

# Study of Parents' KAP regarding their Children's Oral Health and the Factors that Influence Children's Risk of Dental Caries

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## Research

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# Abstract

**Background:** Caries can harm children's physical health, mental health, and overall development. To understand the factors that influence children's risk of dental caries and the status of dental caries among children in Beijing, China, aged 3–5 years and to determine parents' KAP regarding their children's oral health.

**Methods:** The research subjects were parents who accompanied their children to a hospital for dental examination, and parents who attended community-based oral-health consultations. Data were collected through a questionnaire survey. The data were statistically analyzed using SPSS software.

**Results:** Overall, 41.4% of the children had dental caries. The parents had high demand for dental-caries-related knowledge, and were willing to receive such knowledge from a variety of sources. Logistic regression models showed that factors that impact children's caries were the mother's educational background, whether parents regularly acquire oral-health knowledge, and whether children have a dental examination each year.

**Conclusion:** In Beijing, approximately half of the children aged 3–5 years have dental caries. Parents have good knowledge and attitudes regarding their children's oral health, but their associated actions are insufficient. Therefore, it is necessary to provide parents with assistance regarding managing children's oral health.

## Background

In global terms, oral health has always been considered an element of public health<sup>1</sup>. In 1998, Slade et al. began to study the oral-health-related quality of life (OHRQL) of adults and older people,<sup>2</sup> and scholars from various countries built on this by exploring OHRQL among children.<sup>3</sup> In 2003, Jokovic et al. designed a questionnaire concerning oral-health quality during early childhood,<sup>4</sup> and the following year Jokovic et al. studied OHRQL among 8–10-year-old children.<sup>5</sup> In recent years, the research focus has been further expanded. New topics include the relationship between poor oral health and the risk of falls among older adults,<sup>6</sup> between oral health and quality of life among patients with depression,<sup>7</sup> and between oral health and quality of life among malnourished patients.<sup>8</sup> Although there have been extensive studies of oral health, there remains a large gap in the research regarding oral-health-related knowledge, attitudes, and practices (KAP). Notably, the study of oral-health-related KAP can play a positive role in the prevention of oral diseases.<sup>1</sup> Furthermore, study of oral-health-related KAP among populations can help to maintain public-health levels.

In the field of oral health, children's oral health is a major concern. In the field of oral health, children's oral health is a major concern. However, to improve children's development, it is necessary to examine the current status of children's dental caries and parents' oral-health practices." Nevertheless, to improve

children's development, experts should also examine the current status of children's dental caries and parents' oral-health practices.

Dental caries, as one of the major diseases that negatively influence OHRQL, have a strong impact on people's lives, especially children who lack awareness of prevention techniques.<sup>9,10</sup> The influencing factors of early childhood dental caries can be categorized into six risk factors: social demography, dietary habits, oral hygiene, oral flora, feeding methods, and other factors.<sup>11</sup> Overall, over 100 factors have been found to affect children's risk of dental caries but, despite this high number, most can be effectively prevented through scientific measures. However, this requires parents to possess a certain level of knowledge regarding children's oral health, and to impart this knowledge upon their children.<sup>12</sup> Therefore, studying parents' KAP regarding their children's oral health and the factors that influence children's risk of dental caries can have positive implications.

This study aims to conduct a basic survey, in Beijing, China, of parents' KAP concerning their children's oral health in an attempt to understand whether parents of children aged 3–5 years possess the basic KAP to ensure that their children have healthy oral health. The fundamental purpose of this study is to provide basic reference materials and explore the parent-related factors that affect children's dental caries, which can serve to raise parents' awareness of children's oral health and preventive measures for dental caries, and help reduce the incidence of dental caries in children.

## **Method**

The research comprised three phases. The first phase involved designing a questionnaire to obtain data. The second phase consisted of data collection. And the last phase included a series of analysis for data.

### **Phase I: Questionnaire Design**

Through an extensive literature review,<sup>13,14</sup> the present research group designed a questionnaire to test parents' oral-health knowledge. The questionnaire comprised six modules: the parents' and children's basic demographic information, parents' level of knowledge regarding oral health, parents' attitudes towards oral problems, parents' current practices for maintaining children's oral health, parents' level of demand for oral-health knowledge, and parents' preferred sources of oral-health knowledge. Parents' KAP regarding their children's oral health was measured through items scored using a five-point Likert scale, ranging from "strongly agree" to "strongly disagree," or from "strong need" to "very little need."

### **Phase II: Data Collection**

From August to December 2019, the data for this study were collected in Beijing. HaiDian Maternal & Child Health Hospital was the main location for data collection. In addition, community health service centers were an option for data collection. The inclusion criteria of participants were as follows: (1) parents who accompanied their children to hospital for a dental examination, or parents who attended community-based oral-health consultations regarding their children; (2) ability to exchange and contact

with researchers and (3) willingness to receive this questionnaire survey. We excluded participants which their children have autism or other mental disease. After obtaining informed consent from respondents, professional personnel distributed and recovered the questionnaire.

### **Phase III: Data analysis**

All data were analyzed using the SPSS software package. Basic characteristic information was obtained by using descriptive statistics. The factors influencing children's risk of dental caries were analyzed through multiple logistic regression analysis.

## **Results**

### **Basic characteristics**

Overall, 2,200 questionnaires were distributed to the respondents, of which 2,078 were returned (response rate: 94.5%); however, 216 questionnaires did not relate to children aged 3–5 years. Hence, 1,862 responses were analyzed. The data concerned basic information regarding the respondents and their family members; primarily the children's ages, gender, and incidence of dental caries, the parents' respective education levels, how often the children underwent dental examinations, whether the children had undergone a dental examination within the past year, whether family members were involved in the oral-health industry, and whether parents had regular access to oral-health information (Table 1).

Table 1

Basic characteristics of the respondents and their family members.

<b>Variable</b>	<b>N(%)</b>
Child's age (years)	
Three	926(49.7)
Four	434(23.3)
Five	502(27.0)
Child's sex	
Male	969(52.0)
Female	893(48.0)
Child's number of dental caries	
Zero (No caries)	1087(58.4)
One	121(6.5)
Two	217(11.7)
Three	95(5.1)
Four	120(6.4)
Five or more	222(11.9)
Father's educational background	
Below undergraduate	325(17.5)
Undergraduate	834(44.7)
Master's	482(25.9)
Doctor's	221(11.9)
Mother's educational background	
Below undergraduate	324(17.4)
Undergraduate	883(47.5)
Master's	511(27.4)
Doctor's	144(7.7)
Frequency of the child's oral examinations	
Once a month	11(0.6)
Every 2–3 months	94(5.0)

Variable	N(%)
Every six months	429(23.0)
Once a year	639(34.3)
Never	689(37.1)
Child received an oral examination in the past year	
Yes	1002(53.8)
No	860(46.2)
Family member works in the oral-health field	
Yes	198(11.6)
No	1664(89.4)
Parents acquire oral-health knowledge regularly	
Yes	630(33.8)
No	1232(66.2)

### Parents' KAP

Parents' KAP regarding their children's oral health was described using means. The means for the parents' attitudes toward maintaining their children's oral health ranged from 4.63 to 4.70. More specifically, the mean for the item "Teeth must be examined when the deciduous teeth germinate" was 3.28, that for "fluoride toothpaste should be used after deciduous teeth germinate" was 3.63, that for "children's mouths should be cleaned after meals" was 3.95, and the means for the other knowledge questions averaged between 4.05 and 4.36. The means for controlling children's intake of sweets, sweetened beverages, and sweetened milk were 3.63, 3.88 and 3.76, respectively, and the remaining questions regarding practices averaged between 4.08 and 4.47 (Table 2).

Table 2  
Scores for each question concerning the parents' KAP regarding their children's oral health.

		Mean score	Standard deviation
<b>Knowledge</b>	Teeth should be examined when deciduous teeth germinate	3.28	0.018
	Children's mouths should be cleaned after meals	3.95	0.016
	Fluoride toothpaste should be used after the deciduous teeth have germinated	3.63	0.017
	For children, the toothpaste dosage should be approximately the size of a small grain of rice	4.05	0.015
	Feeding milk at night may lead to dental caries in children	4.24	0.014
	Sucrose is the most caries-inducing sugar	4.09	0.015
	Fruit juices and fizzy drinks tend to cause tooth decay	4.36	0.013
	Neglect of treatment for dental caries will affect overall health	4.24	0.014
<b>Attitude</b>	Children should be taken to hospitals to treat dental problems	4.68	0.007
	Prevention of dental diseases is as important as treatment	4.67	0.007
	Regular oral-health checks are important	4.64	0.007
	Protecting children's first permanent molars is important	4.63	0.008
	Parents should help their children develop good oral habits	4.70	0.007
	Pediatricians and family doctors should consider children's oral health	4.64	0.007
<b>Practice</b>	I supervise or help my child clean his/her teeth	4.24	0.012
	I ensure that my child brushes his/her teeth for more than three minutes	4.09	0.013
	I ensure that my child uses fluoride toothpaste	4.33	0.011
	I ensure that my child uses mouthwash after meals	4.08	0.013
	I replace my child's toothbrushes regularly	4.47	0.009
	I ensure that my child rarely eats sweets	3.63	0.017
	I ensure that my child rarely drinks sweet drinks	3.88	0.015
	I ensure that my child rarely drinks sweetened milk	3.76	0.016

Most respondents chose “strong need” or “need” to describe their level of knowledge regarding dental caries (Table 3). The data showed that respondents had a variety of preferences regarding sources of oral-health knowledge (Table 4).

Table 3  
Parents’ level of need for knowledge regarding specific dental caries topics.

	<b>Strong need</b>	<b>Need</b>	<b>Ambivalent</b>	<b>Do not need</b>	<b>Very little need</b>
Dangers associated with dental caries (%)	32.7	39.5	19.6	4.6	3.6
Causes of dental caries (%)	35.2	42.5	16.1	3.5	2.7
Prevention of dental caries (%)	41.2	41.9	11.9	2.5	2.5
Dental caries treatment (%)	40.1	41.7	13.3	2.5	2.4
Ideal frequency and content of oral examinations (%)	38.6	42.8	13.9	2.3	2.4
Correct method of and times for brushing teeth (%)	39.8	40.5	13.0	3.9	2.8

Table 4  
Parents’ level of need regarding specific sources of oral-health knowledge.

	<b>Strong need</b>	<b>Need</b>	<b>Ambivalent</b>	<b>Do not need</b>	<b>Very little need</b>
Prescribed health education (%)	35.7	44.4	15.5	2.5	1.9
Doctor-patient exchange (%)	35.2	44.1	16.0	3.0	1.7
Videos (%)	31.8	42.4	20.5	3.6	1.7
Classroom education (%)	33.5	41.5	19.2	3.9	1.9
Mobile- or web-based information (%)	33.1	47.0	16.2	2.0	1.7
At patient admission(%)	24.7	38.5	27.3	6.8	2.7
Examples using teeth models (%)	30.0	44.8	20.6	2.8	1.8
Graphic bulletin board (%)	28.8	45.4	20.8	3.1	1.9
Returned telephone calls (%)	15.1	26.0	32.0	20.8	6.1
Visits to treatment facilities (%)	19.3	31.0	29.3	15.5	4.9
Regular community outreach (%)	22.8	39.5	26.3	7.9	3.5

## **Factors influencing children's risk of dental caries**

Overall, 58.4% of the respondents reported that their children had “no caries.” The rest of the children were referred as “experiencing dental caries.” This group comprised the following: “one cavity” (6.5%), “two cavities” (11.7%), “three cavities” (5.1%), “four cavities” (6.4%), and “five or more cavities” (11.9%). Finally, the respective impacts of whether parents regularly acquired oral-health knowledge, whether children received one dental examination a year, and the parents’ educational backgrounds were analyzed to determine whether these had any effect on children’s risk of dental caries (Table 5).

Table 5  
Multivariate logistic analysis of factors that may influence children's risk of dental caries.

		$\beta$	SE	Wald	OR(95% CI)	P-value
Parents regularly acquire oral health knowledge	Yes	-0.379	0.060	40.143	0.685*** 0.609–0.770	0.000
Child has at least one dental examination a year	Yes	1.318	0.063	432.556	3.734*** 3.298–4.228	0.000
Father's educational background	Below undergraduate	0.149	0.132	1.273	1.160 0.896–1.502	0.259
	Undergraduate	-0.133	0.102	1.681	0.876 0.715–1.070	0.195
	Master's	0.198	0.104	3.622	1.219 0.994–1.495	0.057
	Doctor's	-	-	-	-	-
Mother's educational background	Below undergraduate	0.684	0.149	21.211	1.982*** 1.481–2.651	0.000
	Undergraduate	0.220	0.125	3.083	1.246 0.975–1.594	0.079
	Master's	-0.342	0.126	7.308	0.711** 0.555–0.910	0.007
	Doctor's	-	-	-	-	-
Constant		-1.246	0.131	90.010		0.000
* p < .05, ** p < .01, *** p < .001.						
Abbreviations – $\beta$ : regression co-efficient beta; SE: standard error.						

## Discussion

The results of this study highlight the relationship between dental caries in children aged 3–5 years and their parents' KAP regarding their children's oral health. The oral health of children aged 3–5 years is primarily the responsibility of their parents, which indicates that the main cause of dental caries in children is insufficient KAP among parents regarding their children's oral health. Parents' KAP is formed through the influence of many factors. There is a correlation between the parents' education level and the time and energy they devote to acquiring oral-health knowledge. Additionally, the associated harms, the pathogenic factors, the treatment, and especially the prevention of dental caries are the oral-health topics for which parents lack sufficient knowledge. In short, parents are mindful of their children's oral health, but show some deficiencies regarding their practices for protecting their children's oral health.

Parents' education levels influence the number of dental caries their children have. Parents are an important resource of oral-health knowledge for children, and their associated KAP affects their children's formation of oral-health concepts. Previous studies have also focused on the relationship between parents' education levels and their children's oral health awareness,<sup>15</sup> and studies have shown that, by improving their knowledge and attitude towards oral health, parents can improve their children's oral health.<sup>16</sup> During the preschool period, parents are the primary persons responsible for their children's oral health, so parents should acquire sufficient oral-health knowledge and implement relevant oral-health-promotion activities to control their children's oral-health risks.<sup>17</sup>

UK-based researchers have suggested that, to protect children's oral health, "health visitors" (i.e., public-health nurses) should receive training in oral-health promotion, including how to perform oral-health risk assessments and guidance on evidence-based, up-to-date prevention measures.<sup>18</sup> On the other hand, in the US the "dental home" has been developed to foster a comprehensive, sustained, coordinated, family-centered approach to providing oral-health care among children.<sup>19</sup> The success of this initiative should be noted, and similar approaches should be considered in other countries. Such as, under the guidance of province-level, city-level and county-level centers for disease control and prevention in China, Chinese community health service centers or service stations have established corresponding dental homes or similar organizations.<sup>20</sup>

In Beijing, parents' KAP regarding their children's oral health is improving, and they are paying more attention to their children's oral health.<sup>21</sup> The respondents of the present study showed high awareness of basic oral-health knowledge. There are several possible reasons for this. First, the economy, politics, and society in Beijing are relatively stable, and the development of public-health services related to oral health is relatively good. Second, public dissemination of health knowledge through social media can greatly enhance understanding of health knowledge among social groups.<sup>22</sup> Individuals who are seeking information about oral health can search the Internet for health information or consult an online health expert. Finally, parents' health awareness is increasing and they have more knowledge about the

management of children's oral health. Therefore, among parents' KAP, knowledge and attitudes are improving. However, the current situation, in which children of parents with adequate oral-health knowledge continue to experience oral diseases, indicates that parents' oral-health-related actions, including supervision of children's brushing and educating children about proper brushing methods, require further analysis to better determine safeguarding measures for children's oral health.

To protect their children's oral health, parents must consider various factors, including food choices, dental cleaning, and dental replacement. Excessive consumption of sugar-rich foods in children increases the prevalence of dental caries.<sup>23</sup> Sweets, cakes, and sweet drinks contain large amounts of sugar, and parents should limit children's intake of such foods. However, parents continue to have difficulty controlling the consumption of sugar-rich foods in children. First, sugar-rich foods are attractive to humans.<sup>24</sup> Second, parents can have busy work lives, meaning their ability to intervene in this regard is limited. Parents' level of oral-health knowledge is relatively good. However, their demand for knowledge concerning dental-caries-related diseases is relatively high, indicating that they lack knowledge in certain areas. First, general oral-health knowledge is relatively easy to obtain, but elements concerning the dangers associated with dental caries, the treatment of dental caries, and the prevention of dental caries remain relatively restricted to professional dental knowledge. For instance, the effects of various saliva components, including pH, buffering capacity, proteins, electrolytes, antioxidants, enzymes and minerals, on the generation of dental caries are largely known only to medical professionals.<sup>25</sup> Second, the high demand for knowledge indicates that regular oral examinations and contents and the correct methods of brushing teeth should be further publicized and explained by health-care organizations.

The respondents' preferred sources of oral-health knowledge revealed a high demand for prescribed health education, doctor-patient exchanges, classroom education, educational videos, mobile- or web-based resources, and examples using teeth models. In contrast, return telephone calls and visiting treatment sites showed low demand. Therefore, to promote oral-health knowledge, the above knowledge sources should be adopted, and practical actions for improving people's awareness of oral health knowledge should be applied.<sup>26</sup>

Regular access to oral-health knowledge and accompanying children to examinations are factors that influence dental caries in children. Active learning and understanding of oral-health-related knowledge among parents are conducive to timely health interventions for children and guidance that protects children's teeth.<sup>27</sup> Regular dental check-ups play a key role in maintaining oral health;<sup>18</sup> thus, parents should insist on regularly accompanying children to hospitals or community medical institutions for dental check-ups. More importantly, countries should explicitly include dental examinations in their health-care plans.<sup>28</sup>

The results of this study only represent parents who have relatively high education levels and who are based in an economically developed city. It is important to note that there are several constraints regarding the findings. First, the research focused on a specific group, meaning the results are not completely generalizable. In future research, parents from less-developed areas or rural areas should be

surveyed in order to compare the results. Second, there may be other problems (e.g., gum disease) that can better reflect the current situation of parents' KAP regarding children's oral health. These problems can be incorporated into future research, thereby constructing a more comprehensive understanding of parents' oral-health-related KAP. Finally, family economic status could be considered and compared with the frequency of dental exams, which could reveal additional factors that influence dental caries in children.

## Conclusions

In conclusion, the very common phenomenon of children have dental caries in Beijing, China. In the meantime, parents have insufficient actions regarding their children's oral health. This findings contribute to the demonstration and have an important guiding role for the development of interventions to improve the parents' KAP regarding their children's oral health in China.

### Why This Paper Is Important To Children's Parents

- Children's parents should be aware of the various potential influencing factors on early childhood dental caries.
- Parents' KAP on Children's oral health is effective for protecting children's dental health.

## List Of Abbreviations

knowledge, attitudes, and practices    KAP

## Declarations

### Ethics approval and consent to participate

The research was confirmed to the ethical standards of Helsinki declaration. Each participant accepted to participate in the study were informed the topic and content about this survey.

### Consent for publication

Not applicable.

### Availability of data and material

The raw datasets of this study can be made available from the corresponding author on reasonable request.

### Competing interests

The authors declare no conflict of interests.

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## Authors' contributions

Lili Xu came up with the idea and designed the study with the help of Jing Tian and Huiyu Wang. Acquisition of data was done by Changhui Shao and Yibo Wu with help from Zaimu Yang and Dingding Guo. Anurag Aryal (AAR) entered the data into SPSS with the help from SS. AP analyzed and interpreted the data with the help from AD and AA. Xinyan Liu and Jiaqing Xiao conducted the focus group discussion. All the authors contributed in preparation and submission of manuscript. All authors read and approved the final manuscript.

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