

Use of full strength fluoride toothpaste among preschoolers in New Zealand, and factors determining toothpaste choice

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ABSTRACT

AIM: International researchers have highlighted an inconsistent knowledge-base for parents and caregivers regarding the use of toothpaste among preschoolers. The New Zealand Government has published recommendations on the use of toothpaste in this age group.

This study aimed to explore parents and caregivers' knowledge about toothpaste, with the aim of improving health literacy and overall oral health of New Zealand preschoolers.

METHOD: The study was conducted via an online sample of parents and caregivers of preschoolers (n=1,056).

RESULTS: Only 19% of the preschoolers in the sample used full-strength fluoride toothpaste. Preschoolers were significantly more likely to use full-strength toothpaste if they were not the first child in the family (OR=1.77, 1.28–2.47) or have previously visited a dental professional (OR=1.84, 1.18–2.85). In addition, parents and caregivers made decisions around purchasing of toothpaste based on the level of trust they had in the brand (59%) and also matching age-specific toothpaste to their child (49%).

CONCLUSION: The findings of this research highlight the need for timely advice for parents and caregivers on toothpaste choices for preschool children. The New Zealand Government has published recommendations on the use of full-strength fluoride toothpaste for all ages, including pre-schoolers.

Oral health has been identified as an important public health issue by the World Health Organization (WHO).¹ One of the focuses of the WHO oral health preventative strategies is to prevent dental caries among all population and social groups.² Apart from reducing sugar intake,^{3,4} tooth brushing is another effective self-care strategy.⁴

The New Zealand Ministry of Health's advice on tooth brushing is to brush at least twice daily.⁵ The expert advisory group of the New Zealand Guidelines Group provides further advice around the use of fluoride toothpaste; specifically, toothpaste of at least 1,000 parts per million (ppm) of fluoride is recommended for all ages. This amount of fluoride is equivalent to 0.76% sodium monofluorophosphate, or 0.221% sodium

fluoride. It is also recommended that toothpastes labelled as 'child strength' should be avoided for all ages because of their low level of fluoride. In terms of amount, for children up to the age of 5 years old, a smear of toothpaste should be used.⁶

Findings from the 2009 Oral Health Survey indicated that, despite the Ministry of Health's recommendation on tooth brushing,⁵ only two-third of preschoolers aged 2–4 years (66%) brushed their teeth at least twice daily. The proportion of those who brushed twice daily with fluoride toothpaste was only at 15%.⁷

Similar to other countries, in New Zealand a wide range of toothpastes are available for purchase. This includes full-strength toothpastes that are not age-specific, as well as those that are labelled for babies or children,

or as 'natural' or 'herbal' toothpastes. The strength of fluoride varies hugely, with those labelled for babies/children or as natural/herbal typically containing less fluoride (or no fluoride at all).

While the Ministry of Health⁵ endorses the New Zealand Guidelines Group's recommendation of all people using full-strength toothpaste,⁶ there is no published data on the use of different types of toothpastes among New Zealanders.⁸ This study fills this information gap by collecting data on the use of different types of toothpastes by preschoolers in New Zealand, and the factors determining toothpaste choice as reported by their parents or caregivers. This information can then be used to inform public health initiatives to enhance the parents and caregivers' health literacy in relation to toothpaste usage and improve the oral health of young New Zealanders.

Methods

Participants

The research population for the study was parents and caregivers of preschoolers, operationally defined as those aged between 4 months and 4 years 11 months old. To be eligible to take part, participants must be 18 years old and over, and responsible for providing regular care and/or guardianship for the preschoolers.

Using an identical methodology as the main study, the questionnaire was piloted with 56 respondents. Prior to the commencement of the study, there was an expected sample size of 1,000 for the main survey. No change was made to the recruitment protocol or the questionnaire after the pilot, and therefore responses from the pilot were included in the analysis. This decision resulted in a total of 1,056 participants in the final sample. Ethics approval for this study was obtained from the New Zealand Ethics Committee (Ref: NZEC 15 #23).

Sampling procedure

A convenience sample of parents and caregivers were recruited from an online research panel called Consumer Link. Potential participants received an email invite and received points on completion of the online survey. The points are accumulated and can be redeemed for products

or services. Prior to participation, potential respondents were informed that their participation was voluntary. Informed consent was indicated by respondents selecting a tick box to represent their willingness to participate. The response rate was 78%.

Analysis

The analysis was undertaken using STATA IC 13.1. A total of 50 respondents indicated that the preschoolers under their care did not have any teeth, and a further 22 reported that their preschoolers did not use toothpaste. The questions on toothpaste were irrelevant to this group of respondents, and therefore they were not asked in the survey. This reduced the number of cases for the analysis to 984.

The dependent variables were: a) the type of toothpaste used by the preschoolers; and b) the factors parents/caregivers considered when they chose toothpastes for their preschoolers. For both variables, descriptive statistics were calculated. In-depth analysis was also carried out with the first variable, to help with the understanding of factors that were associated with an increased likelihood of using full-strength fluoride toothpastes.

This was undertaken using univariate and multivariate logistic regression models.

Results

Sample characteristics

Socio-demographic characteristics of the total sample and the sub-sample are described in Table 1. A large majority of the adult respondents were females (87%) and the biological parent of the preschoolers (95%). Only 7% and 2% of adult respondents self-identified as Māori or Pacific (when prioritised in the order of Māori, Pacific, and European/other). In terms of the preschoolers' characteristics, there was an even representation of both boys and girls, and the first and subsequent child of their parents.

Type of toothpaste currently used by the child

Two respondents did not know the type of toothpastes that was used by the preschool child, and their responses were excluded from the analysis on this specific measure

Table 1: Socio-demographic characteristics of the adult respondents and the child under their care.

	Total Sample n=1,056		Sub-sample (children with 1+ teeth and used toothpaste) n=984	
Adult characteristics	n	%	n	%
Gender				
Male	138	13.1	126	12.8
Female	918	86.9	858	87.2
Ethnicity (prioritised)				
Māori	76	7.2	72	7.3
Pacific	16	1.5	15	1.5
New Zealand European/ Other	964	91.3	897	91.2
Age group				
18–24 years	11	1.0	10	1.0
25–34 years	474	44.9	435	44.2
35–44 years	518	49.1	490	49.8
45–54 years	40	3.8	39	4.0
55+ years	13	1.2	10	1.0
Relationship to the child				
Biological parent	1,003	95.0	934	94.9
Mother's/father's partner	26	2.5	25	2.5
Grandparent	14	1.3	12	1.2
Foster parent	7	0.7	7	0.7
Legal guardian	5	0.5	5	0.5
Aunt	1	0.1	1	0.1
Household equivalised income				
<\$40,000	63	6.0	57	5.8
\$40,001–\$70,000	254	24.1	233	23.7
\$70,001–\$100,000	276	26.1	259	26.3
\$100,001+	360	34.1	336	34.2
Don't know	103	9.8	99	10.1
Child characteristics				
	n	%	n	%
Gender				
Male	527	49.9	489	49.7
Female	529	50.1	495	50.0
Ethnicity (prioritised)				
Māori	138	13.1	128	13.0
Pacific	31	2.9	28	2.9
New Zealand European/ Other	887	84.0	828	84.2
Age group				
4–6 months	46	4.4	6	0.6
7–11 months	47	4.5	23	2.3
1 year	227	21.5	220	22.4
2 years	262	24.8	261	26.5
3 years	278	26.3	278	28.3
4 years	196	18.6	196	19.9
First child of the adult				
Yes	532	52.9	508	54.2
No	474	47.1	429	45.8

Table 2: Type of toothpaste currently used by the child, reported by the parents/ caregivers (n=982).

	Toothpaste for babies (n=222)	Toothpaste for children (n=535)	Non-fluoridated / natural toothpaste (n=40)	Full-strength fluoride toothpaste (n=185)	Odds ratio (using full-strength fluoride toothpaste)
Overall	22.6	54.5	4.1	18.8	-
Child's gender					
Male (n=488)	23.0	57.0	3.7	16.4	1
Female (n=494)	22.3	52.0	4.5	21.3	1.38 (1.00–1.90)
Child's ethnicity					
Māori (n=128)	25.8	50.0	5.5	18.8	1
Non-Māori (n=854)	22.1	55.2	3.9	18.9	1.01 (.63–1.62)
Adult's ethnicity					
Māori (n=72)	25.0	48.6	5.6	20.8	1
Non-Māori (n=910)	22.4	54.9	4.0	18.7	.87 (.48–1.59)
Child's age					
4–6 months (n=6)	16.7	66.7	0.0	16.7	1
7–11 months (n=23)	43.4	43.5	0.0	13.0	.75 (.06–8.83)
1 year (n=220)	40.5	39.1	3.6	16.8	1.01 (.11–8.91)
2 years (n=259)	25.5	50.6	3.1	20.8	1.32 (.15–11.51)
3–4 years (n=474)	11.8	64.1	5.1	19.0	1.17 (.14–10.15)
First child of the adult (n=959)					
Yes (n=507)	25.4	55.4	4.1	15.0	1
No (n=428)	19.4	52.9	4.0	23.8	1.77 (1.28–2.47)
Perceived oral health status (n=982)					
Excellent/ very good (n=879)	23.1	54.2	4.0	18.8	1
Good/fair/ poor (n=101)	17.8	58.4	5.0	18.8	1.00 (.59–1.70)
Child had visited a dental professional (n=971)					
No (n=755)	38.4	44.9	4.2	12.5	1
Yes (n=216)	18.1	57.0	4.1	20.8	1.84 (1.18–2.85)
Agreed that it is important to use age-appropriate toothpaste (n=946)					
No (n=362)	9.1	43.1	5.0	42.8	19.13 (11.91–30.71)
Yes (n=584)	31.0	61.6	3.6	3.8	1

Note: Statistically significant difference at $p < 0.05$ are denoted in bold.

Table 3: Reasons for choice of toothpaste (n=974).

Reasons (multiple reasons allowed)	%
A brand I trust	58.6
Matches my child's age	49.4
A taste my child likes	25.1
Cheaper price/ discounted	18.0
Contain a low level of fluoride	15.7
A cartoon character/ picture my child likes	13.5
To have one toothpaste for the whole family	12.2
Other reasons	10.6
Contain no fluoride	4.2

Number of response options selected:
Range = 1 to 7
Mean = 2.1

(n=982). Overall, only 19% of the preschoolers in our sample used full-strength fluoride toothpaste. Half of them used toothpastes labelled as suitable for children.

The odds ratios generated from the univariate logistic regression models suggested that the likelihood of preschoolers using full-strength fluoride toothpastes did not differ by the preschooler's demographic characteristics, adult's ethnicity, or perceived oral health of the child, as reported by the adult. However, preschoolers had increased likelihood of using full-strength fluoride toothpastes if they were not the first child of their parents (OR=1.77, 95% CI=1.28–2.47) or if they had ever visited a dental professional (OR=1.84, 95% CI=1.18–2.85). Because of the potential association between dental visit and the child's age, a multivariate logistic regression model was also computed. After controlling for age, having visited a dental professional still predicted the use of full-strength toothpaste (AOR=1.95, 95% CI=1.21–3.16).

Other than birth order and dental visit, the use of full-strength fluoride toothpastes was also associated with agreement with the statement, "it is important for children to use age-appropriate toothpaste". Preschoolers whose parents or caregivers did not agree with this statement had 19-fold increased odds (95% CI=11.91–30.71) of using full-strength fluoride toothpaste (see Table 2).

Factors determining toothpaste choice

Ten respondents indicated that they were not responsible for choosing tooth-

pastes for their preschoolers, and were not asked the question on what factors they considered when choosing toothpaste for their preschoolers. The remaining respondents (n=974) were asked to select from a list of nine factors, and multiple responses were allowed.

The number of factors selected by respondents ranged from one to seven; 38% of respondents selected only one factor and 31% selected two (see Table 3). The most commonly cited factor was a brand that they trust (59%), followed by choosing a toothpaste that matches the child's age (49%). One-quarter of respondents commented on taste (25%), while one-fifth commented on price (18%). Having one toothpaste for the entire family was only mentioned by 12% of the respondents, and 11% mentioned there were other reasons affecting their choice. However, the questionnaire did not require respondents to indicate what the 'other' reasons were.

Discussion

Despite the Ministry of Health's recommendation on the use of full-strength fluoride toothpaste for all ages,⁵ our data indicated that only 19% of the preschoolers in the sample used this type of toothpaste. Our data suggested that the low uptake of full-strength fluoride toothpaste could be attributed to parents and caregivers' lack of knowledge around toothpaste use among preschoolers.

Direct evidence could be drawn from the strong inverted relationship between parents and caregivers' belief that children should use age-appropriate toothpaste

and the use of full-strength fluoride toothpaste. Less direct evidence came from the differences found among first and subsequent children, with subsequent children being more likely to use full-strength fluoride toothpaste. Differential level of parental knowledge and behaviours associated with preschool oral health has been well documented in a previous New Zealand study⁹ and international literature.^{8,10} For example, a study conducted with 104 pregnant women in Dunedin found that overall, there was a low level of knowledge on preschool oral health care. The researchers in this study showed that there was a lack of knowledge of when tooth brushing should begin, or when preschoolers should have their first dental visit. This was particularly true among women who were first-time mothers, young, or with a low socio-economic status.⁹

The other factor that was associated with the use of full-strength fluoride toothpaste was dental visits, with preschoolers who had ever visited a dental professional having increased odds of using full-strength toothpaste. This finding might suggest that dental professionals are an important information source for parents and caregivers on toothpaste choice; however, the first dental visit might happen too late to provide timely oral health advice to parents and caregivers. There is currently no population-based data on the proportion of preschoolers in New Zealand who have ever visited a dental professional. The 2009 Oral Health Survey had collected data on dental visit in the past 12 months, and found that only 60% of two-to-four year olds had done so.⁷

The results from the current study also demonstrated the lack of awareness amongst the participants of the Ministry of Health's recommendation around toothpaste. From a list of nine reasons, the Ministry's recommendation on having one toothpaste for the whole family ranked seventh. In contrast, choosing an age-appropriate toothpaste was the second most commonly-selected reason, at 49%. To put our findings into context, three previous studies were conducted in Asia where parents selected from a list of factors that affected their toothpaste choice for their children. The actual proportion of parents

who chose toothpaste for their children based on the fluoride concentration varied hugely across studies: 12% in India,¹¹ 61% in China,¹² and 85% in Malaysia.¹³ Importantly, fluoride concentration was not the most commonly cited reason in any of these studies.¹¹⁻¹³ Factors that were more commonly reported were brand, taste, and advice and recommendations from friends, family and dental professionals. The consistency across studies around the relatively low priority given on fluoride concentration suggest this might be a universal issue.

In New Zealand, part of the confusion on toothpaste choice could arise from manufacturers' instructions on toothpaste packaging being inconsistent with the Ministry of Health's recommendations. Future studies may investigate the extent to which parents and caregivers read and adopt the tooth brushing information printed on toothpaste packaging. In terms of health promotion strategies, it is important to recognise the different messaging parents and caregivers are exposed to around toothpaste types.

Explicit information that would allow parents and caregivers to distinguish messaging from different sources, and to comply with the Ministry of Health's recommendations might be required.

The responses to the type of toothpaste currently used by the sampled preschoolers and the parents' or caregivers' criteria for choosing toothpaste were consistent. It appeared that there is a need to improve parents and caregivers knowledge level to ensure they adopt the Ministry of Health's recommendations. While dental professionals could be an important channel to provide oral health information to parents and caregivers, advices delivered by a range of other health professionals who engage with parents and caregivers at an earlier stage—such as lead maternal carers, Well Child providers, or public health nurses—could also be beneficial. The study conducted in Dunedin has found that pregnant women were receptive to the idea of receiving oral health information from Plunket nurses, general medical practitioners, dentists and midwives.²⁴ A number of overseas studies have found oral health interventions delivered during pregnancy effective. These interventions also had a

focus on improving the oral health of the women.^{10,14,15}

Strengths and limitations

This study provided novel information around the type of toothpastes used by preschoolers in New Zealand, and the findings had important implications on both oral health literacy and promotion. A lot of the literature in preschool oral health has focused on mothers, as they have been identified as playing a key role in the general health and wellbeing of their children. However, understanding the involvement of the whānau would help to address the wider household-related barriers for having good oral health practice. By giving the opportunity for both of the parents and caregivers to participate in this survey, we hope to fill in some of the existing knowledge gaps. This is particularly important in the New Zealand context as grandparents, aunties and uncles often play an important role as a main caregiver in Māori and Pacific families.

It is also important to acknowledge the limitations of the dataset. This includes the small Pacific and Māori sample size. According to the 2013 New Zealand Census of Population and Dwelling, 7% of the New Zealand population are affiliated with at least one Pacific ethnicity (based on total ethnicity).¹⁶ The ethnicity composition

of the parent and caregiver population in New Zealand is not known, however, the proportion of Pacific people within this sub-population is likely to be smaller than 7% due to the youthful nature of the Pacific population in New Zealand, when compared with other groups such as New Zealand European and Asian.¹⁷ In the current study, only 2% of the adult respondents were Pacific people (using prioritised ethnicity). It is also likely that Māori were underrepresented in the sample (7%), as Māori make up 14.6% of the overall New Zealand population.¹⁶

Due to the nature of recruiting participants through an established online database, the findings from this study is subject to selection bias. While the prevalence estimates presented in this paper will need to be interpreted with caution, they provide us with solid New Zealand evidence that assists with the understanding of the factors associated with the low use of fluoride toothpaste among children.

Conclusion

In summary, data from the current study emphasised the importance of providing timely advice to parents and caregivers on toothpaste choice for preschoolers. The association between dental visits and use of appropriate toothpaste choice for children suggested that dental professionals are a crucial oral health information source for parents and caregivers.

Competing interests:

Nil

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