Dose and The Time-Dependent Association of Smoking and Its Cessation With Risk of Peri-Implant Diseases A Retrospective Analysis

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Introduction

Objectives: To determine the association between tobacco and peri-implant diseases in a sample of patients who had received implant-supported restorations in a university dental clinic.

Materials and Methods: There were four hundred and fifty implants examined. Data pertaining to the individuals and the implant were assessed after a sample of patients was chosen from an electronic database. The development of smoking was thoroughly documented, including the amount of smoke smoked, the cumulative lifetime dose, the length of exposure, the intensity of the habit, and the decision to stop smoking. The main objective of the study was to determine the peri-implant status, which includes peri-implant mucositis (PM), peri-implantitis (PI), and health (H).

Results: 49 patients (47.9%) did not smoke, 42 patients (35.9%) had smoked in the past, and 19 patients (16.2%) were smokers currently. Thirty-nine subjects (33.4%) showed H, while 37 subjects (31.6%) and 41 subjects (35%) showed PM and PI.

Conclusions: Smoke intensity was associated with an increased risk of the development of peri-implantitis. Moreover, the risk of peri-implant diseases might be similar in those subjects who had stopped smoking for more than 21 years with respect to never-smokers.

Keywords: Tobacco, peri-implant diseases,

Introduction

With excellent survival and achievement stages, dental implants have emerged as a reliable therapy for the rehabilitation of patients who are partially or completely toothless; yet, with time, biological issues may arise. "Presence of reversible inflammatory modifications in the peri-implant mucosa without first ongoing marginal peri-implant bone loss" is the definition of peri-implant mucositis (PM), whereas "inflammation of the peri-implant soft tissue and progressive loss of supporting bone" is the definition of peri-implantitis (PI).[1]

In a systematic evaluation and meta-analysis, Derks and Tomasi (2015)[2] demonstrated a prevalence of 22% for PI and 43% for PM. Furthermore, a cross-sectional study carried out in Spain found that the prevalence of PI and

PM was 24% and 27%, respectively, at the individual stage. All of these findings, along with the unpredictable nature of PI therapy, appear to point to the critical relevance of peri-implant prevention of illness. solid proof suggests that individuals with a history of periodontitis, inadequate plaque control, and irregular post-implant treatment have a greater likelihood of developing periodontal disease (PI), according to the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Situations.

There is proof that tobacco use influences the makeup of the biofilm, the host reaction, the healing of wounds, and the efficacy of periodontal therapy. It also increases the risk of periodontal disease development and progression. Similarly, some research found that smokers had a 2.7–31 times increased chance of developing PI. Also, a 10-year prospective cohort research revealed that the frequency of peri-implant illnesses was 6% in non-smokers and 17.9% in smokers. According to Tsigarida et al. (2015)[3], smoking affects the peri-implant microbiome, which is defined as a pathogen-rich community that is lacking in commensals even in patients with clinically significant health conditions.

Consequently, the current study set out to ascertain if smoking was linked to peri-implant illnesses in a group of patients who had received implant-supported restorations in a university dentistry clinic. Consequently, the current study set out to ascertain if smoking was linked to peri-implant illnesses in a group of patients who had received implant-supported restorations in a clinic. The study also sought to look into factors related to patients and implants that are linked to peri-implant illnesses.

Materials and Methods

This study was planned as a retrospective cohort analysis of individuals who were managed at the Dental Institute, RIMS Ranchi, in the Department of Periodontology and Implantology, using restorations supported by implants. The Ethical Committee accepted the protocol, and the study was carried out in accordance with the 1975 Declaration of Helsinki (as amended in 2013). Every patient provided written informed permission before to their involvement in the trial. Peri-implant illnesses, the primary outcome variable, served as the basis for calculating the sample size. A total of 120 participants were needed, with 40 patients in each group, assuming a 5% alpha risk. Individuals who met the following eligibility criteria were chosen : (1) individuals who were over the age of eighteen; (2) those who were partially or completely edentulous and underwent rehabilitation with dental implants; (3) those who had a complete (fixed or removable), partial, or single tooth prosthesis; (4) those who had prosthetic rehabilitation that was cemented, screwed, or via machinery maintained; and (5) those who had sufficient passage for probing within dental implants. Additionally, individuals whose medical records were partial (i.e., when more than 10% of the data was missing or incomplete) were not included in the evaluation, nor were implantation implanted between 20013 and 2023.

This study selected a representative sample of participants with implant-supported restorations performed between 2013 and 2023 using stratified random sampling depending on the year of the implant's installation. Following that, once the required number of patients in each group was reached, one examiner called the patients to invite them to come for a clinical examination.

The group being studied was split into three groups in this case: participants with peri-implant mucositis (PM), patients with peri-implantitis (PI), and healthy patients (H).

After patient files were examined, the following details about the patients were noted: age, sex, kind of edentulism, related medical conditions, and supportive periodontal therapy (SPT). Participants were split into three groups: fully compliers (i.e., participants going to the suggested SPT intervals during the observation period), unpredictable compliers (i.e., patients attending the scheduled SPT intervals irregularly), and non-compliers (i.e., subjects not attending the SPT after the active periodontal therapy). The level of SPT was defined in relation to the obedience to continuing treatment. A document that was specifically created for the research project was used to record the variables being studied for the case report.

At implant level, the following clinical parameters were evaluated at six sites per implant:

- Modified plaque index (mPI)
- Modified bleeding index (mBI)
- Suppuration on probing (SUP), assessed dichotomously within 30s after probing (i.e., presence/absence of suppuration).
- Probing pocket depth (PPD), recorded from the mucosal margin to the bottom of the peri-implant pocket.
- Mucosal recession (MR), measured from the implant neck to the mucosal margin.

  Utilising a film holder and the long-cone paralleling technique, periapical x-rays were collected. Digitally acquired radiographs were loaded into a software application and adjusted based on the implant's known dimensions. Patient files provided the initial diagnosis of periodontal disease

Smoking habit

During the clinical assessment, data regarding smoking behaviour was gathered by one examiner. Three categories were used to categorise smoking status: never smoker (less than 100 cigarettes smoked in a lifetime), former smoker, and current smoker. Additionally, smokers were categorised as light (less than 10 cigarettes per day), moderate (between 11 and 19 cigarettes per day), or heavy (more than 20 cigarettes per day). Patients were questioned regarding their exposure to tobacco smoke in terms of intake (the number of cigarettes smoked daily), duration (the number of years they smoked), and age at which they began smoking. In addition, pack-years, or lifetime exposure, were computed. Patients who had previously smoked were asked how long it had been since they stopped. The Fagerström test for nicotine dependence (FTND), a six-item assessment with a total score ranging from 0 (no dependence) to 10, was completed by smokers.

Implants

What follows characteristics of implants were gathered from patient files: use of systemic antibiotics. prior to and/or right after the operation, bone augmentation, diameter, length, brand, function time, implant location, surface roughness, type of connection, and the order of placement of implants following tooth extraction.

While continuous data points were described using the mean and standard deviation (SD), categorical ones were presented utilising frequency values and percentages. The test Kolmogorov-Smirnov was employed to determine if the data was distributed normally.

Results

Given that 40 individuals were required in each group, 250 subjects (or about 20% of the total of 1324 patients) were chosen at random from the pool of patients. A total of 61.2% of them were willing or able to be examined, with 97 of them not being able to. The most frequent excuses for missing class were: general health (37%), geographic location (17%), lack of interest (40%), and miscellaneous (6%). Therefore, 153 patients were

assessed until the minimum number of patients needed for each group was found. In addition, four patients—three with PI and one from the H group—had incomplete medical data and were thus removed from the research.

Table 1: Description of studied patients ($n = 117$) and implants ($n = 450$)

Variable	Mean ± SD or n (%)	Health	PM	PI	p-Value
Patient-related variables	$n = 117$	$n = 39$	$n = 41$	$n = 37$	
Sex (men) (%)[a]	62 (53%)	22 (56.4%)	23 (56.1%)	17 (46%)	.024
Age (years)[b]	64.2 ± 11.6	62.7 ± 12.9	66.1 ± 11.2	63.6 ± 10.5	.399
Education Level (%)[a]					<.001
Low	45 (38.5%)	10 (25.6%)	20 (48.8%)	15 (40.5%)	
Medium	39 (33.3%)	14 (35.9%)	10 (24.4%)	15 (40.5%)	
High	33 (28.2%)	15 (38.5%)	11 (26.8%)	7 (18.9%)	
Systemic (%)[a]					
Healthy	37 (31.6%)	13 (33.3%)	14 (34.1%)	10 (27.0%)	.265
Cardiovascular disease	24 (20.5%)	7 (17.9%)	6 (14.6%)	11 (29.7%)	.052
Hypercholesterolemia	22 (18.8%)	4 (10.3%)	11 (26.8%)	7 (18.9%)	.061
Diabetes Mellitus	20 (17.1%)	2 (5.1%)	10 (24.4%)	8 (21.6%)	.034
Self-reported allergy to penicillin (%)[a]	8 (6.8%)	3 (7.7%)	1 (2.4%)	4 (10.8%)	.484
History of periodontitis (%)[a]	87 (74.4%)	23 (59.0%)	36 (87.8%)	28 (75.7%)	<.001
Periodontal status (%)[a]					<.001
Health	54 (46.2%)	26 (66.7%)	14 (34.1%)	14 (37.8%)	
Gingivitis	11 (9.4%)	3 (7.7%)	6 (14.6%)	2 (5.4%)	
Mild CP	20 (17.1%)	4 (10.3%)	10 (24.4%)	6 (16.2%)	
Moderate CP	21 (17.9%)	4 (10.3%)	8 (19.5%)	9 (24.3%)	
Severe CP	11 (9.4%)	2 (5.1%)	3 (7.3%)	6 (16.2%)	
Type of edentulism (partial) (%)[a]	107 (91.5%)	39 (100.0%)	37 (90.2%)	31 (83.8%)	<.001
Number of implants per patient [b]	4.6 ± 3.3	3.3 ± 2.8	5.3 ± 3.2	5.3 ± 3.4	.007
Full-mouth plaque score (<20%) (%)[a]	7 (6.0%)	0 (0%)	7 (17.1%)	0 (0%)	.032
SPT complier (%)[a]	47 (40.2%)	16 (41.0%)	14 (34.1%)	17 (46.0%)	<.001
Implant-related variables	$n = 450$	$n = 142$	$n = 230$	$n = 78$	
Width (mm)[b]	4.1 ± 0.5	4.1 ± 0.6	4.1 ± 0.5	4.1 ± 0.6	.581
Length (mm)[b]	11.1 ± 2.0	10.8 ± 2.3	11.2 ± 1.8	11.4 ± 2.1	.091
Function time (years)[b]	8.0 ± 1.9	7.45 ± 2.2	7.72 ± 1.8	8.55 ± 1.8	<.001

Jaw (maxilla) (%)[a]	260 (57.8%)	77 (54.2%)	137(59.6%)	46 (59%)	.582
Position (posterior) (%)[a]	336 (74.7%)	109 (76.8%)	167(72.6%)	60 (76.9%)	.590
Time of implant placement (delayed) (%)[a]	438 (97.3%)	140 (98.6%)	224(97.4%)	74 (94.9%)	.261
Use of antibiotics (%)[a]	447 (99.3%)	142(100.0%)	227(98.7%)	78(100.0%)	.236
Regeneration (yes) (%)[a]	110 (24.4%)	26 (18.3%)	67 (29.1%)	17 (21.8%)	.052
Surface roughness (%)[a]					<.001
Minimally rough	74 (17.0%)	8 (5.8%)	48 (21.4%)	18 (24.0%)	
Moderately rough	337 (77.3%)	128 (93.4%)	158 (70.5%)	51 (68.0%)	
Rough	25 (5.7%)	1 (0.7%)	18 (8.0%)	6 (8.0%)	
Type of prosthesis (%)[a]					.125
Single	91 (20.2%)	38 (26.8%)	41 (17.8%)	12 (15.4%)	
Partial	252 (56.0%)	77 (54.2%)	125 (54.4%)	50 (64.1%)	
Full arch	96 (21.3%)	23 (16.2%)	59 (25.7%)	14 (18.0%)	
Overdenture	11 (2.4%)	4 (2.8%)	5 (2.2%)	2 (2.6%)	
Type of connection (internal) (%)[a]	446 (99.1%)	142 (100.0%)	228 (99.1%)	76 (97.4%)	.153
Loading protocol (delayed) (%)[a]	438 (97.3%)	140 (98.6%)	224 (97.4%)	74 (94.9%)	.261
Type of retention (screwed) (%)[a]	387 (86.0%)	118 (83.1%)	198 (86.1%)	71 (91.0%)	.268
Access to interproximal hygiene (%)[a]					<.001
No accessibility	76 (16.9%)	15 (10.6%)	39 (17.0%)	22 (28.2%)	
Difficult	183 (40.7%)	33 (23.2%)	112 (48.7%)	38 (48.7%)	
Possible	191 (42.4%)	94 (66.2%)	79 (34.3%)	18 (23.1%)	

- *Note*: Bold numbers are statistically significant, *p*-value <.05.

- Abbreviations: CP, chronic periodontitis; PI, peri-implantitis; PM, peri-implant mucositis; SPT, supportive periodontal therapy.

- [a] Chi-square or Fisher's test.

- [b] ANOVA.

Table 2: Mean clinical and radiographic parameters at implant-level.

Variable	Mean ± SD n = 450	Health n = 142	PM n = 230	PI n = 78	p-Value
mPI	0.61 ± 0.57	0.25 ± 0.39	0.77 ± 0.57	0.79 ± 0.54	<.001
mBI	0.55 ± 0.64	0.00 ± 0.00	0.74 ± 0.57	1.01 ± 0.73	<.001
SUP	0.03 ± 0.14	0.00 ± 0.00	0.01 ± 0.09	0.11 ± 0.29	<.001
PPDm (mm)	3.50 ± 0.98	3.03 ± 0.48	3.48 ± 0.90	4.43 ± 1.20	<.001

PPDd (mm)	4.40 ± 1.05	3.53 ± 0.96	4.20 ± 0.98	5.31 ± 1.12	<.001
MR (mm)	0.20 ± 0.56	0.03 ± 0.13	0.22 ± 0.56	0.44 ± 0.87	<.001
KM (mm)	2.04 ± 1.42	2.17 ± 1.29	2.23 ± 1.48	1.72 ± 1.37	.018
BL (mm)	2.29 ± 1.10	0.24 ± 0.50	0.92 ± 0.91	4.40 ± 1.49	<.001

Table 3: Description of smoking-related variables

Smoking-related variables	Mean ± SD or n (%) n = 117	Health n = 39	PM n = 41	PI n = 37	p-Value
Smoking status (%)[a] (n = 117)					<.001
Never-smoker	56 (47.9%)	17 (43.6%)	24 (58.5%)	15 (40.5%)	
Former smoker	42 (35.9%)	16 (41.0%)	13 (31.7%)	13 (35.1%)	
Current smoker	19 (16.2%)	6 (15.4%)	4 (9.8%)	9 (24.3%)	
Age at initiation (years)[b] (n = 61)	18.6 ± 6.0	19.9 ± 6.8	18.8 ± 7.7	17.2 ± 2.7	.344
Smoking behaviour[a] (n = 19)					.536
Light smoker	6 (31.6%)	3 (50%)	2 (50%)	1 (11.1%)	
Moderate smoker	9 (47.4%)	3 (50%)	2 (50%)	4 (44.4%)	
Heavy smoker	4 (21%)	0 (0%)	0 (0%)	4 (44.4%)	
Duration of smoking (years)[b] (n = 61)	29.6 ± 14.1	20.2 ± 11.4	34.4 ± 12.6	35.4 ± 13.0	<.001
Number of cig/day (n = 61)	15.7 ± 11.2	16.0 ± 14.0	11.0 ± 5.9	18.9 ± 10.3	.087
Number of pack-years (n = 61)	26.1 ± 19.4	18.6 ± 17.7	23.3 ± 16.9	35.7 ± 19.6	.009
Smoke intensity (n = 117)					.035
Never-smoker	56 (47.9%)	17 (43.6%)	24 (58.5%)	15 (40.5%)	
≤23 pack-years	32 (27.3%)	14 (35.9%)	12 (29.3%)	6 (16.2%)	
>23 pack-years	29 (24.8%)	8 (20.5%)	5 (12.2%)	16 (43.2%)	
Type of tobacco (%)[a] (n = 19)					.061
Cigarettes	17 (89.5%)	6 (100%)	3 (75%)	8 (88.9%)	
Cigar	2 (10.5%)	0 (0%)	1 (25%)	1 (11.1%)	
Type of cigarettes (%)[a] (n = 17)					.038
Factory-made	14 (82.4%)	4 (66.7%)	3 (100%)	7 (87.5%)	
Hand-rolled	3 (17.6%)	2 (33.3%)	0 (0%)	1 (12.5%)	
Electronic	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Cigarette tar yield (%)[a] (n = 17)					.125
Regular	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Light	2 (11.8%)	0 (%)	0 (0%)	2 (25%)	
Ultralight	15 (88.2%)	6 (100%)	3 (100%)	6 (75%)	

Flavor (unflavored) (%)[a] (n = 17)	15 (88.2%)	5 (83.3%)	3 (100%)	7 (87.5%)	.048
Number of puffs per cigarette[b] (n = 17)	10.7 ± 3.8	12.8 ± 4.0	7.0 ± 2.4	10.9 ± 3.1	.046
FTND[b] (n = 19)	4 ± 1.0	4 ± 1.1	4 ± 1.0	4 ± 1.0	.852
Duration of smoking cessation (years)[b] (n = 42)	20.2 ± 12.6	26.7 ± 15.6	17.1 ± 6.6	15.2 ± 10.0	.025
Quitting attempt (yes) (%)[a] (n = 19)	16 (84.2%)	5 (83.3%)	3 (75%)	8 (88.9%)	.085
Number of quit attempts[b] (n = 19)	2.5 ± 4.4	1.5 ± 1.0	5.5 ± 9.7	1.8 ± 1.2	.315
Difficulty to quit smoking[a] (n = 19)					.075
Very easy	2 (10.5%)	0 (0%)	1 (25%)	1 (11.1%)	
Easy	1 (5.3%)	0 (0%)	1 (25%)	0 (0%)	
Difficult	10 (52.6%)	4 (66.7%)	2 (50%)	4 (44.4%)	
Very difficult	6 (31.6%)	2 (33.3%)	0 (0%)	4 (44.4%)	

Table 4: Random effects univariate and multinomial regression model comparing PM and PI versus peri-implant health.

Variable	Univariate OR (95% CI)			Multivariable OR (95% CI)		
	Group		*p*-Value	Group		*p*-Value
	PM	PI		PM	PI	
Patient-related variables						
Age	1.1 (0.98–1.3)	1.12 (0.96–1.06)	.399			
Sex (man)	1.05 (0.43–2.55)	0.63 (0.25–1.54)	.455			
Educational level			.120			
Low (ref)	1	1				
Medium vs. ref	0.33 (0.10–1.10)	0.68 (0.24–1.99)				
High vs. ref	0.34 (0.10–1.15)	0.38 (0.05–0.99)				
History of periodontitis	1.35 (0.36–3.90)	2.29 (0.40–8.51)	.489			
Periodontal status			.205			
Periodontal health (ref)	1	1				
Mild CP vs. ref	15.00 (1.34–167.64)	9.00 (0.76–108.00)				
Moderate CP vs. ref	12.00 (1.05–136.79)	13.50 (1.20–172.21)				
Severe CP vs. ref	9.00 (0.42–152.36)	17.00 (1.27–285.70)				
SPT	0.77 (0.31–1.92)	1.16 (0.47–2.87)	.587			

Number of implants	1.28 (1.06–1.56)*	1.27 (1.08–1.55)*	.010	1.29 (1.07–1.57)*	1.38 (1.17–1.57)*	.016
Smoking-related variables						
Smoking status			.436			
Never-smoker (ref)	1	1				
Smoker vs. ref	0.50 (0.12–2.10)	1.60 (0.48–6.50)				
Former smoker vs. ref	0.62 (0.23–1.77)	0.87 (0.32–2.85)				
Pack-years	1.02 (0.99–1.11)	1.16 (1.01–1.28)*	.032			
Duration of smoking	1.15 (1.02–1.27)*	1.10 (1.04–1.67)	.004			
Smoke intensity			.030			.002
Never-smoker (ref)	1	1				
Yes (≤23 pack-years) vs. never-smoker	0.65 (0.24–1.95)	0.42 (0.21–1.50)		0.56 (0.19–1.69)	0.34 (0.05–1.62)	
Yes (>23 pack-years) vs. never-smoker	0.46 (0.13–1.66)	2.26 (1.77–6.68)*		0.25 (0.05–1.27)	3.40 (0.91–17.30)*	
Duration of smoking cessation	1.10 (0.98–1.22)	1.09 (0.95–1.28)	.060			
Implant-related variables						
Width	1.15 (0.61–2.45)	1.17 (0.72–3.00)	.856			
Length	1.08 (0.98–1.52)	1.14 (1.00–1.78)*	.040			
Jaw (mandible)	0.95 (0.44–1.69)	0.98 (0.48–1.50)	.721			
Position (posterior)	0.70 (0.36–1.44)	0.81 (0.44–1.88)	.288			
Regeneration (yes)	4.15 (2.14–15.12)*	3.47 (1.56–10.25)*	<.001	2.22 (1.30–5.29)*	1.73 (0.80–3.75)	.016
Buccal KM	0.95 (0.83–1.20)	0.76 (0.50–0.99)*	.040	0.90 (0.78–1.55)	0.78 (0.65–0.99)*	.032
Surface roughness (moderately rough)	0.35 (0.08–0.83)*	0.32 (0.09–0.85)*	.001	0.28 (0.10–0.74)*	0.29 (0.11–0.80)*	.020
Type of prosthesis			<.001			.090
Single (ref)	1	1				
Partial vs. single	2.01 (1.15–4.25)*	3.15 (1.98–7.58)*		1.18 (0.62–3.15)	1.23 (0.98–3.00)	
Complete vs. single	2.59 (1.14–5.87)*	6.25 (2.45–14.25)*		1.67 (0.98–	1.18 (0.90–	

				4.85)	4.21)	
Type of retention (cemented)	0.41 (0.17–1.10)	0.33 (0.22–0.75)*	.035			
Access to interproximal hygiene			<.001			<.001
No accessibility (ref)	1	1				
Limited vs.ref	5.25 (1.62–11.85)*	2.25 (1.00–7.58)*		1.90 (0.88–4.08)	1.26 (0.53–3.00)	
Possible vs. ref	0.56 (0.23–1.15)	0.21 (0.10–0.45)*		0.45 (0.21–0.94)*	0.19 (0.07–0.46)*	
Function time	1.10 (0.78–1.24)	1.22 (1.01–1.59)*	.03	1.01 (0.88–1.50)	1.11 (1.01–1.55)*	.048

- * Statistically significant, *p*-value <.05.
- *Note*: Bold numbers are statistically significant, *p*-value <.05.
- Abbreviations: CP, chronic periodontitis; KM, keratinized mucosa; OR, odds ratio; SPT, supportive periodontal therapy.

Discussion

In a small number of individuals who were given restorations supported by implants in a department the purpose of this retrospective investigation was to ascertain the relationship among tobacco use (i.e., smoking status, lifetime cumulative dose, duration of exposure, intensity of the habit, and smoking cessation) and peri-implant diseases. The investigation also sought to determine which traits of the patient and the implant were linked to peri-implant illnesses.

While assessments among those who smoke and never-smokers and former smokers and never-smokers were made, the findings of this study first demonstrated that smoking status (i.e., smoker, former smoker, or never-smoker) was not linked to an increased risk of developing peri-implant diseases (p =.436). Diverse data have been reported before in this context.

There have been studies on PI that have not discovered a connection among tobacco and PI. [4, 5, 6] Despite the fact that smoking has been linked to implant disappointment, it was not identified as to be an indicator for peri-implantitis in the 2017 World Workshop Consensus Report on Periodontal and Peri-implant Conditions (Schwarz et al., 2018).[7] The various criteria used to define a smoker (such as the amount of cigarettes smoked per day, which is a continuous variable, or whether there is a history of cigarette smoking, which is a categorical variable) could assist in clarifying some of these conflicting findings. It is noteworthy that most examinations did not report the minimum number of cigarettes smoked per day in order to be classified as a smoker.

Furthermore, there is a dearth of information on the relationship between smoking amount and peri-implant disorders, including late implant failure. In this regard, Lindquist et al. (1997)[8] found that individuals who stated they smoked more than 14 cigarettes per day had significantly greater bone resorption than non-smokers and those who reported smoking fewer than 14 cigarettes per day in a 10-year follow-up analysis. According to

Naseri et al. (2020), a systematic review and meta-analysis revealed that those who smoked more than ten cigarettes per day had a statistically significant increased chance of implant failure.[9] These results thus indicated that an increase in daily cigarette smoking is associated with a higher likelihood of peri-implant bone loss and, consequently, failure of the implants.

Conclusion

It can be determined that: (a) the degree of smoke is linked to a higher risk of peri-implantitis; (b) subjects who had stopped smoking for more than 21 years may have a similar risk of peri-implant diseases compared to those who had never smoked; and (c) particular factors concerning patients and implants, such as the mean number of implants per patient, guided bone regeneration, rough surface, access to interproximal hygiene, and buccal KM dimensions, are linked to peri-implant diseases.

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