenous and non-Indigenous children in the data frameset

Variable	Indigenous		Non-Indigenous	
	n	M (sd)	*n*	M (sd)
All (dmft)	79	3.4(3.7)	174	0.8(1.9)
All (d only)	79	3.3(3.6)	174	0.8(1.8)
	n (%)		*n* (%)	
Caries free	26 (30)		131 (75)	
Caries experience	59 (70)		44 (25)	

D, Decay; dmft, number of decayed, missing or filled teeth.

Table 4: A comparison of reported behaviours and toothache history between the total study population and those with severe early childhood caries

Behaviour	All children			Children with s-ECC		
	Total	Ind	Non-Ind	Total	Ind	Non-Ind
		n (%)	*n* (%)		*n* (%)	*n* (%)
Toothbrush at home	222	53 (23.9)	169 (76.1)	35	18 (51.4)	17 (48.6)
Brush once per day	95	19 (20.0)	76 (80.0)	10	5 (50.0)	5 (50.0)
Brush twice per day	92	21 (22.8)	71 (77.2)	14	5 (35.7)	9 (64.3)
Never brushes	30	26 (86.7)	4 (13.3)	7	6 (85.7)	1 (14.3)
Brush < once per day	37	16 (43.2)	21 (56.8)	13	10 (76.9)	3 (23.1)
Help with brushing	161	36 (22.0)	125 (78.0)	23	8 (34.8)	15 (65.2)
Toothache before	36	24 (66.7)	12 (33.3)	14	10 (71.4)	4 (28.6)
Fall asleep with bottle	83	34 (41.0)	49 (59.0)	23	11 (47.8)	12 (52.2)
Frequent soft drinks	101	57 (56.4)	44 (43.6)	29	19 (65.5)	10 (34.5)

Ind, Indigenous; s-ECC, severe early childhood caries.

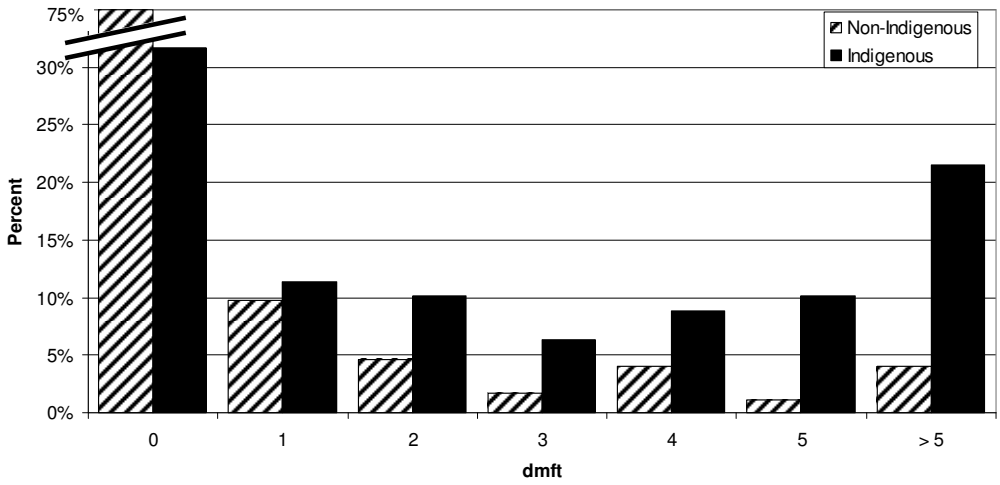

Figure 1: Percentage of Indigenous and non-Indigenous children according to dmft (number of decayed, missing or filled teeth) score. dmft = 0 for non-Indigenous children was 75%.

Discussion

The study results clearly demonstrate that poor preschooler oral health is prevalent in some Indigenous communities in rural and remote areas of WA. Water fluoridation levels in the communities concerned varies between 0.3-0.9 ppm, which indicates suboptimal levels in some communities. Due to small community sizes however, water fluoridation is not a feasible option and this highlights the potential value of fluoridated toothpaste use in such communities.

Although the study has some limitations – retrospective, opportunistic sample design without assessment of socioeconomic background, and the well-known complexities of the questionnaire process – it makes a significant contribution to knowledge in an area of little published data.

In this study, untreated caries (d) comprised the overwhelming majority of the average dmft of 1.7 score, with an average d=1.6 (sd=2.8), m=0.2 (sd=0.7), and f=0.1 (sd=0.4). The mean dmft score of 1.7 is consistent with that reported in a study carried out among preschool children in Brisbane (metropolitan Queensland, Australia) where the dmft score was 1.4[8,9]. The mean dmft score is less than the score reported in our previous study of a similar rural population[1]; however, this study included some significantly more remote Indigenous communities. The proportion of decay-free children of approximately 60% is similar to the number determined by previous surveys[3,7]. Although the decay severity reported in this study for Indigenous children is higher than that reported in previous studies[12-17], the disparity in mean dmft between Indigenous and non-Indigenous children is consistent with previous studies[1,13,14].

The mean dmft score in this study was less than that reported in the Child Dental Health Survey (CDHS) of WA for 5-6 year-old children[3]. This is not unexpected because participants were older in the CHDS, there was less geographic clustering and fewer problems obtaining representative samples. Severe early childhood caries was significantly associated with Indigenous status, consumption of carbonated drinks, toothache history and sleeping with a feeding bottle. The factors associated with s-ECC in this study are consistent with previous research[18-22].

Conclusion

Little published research has focused on the oral health of rural and remote Australian preschool children. Although the number of participants in the present study was small and opportunistic sampling techniques were utilized, it is among the largest in the area and one of the first in Australia. Knowledge and recognition of oral health disparities and treatment needs are the first steps in addressing the very complex issues involved. This study found a significant burden of unmet need in the children examined, representing a significant level of pain and suffering in this group. This suffering is greater for Indigenous children. Action to improve this serious situation is linked with promoting the core messages for good oral health. A systemic approach to addressing the needs of remote dwelling people, and in particular remote area Indigenous children, must include a sustained evidence-based, primary health focus that is inclusive of oral health. Included in this approach are efforts to address rural inequities in the social determinants of health, promote a healthy lifestyle and improve accessibility to primary health care.

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