Association Between Dental Health Behavior and Incidence of Dental Caries in Women Nurses in Japan

Nobue Saito\(^1\), Toshimi Sairenchi\(^1\), Takashi Muto\(^1\), Shizue Sayama\(^2\), Junko Morikawa\(^2\), Hiromi Taneichi\(^3\), and Masako Nishigori\(^1\)

\(^1\) Department of Public Health, Dokkyo Medical University School of Medicine,\n\(^2\) Department of Nursing, Dokkyo Medical University Hospital,\n\(^3\) Dokkyo Medical University School of Nursing

SUMMARY

Background: The relationship between dental health behavior and incidence of dental caries among women nurses remains unclear.

Methods: A cross-sectional questionnaire-based survey was conducted on 693 women nurses who worked at Dokkyo Medical University Hospital. The survey questionnaire consisted of demographic characteristics, dental health behavior, visits to dentists during working hours in the previous year, and further details about dental problems. The odds ratio (OR) with 95% confidence interval (CI) for experience with dental problems due to dental caries in the previous year was calculated using single logistic regression models.

Results: Among 693 subjects, 178 (25.7%) had experienced dental problems due to dental caries in the previous year. Compared with subjects who never brushed their teeth after snacking between meals, the OR of experience with dental problems due to dental caries was significantly lower among subjects who always brushed their teeth after snacking between meals (OR: 0.55, 95% CI: 0.32–0.94). Compared with subjects who never had dental checkups, the OR of experience with dental problems due to dental caries was significantly lower among subjects who had dental checkups once a year (OR: 0.46, 95% CI: 0.26–0.81) and less than once a year (OR: 0.57, 95% CI: 0.39–0.83).

Conclusions: Women nurses who always brushed their teeth after snacking between meals had less experience with dental problems due to dental caries than those who did not. Women nurses who had dental checkups were at lower risk of dental problems due to dental caries than those who did not.

Key Words: dental caries, nurse, dental health behavior, women, dental checkup

INTRODUCTION

In Japan, medical care expenditure for dental care constituted 7.1% of the national healthcare expenditure in 2010, and the estimated amount for dental care is increasing yearly\(^1\). Medical care expenditure for dental care thus occupies an important place in national healthcare in Japan. Moreover, dental disease causes a loss of productivity\(^2\). Therefore, it is important to
detect dental caries in the early stage before symptoms become obvious. Also, dental caries must be prevented before serious symptoms develop.

Factors such as the behavior of snacking between meals\(^3\), having a family dentist\(^3\), the use of fluoride toothpaste\(^3\), fluoride mouthwash\(^4\), and plaque control record (PCR)\(^5\) are related to dental caries among Japanese adults. However, the subjects of the above-mentioned studies were mainly men\(^3,4\). The relationship between dental health behavior and dental caries among women nurses in a hospital remains unclear. If there were general awareness of optimal dental health behavior for preventing dental caries, good dental health behavior in everyday life would be easier to practice and women nurses might take an interest in their oral health.

Thus, the purpose of this study was to examine the relationship between dental health behavior and dental caries in women nurses in Japan.

**METHODS**

**Study Design and Population**

The study had a cross-sectional design. An anonymous, self-administered questionnaire-based survey was conducted among nurses working at Dokkyo Medical University Hospital, Japan, during August 2012. Full-time nurses (N=913) who worked at the hospital were recruited. A total of 884 nurses responded, with a response rate of 96.8%. From these 884 respondents, we excluded 191 (109 who had worked less than one year, 54 males, and 28 who submitted incomplete data). Thus, 693 subjects were enrolled in the present study. The protocol of this study was approved by the ethics committee of Dokkyo Medical University (No. 24020).

**Survey Procedure**

The survey questionnaire consisted of three parts. Part one included the following demographic characteristics: sex, age (years), years of experience as a nurse, number of night shifts per month in the last year (‘two-shift system’ or ‘three-shift system’), and marital status (‘married’ or ‘single’). Part two included questions regarding the following dental health behavior we thought might affect dental caries: frequency of tooth brushing (‘once per day’, ‘twice per day’, or ‘three or more times per day’); use of dental floss or interdental brushes (‘never’, ‘once a year’, ‘twice or less per week’, ‘three times per week’, or ‘every day’); and having dental checkups (‘never’, ‘less than once a year’, ‘once a year’, or ‘every six months’). Part three included questions regarding dental problems in the previous year: any experience with dental problems in the previous year (‘yes’, ‘no’, or ‘unsure’); and further details about dental problems (‘dental caries’, ‘periodontal disease’, ‘detachment of prosthesis’, ‘temporomandibular disorder’, ‘pericoronitis’, or ‘other’).

**Statistical analysis**

The p values for experience with dental problems due to dental caries were calculated using the chi-squared test for frequency of tooth brushing, tooth brushing after snacking between meals, use of dental floss or interdental brushes, and having dental check-ups.

The odds ratio (OR) with 95% confidence interval (95% CI) for experience with dental problems due to dental caries in the previous year was calculated using single logistic regression models. The independent variables were dental health behavior: frequency of tooth brushing (‘twice per day’ or ‘three or more times per day’), tooth brushing after snacking between meals (‘never’, ‘once a year’, ‘twice or less per week’, ‘three times per week’, or ‘every day’), having dental checkups (‘never’, ‘less than once a year’, ‘once a year’, or ‘every six months’). All statistical analyses were conducted using SAS, version 9.3 (SAS Institute, Inc., Cary, NC, USA).

**RESULTS**

Baseline characteristics of 693 women nurses are shown in Table 1. One hundred and seventy-eight subjects (25.7%) had experienced dental problems due to dental caries in the previous year.

The proportions of responses based on experience with dental problems due to dental caries in the previous year are shown in Table 2. Statistically significant differences were found with presence of dental check-ups. No significant differences were found for frequen-
The OR with 95% CI for dental visits in the previous year is shown in Table 4. Compared with subjects who brushed their teeth once per day, those who brushed twice per day had a lower frequency of dental visits (OR: 0.79, 95% CI: 0.54-1.12). Similarly, the use of dental floss or interdental brushes was associated with a lower frequency of dental visits, with those using dental floss or interdental brushes every day having an OR of 0.45 (95% CI: 0.24-0.84).

Table 1: Baseline characteristics of 693 women nurses

<table>
<thead>
<tr>
<th></th>
<th>Total (N = 693)</th>
<th>No experience with dental problems due to dental caries in the previous year (N = 515)</th>
<th>Some experience with dental problems due to dental caries in the previous year (N = 178)</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex (No., %)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>693 100.0</td>
<td>515 83.7</td>
<td>178 55.0</td>
<td></td>
</tr>
<tr>
<td>Age (mean ± SD)</td>
<td></td>
<td>33.5 ±8.5</td>
<td>33.5 ±8.5</td>
<td></td>
</tr>
<tr>
<td>Years of experience as a nurse (mean ± SD)</td>
<td></td>
<td>11.6 ±8.2</td>
<td>11.6 ±8.2</td>
<td></td>
</tr>
<tr>
<td>Number of night shifts per month (mean ± SD)</td>
<td></td>
<td>Two-shift system (night shift) 4.8 ±2.0</td>
<td>Three-shift system (evening shift and night shift) 6.9 ±3.6</td>
<td></td>
</tr>
<tr>
<td>Marital status (No., %)</td>
<td></td>
<td>Married 282 40.7</td>
<td>178 55.0</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>411 59.3</td>
<td>337 45.3</td>
<td>202 45.0</td>
<td></td>
</tr>
</tbody>
</table>

SD indicates standard deviation.

Table 2: Proportions of responses based on experience with dental problems due to dental caries in the previous year among 693 women nurses.

- Frequency of tooth brushing (No., %)
  - Once per day: 0/0/0/0.0/0/0.0
  - Twice per day: 78/11.3/57/11.1/21/11.8/0.79
  - Three or more times per day: 615/88.7/458/88.9/157/88.2

- Brushing teeth after snacking between meals (No., %)
  - Never: 188/27.1/131/25.4/57/32.0
  - Sometimes: 376/54.3/280/54.4/96/53.9/0.09
  - Always: 129/18.6/104/20.2/25/14.1

- Use of dental floss or interdental brushes (No., %)
  - Never: 331/47.8/247/48.0/84/47.2
  - Twice or less per week: 252/36.4/186/36.1/66/37.1
  - Three times per week: 71/10.2/51/9.9/20/11.2/0.84
  - Every day: 39/5.6/31/6.0/8/4.5

- Having dental checkups (No., %)
  - Never: 250/36.1/168/32.6/82/46.1
  - Less than once a year: 286/41.3/224/43.5/62/34.8
  - Once a year: 99/14.3/81/15.7/18/10.1/<0.01
  - Every six months: 58/8.3/42/8.2/16/9.0

*Data were analyzed using chi-squared tests for frequency of tooth brushing, brushing teeth after snacking between meals, use of dental floss or interdental brushes, and having dental checkups.

The most frequently reported dental problem was dental caries (173 participants) followed by detachment of prosthesis and pericoronitis.
To the best of our knowledge, this is the first study to show an association between dental health behavior and dental caries among women nurses in Japan. Women nurses who always brushed their teeth after snacking between meals had less experience with dental problems due to dental caries than those who did not. Women nurses who had dental checkups were at lower risk of dental problems due to dental caries than those who did not.

The association between snacking between meals and dental problems due to dental caries in the previous year was significantly lower among subjects who always brushed their teeth after snacking between meals. Compared with subjects who never had dental checkups, the OR of experience with dental problems due to dental caries in the previous year was significantly lower among subjects who had dental checkups once a year and less than once a year. However, compared with subjects who never had dental checkups, the OR of experience with dental problems due to dental caries in the previous year was not significantly lower among subjects who had dental checkups every six months.

**DISCUSSION**

To the best of our knowledge, this is the first study to show an association between dental health behavior and dental caries among women nurses in Japan. Women nurses who always brushed their teeth after snacking between meals had less experience with dental problems due to dental caries than those who did not. Women nurses who had dental checkups were at lower risk of dental problems due to dental caries than those who did not.
Dental health behavior and dental caries

The possible reason that tooth brushing after snacking between meals is effective for the prevention of dental caries is unclear. However, the possible mechanism of the reason that snacking between meals is related to dental caries has been reported previously\cite{13,14}. A significant relationship was found between the number of streptococcus mutans and not brushing after snacking\cite{13}. A previous study reported that plaque control is likely to play a significant role in controlling streptococcus mutans\cite{14}. Moreover, the oral health status of adults who received regular oral health care including checkups was better than the oral health condition of subjects of two separate national or municipal surveys of dental diseases\cite{12}. In addition, as the brushing per day increased, the lower the PCR became\cite{15}.

The strength of the present study was the high response rate (96.8%). However, our study had several limitations. First, because the frequency of snacking between meals was not recorded, subjects who never snacked between meals might have been included in the subjects who never brushed their teeth after snacking between meals. However, a previous study\cite{16} reported that 71.9% of nurses always or sometimes had snacks between meals. Second, the dental problem was self-reported and we did not conduct oral examination. Third, as the present study was a single-center study, the results might not be generalizable.

In conclusion, women nurses who always brushed their teeth after snacking between meals had less experience with dental problems due to dental caries than those who did not, and women nurses who had dental checkups were at lower risk of dental problems due to dental caries than those who did not. Brushing after snacking between meals might prevent dental caries among people familiar with appropriate methods of tooth cleaning.

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REFERENCES


