

A survey of attitude about smoking, associated with periodontal disease and dental implants intended for new patients hoping dental implants

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Abstract

Objectives

The purpose of the current survey was to investigate the attitude of patients towards smoking and their knowledge of smoking as a risk factor for periodontal disease and dental implants.

Methods

The subjects were new 1,585 patients who visited the clinic of the Tokyo Medical and Dental University Hospital from January to December 2012 for an oral implant. The methodology included a questionnaire-survey about smoking status for the recognition of smoking as a risk factor for periodontal disease and dental implants and the Kano Test for Social Nicotine Dependence (KTSND) .

Results

The response number was 1,159 respondents (response rate, 73%) . Smoking was recognized as a risk factor for periodontal disease by 621 patients (59%) and as a risk factor for dental implants by 234 patients (23%) . The KTSND scores of the patients with knowledge of smoking as a risk factor for periodontal disease (621 patients, 59%) and for dental implants (234 patients, 23%) were significantly lower than those of the patients without knowledge of smoking as a risk factor for periodontal disease and for dental implants, respectively.

Discussion

The recognition of smoking as a risk factor for periodontal disease and dental implants had an influence on the smoking status and attitude.

Conclusion

In order to increase the recognition of smoking as a risk factor for periodontal disease and dental implants, the informed consent process and patient education must be improved.

Key words

Dental implant, periodontal disease, smoking, smoking cessation, Kano Test for Social Nicotine Dependence (KTSND)

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Introduction

Smoking is a risk factor for various diseases, including periodontal disease^{1,2)}. The oral tissue is most directly affected by smoking; carbon monoxide, a component of smoke, initially impedes blood flow and thereafter impedes immune function. Smoking affects dental implants as well as the natural teeth. Strietzel et al.³⁾ identified smoking as a risk factor for the survival rate of dental implants. However, no study has been conducted in which the patients' knowledge regarding smoking as a risk factor for periodontal disease and dental implants was surveyed.

The Kano Test for Social Nicotine Dependence (KTSND)⁴⁾ is composed of 10 questions that reflect 3 factors: the smoker's attempt to undervalue the harm caused by smoking, to overvalue the favorable effects of smoking, and to justify smoking as an acceptable cultural and social behavior. Higher KTSND score reflect an increased perception that the act of smoking is acceptable and justifiable, indicating a greater social dependence on nicotine. Smokers as well as non-smokers can answer the questions in the KTSND. It is in the order corresponding to current smokers, ex-smokers, and non-smokers^{4~9)}. The scores change according to various factors, such as smoking experience, occupation, and circumstance. However, no study has reported the use of this survey in patients confined to or visiting dental hospitals.

The purpose of the current survey is to investigate the attitude of patients towards smoking and their knowledge of smoking as a risk factor for periodontal disease and dental implants.

Materials and Methods

The study subjects were patients who visited the Tokyo Medical and Dental University Hospital for dental implants from January 2012 to December 2012.

The survey methods included administering questionnaires to patients (without writing down their names) and collecting and analyzing the data. The questionnaires included questions about sex, age,

smoking experience, knowledge of smoking as a risk factor for periodontal disease and dental implants, and the KTSND (Appendix).

The KTSND (version 2.1) consists of 10 questions with a choice of 4 responses: "Definitely Yes," "Probably Yes," "Probably No," and "Definitely No", which are scored as 3, 2, 1, and 0, respectively, except for Question 1, which is scored in reverse order. The individual scores for each question are added to give a total KTSND score that ranges from 0 to 30, with higher scores indicating a greater social dependence on nicotine. The desired KTSND score is ≤ 9 ^{10, 11)}.

The smoking rates between men and women were compared by using the Mann-Whitney test. The KTSND scores were compared between non-smokers, ex-smokers, and current smokers by using the Games-Howell test. The KTSND scores were compared between the subjects who answered "Definitely Yes", "Probably Yes", "Probably No", and "Definitely No" by using the Games-Howell test.

The statistical software package PASW Statistics version 18.0.0 (SPSS Inc. SPSS Japan) was used for all statistical analyses. The statistical level of significance was set at $p < 0.05$.

The survey was conducted in accordance with the guidelines of the ethics committee at Tokyo Medical and Dental University (accepted December 05 2011; accepted No. 733).

Results

1. Patient characteristics (Table 1)

The questionnaire was distributed to a total of 1,585 patients, and the collection number was 1,358 respondents (collection rate, 87%) and the response number was 1,159 respondents (response rate, 73%). The mean age was 54.1 years, and the men: women ratio was approximately 1: 2. The highest proportion of subjects was aged 60~69 (29%), followed by those aged 50~59 (27%), 40~49 (21%), 30~39 (10%), 70~79 (7%), 20~29 (4%), 80~89 (1%), and 10~19 (1%).

Overall, 144 patients (12%) were current smokers and 216 (19%) were ex-smokers. Among men,

Appendix The questionnaire that was distributed to the study subjects

A survey of attitudes associated with smoking, periodontal disease, and dental implants

Please circle the reply that best reflects your opinion.

Sex : Male or Female Age: _____

1) Are you a smoker?

A. Current smoker B. Ex-smoker C. Non-smoker

2) Do you think smoking is a risk factor of periodontal disease?

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

3) Do you think smoking is a risk factor of dental implants?

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 1: Smoking itself is a disease

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 2: Smoking is a part of culture

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 3: Tobacco is one of life's pleasures

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 4: Smokers' lifestyles may be respected

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 5: Smoking sometimes enriches people's lives

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 6: Tobacco has positive physical or mental effects

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 7: Tobacco has effects to relieve stress

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 8: Tobacco enhances the function of smokers' brains

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 9: Doctors exaggerate the ill effects of smoking

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

Q 10: People can smoke at places where ashtrays are available

1. Definitely Yes 2. Probably Yes 3. Probably No 4. Definitely No

End of all questions. Thank you for your cooperation.

Please submit it to the collection box.

Table 1 Patient characteristics

	Total	Men	Women
All subjects	1,585	636	949
Collection number (%)	1,358 (87)	532 (84)	826 (87)
Response number (%)	1,159 (73)	414 (65)	745 (79)
Mean age \pm SD	54.1 \pm 15.6	53.4 \pm 15.7	54.4 \pm 15.6
Age group (year, %)			
10-19	7 (1)	2 (1)	5 (1)
20-29	48 (4)	23 (6)	25 (3)
30-39	119 (10)	55 (13)	64 (9)
40-49	239 (21)	84 (20)	155 (20)
50-59	326 (27)	112 (27)	214 (29)
60-69	334 (29)	110 (26)	224 (30)
70-79	76 (7)	21 (5)	55 (7)
80-89	10 (1)	7 (2)	3 (1)
Smoking status			
Current smoker (%)	144 (12)	85 (21)*	59 (8)*
Ex-smoker (%)	216 (19)	138 (33)	78 (10)
Non-smoker (%)	799 (69)	191 (46)	608 (82)
Age groups of current smokers (%)			
10-19	1 (14)	0 (0)	1 (20)
20-29	9 (19)	6 (26)	3 (12)
30-39	26 (22)	16 (29)	10 (16)
40-49	40 (17)	19 (23)	21 (14)
50-59	44 (13)	30 (27)	14 (7)
60-69	23 (7)	16 (14)	7 (3)
70-79	2 (3)	0 (0)	2 (4)
80-89	1 (10)	1 (14)	0 (0)

* : The current smoking rate of males was significantly higher than was that of females ($P < 0.05$).

85 patients (21%) were current smokers and 138 (33%) were ex-smokers. Among women, 59 patients (8%) were current smokers and 78 (10%) were ex-smokers. The current smoking rate among men was significantly higher than that among women. The highest proportion of current smokers was aged 30~39 (22%), followed by those aged 20~29 (19%), 40~49 (17%), 10~19 (14%), 50~59 (13%), 80~89 (10%), 60~69 (7%), and 70~79 (3%).

2. KTSND scores (Table 2)

The mean KTSND scores of the current smokers, ex-smokers, and non-smokers were 17.7 ± 5.2 , 15.6 ± 6.5 , and 14.3 ± 7.0 , respectively. The KTSND score of the current smokers was significantly higher than those of the ex-smokers and non-smokers. The KTSND score of the ex-smokers was significantly

higher than that of the non-smokers. For questions 1, 4, 9, and 10, the KTSND scores of the current smokers were significantly higher than those of the non-smokers; further, for questions 4 and 9, the KTSND scores of the current smokers were significantly higher than those of the ex-smokers.

3. Knowledge of smoking as a risk factor for periodontal disease and dental implants (Table 3)

Regarding periodontal disease, 621 patients (59%) replied "Definitely Yes", who had the knowledge of smoking as a risk factor for periodontal disease. Out of these, 65 were current smokers (23%), 146 were ex-smokers (68%), and 410 were non-smokers (60%). For dental implants, out of all of the respondents, 234 patients (23%) replied "Definitely Yes." Out of these, 34 patients were current

Table 2 The Kano Test for Social Nicotine Dependence (KTSND) scores according to smoking status

	Current smokers	Ex-smokers	Non-smokers
	Mean \pm SD	Mean \pm SD	Mean \pm SD
Q 1: Smoking itself is a disease	1.19 \pm 0.09* ¹	1.05 \pm 0.96	0.93 \pm 0.95* ¹
Q 2: Smoking is a part of culture	1.23 \pm 0.98	1.42 \pm 1.11	1.11 \pm 0.99
Q 3: Tobacco is one of life's pleasures	2.02 \pm 0.94	2.06 \pm 1.07	1.81 \pm 1.11
Q 4: Smokers' lifestyles may be respected	1.60 \pm 0.89* ^{1, 2}	1.20 \pm 0.97* ²	1.02 \pm 0.93* ¹
Q 5: Smoking sometimes enriches people's lives	1.34 \pm 0.81	1.30 \pm 0.99	1.14 \pm 0.96
Q 6: Tobacco has positive physical or mental effects	1.24 \pm 0.84	1.05 \pm 0.91	1.00 \pm 0.95
Q 7: Tobacco has effects to relieve stress	1.83 \pm 0.73	1.67 \pm 0.93	1.43 \pm 0.97
Q 8: Tobacco enhances the function of smokers' brains	1.01 \pm 0.84	0.76 \pm 0.79	0.81 \pm 0.84
Q 9: Doctors exaggerate the ill effects of smoking	1.13 \pm 0.90* ^{1, 2}	0.62 \pm 0.81* ²	0.63 \pm 0.84* ^{1, 2}
Q 10: People can smoke at places where ashtrays are available	2.29 \pm 0.88* ¹	2.03 \pm 1.08	1.93 \pm 1.06* ¹
Total KTSND score	17.7 \pm 5.2* ^{3, 4}	15.6 \pm 6.5* ^{4, 5}	14.3 \pm 7.0* ^{3, 5}

*¹: The KTSND score of current smokers was significantly higher than was that of non-smokers ($P < 0.05$).

*²: The KTSND score of current smokers was significantly higher than was that of ex-smokers ($P < 0.05$).

*³: The total KTSND score of current smokers was significantly higher than was that of non-smokers ($P < 0.05$).

*⁴: The total KTSND score of current smokers was significantly higher than was that of ex-smokers ($P < 0.05$).

*⁵: The total KTSND score of ex-smokers was significantly higher than was that of non-smokers ($P < 0.05$).

Table 3 The KTSND scores according to knowledge of smoking as a risk factor for periodontal disease and dental implants

Answer	Knowledge of smoking related to periodontal disease			
	Definitely Yes	Probably Yes	Probably No	Definitely No
Current smokers (%)	65 (45)	57 (39)	16 (11)	6 (5)
Ex-smokers (%)	146 (68)	45 (20)	20 (9)	3 (2)
Non-smokers (%)	410 (60)	178 (26)	75 (11)	21 (3)
Total (%)	621 (59)	282 (27)	113 (11)	31 (3)
KTSND	13.3 \pm 7.0* ^{1, 2, 3}	17.5 \pm 5.6* ¹	16.7 \pm 5.6* ²	16.6 \pm 7.2* ³
Answer	Knowledge of smoking related to dental implants			
	Definitely Yes	Probably Yes	Probably No	Definitely No
Current smokers (%)	34 (23)	55 (28)	46 (32)	9 (6)
Ex-smokers (%)	83 (39)	61 (28)	68 (32)	2 (1)
Non-smokers (%)	118 (17)	202 (30)	342 (50)	23 (5)
Total (%)	234 (23)	318 (31)	456 (44)	34 (3)
KTSND	13.6 \pm 7.3* ^{4, 5, 6}	16.5 \pm 6.2* ⁴	17.7 \pm 6.7* ⁵	17.4 \pm 6.4* ⁶

*¹: The KTSND score of "Definitely Yes" was significantly lower than was that of "Probably Yes" ($P < 0.05$).

*²: The KTSND score of "Definitely Yes" was significantly lower than was that of "Probably No" ($P < 0.05$).

*³: The KTSND score of "Definitely Yes" was significantly lower than was that of "Definitely No" ($P < 0.05$).

*⁴: The KTSND score of "Definitely Yes" was significantly lower than was that of "Probably Yes" ($P < 0.05$).

*⁵: The KTSND score of "Definitely Yes" was significantly lower than was that of "Probably No" ($P < 0.05$).

*⁶: The KTSND score of "Definitely Yes" was significantly lower than was that of "Definitely No" ($P < 0.05$).

smokers (23%), 83 were ex-smokers (39%), and 118 were non-smokers (17%).

The mean KTSND score of the subjects answering “Definitely Yes” regarding knowledge of smoking as a risk factor for periodontal disease was 13.3 ± 7.0 , that of “Probably Yes” was 17.5 ± 5.6 , that of “Probably No” was 16.7 ± 5.6 , and that of “Definitely No” was 16.6 ± 7.2 . The KTSND score of the group who answered “Definitely Yes” was significantly lower than those of the other groups. Moreover, the mean KTSND score of subjects answering “Definitely Yes” regarding knowledge of smoking as a risk factor for dental implants was 13.6 ± 7.3 , that of “Probably Yes” was 16.5 ± 6.2 , that of “Probably No” was 17.7 ± 6.7 , and that of “Definitely No” was 17.4 ± 6.4 . The KTSND score of the group who answered “Definitely Yes” was significantly lower than those of the other groups.

4. Relationship between the KTSND scores and the knowledge of smoking as a risk factor for periodontal disease and dental implants (Table 4)

Smoking was not regarded as a risk factor for either periodontal disease or dental implants by 540 patients (47%) because they did not answer “Definitely Yes” to either question; these subjects are hereinafter referred to as the NN group. The KTSND

score of these subjects was 17.3 ± 5.6 . Smoking was regarded as a risk factor for both periodontal disease and dental implants by 226 patients (19%) because they answered “Definitely Yes” for both questions; these subjects are hereinafter referred to as the YY group. The KTSND score of these subjects was 13.6 ± 7.3 . Further, 385 patients (33%) thought that smoking is a risk factor for periodontal disease because they answered “Definitely Yes” for questions regarding periodontal disease; these subjects are hereinafter referred to as the YN group. The KTSND score for these subjects was 13.2 ± 6.8 . Finally, 8 patients (1%) thought that smoking is a risk factor for dental implants because they answered “Definitely Yes” for questions regarding dental implants; these subjects are hereinafter referred to as the NY group. The KTSND score of these subjects was 13.4 ± 8.8 . The KTSND scores of the NN group were significantly higher than those of the YY and YN groups.

Discussion

The Health, Labor, and Welfare Ministry¹²⁾ reported that the percentage of current smokers was 20.1% in 2011, while the percentage in this study was 12%. Further, they reported that 37.3% of the men and 10.2% of the women in their 50s were current smokers, and 29.3% of the men and 6.4% of the women in their 60s were current smokers. In this

Table 4 Relationship between the KTSND scores and knowledge of smoking as a risk factor for periodontal disease and dental implants

Status	Subjects (%)	KTSND score
Patients who think smoking is not a risk factor for either periodontal disease or dental implants (NN)	540 (47)	$17.3 \pm 5.6^{*1,2}$
Patients who think smoking is a risk factor for both periodontal disease and dental implants (YY)	226 (19)	$13.6 \pm 7.3^{*1}$
Patients who think smoking is a risk factor for periodontal disease (YN)	385 (33)	$13.2 \pm 6.8^{*2}$
Patients who think smoking is a risk factor for dental implants (NY)	8 (1)	13.4 ± 8.8

*¹: The KTSND score of NN was significantly higher than was that of YY ($P < 0.05$).

*²: The KTSND score of NN was significantly higher than was that of YN ($P < 0.05$).

study, the rate of current smokers was 27% for men and 7% for women in their 50s, and 14% and 3%, respectively, for those in their 60s. Therefore, these results showed a trend similar to that of the Health, Labor, and Welfare Ministry. The reason for the low percentage of total current smokers in this study was presumably due to the men: women ratio of 1: 2. It was easier for women to visit our clinic than men, because our consultation time was from 0900 to 1600, and the smoking rate among women was lower than that among men. As a result, the smoking rate was low in this study.

Smoking is a risk factor for various diseases. Smoking was reported as a risk factor for periodontal disease by Heber et al.¹⁾ and Genco et al.²⁾, for the loss of periodontal tissue by Haffajee et al.¹³⁾, and for dental implants by Strietzel et al.³⁾ and Liddel et al.¹⁴⁾ In order to maintain oral health, all patients must have proper information and the rate of smoking should be 0%. In this study, 59% of patients had knowledge of smoking as a risk factor for periodontal disease, whereas 23% of patients had knowledge of smoking as a risk factor for dental implants (Table 3). Awareness of an increased risk for dental implants was very low compared to that of regarding periodontal disease. However, Lung et al.¹⁵⁾ reported that only 6% of their respondents were specifically aware of the link between smoking and periodontal disease. The patients who visited the university hospital were often referred by other general practices; thus, they had already received instructions regarding dental treatments, including smoking cessation. In recent years, dental implants have rapidly become popular in Japan. Imakita et al.¹⁶⁾ reported that the number of new patients who visited our clinic in 2012 was decupled the number of patients in 1996. Therefore, the difference in knowledge regarding dental implants between doctors and patients was very large, and almost all patients were unaware of the risk factor for dental implants. Doctors should provide information regarding dental implants, including the risk factor, before obtaining informed consent, and they must educate patients about the benefits of smoking cessation.

Yoshii et al.⁸⁾ reported that KTSND scores of 18.0 ± 5.0 , 12.2 ± 4.9 , and 12.2 ± 5.3 were obtained in current smokers, ex-smokers, and non-smokers, respectively. In this study, scores of 17.7 ± 5.2 , 15.6 ± 6.5 , and 14.3 ± 7.0 were obtained in current smokers, ex-smokers, and non-smokers, respectively (Table 2). The patients' mean age in this study was 54.1 ± 15.6 , and the patients in this age group would not have received sufficient education regarding smoking cessation as youths. Therefore, the KTSND scores in this study were relatively high. Recently, the Health, Labor, and Welfare Ministry¹²⁾ reported that 74% of the patients with periodontal disease were in their early 20s and 85% were in their early 60s. On the basis of these results, in 2004, the Japanese Society of Periodontology¹⁷⁾ named smoking cessation, which was positively related decrease periodontal diseases; therefore, the patients who visited the clinic should be recognized smoking as a risk factor for periodontal disease. Similarly, the Japanese Society of Oral Implantology¹⁸⁾ made a non-smoking declaration in 2010. Although differences exist in the awareness of smoking as a risk factor between periodontal disease and dental implants, almost all societies recommend smoking cessation. In this study, the KTSND scores of the subjects who answered "Definitely Yes" regarding knowledge of the association between smoking and periodontal disease (13.3 ± 7.0) and dental implants (13.6 ± 7.3) were lower compared to those of the other subjects (Table 3). Further, when viewed individually, the KTSND score of the NN group was higher than those of the other subjects (Table 4). Therefore, patient education regarding dental therapy potentially decreased the KTSND scores of these subjects. However, Yoshii et al.⁹⁾ reported that the desired KTSND score is ≤ 9 . In addition, the boundary value between normal and high KTSND scores was set as 10, based on the results of a survey administered to the attendees of a tobacco control meeting who were not socially dependent on nicotine¹⁰⁾. In this study, no group obtained a score ≤ 9 .

The KTSND questionnaire is comprised of 10 questions related to 3 factors: justifying smoking as

an acceptable cultural and social behavior, overvaluing the favorable effects of smoking, and undervaluing the harm caused by smoking⁴⁾. Questions 2, 3, 4, and 5 are related to the justification of smoking as an acceptable cultural and social behavior, while questions 6, 7, and 8 are related to overvaluing the favorable effects of smoking. Questions 1, 9, and 10 are related to undervaluing the harm of smoking. In this study, the KTSND scores of current smokers for Q1, 4, 9, and 10 were significantly higher than were those of non-smokers. Moreover, the KTSND scores of current smokers for Q4 and 9 were significantly higher than those of ex-smokers (Table 2). Therefore, this study suggests that current smokers tend to both glamorize smoking and underestimate the harm it causes.

The doctor and the patient must remind themselves of the fact that smoking is a risk factor for various diseases. Regarding periodontal disease, current smokers have dark gum color, less blood flow, stained teeth, and bad breath. Although patients can directly evaluate their oral health themselves, they cannot evaluate their lungs. It is important for current smokers to realize the result of smoking cessation every day. However, this study could not show the best instruction for dental patients. Further studies are necessary to investigate the optimal patient education and informed consent processes, including smoking cessation.

Conclusions

In this study, 59% of patients recognized smoking as a risk factor for periodontal disease, whereas 23% recognized smoking as a risk factor for dental implants. The KTSND score of the patients who recognized smoking as a risk factor for both periodontal disease and dental implants was significantly lower compared to those of the other subjects. However, none of the KTSND scores in this study reached the desired KTSND score. In order to increase the recognition of smoking as a risk factor for periodontal disease and dental implants, the informed consent process and patient education must be improved.

A part of this study was presented at the 10th Asia Pacific Conference on Tobacco or Health (August 2013, Tokyo).

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歯科インプラント科初診患者を対象とした歯周病と 歯科インプラントに関する喫煙の意識調査

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- 【目的】** 喫煙が歯周病と歯科インプラントの危険因子になることを認識しているかの患者意識調査である。
- 【方法】** 2012年1月から12月に東京医科歯科大学歯学部附属病院インプラント科に来院した初診患者1,585人を対象とし、質問紙票（喫煙状況、喫煙による歯周病と歯科インプラントへの影響の認識、社会的ニコチン依存度（Kano Test for Social Nicotine Dependence : KTSND））を用いて調査した。
- 【結果】** 有効回答数は1,159枚（73%）であった。KTSNDにおいて、喫煙が歯周病の危険因子になると認識していたもの（621人、59%）と、歯科インプラントの危険因子になると認識していたもの（234人、23%）の値が、認識していないものより有意に低かった。
- 【考察】** 歯周病と歯科インプラントの危険因子を認識することは、喫煙状況と意識に影響を与えることが示唆された。
- 【結論】** 喫煙が歯周病・歯科インプラントの危険因子になる認識をあげるためには、インフォームドコンセントと患者教育を充実させる必要がある。

キーワード： 歯科インプラント、歯周病、喫煙、禁煙、加濃式社会的ニコチン依存度質問票（KTSND）