

## A questionnaire survey of dental students in Japan, China, and Indonesia about denture cleansers

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**Purpose:** It is not definite about how much knowledge, experience, and opinion the dental students have about denture cleansers. The purpose of this study was to investigate the interest and knowledge about denture cleansers of dental student in Japan, China, and Indonesia.

**Materials and Methods:** Forty-seven dental students from Japan (Hiroshima University), 38 dental students from China (Hebei Medical University and Wuhan University), and 29 dental students from Indonesia (Airlangga University) were surveyed in this study.

**Results:** The response rate was 92.1%. Significant differences were found among the three countries for all questions. For the question "Have you heard of denture cleanser?", 100% of Japanese students answered "Yes", whereas 40.5% of Chinese students and 13.8% of Indonesian students answered "No". Japanese students recognized denture cleansers in TV commercials more often than Chinese and Indonesian students (Q8). For the question "Do you think the use of denture cleanser is more effective than a clinical intervention?", about 75% of the subjects in Japan answered "Yes"; however, over 55% of subjects in China and Indonesia answered "No".

**Conclusion:** The results suggest that there are differences in the awareness and knowledge about denture cleansers among the three countries of Japan, China and Indonesia. Chinese dental students had the least knowledge about denture cleansers compared with the other two countries. (Int Chin J Dent 2010; 10: 51-56.)

**Key Words:** China, dental student, denture cleanser, Indonesia, Japan, questionnaire

### Introduction

Commercial denture cleansers may be classified into the following groups: neutral peroxides with enzymes, enzymes, acids, hypochlorites, peroxides, crude drugs, and mouth rinses for dentures.<sup>1</sup> Denture cleansers have been widely used in prosthodontics to prevent colonization of *Candida albicans* and related *Candida* species and formation of denture plaque.<sup>2-5</sup> They have been shown to significantly reduce the number of microorganisms on dentures in a hospitalized geriatric population.<sup>6</sup> However, denture cleansers can cause significant deterioration of the physical and mechanical properties of denture base materials if not correctly used.<sup>7-12</sup> Murdoch-Kinch et al.<sup>13</sup> reported that oral mucosal injury can be caused by denture cleansers.

Denture wearers would benefit greatly from a dental professional's guidance about the use of denture cleansers. However, the awareness and knowledge of Japanese, Chinese, and Indonesian dental students about denture cleansers remain unclear. A recently published study reported that there were many differences in the understanding and experience of denture cleansers in the clinic among Japanese, Chinese, and Indonesian dentists.<sup>14</sup> Japanese dentists were the most informed about denture cleansers.

Because dental students have incomplete knowledge about dental services, it was thought that TV commercials about denture cleansers may have an effect on the students' awareness and knowledge. The purpose of this study was to clarify Japanese, Chinese, and Indonesian dental students' recognition of denture cleansers and to investigate any differences in their understanding of denture cleansers based on their nationality.

## Materials and Methods

In this study, 114 dental students were asked to complete and return a structured questionnaire (Table 1). The subjects were selected at random from fourth-year undergraduate dental students in Japan (Hiroshima University, Hiroshima), fourth-year undergraduate dental students in China (Hebei Medical University, Shijiazhuang; Wuhan University, Wuhan) and fifth-year undergraduate dental students in Indonesia (Airlangga University, Surabaya). They included 47 Japanese dental students (men, 26; women, 21; mean age: 23.6 years); 38 Chinese dental students (men, 22; women, 16; mean age: 22.8 years) and 29 Indonesian dental students (men, 3; women, 26; mean age: 23.1 years). The questionnaire was distributed and collected in Japan, China and Indonesia from 2006 to 2007 after the aim of the survey was explained to the subjects and their consent was obtained.

**Table 1.** Questionnaire items and percentage distributions of answers by dental students

Item descriptions		Category score			$\chi^2$ test
		2	1	0	
Q 1. Have you heard of denture cleansers?	JPS	15	32	0	A **
	CNS	0	22	15	
	INS	0	25	4	
Q 2. Do you know what the function of a denture cleanser is?	JPS	19	28	0	A **
	CNS	2	20	14	
	INS	1	27	1	
Q 3. Do you know of any disadvantages of denture cleansers?	JPS	3	24	20	A **
	CNS	0	7	29	
	INS	0	19	10	
Q 4. How many imported brands of denture cleanser do you know?	JPS	0	5	42	B **
	CNS	0	6	28	
	INS	3	1	26	
Q 5. How many domestic brands of denture cleanser do you know?	JPS	7	28	12	B **
	CNS	2	6	26	
	INS	0	1	28	
Q 6. Have you ever been taught about denture cleansers?	JPS	7	24	16	C **
	CNS	0	10	24	
	INS	0	20	9	
Q 7. Have you ever seen denture cleansers in books or lecture meetings?	JPS	8	25	14	C **
	CNS	0	9	27	
	INS	0	18	10	
Q 8. Have you ever seen any TV commercials about denture cleansers?	JPS	24	21	2	C *
	CNS	0	4	32	
	INS	3	5	21	
Q 9. Do you know any alternatives to denture cleansers?	JPS	2	7	38	A **
	CNS	0	8	28	
	INS	1	14	14	
Q10. Have you ever seen denture cleansers in the clinic?	JPS	5	16	26	C **
	CNS	1	10	25	
	INS	0	7	22	
Q11. Do you think the use of denture cleanser is more effective than a clinical intervention?	JPS	26	9	12	A **
	CNS	0	18	14	
	INS	4	13	12	

A 2: Yes, very much, 1: Yes, but only a little, 0: No B 2: Three or more, 1: Less than three, 0: None C 2: Yes, often, 1: Yes, occasionally, 0: No \* : p<0.01 \*\* : p<0.001 NS: Not significant

The questionnaire was written in Japanese and then translated into Chinese and Indonesian. After discussion with the staff in Japan, China, and Indonesia, it was decided to retain the same estimation criteria. The questionnaire consists of 11 questions (five questions about knowledge and comprehension; four questions about education; two questions about clinical practice). Each question had three response options; “No” or “None” (score 0), “Yes, but only a little”, “Yes, occasionally” or “Less than three” (score 1), and “Yes, very much”,

“Yes, often” or “Three or more” (score 2).

Chi-square tests were used to examine the differences in the responses for each item on the questionnaire among the three countries. Forward stepwise logistic regression analyses were then carried out on the dependent variable (between Japan and China; between Japan and Indonesia; and between China and Indonesia). The Wald statistic was used to test the null hypothesis that the regression coefficients were zero. The Nagelkerke  $R^2$  statistic was used to discriminate how well the model was able to distinguish between the awareness and knowledge of dental students in the three countries. All analyses were computed with SPSS for Windows operating system (SPSS 16, SPSS Japan Inc., Tokyo, Japan).

## Results

The response rate was 92.1%: Japanese students, 100%; Chinese students, 78.9%; and Indonesian students 96.6%. Questionnaire items and percentage distribution of responses are shown in Table 1. Significant differences between the three countries were found for all questions. Compared with Chinese and Indonesian students, more Japanese students not only knew about denture cleansers, but also had a clear understanding of its purpose and directions for its use (Q1 and Q2). For the question “Do you know of any disadvantages of denture cleansers?”, 42.6% of Japanese students; 80.6% of Chinese students and 34.5% of Indonesian students answered “No”. For the question “How many imported brands of denture cleanser do you know?”, over 80% of respondents answered “None”. For the question “How many domestic brands of denture cleanser do you know?”, 74.5% of Japanese students answered “Less than three”, whereas 76.5% of Chinese students and 96.6% of Indonesian students answered “None”. For Q6 and Q7, over 70% of Chinese students answered “No”. Japanese students recognized denture cleansers in TV commercials more often than Chinese and Indonesian students (Q8). There was a significant difference in the knowledge of the therapeutic effects of denture cleanser among students in three countries (Q11).

**Table 2.** Results of binary logistic regression analysis using Wald methods between Japan and China

Item No.	B	S.E.	Wald chi-square	Freedom	P	Exp (B)
Forward stepwise (Wald)						
Q 8: TV commercials of DC*	5.98	1.52	15.45	1	0.000	393.05
Q11: Effectiveness of DC*	2.51	1.25	4.01	1	0.045	12.28

\* denture cleanser, For the forward stepwise method, variables were entered in step 1 to 2: Q8, Q11 in that order.

Table 2 shows the estimated coefficients and related statistics from the logistic regression model that predicts group membership (between Japan and China). The model contained two variables using a forward stepwise method ( $P < 0.05$ ): Q8 (TV commercials of DC) and Q11 (Effectiveness of DC).

**Table 3.** Results of binary logistic regression analysis using Wald methods between Japan and Indonesia

Item No.	B	S.E.	Wald chi-square	Freedom	P	Exp (B)
Forward stepwise (Wald)						
Q 5: Domestic brands of DC*	-3.89	1.32	8.65	1	0.003	0.21
Q 8: TV commercials of DC*	-2.06	0.73	7.92	1	0.005	0.13
Q 9: Alternatives to DC*	2.51	1.07	5.56	1	0.018	12.36

\* denture cleanser, For the forward stepwise method, variables were entered in step 1 to 4: Q5, Q8, Q9 in that order.

Table 3 shows the estimated coefficients and related statistics from the logistic regression model that predicts group membership (between Japan and Indonesia). The model contained three variables using a forward

stepwise method ( $P < 0.1$ ): Q5 (Domestic brands of DC), Q8 (TV commercials of DC) and Q9 (Alternatives to DC). Table 4 shows the estimated coefficients and related statistics from the logistic regression model that predicts group membership (between China and Indonesia). The model contained three variables using a backward stepwise method ( $P < 0.1$ ): Q3 (Disadvantages of DC), Q5 (Domestic brands of DC) and Q7 (Seen DC in books or lecture meetings).

**Table 4.** Results of binary logistic regression analysis using Wald methods between China and Indonesia

Item No.	B	S.E.	Wald chi-square	Freedom	P	Exp (B)
Forward stepwise (Wald)						
Q 3: Disadvantages of DC*	3.28	1.15	8.14	1	0.004	26.69
Q 5: Domestic brands of DC*	-4.31	1.66	6.75	1	0.009	0.01
Q 7: Seen DC* in books or lecture meetings	2	0.88	5.23	1	0.022	7.42

\* denture cleanser, For the forward stepwise method, variables were entered in step 1 to 4: Q3, Q5, Q7 in that order.

Table 5 shows that 46 Japanese students (97.9%) and 28 Chinese students (93.3%) were correctly predicted using the method outlined above. The Nagelkerke  $R^2$  statistic was 0.877; that is, 87.7% of the variation in the outcome variable was explained by the logistic regression model. Table 6 shows that 44 Japanese students (93.6%) and 23 Indonesian students (82.1%) were correctly predicted. The Nagelkerke  $R^2$  statistic was 0.777; that is, 77.4% of the variation in the outcome variable was explained by the logistic regression model. Table 7 shows that 27 Chinese students (90.0%) and 25 Indonesian students (89.3%) were correctly predicted. The Nagelkerke  $R^2$  statistic was 0.650; that is, 65.0% of the variation in the outcome variable was explained by the logistic regression model.

**Tables 5-7.** Observed and predicted group membership using Wald methods between two countries

<b>Table 5.</b>				<b>Table 6.</b>				<b>Table 7.</b>			
Predicted country				Predicted country				Predicted country			
Group	Japan	China		Group	Japan	Indonesia		Group	China	Indonesia	
Forward stepwise (Wald)				Forward stepwise (Wald)				Forward stepwise (Wald)			
Japan	46	1	97.9	Japan	44	3	93.6	China	27	3	90.0
China	2	28	93.3	Indonesia	5	23	82.1	Indonesia	3	25	89.3
Total			96.1	Total			89.3	Total			89.7

The cut value is 0.50. Nagelkerke  $R^2 = 0.877$  (Table 5), 0.777 (Table 6), and 0.650 (Table 7) (forward stepwise).

\* Responses of eight Chinese students and one Indonesian student were deleted because they did not give complete answers in the questionnaire.

## Discussion

In the clinic, patients would benefit greatly from a dentist's guidance in the use of denture cleansers. This study was designed to survey the knowledge, understanding and level of education about denture cleansers among Japanese, Chinese, and Indonesian dental students.

More than 59% of Chinese students and more than 86% of Indonesian students said that they had heard only a little about denture cleansers and that they knew only a little of their function, and over 80% of dentists in China answered that they did not know of any disadvantages of denture cleansers. It is important for dentists to be familiar with the disadvantages of denture cleansers; in particular, the risk of oral mucosal injury caused by inappropriate use of denture cleansers.<sup>13</sup> In China, professional education about denture cleansers is a more pressing need than in the other two countries. Over 76% of the students in China and more than 96% of the Indonesian students did not know of any domestic brands of denture cleanser. In China and Indonesia, domestic manufacturer of denture cleansers is almost non-existent, and they are reliant on imports; this may be why many dental students in China and Indonesia did not know of any domestic brands. In addition, the difference in the

economic strength among the countries may have affected the students' answers. Furthermore, the answers to the questions regarding imported and domestic denture cleanser products may have been related to differences in the production of denture cleansers among the three countries.

Over 70% of students in China responded that they had never been taught about denture cleansers, and had never seen denture cleansers in books or lecture meetings. However, only approximately 30% of Japanese students and Indonesian students answered "No" to these questions. In Indonesia, specialty books containing information about denture cleansers that were translated from Japanese into Indonesian were being used as textbooks. This may be why the Chinese students' responses were so low to these questions, as they had mostly never been taught about denture cleansers, and had never seen denture cleansers in books or lecture meetings.

Over 70% of students in China and Indonesia responded that they had never seen denture cleansers on television. This could be due to the fact that mass media is more developed in Japan than in China and Indonesia. This suggests that Japanese students not only receive education about denture cleansers in dental school, but are also exposed to information about denture cleansers through TV commercials. Students should be taught evidence-based facts about denture cleansers in dental school by specialist prosthodontists. We also suggest that it is particularly important to teach students about the advantages and disadvantages of denture cleansers as part of their professional education.

Over 69% of Chinese students and over 75% of Indonesian students stated that they had never seen denture cleansers in the clinic. There are various environmental differences among the three countries, such as the education system and the clinical system, which could affect awareness about denture cleansers.

The results of our study suggest that using only two out of the 11 questions (Q8: TV commercials of DC, and Q11: Effectiveness of DC) allowed the nationality of the dental students in Japan and China to be almost correctly predicted (96.1%) by the model. Using only three items (Q5: Domestic brands of DC, Q8: TV commercials of DC, and Q9: Alternatives of DC), the nationality of dental students in Japan and Indonesia was almost correctly predicted (89.3%). Finally, using only three items (Q3: Disadvantages of DC, Q5: Domestic brands of DC, and Q7: Seen DC in books or lecture meetings), the nationality of dental students in China and Indonesia was almost correctly predicted (89.7%). However, some limitations can be identified in this study: the indirect translation of the questionnaire from Japanese to Chinese and Indonesian; and the small sample sizes. It is unknown whether the results can be generalized to other samples; therefore, it is necessary to conduct future research in more diverse samples.

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#### References

1. Nikawa H, Hamada T, Yamashiro H, Kumagai H. A review of vitro and in vivo methods to evaluate the efficacy of denture cleansers. *Int J Prosthodont* 1999; 12: 153-9.
2. Anthony DH, Gibbons P. The nature and behavior of denture cleansers. *J Prosthet Dent* 1958; 8: 796-810.
3. Abelson DC. Denture plaque and denture cleansers. *J Prosthet Dent* 1981; 45: 376-9.
4. Koopmans AS, Kippuw N, de Graaff J. Bacterial involvement in denture-induced stomatitis. *J Dent Res* 1988; 67: 1246-50.
5. Nikawa H, Hamada T, Yamamoto T, Kumagai H. Effects of salivary or serum pellicles on the *Candida albicans* growth and biofilm formation on soft lining materials in vitro. *J Oral Rehabil* 1997; 24: 594-604.
6. Gornitsky M, Paradis I, Landaverde G, Malo AM, Velly AM. A clinical and microbiological evaluation of denture cleansers for geriatric patients in long-term care institutions. *J Can Dent Assoc* 2002; 68: 39-45.
7. Backenstose WM, Wells JG. Side effects of immersion-type cleansers on the metal components of dentures. *J Prosthet Dent* 1977; 37: 615-21.
8. Purnaveja S, Fletcher AM, Ritchie GM, Amin WM, Moradians S, Dodd AW. Compatibility of denture cleansers with some new self curing denture base materials. *Biomaterials* 1982; 3: 251-2.

9. Nikawa H, Iwanaga H, Hamada T, Yuhta S. Effects of denture cleansers on direct soft denture lining materials. J Prosthet Dent 1994; 72: 657-62.
10. Rodrigues Garcia RCM, Léon BLT, Oliveira VMB, Del Bel Cury AA. Effect of a denture cleanser on weight, surface roughness, and tensile bond strength of two resilient denture liners. J Prosthet Dent 2003; 89: 489-94.
11. Hong G, Murata H, Li YA, Sadamori S, Hamada T. Influence of denture cleansers on the color stability of three types of denture base acrylic resin. J Prosthet Dent 2009; 101: 205-13.
12. Amanda P, Leticia RD, Nathália de QR, Raphael Freitas de S, Cláudia Helena Lovato da S, Helena de FOP. Effect of denture cleansers on physical properties of heat-polymerized acrylic resin. J Prosthodont Res 2010; 54: 78-83.
13. Murdoch-Kinch CA, Mallatn ME, Miles DA. Oral mucosal injury caused by denture cleanser tablets -A case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1995; 80: 756-8.
14. Hong G, Li YA, Lian YM, Sadamori S, Hamada T, Murata H. Comparison of their recognition about the denture cleansers among Japanese, Chinese and Indonesian dentists. Int J Chin Dent 2010; 10: 29-34.

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