

## 외국인 유학생들의 치과진료서비스 이용장벽

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## Barriers to the utilization of dental services among international students of Korean universities

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**Objectives:** International students attending Korean universities are sometimes not able to receive timely dental treatment, despite the need for dental treatment owing to various oral health problems. The purpose of the study was to identify various barriers to the regular use of dental services by international students in a metropolitan area of Korea.

**Methods:** Questionnaires, both online and offline, were sent to 500 foreign university students enrolled in five selected universities located in Daegu city and nearby areas, with a total of 19 valid responses received. The questionnaire consisted of 41 items, including demographic characteristics, oral hygiene-related behavior, barriers to dental services access, and Oral Health Impact Profile (OHIP-14). The internal validity of each factor was 0.8 or higher (Cronbach Alpha  $\alpha=0.86$ ), confirming the reliability. All data were analyzed using IBM SPSS for Windows ver. 25.0 was used for analysis, and the statistical significance level was set to 0.05%.

**Results:** Among the international student participants, 69.5% did not visit the dentist during their stay in Korea, and those with low prevalence of gum bleeding and plaque were more likely to visit the dentist regularly. Financial problems and lack of knowledge and interest in oral health were significantly associated with the use of dental services. The revised model's explanatory power was 20.3%.

**Conclusions:** In order to improve the oral and general health of international students residing in Korea, university level oral health education programs, oral health care centers, and governmental support programs should be implemented.

**Key Words:** Barriers, International students, Utilization of dental services

## Introduction

Korea has increased its international competitiveness by meeting the global standard of education. Therefore, due to economic development and globalization, Korea continues to attract foreigners, and has become a study destination for many international students<sup>1,2</sup>.

To date, the global COVID-19 pandemic has reduced the global mobility of international students, and in accordance

with the data released by the Ministry of Education in 2020, for the first time in Korea, the number of international students has decreased by 4% with approximately 153,695 foreign students enrolled in Korean universities and colleges. However, the number of foreign students enrolled in degree programs increased by 12.8%, and will continue to increase due to the Korean government program aimed at 200,000 international students by 2023<sup>3,4</sup>.

According to the International Student Mobility of 2020 in-

indicator of the Organization for Economic Cooperation and Development, foreign students accounted for 2.3% of all students at Korean universities<sup>5)</sup>. The large number of foreign students enrolled in Korean universities are mainly from nearby countries in the Asian region, where Chinese students accounted for 44.4% of the entire population of international students in Korea, followed by Vietnamese students accounting for 24.9%, Mongolia 4.6%, Japan 2.7%, United States 1.8%<sup>6)</sup>.

A comparative study of international and Japanese college students conducted in Japan showed that foreigners' oral health conditions were worse than those of Japanese and it was linked with the lower use of dental service<sup>7)</sup>. In research by Shim et al.<sup>8)</sup> 65.3% of Chinese students residing in Korea had not visited the dentist during their stay in Korea, and Language barriers, economic burdens, and lack of information were found to be associated with low utilization of dental services.

According to the study on the use of dental institutions among foreigners in Korea, the time and cost of dental treatment have been pointed out as the main reasons why the majority of foreigners in Korea have never received any dental treatment in Korea<sup>9)</sup>.

Time and financial condition are the main reasons why foreign workers in Pocheon did not receive dental treatment, and more than half visited the dentist only when they were having pain (56%) and 44% did not receive dental treatment even when they were in pain<sup>10)</sup>, and according to a study of international students, particularly Chinese students in Korea, the results found that international students had poorer oral health management practices than domestic students, resulting in lowering

their quality of life, and academic performance<sup>11)</sup>.

Multiple factors have been associated with the low use of dental services among foreigners, and the utilization of dental care is more discretionary than the use of other health care services because oral conditions are not life-threatening<sup>12)</sup>. Therefore, considering the need for improvement in oral health among international students, it is important to identify risk factors that interfere with regular use of dental services. In addition, limited studies has been conducted to identify barriers to the utilization of dental services among international students of Korean universities. And information on the dental health of international students is strongly needed as the number of international students is increasing rapidly in Korea. Hence, the purpose of the study was to identify risk factors that interfere with the regular use of dental services by foreign students in a metropolitan of Korea.

## Materials and Methods

### 1. Research subjects and data collection

A cross-sectional study was carried out to investigate barriers to the utilization of dental services from April 2021 to July 2021. Data collection was done by means of online and face-to-face questionnaires, with the help of representatives of international students at each university. For online, google docs were distributed through email and SNS groups to all foreign students whose contact information was available. About 500 foreign students were targeted as a convenience sample from 5 Korean universities located in Daegu city and nearby. Only 453

**Table 1.** Questionnaire of the barriers to the utilization of dental services

Contents	Questions
Language barrier	"Lack of understanding of dentist explanation and recommendation" "I cannot address freely my problem to the dentist"
Lack of time	"Problem in finding and understanding appropriate information regarding dental care" "Dental treatment and appointment kept me waiting for a long time" "I am always busy, I do not have enough time for a dentist"
Dental fear and anxiety	"I have a fear toward dental treatment" "Dental procedure is likely to result in postoperative pain" "I am afraid that it would be unpleasant and painful"
Financial problem	"I had unpleasant dental experiences" "High cost of dental services" "I do not want to spend my money" "I can't afford the treatment fees"
Lack of knowledge and interest in oral health	"Lack of transport for treatment" "I am not aware of available dental treatment options" "I know little knowledge about the signs and symptoms of dental disease" "I do not understand the importance of taking care of my teeth" "I do not know if I need dental treatment" "I do not think dental diseases are very serious"

completed and submitted the questionnaire; among them, 34 questionnaires with inadequate responses were eliminated. A total of 419 were used for statistical analysis.

The data gathered was kept confidential. Ethical clearance was obtained from the ethical committee of Kyungpook National University, institutional review board (KNU-2021-0023).

**Table 2.** Utilization of dental services according to demographic characteristics

Variables	Dental services utilization		X <sup>2</sup>	P-value
	Yes n (%)	No n (%)		
Total	128 (30.5)	291 (69.5)		
Gender			16.857	0.001*
Male	51 (39.8)	179 (61.5)		
Female	77 (60.2)	112 (38.5)		
Age			29.361	0.001*
<25	45 (35.2)	170 (58.4)		
25-30	40 (31.3)	77 (26.5)		
>30	43 (33.5)	44 (15.1)		
Nationality			15.111	0.002**
Asia	83 (64.8)	139 (47.8)		
Africa	36 (28.1)	137 (47.1)		
Europe	5 (4.0)	9 (3.1)		
America	4 (3.1)	6 (2.0)		
Residence type			8.142	0.038**
One room	60 (46.9)	116 (39.8)		
Dormitory	39 (30.5)	123 (42.2)		
Apartment	24 (18.8)	49 (16.8)		
Villas	5 (3.9)	3 (1.0)		
Period of stay in Korea			5.067	0.164
≤2 year	45 (35.2)	127 (43.6)		
3-4 years	58 (45.3)	98 (33.7)		
5-6 years	21 (16.4)	55 (18.9)		
≥7 years	4 (3.1)	11 (3.8)		
Attending university			9.852	0.043*
Kyungpook National University	83 (64.8)	171 (58.8)		
Keimyung University	18 (14.1)	26 (8.9)		
Yeungnam University	14 (10.9)	46 (15.8)		
Daegu Catholic University	8 (6.3)	15 (5.2)		
Daegu University	5 (3.9)	33 (11.3)		
Education			23.600	0.001*
Bachelor's degree	22 (17.2)	92 (31.6)		
Master's degree	47 (36.7)	130 (44.7)		
Doctorate	50 (39.1)	62 (21.3)		
Post-doctorate	9 (7.0)	7 (2.4)		
Marital status			6.070	0.014
Single	92 (71.9)	240 (82.5)		
Married	36 (28.1)	51 (17.5)		
Topik level <sup>†</sup>			32.727	0.001**
Level 1	17 (13.3)	78 (26.8)		
Level 2	13 (10.2)	42 (14.4)		
Level 3	23 (17.9)	84 (28.9)		
Level 4	40 (31.3)	55 (18.9)		
Level 5	30 (23.4)	28 (9.6)		
Level 6	5 (3.9)	4 (1.4)		
Korean national health insurance			8.413	0.013**
Yes	123 (96.1)	254 (87.3)		
No	5 (3.9)	28 (9.6)		
Don't know	0 (0.0)	9 (3.1)		

\* $P < 0.05$  determined by Chi-square test, \*\* $P < 0.05$  determined and Fisher's exact test.

<sup>†</sup>Topik: Test of Proficiency in Korean.

**Table 3.** Utilization of dental services according to oral health-related behaviors

Variables	Dental services utilization		X <sup>2</sup>	P-value
	Yes n (%)	No n (%)		
Total	128 (30.5)	291 (69.5)		
Brushing frequency			46.191	0.001*
Once daily	34 (26.6)	116 (39.9)		
Twice daily	51 (39.8)	153 (52.6)		
More than twice daily	43 (33.6)	22 (7.5)		
Brushing duration			28.033	0.001**
<1 minute	3 (2.3)	33 (11.3)		
1 minute	26 (20.3)	101 (34.7)		
2 minutes	54 (42.2)	106 (36.5)		
>2 minutes	45 (35.2)	51 (17.5)		
Toothbrush changing time			3.827	0.281
1 month	28 (21.9)	51 (17.5)		
3 months	47 (36.7)	112 (38.5)		
6 months	26 (20.3)	80 (27.5)		
12 months	27 (21.1)	48 (16.5)		
Cleaning oral hygiene aids			88.941	0.001*
Yes	101 (78.9)	85 (29.2)		
No	27 (21.1)	206 (70.8)		
Cleaning oral hygiene aids used			17.955	0.001**
Mouthwash	32 (31.7)	51 (58.6)		
Dental floss	25 (24.8)	20 (23.1)		
Interdental brush	24 (23.8)	8 (9.2)		
Tongue cleaner	16 (15.7)	5 (5.7)		
Others	4 (4.0)	3 (3.4)		
Gum bleeding			36.292	0.037**
Yes	44 (34.4)	189 (64.9)		
No	80 (62.5)	91 (31.3)		
Don't know	4 (3.1)	11 (3.8)		
Frequency of gum bleeding <sup>†</sup>			6.590	0.042*
Once a week	22 (47.8)	103 (54.8)		
2-3 times a week	18 (39.1)	41 (21.8)		
Every time I brush	6 (13.1)	44 (23.4)		
Presence of hard deposit (Calculus)			11.873	0.003*
Yes	41 (32.0)	145 (49.8)		
No	76 (59.4)	123 (42.3)		
Don't know	11 (8.6)	23 (7.9)		
Experience of dental problem			13.125	0.001**
Yes	47 (36.7)	162 (55.7)		
No	80 (62.5)	126 (43.3)		
Don't know	1 (0.8)	3 (1.0)		
Type of experienced dental problem <sup>†</sup>			11.744	0.032*
Sensitive teeth to hot or cold	15 (29.4)	53 (32.9)		
Pain or toothache	14 (27.5)	17 (10.6)		
Tooth decay or cavity	9 (13.7)	50 (31.1)		
Gum problems	7 (13.7)	15 (9.3)		
Halitosis (bad smell)	4 (7.8)	22 (13.7)		
Mouth dryness	2 (3.9)	4 (2.5)		
Oral health status			7.104	0.000**
Very good	61 (47.7)	51 (17.5)		
Good	29 (22.6)	129 (44.3)		
Normal	28 (21.9)	97 (33.3)		
Poor	10 (7.8)	14 (1.8)		

\* $P < 0.05$  determined by Chi-square test, \*\* $P < 0.05$  determined by Fisher's exact test.<sup>†</sup>Yes to the utilization of dental services.

## 2. Questionnaire

A structured questionnaire was designed in both English and Korean language. A pilot study was conducted on 50 foreign students. The reliability of the questionnaire was approved by Cronbach Alpha Coefficient ( $\alpha=0.86$ ). The final questionnaire was made based on existing literature on barriers to the utilization of dental services and from discussions with international students<sup>13-15</sup>.

In the survey, the subjects were asked a series of questions about their demographics, oral hygiene behavior, dental service use, and barriers to dental service use.

To assess the use of dental services, two questions were asked: "Have you ever visited a dental clinic in Korea?" (1=Yes, 2=No, 3=I don't know); "if, yes what kind of treatment have you received?" (Routine check-up, root canal treatment/crown, scaling, implant, restorative treatment, gum treatment "others").

Questions for barriers to the utilization of dental services were classified into 5 categories. Responses were based on 5-point Likert Scales ranging from "strongly disagree (1)" to "strongly agree (5)" (Table 1). We combined agree and strongly agree into agree, and disagree and strongly disagree into disagree for analysis<sup>16</sup>.

## 3. Statistical analysis

Data were analyzed using IBM SPSS Statistics for Windows Software, version 25 (IBM Corp., Armonk, NY, USA). The association between participants' demographic characteristics, oral health-related behaviors, and perceived barriers to the utilization of dental services were performed using a Chi-square test or Fisher's exact test. Multivariate logistic regression was used to analyze factors affecting the utilization of dental services. The level of significance was defined as  $P<0.05$ .

## Results

### 1. Characteristics of participants according to the utilization of dental services

Table 2 summarizes the utilization of dental services according to demographic characteristics. Utilization of dental services was significantly associated with gender, age, nationality, residence type, attending university, education, marital status, topik level, and having Korean national health insurance ( $P<0.05$ ). Furthermore, the proportion of those who visited the dentist was lower for male participants. 61.5% of males and 38.4% of females answered that they had not visited a dental clinic in Korea ( $P<0.05$ ). In addition, foreign students from Asia were more likely to use dental services compared to others from Africa, Europe, and America, 64.8%, 28.1%, 4.0%, and 3.1%, respec-

**Table 4.** Perceived barriers and utilization of dental services (n=419)

Variables	Yes n (%)	No n (%)	X <sup>2</sup>	P-value
Total	128 (30.5)	291 (69.5)		
Language barrier			27.079	0.000*
Agree	38 (29.7)	133 (45.5)		
Neutral	20 (15.6)	76 (26.1)		
Disagree	70 (54.7)	82 (28.2)		
Lack of time			3.263	0.196
Agree	26 (20.3)	48 (16.5)		
Neutral	20 (26.6)	67 (23.0)		
Disagree	82 (64.1)	176 (60.2)		
Dental fear and anxiety			0.252	0.882
Agree	29 (22.7)	68 (23.4)		
Neutral	25 (19.5)	62 (21.3)		
Disagree	74 (57.8)	161 (55.3)		
Financial problem			28.429	0.000*
Agree	32 (25.0)	138 (47.4)		
Neutral	23 (18.0)	65 (22.3)		
Disagree	75 (17.4)	88 (30.2)		
Lack of knowledge and interest in oral health			52.531	0.000*
Agree	26 (20.3)	141 (48.5)		
Neutral	16 (12.5)	64 (22.0)		
Disagree	86 (67.2)	86 (29.6)		

\* $P<0.05$  determined by Chi-square test.

tively ( $P<0.05$ ). However, no statistically significant associations were observed between period of stay and utilization of dental services ( $P>0.05$ ).

## 2. Relationship between oral health-related behaviors and utilization of dental services among foreign university students

69.5% of study participants had never visited a dental clinic during their stay in Korea. There was a significant association between brushing frequency, brushing duration, use of oral hygiene cleaning aids, presence of gum bleeding, hard deposit, experiencing dental problem, type of experienced dental problem and oral health status topic level with dental services utilization ( $P<0.05$ ). Among those who visited a dental clinic, 34.4% and 32.2% had gum bleeding during brushing and hard deposit, respectively. They were significantly lower than those (64.9% and 49.8%) who didn't visit dental clinics. This indicates that participants who visited a dental clinic regularly have a lower prevalence of bleeding gums and hard deposits ( $P<0.05$ ) (Table 3).

## 3. Perceived barriers and utilization of dental services among international students

Based on analysis of the responses of the subjects on the Likert scale, participants who agreed to language barrier, financial problem, and lack of knowledge and interest in oral health, many did not use dental services (45.5%, 47.4%, and 48.5%) respectively, ( $P<0.05$ , Table 4).

## 4. Regression analysis of barriers associated with the utilization of dental services

Table 5 shows results from the regression analyses with dental services utilization as the dependent variable. The predictor variables included in the regression analysis accounted for 20.3% of the variance. Financial problem, lack of knowledge and interest in oral health were negatively associated with the use of dental services. Participants agreed on financial problem and lack of knowledge and interest in oral health were less likely to use dental services ( $P<0.05$ ).

## Discussion

Although Regular dental care is associated with improvement in overall health and well-being, international students hesitate to seek dental care and often delay dental treatment

**Table 5.** Regression analysis of barriers associated with the utilization of dental services

Variables	B	Std. Error	Wald statistic	P-value	Odds ratio	95% CI	
Intercept	0.324	0.210	2.369	0.124			
Language barrier							
Agree	0.016	0.386	0.002	0.968	1.016	0.477	2.165
Neutral	-0.135	0.422	0.102	0.749	0.874	0.382	1.998
Disagree	0		-		-	-	-
Lack of time							
Agree	0.334	0.527	0.402	0.526	1.397	0.497	3.924
Neutral	-0.289	0.345	0.699	0.403	0.749	0.381	1.474
Disagree	0		-		-	-	-
Dental fear and anxiety							
Agree	0.004	0.480	0.000	0.993	1.004	0.392	2.572
Neutral	0.334	0.344	0.944	0.331	1.397	0.712	2.741
Disagree	0		-		-	-	-
Financial problem							
Agree	-1.114	0.481	5.349	0.021*	0.328	0.128	0.844
Neutral	-0.554	0.307	3.265	0.071	0.574	0.315	1.048
Disagree	0		-		-	-	-
Lack of knowledge and interest in oral health							
Agree	-1.318	0.452	8.519	0.004*	0.268	0.110	0.649
Neutral	-1.500	0.373	16.154	<0.001*	0.223	0.107	0.464
Disagree	0		-		-	-	-
R <sup>2</sup> =0.203							

\* $P<0.05$  by logistic regression analysis.

B: regression coefficient, Std, Error: standard error, Odds ratio: Exp (B), CI: confidence interval.



when they need it due to the various difficulties they face in their host country. This study aimed at investigating barriers to the utilization of dental services among foreign students in a metropolitan of Korea.

The present study reported that 69.5% of study participants have not visited a dental clinic during their stay in Korea, and this indicates low utilization of dental services among foreign students in Korea, with was found to be similar to the existing studies<sup>7-9</sup>.

Our results demonstrated female students were more likely to use dental services compared to male students ( $P<0.001$ ). This result agrees with a cross-sectional study done on health-care services utilization among international students in Ankara<sup>17</sup>. Based on our results, females are more concerned about their appearance with positive dental health attitudes and behaviors<sup>18</sup>. The young group was less likely to use dental services in comparison to the older group, which is contrary to a study done by Kakatkar et al.<sup>13</sup>, and this can be explained by the fact that half of study participants were below 25 years old. With regard to nationality, about 64.8% of participants who accessed dental clinics during their stay in Korea were from Asia. This might be the result of high participation of students from Asia, as the large number of foreign students enrolled in Korean universities are mainly from nearby countries of the Asian region<sup>6</sup>.

In Korea, a study done on foreign workers showed that about 44% did not receive dental treatment even when they were in pain<sup>10</sup>, similarly to this study 55.7% did use dental service even when they were experiencing dental problems, and tooth sensitivity to hot and cold (32.9%), and tooth decay was (31.1%) the most problem experienced. This may be due to low utilization of dental services which means that international students suffer from dental diseases but fail to comply with regular use of dental services. Foreign students who visit the dentist regularly have a lower prevalence of bleeding gums ( $P=0.037$ ) and hard deposits (Calculus) on their teeth ( $P=0.003$ ). This association has been also reported by Antunes et al.<sup>19</sup>.

A study done on Chinese students emphasized the need for a translated version of the guidebook, the availability of medical professional interpreters, the availability of a university-level oral health service center, and practical oral health education to enhance oral health among foreign students<sup>8</sup>. By chi-square analysis, language barrier, financial problem, lack of knowledge and interest in oral health were statically associated with the utilization of dental services ( $P<0.05$ ). Further analysis with logistic regression found that financial problem, lack of knowledge and interest in oral health were negatively associated with the utilization of dental services, and the model explanation power was

20.3% ( $P<0.05$ ). In contrast, this association was not found between dental fear and anxiety, and lack of time to dental service use.

With logistic regression analysis, our results confirm that participants who agreed to lack of knowledge and interest in oral health were less likely to use dental services. This agrees with the study done on foreign children in Korea, low utilization of dental services was associated with low dental knowledge and insufficient interest in oral health<sup>20</sup>. The present study shows that an increase in financial problems reduces the use of dental services, similar to the study Studies done on the use of dental institutions among Chinese students and foreigners in Korea. This revealed that one of the main reasons why they did not use dental services during their stay in Korea was financial burden<sup>8,21</sup>. Surprisingly, the present study found that language was not statistically associated with the utilization of dental services using logistic regression analysis. More than half of foreign students that participated in this study have topik level 3 or higher, meaning that they could easily speak and understand the basic Korean language.

Our results should be interpreted within the context of certain limitations. First of all, its findings do not apply to all internationals in Korea. The data used in this study was obtained from five universities located in Daegu city and nearby. Therefore, the generalization of this study would be limited. Despite these limitations, the findings of this study not only reveal several barriers faced by foreign students in Korea but also provide information on their oral health status and behaviors.

Participants in this study reflect the diversity of the study population, foreign students of various nationalities were enrolled in this study, and a relatively large sample of both females and males was recruited.

## Conclusions

The obstacles to the use of dental services by foreign students to be addressed in the oral health care delivery program include financial problem, lack of knowledge and interest in oral health. Therefore, in order to improve the general and oral health of foreign students residing in Korea, university-level oral health education programs, oral health care centers, and governmental support programs should be implemented.

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