

Indigenous Australian dental health: A brief review of caries experience

Nicole Martin-Iverson,* Tom Pacza,* Andrea Phatouros,† Marc Tennant‡

Abstract

The indigenous community in Australia is an at risk population for oral diseases such as dental caries. The majority of communities are isolated and dental services in these areas are limited. Oral hygiene standards are poor and this combined with a diet rich in refined carbohydrates has led to high incidences of dental caries. In addition, diabetes, which is related to obesity (and a diet high in sugar and fat) has been linked to increases in oral disease. Caries prevalence was found to be low in areas where fluoridation levels in the water were high. The fact that the fluoride supplementation appears to improve oral health to a significant degree suggests that implementation of fluoride treatment programmes for school children and, where viable, fluoridation of water sources would be appropriate. In addition, dental education programmes should receive high priority. As with the rest of the community, these preventive measures will result in less need for emergency dental treatment in the future, better oral health for the community and reduced financial burden on the State. It is under these circumstances that oral health planners and providers must, in consultation with the relevant community representatives, develop appropriate mechanisms to address the needs of this group. The development of strategies that integrate with the plethora of general health strategies currently being implemented is just one means of achieving improved oral health outcomes for indigenous Australians.

Key words: Aboriginal, dental health, review, caries.

(Received for publication September 1998. Revised August 1999. Accepted August 1999.)

Introduction

Many facets of modern indigenous Australian lifestyle place this group at risk of oral disease,

primarily caries. In addition, the majority of the indigenous Australian population resides in rural and remote areas which have only limited access to dental services. In this brief review the oral health status of indigenous Australia will be examined.

A number of studies have assessed oral health status among various indigenous Australian communities across Australia. In general, the results report poor oral health with a high prevalence of dental caries.¹⁻⁶ There are some communities where caries prevalence is low; these correspond to areas where high levels of fluoride in the water have provided some protection. Nevertheless, a general lack of oral hygiene skills and a diet rich in sugar products have led to high levels of caries among most groups.⁷ Clearly there are differences between various communities, depending on their remoteness and level of dental care. These variations will be State dependent and, as such, the authors have reported on the data on a State-by-State basis.

Data on oral health from various Australian States

Western Australia

In 1968, a study compared two groups of Aboriginal children at the remote Warburton and Cundelee missions.¹ It was observed that neither community practised tooth brushing or other oral hygiene methods. The children at the Cundelee mission consumed a more Western diet containing large quantities of refined carbohydrates in the form of bread, sugar, jam, sweets and biscuits, whereas the Warburton children received balanced institution meals supplemented by traditional foods. In addition, the children in the Warburton community were exposed to water with a high fluoride content (1-1.5 ppm). The effect of these differences in diet and fluoride was seen in caries prevalence; while 28 per cent of Warburton children were completely free of caries, only 10 per cent of Cundelee children were caries free. The DMFX

*Research Scholar, School of Oral Health Sciences, The University of Western Australia.

†Lecturer, School of Oral Health Sciences, The University of Western Australia.

‡Senior Lecturer, School of Oral Health Sciences, The University of Western Australia.

score for 6-14 year olds was 1.05 in Warburton and 3.04 in Cundelee.

Data collected in the early 1960s from Carnarvon compared Aboriginal and Caucasian children.⁸⁻¹⁰ The fluoride level in Carnarvon was high (1.5 ppm), so there was a significant prevalence of dental fluorosis, which was also found to be significantly higher among Aboriginal than Caucasian children (81 per cent and 45 per cent respectively).⁶ It was also reported that the Aboriginal children had lower prevalence of caries than the Caucasian children in the same area. Aboriginal children aged 6-16 had an average DMFX of 1.57 (comparable with that at Warburton) and among similarly aged Caucasian children the DMFX was 3.58.^{8,10} It has been suggested that this difference is linked to increased fluorosis among Aboriginal children, although both groups consumed water with a fluoride concentration of 1.5 ppm. Alternatively, the mission life of the Aboriginal children meant that their diet was regulated and contained only limited carbohydrates.⁸

New South Wales

A number of studies from New South Wales in the 1970s and 1980s by Schamschula and associates^{2,3} found generally poorer oral health among Aboriginal groups than among their Caucasian counterparts. However, others have reported a reduction in caries in Aboriginal children.⁶ This difference may well be explained by the different sample populations with each study.

In 1980, the oral health of adolescent and adult Aborigines in Brewarrina and Walgett was examined. An increase in caries with the introduction of a Western diet high in processed foods was reported.³ DMFT scores were high: 17.1 at age 20, 20.7 at age 35 and then reducing to 14.6 at age 50 and over. In addition, oral hygiene was poor, with an oral hygiene index range of 2.5 in the 16-23 year olds to 3.7 in the over 50 age group. Oral debris and calculus scores were also high. Tooth mortality due to caries and periodontal disease was high, reaching 75 per cent at an average age of 43. In this study, 38 per cent of the subjects were considered to require emergency dental treatment.

Schamschula reported that Aboriginal children in rural New South Wales had up to 90 per cent more decayed tooth surfaces than Caucasian children from the same area, despite comparable sugar consumption.¹¹ The same report indicated that Aboriginal children also had five times as many malformed teeth, showing deep grooves and pits, than the Caucasian children. It was thought that this rough surface could facilitate an increased risk of caries, and the pits and grooves themselves could be the result of malnutrition or frequent childhood illnesses. Both this and the previous study³ discussed

the need for improved dental services and education on preventive oral hygiene skills.

A separate study compared Aboriginal and Caucasian children living in Brewarrina and Walgett in the Orana region of New South Wales.² While both groups had similar diets, the Aboriginal children showed a greater prevalence and more severe caries, poorer oral hygiene and more gingivitis than the Caucasian children, although oral health was generally poor in both groups. The authors noted that many of the children were completely unaware of the need for any sort of oral hygiene. DMFT scores of 2.0 in 6-8 year olds and 3.9 in 10-11 year olds from Aboriginal children, and 1.2 and 3.7 respectively among Caucasian children were recorded. The severity rating (SR) was much higher among Aboriginal children: 4.1 in 6-8 year olds and 6.7 in 10-11 year olds, compared with 1.3 and 4.4 among Caucasians. In addition, the Aboriginal children showed a higher percentage of decayed teeth (D), while Caucasian children showed a higher percentage of filled teeth (F) than the Aboriginal children. Again, Aboriginal children showed higher prevalence of pitting and hypoplasia on their teeth, which could increase their susceptibility to dental caries. The highest level of fluoride in the water in these areas was only 0.26 ppm.

After this study was undertaken, a school-based dental education and prevention programme which included fluoride treatment was implemented.¹² After four years of the programme, the oral health of the children was re-assessed.¹² Some decrease in caries prevalence was seen, particularly among younger children. The DMFT scores from Aboriginal children had decreased by 33 per cent in 10-11 year olds and 50 per cent in 6-8 year olds since the first study and the SR scores had similarly decreased by 34 per cent in the older group and 73 per cent in the younger group. Among most age groups, DMFT and dmft in Aboriginal children was still higher than the Caucasian children, however both groups still exceeded the Australian average (by 52 per cent and 8 per cent respectively).¹² This study concluded that while the introduction of the school dental programme had begun to reduce the incidence of caries, improvements were still needed in the oral health of the Aboriginal children.

Northern Territory

In an early study (1970), the oral health of Aboriginal children and young adults at Yuendumu mission in the Northern Territory was assessed.¹³ It was found that caries prevalence had increased since the 1950s, associated with increased economic development and with the availability of Western-style foods, of which refined carbohydrates were popular. In addition, the fluoride level of the drinking

water had changed from a high 1.3-1.8 ppm to a lower (although still beneficial) 0.4-0.8 ppm in 1965. Despite a rise in caries prevalence, it was still considered to be low compared with Australian city populations. This was thought to be due to the naturally high level of fluoride in the water from which most of those children examined in 1970 would have benefited. The average DMFT for males was 2.3 and for females was 3.0.

In 1971, the prevalence of caries in Aboriginal children aged 6-14 was compared between Bathurst Island and Groote Eylandt in the Northern Territory.¹⁴ Groote Eylandters were financially better off and consumed a more Western diet. Fluoride levels in both places were very low (less than 0.1 ppm). The Groote Eylandt children had significantly more dental caries than the Bathurst Islanders. Average DMFT scores were 5.49 at Groote Eylandt and 2.13 at Bathurst Island, and average dmft scores for 6-9 year olds were 7.82 at Groote Eylandt and 4.83 at Bathurst Island. These differences were attributed to the differences in diet and economic status between the two groups. One of the communities on Groote Eylandt later had fluoride added to the water supply, which resulted in a decrease in caries prevalence.^{8,15}

An additional programme in 1979 involved adding dental information to the Aboriginal Health Workers' training in the Northern Territory.¹⁶ This training included mainly preventive dentistry (directed at children), such as tooth brushing and fluoride application. In addition, training in pain relief and simple extractions of teeth loosened by periodontal disease was also provided. This is a way of providing some limited immediate dental care but, more importantly, dental education through the existing health service system.

Queensland

A study on Mornington Island off the coast of Queensland in 1972 examined Aboriginal children aged 4-15 years.¹⁷ The prevalence of caries was low, probably due to the high fluoride level of 1.3 ppm in the drinking water. The mean DMFT was 1.1 and dmft was 0.5. However, the level of gingivitis was high; only 26 out of the 167 children examined were free from gingivitis, which was defined as bleeding on probing.

A separate study in northern Queensland of various mainland and island communities examined Aborigines and Torres Strait Islanders for caries.⁴ Caries prevalence was high, with 45 per cent of all teeth being carious. It was also observed that the Torres Strait Islander children had a higher prevalence of caries than the Aboriginal children, although the difference between adults was not found to be significant. Adult DMFT scores were 15.8 for Aborigines and 12.2 for Torres Strait

Islanders. Among children (6-12 year olds), the mean DMFT scores were 0.5-4.4 among Aboriginal children and 1.3-6.3 for Torres Strait Islander children. These poor oral health scores were attributed to inadequate oral hygiene, a Western diet and a lack of fluoride.

Discussion

Based on the data presented, areas with high fluoride levels appear well protected against caries, and projects for providing fluoride supplementation to various populations have had some effect. Indigenous Australian oral health was often found to be very poor, particularly in relation to the oral health status of the general Australian population. Caries prevalence was found to be low in areas where fluoridation levels in the water were high, such as Carnarvon, Yuendumu and Mornington Island. The fact that these high levels of fluoridation appear to improve oral health to such a degree suggests that implementation of fluoride treatment programmes for school children and, where viable, fluoridation of water sources (as carried out at Groote Eylandt) are necessary to alleviate the burden of widespread caries. In addition, the dental hygiene education schemes in schools have been shown to be worthwhile. It is also obvious that oral health deteriorates with the change to a Western diet and also with increasing economic resources in an area (probably as a result of the ability to afford more Western foods). Education on appropriate dietary habits would be beneficial in conjunction with oral hygiene education.

Indigenous communities are a population at risk of oral diseases such as dental caries. The majority of communities are isolated and dental services in these areas are limited. Oral hygiene standards are poor and, combined with a diet rich in refined carbohydrates, these factors have led to high incidences of dental caries. In addition, diabetes, which is related to obesity and a diet high in sugar and fat, has been linked to increases in dental caries.

Poor oral hygiene was also widespread; consequently dental education programmes should receive high priority. As with the rest of the community, these preventive measures will result in less need for emergency dental treatment in the future, better oral health for the community and reduced financial burden on the State. In addition to education on proper oral hygiene, and maintenance of a balanced diet, it is essential to integrate oral health programmes with current programmes related to obesity and diabetes.

The provision of services in small communities is difficult. However, through the development training programmes for existing health personnel in rural and remote communities, some change could be

effected. For example, in Western Australia there is currently a programme to provide further training to Aboriginal Health Workers in basic dental health. Additional programmes for rural and remote nurses and doctors are currently being planned.

Also, with the close preventive links that exist between diabetes, cardiovascular disease and dental health (for example, good diet), there are opportunities to dovetail the oral health preventive message into existing preventive strategies in general health.

Conclusion

The poor oral health of indigenous Australians may contribute to their poor general health and to a reduced quality of life. The fact that fluoride supplementation appears to improve oral health to a significant degree suggests that implementation of fluoride treatment programmes for school children and, where viable, fluoridation of water sources would be appropriate. In addition, dental education programmes, particularly in oral hygiene, should receive high priority.

It is under these circumstances that oral health planners and providers must, in consultation with the relevant community representatives, develop appropriate mechanisms to address the needs of this group. The development of strategies that integrate with the plethora of general health strategies currently being implemented is just one means of achieving improved oral health outcomes for indigenous Australians.

Acknowledgements

The authors are grateful to the Rural Health Support Education and Training Program, the Health Department of Western Australia, Kimberley Aboriginal Medical Service Council and Dr David Atkinson for their support; Professor John McGeachie for his review of the manuscript and Alice Evans for her secretarial assistance.

References

1. Kailis DG. Dental conditions observed in Australian aboriginal children resident in Warburton and Cundelee missions, Western Australia (August, 1968). *Aust Dent J* 1971;16:44-52.

2. Schamschula RG, Cooper MH, Adkins BL, Barmes DE, Agus HM. Oral conditions in Australian children of Aboriginal and Caucasian descent. *Community Dent Oral Epidemiol* 1980;8:365-369.
3. Schamschula RG, Cooper MH, Wright MC, Agus HM, Un PS. Oral health of adolescent and adult Australian aborigines. *Community Dent Oral Epidemiol* 1980;8:370-374.
4. Homan BT, Davies GN. An oral health survey of Aboriginal and Torres Strait islanders in far north Queensland. *Aust Dent J* 1973;18:75-87.
5. Davies MJ, Spencer AJ, Westwater A, Simmons B. Dental caries among Australian Aboriginal, non-Aboriginal Australian born, and overseas-born children. *Bulletin WHO* 1997;75:197-208.
6. Ried J, Trompf P, eds. *The health of Aboriginal Australia*. Sydney: Harcourt Brace Jovanovich Ltd, 1991.
7. Moodie PM, ed. *Aboriginal health*. Canberra: Australian National University Press, 1973.
8. Kailis DG, Silva DG. Prevalence of dental caries in Australian aboriginal children resident in Carnarvon, Western Australia. *Aust Dent J* 1971;16:109-115.
9. Kailis DG, Silva DG. Occurrence of dental fluorosis in Australian aboriginal children resident in Carnarvon, Western Australia. *Aust Dent J* 1970;15:216-224.
10. Kailis DG, Silva DG. Carnarvon studies. IV. Prevalence of dental caries in 472 Caucasian schoolchildren examined in Carnarvon, Western Australia (August 1963). *Aust Dent J* 1970;15:396-407.
11. Schamschula R. Social causes of dental disease. *WHO* 1981;June:27-29.
12. Cooper MH, Schamschula RG, Craig GG. Caries experience of aboriginal children in the Orana region of New South Wales. *Aust Dent J* 1987;32:292-294.
13. Barrett MJ, Williamson JJ. Oral health of Australian aborigines: survey methods and prevalence of dental caries. *Aust Dent J* 1972;17:37-50.
14. Kailis DG. Australian Aboriginal studies: 1. The effect of socio-economic changes on the prevalence of caries in 6-14 year old children resident at Bathurst Island and Groote Eylandt in the Northern Territory of Australia, 1971. *Aust Dent J* 1979;24:363-368.
15. Kailis DG, Kailis SG, Stevenson TS, Wall C. Groote Eylandt studies. 2. Fluoridation of a small domestic water supply, CMS Angurugu mission, Groote Eylandt, NT, Australia. 1973-1974. *Aust Dent J* 1976;21:327-333.
16. Anderson DA. Dental health services and the Northern Territory of Australia. A short review of people, places, and programmes to 1981. *Aust Dent J* 1982;27:345-351.
17. Yule AJ. Dental health on Mornington Island. *Aust Dent J* 1975;20:167-169.

Address for correspondence/reprints:

Dr Marc Tennant,
School of Oral Health Sciences,
The University of Western Australia,
Nedlands, Western Australia 6907.