Prevalence and extent of chronic periodontitis and its risk factors in a Portuguese subpopulation: a retrospective cross-sectional study and analysis of Clinical Attachment Loss

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Objectives:To assess the prevalence and extent of chronic periodontitis, and its risk factors in a Portuguese subpopulation referred to periodontal examination.

Methods:This retrospective cross-sectional study used a subset of data from patients who sought dental treatment in a university dental clinic in the Lisbon metropolitan area. The sample consisted of 405 individuals (225 females/180 males), aged 20-90 years. All patients underwent a full-mouth periodontal examination and chronic periodontitis was defined as Clinical Attachment Loss (CAL)≥ 3mm affecting two or more teeth. Aggressive periodontitis cases were excluded from the analysis.

Results:Prevalence of chronic periodontitis was 83.5% (95% CI 80.4-86.6%). For these subjects, CAL ≥ 3 mm affected 86.0% (95% CI 84.7-87.2) of sites and 83.7% (95% CI 81.7-85.6) of teeth, respectively. Mean CAL ranged from 3.6 to 4.3 mm, according to age. In the multivariate logistic regression model, smoking (OR=3.55, 95% CI 1.80-7.02) and older age (OR=8.70, 95% CI 3.66-20.69 and OR=4.85, 95% CI 2.57-9.16), for 65+ and 45-64 years old, respectively, were identified as risk indicators for CAL ≥ 3mm.

Conclusions: This particular Portuguese adult subpopulation a had high prevalence of chronic periodontitis, with severe and generalized clinical attachment loss, and its presence was significantly associated with age and smoking. This data should serve to prepare future detailed epidemiological studies and appropriate public health programs.

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25 **Abstract**

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39   respectively, were identified as risk indicators for CAL ≥ 3 mm.

40   **Conclusions**: This particular Portuguese adult subpopulation a had high prevalence of chronic

41   periodontitis, with severe and generalized clinical attachment loss, and its presence was

42   significantly associated with age and smoking. This data should serve to prepare future detailed

43   epidemiological studies and appropriate public health programs.

44

45

46   **INTRODUCTION**

47   Chronic periodontitis is an inflammatory disease characterized by a polymicrobial breakdown of

48   host homeostasis and a progressive destruction of tooth-supporting structures,[1,2] and its

49   epidemiology and risk factors have been broadly studied.[3–6]

50   Periodontal diseases have a significant impact on oral health-related quality of life, especially

51   with the worsening and extension of the disease in which it presents higher destructive

52   consequences.[7] There are important risk factors/indicators for periodontal disease such as

53   alcohol,[8] overweight and obesity,[9] smoking[6] and diabetes.[10] Also, periodontitis can be a risk

54   factor for several systemic diseases.[10–18]

55   Some European epidemiological studies have demonstrated the high prevalence of periodontitis

56   among the populations.[19–23] However, data on the prevalence and risk factors for periodontal

57   disease in the Portuguese population are still missing. According to the latest Portuguese Oral

58   National Health Survey, the prevalence of periodontitis was 10.8% in adults and 15.3% in the

59   elderly.[24] This nationwide survey used the Community Periodontal Index (CPI), with its

60 recognized limitations. To the best of our knowledge, there are no epidemiological studies that
61 used full-mouth periodontal examination (FMEP) methodology to estimate the prevalence of
62 periodontitis regarding Portuguese samples.

63 The aim of this study was to assess the prevalence, severity, and extent of chronic periodontitis
64 through the full-mouth examination of CAL, and its association with sociodemographic,
65 behavioral and environmental risk factors, in a Portuguese adult subpopulation, of a suburban
66 area of the Lisbon Region, forwarded to periodontal examination.

67

68

69 **MATERIAL AND METHODS**

70 The study was conducted in accordance with the Declaration of Helsinki of 1975, as revised in
71 2013, and approved by the Ethics Committee of Egas Moniz (Ethical Application Ref: 595). A
72 written informed consent was obtained from all participants during the first appointment. After
73 the examination, the participants were informed of their periodontal status, and those with
74 diagnosed periodontal diseases were advised to follow the proper treatment. This protocol
75 followed the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE)
76 guidelines.[25]

77

78 ***Study subjects***

79 All participants were patients of Egas Moniz Dental Clinic (Almada, Portugal). This university
80 clinic, located in the municipality of Almada, in Setúbal Peninsula (a NUTS III subregion, part
81 of NUTS II Lisbon Region), provides dental health services to the general public.

82 At the first appointment, patients were submitted to a dental triage protocol, with the application
83 of a self-reported health questionnaire and oral and dental examinations, to guide their treatment
84 needs. Regarding periodontal triage, patients were assessed using the Periodontal Screening and
85 Recording (PSR) procedure [26], and, if diagnosed with code 2 or higher, they were forwarded to a
86 periodontology appointment.

87

88 ***Patient selection***

89 This retrospective cross-sectional study analyzed patients who attended the dental clinic between

90 September 2015 and March 2017. From a total of 3648 subjects who sought the first consultation

91 in the university dental clinic during that period, 1501 (41%) patients were referred to the

92 periodontology department, based on their triage status. From these, 459 attended a periodontal

93 consultation and were considered for this study. Fifty-two participants were excluded due to

94 incomplete questionnaires and periodontal data, and two subjects diagnosed with aggressive

95 periodontitis. Hence, a final sample size of 405 subjects was obtained (11% of the total, 27% of

96 the patients forwarded for periodontal treatment).

97

98 ***Health questionnaire***

99 Before clinical examinations, all patients answered a general and oral health questionnaire that

100 included information such as age, gender, educational level, employment status, general medical

101 history and medication, smoking status and oral hygiene habits.

102

103 ***Clinical data***

104 ***Periodontal status***

105 Five well-trained and calibrated periodontists (R.A., J.C., C.I., F.J., L.A.) performed all dental

106 and periodontal examinations. Periodontal examinations were performed using CDC/AAP full-

107 mouth periodontal examination (FMEP) methodology.[27] We defined chronic periodontitis was

108 defined as CAL ≥ 3 mm affecting two or more teeth.[28] All permanent fully erupted teeth were

109 examined, excluding third molars, retained roots, and implants. The evaluated parameters were:

110 missing teeth, presence or absence of supragingival biofilm (SB), probing depth (PD), bleeding

111 on probing (BOP), gingival recession (REC) and clinical attachment loss (CAL). SB and BOP

112 were scored on four surfaces of each tooth (mesial, distal, buccal and lingual). At six sites per

113 tooth (mesiobuccal, mid-buccal, distobuccal, mesiolingual, mid-lingual and distolingual), PD

114 was measured as the distance from the cementoenamel junction (CEJ) to the bottom of the

115 pocket and REC as the distance from the CEJ to the free gingival margin, and this assessment

116 was assigned a negative sign if the gingival margin was located coronally to the CEJ. CAL was

117 calculated as the algebraic sum of PD and REC. It was used a CP-12 SE (Hu-Friedy, Chicago,
118 IL, USA).

119

120 *Measurement reproducibility*

121 Prior to the initiation of the study, all examiners were submitted to theoretical and practical
122 training in a total of ten volunteer non-study patients suffering from moderate to severe
123 periodontitis. The inter-examiner correlation coefficients, at subject level, ranged from 0.76 to
124 0.97 and between 0.91 and 0.99, for mean PD and mean CAL, respectively.

125

126 *Covariates*

127 Sociodemographic variables and several periodontal disease risk factors were selected as
128 confounding variables. The selected variables were: age, gender, educational level, employment
129 status, smoking status, Body Mass Index (BMI), time elapsed since the last dental appointment,
130 consultation motive and oral hygiene habits.

131 Educational level was assessed as three categories: elementary (1-4 years), middle (5-12 years)
132 and higher (> 12 years) education. Employment status of each participant was classified as:
133 employed, unemployed or retired. Smoking status was defined as non-smoker or smoker. Active
134 smokers were further divided into three categories: light smokers (< 10 cigarettes per day),
135 medium smokers (10-20), heavy smokers (> 20). The height of the participants was measured in
136 centimeters, using a hard ruler installed vertically and secured with a stable base. Weight was
137 assessed in kilograms using mechanical scales. BMI was calculated as the ratio of the
138 individual's' body weight to the square of their height. Four BMI categories were defined using
139 WHO criteria [29]: underweight (BMI < 18.5 kg/m2), normal weight (BMI 18.5 - 24.9 kg/m2),
140 overweight (BMI 25 - 29.9 kg/m2) and obese (BMI ≥ 30 kg/m2). The time elapsed since last
141 dental consult was classified into five categories (never visited, less than one year, 1-2 years, 3-4
142 years, 5 years or over). Consultation motives were classified as routine, aesthetics, pain,
143 functional or other. Oral hygiene habits were assessed by information on toothbrush frequency
144 (2-3 times / daily, one time daily, 2-6 times/weekly) and dental floss use.

145

146   *Data analysis*

147   Data analysis was performed using IBM SPSS Statistics version 24.0 for Windows (Armonk,
148   NY: IBM Corp.). Descriptive and inferential statistics methodologies were applied. In the latter,
149   Mann-Whitney and Kruskal-Wallis tests were used to compare the clinical data as a function of
150   the sociodemographic variables. Further, logistic regression analysis was used to model the
151   relationship between chronic periodontitis and several risk indicators. Preliminary analyses were
152   performed using univariate models. Next, a multivariate model was constructed for the outcome
153   variable CAL $\geq$ 3 mm. Only variables showing a significance p $\leq$ 0.25 in the univariate model
154   were included in the multivariate stepwise procedure. Predictor variables considered in this
155   procedure were: age (years), smoking status, education (years), employment status, last dental
156   visit and dental floss use. The contribution of each variable to the model was evaluated by Wald
157   statistics. Interactions were also analyzed for all tested variables. The final reduced model was
158   obtained with the following predictor variable categories: age (45-64 and $\geq$ 65 years) and
159   smoking status (smoker). Odds ratio (OR) and 95% confidence intervals (95% CI) were
160   calculated for both univariate and multivariate analyses. The level of statistical significance was
161   set at 5%.

162

163

164

165   **RESULTS**

166   Table 1 shows the distribution of sociodemographic, behavioral, biometric and oral hygiene data
167   in the studied sample. Ages ranged from 20 to 90 years. The sample had 55.6% of female
168   patients. It is worth to mention that 65.2% of subjects did not smoke and active smokers were
169   mainly medium smokers (66%), followed by light smokers (29%) and heavy smokers (5%).
170   Regarding education and employment status 77.1% of subjects had ~~an~~ elementary or middle
171   ~~level~~ education, and 51.9% of the subjects were employed. Approximately 59% were overweight
172   and obese, and only 40% had normal values. Interestingly, 53.1% had a period of over one year
173   without any dental visit and 1.2% never had a dental appointment, whereas functional complaint
174   was the major consultation motive.

175   Table 2 shows the periodontal data of this sample according to age, gender, and smoking status.

176   Subjects over 65 years of age had a significantly higher mean number of missing teeth and, in

177   total, this subpopulation presented a mean loss of 8 teeth. Younger individuals (< 45 years of

178   age) presented a significantly lower mean number of missing teeth, PD, REC, furcation lesions

179   and teeth with mobility compared to older subjects. Male patients presented a significantly

180   higher mean PD, deep periodontal pockets ($\geq$ 5 mm) and teeth with furcation lesions than

181   female. Compared to smokers, non-smokers had lower mean SB, PD and CAL, and less deep

182   periodontal pockets.

183   Chronic periodontitis was diagnosed in 83.5% of the patients (Table 3), and subjects with

184   chronic periodontitis had CAL $\geq$ 3 mm, $\geq$ 4 mm, $\geq$ 5 mm, $\geq$ 6 mm and $\geq$ 7 mm affecting, on

185   average, 83.7%, 54.4%, 32.1%, 17.8% and 9.2% of their teeth, respectively (Table 4). Besides,

186   the first lower molar was the most frequently missing tooth, while the lower canine was the least

187   lost but the most severely affected tooth (Fig. 1).

188   In the logistic regression analysis, similar results were observed in the univariable (Table 5) and

189   multivariable models (Table 6). In the multivariable analysis, smoking (OR=3.55, 95% CI 1.80-

190   7.02) and older age (OR=8.70, 95% CI 3.66-20.69 and OR=4.85, 95% CI 2.57-9.16), for 65+ and

191   45-64 years old, respectively, were identified as risk indicators for CAL $\geq$ 3 mm (table 5).

192   Chronic periodontitis was not significantly associated with the remaining variables.

193

194   **DISCUSSION**

195   This retrospective cross-sectional study assessed the periodontal status of forwarded adult

196   subjects who sought dental treatment in a Portuguese university dental clinic, that is located in

197   the metropolitan area of Lisbon. This area has over 2.8 million inhabitants and is the largest

198   Portuguese metropolitan area [30]. This university dental clinic is an important reference dental

199   center in the Lisbon Region and receives patients from all social strata. The absence of complete

200   socioeconomic data constitutes a limitation of this study. Unfortunately, over 70% of patients

201   (data not shown) refused to provide socioeconomic status information.

202   The results of this retrospective study can't be compared with previous investigations performed

203   in Portugal because in these it was applied the CPITN methodology.[24,31–33] This is the first FMPE

204   protocol used in a Portuguese population and provides direct evidence for estimating periodontal

205   status and results in a better representation of the population.[27] Although FMPE methodology

206   can result in an overestimation of periodontal treatment needs among young adults,[21] the partial-

207   mouth examination can miscalculate the prevalence of periodontitis in almost 50% of the

208   population.[27] The overall results demonstrate that this referred subpopulation had a high

209   prevalence of chronic periodontitis (79.3%, 95% CI 77.5-88.1%), and severe extensity of

210   periodontal destruction among the affected subjects (83.7%, 95% CI 81.7-85.6%).

211   This investigation study design is not an epidemiological study per se, but rather an

212   observational study of patients who were forwarded to a periodontology consultation. Thus, we

213   were only able to estimate the prevalence and extent of our referred subpopulation. However,

214   these results underline the fact that the majority of patients attended the periodontal consultation

215   already in a state of advanced periodontal destruction and only a small percentage appeared in

216   the early stages or healthy. Still, a disturbing percentage of patients did not attend periodontal

217   consultations despite the triage referral with approximately 69% missing or unchecking the

218   appointment.

219   Regarding tooth loss, the most frequently missed teeth were the lower first molars and the less

220   missed were the lower canines, as with recent European data.[21,22] Additionally, lower canines

221   and incisors were the most affected teeth with CAL and the lower molars the less. The lower

222   arch presented more periodontal destruction than the upper, and the teeth with more severe CAL

223   levels in the upper arch were the canines.

224   Concerning periodontal parameters, unlike PD, CAL severity increased with age and can be

225   related to the increase of gingival recession with aging.[34] As in the literature,[19–23] age was

226   confirmed in the multivariate analysis as a risk indicator for chronic periodontitis for 45-64 years

227   old (OR=4.85, 95% CI 2.57-9.16) and 65+ years old (OR=8.70, 95% CI 3.66-20.69). However,

228   it's important to highlight that, in the majority of CAL thresholds of subjects with the disease,

229   45-64 years old group presented worse results for prevalence of chronic periodontitis, while 65+

230   years old group had worse levels of periodontal destruction extent.

231   Smoking was strongly associated with chronic periodontitis (OR = 3.55, 95% CI 1.80-7.02).

232   Previous studies reported OR values ranging between 2 and 9 of having periodontitis.[21–23,35–38]

233   Despite not accounting for lifetime smoking exposure, we stratified current smokers according to

234   the number of cigarettes smoked although it was not significantly associated with the severity
235   and progression of the periodontal disease.

236   Several studies found that obesity was associated with an increased risk of periodontitis.[39–41]
237   Besides that, Suvan et al.[42] concluded that overweight/obese individuals are more likely to suffer
238   from periodontitis compared to normal weight individuals. Although our results show that
239   overweight and obesity have no impact on the aggravation of periodontitis, we emphasize that
240   more than half of this subpopulation was overweight or obese, in agreement with the latest
241   national IAN-AF Food and Activity Survey.[43]

242   In the past, several epidemiological surveys reported that people with lower educational level
243   had higher prevalence and severity of periodontal disease.[20,21,23,44,45] However, other studies have
244   indicated that this impact cannot be seen in a singular way but in a multifactorial view.[3,46] Our
245   results show that despite middle education had significance in the univariable model (OR = 2.09
246   (95% CI 1.05-4.13), p = 0.035), when analyzed in a multivariable model it had no impact on the
247   probability of having chronic periodontitis.

248

249   **CONCLUSION**

250   This specific subpopulation of individuals referred to periodontal examination in a university
251   dental clinic of the Lisbon region presented high prevalence and severe extent of chronic
252   periodontitis. Age and smoking were identified as risk indicators for chronic periodontitis in this
253   referred subpopulation. Within the limitations of this study, these results highlight the
254   importance of developing appropriate public health programs to educate the Portuguese
255   population about the burden of periodontal diseases.

256

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259   during this study.

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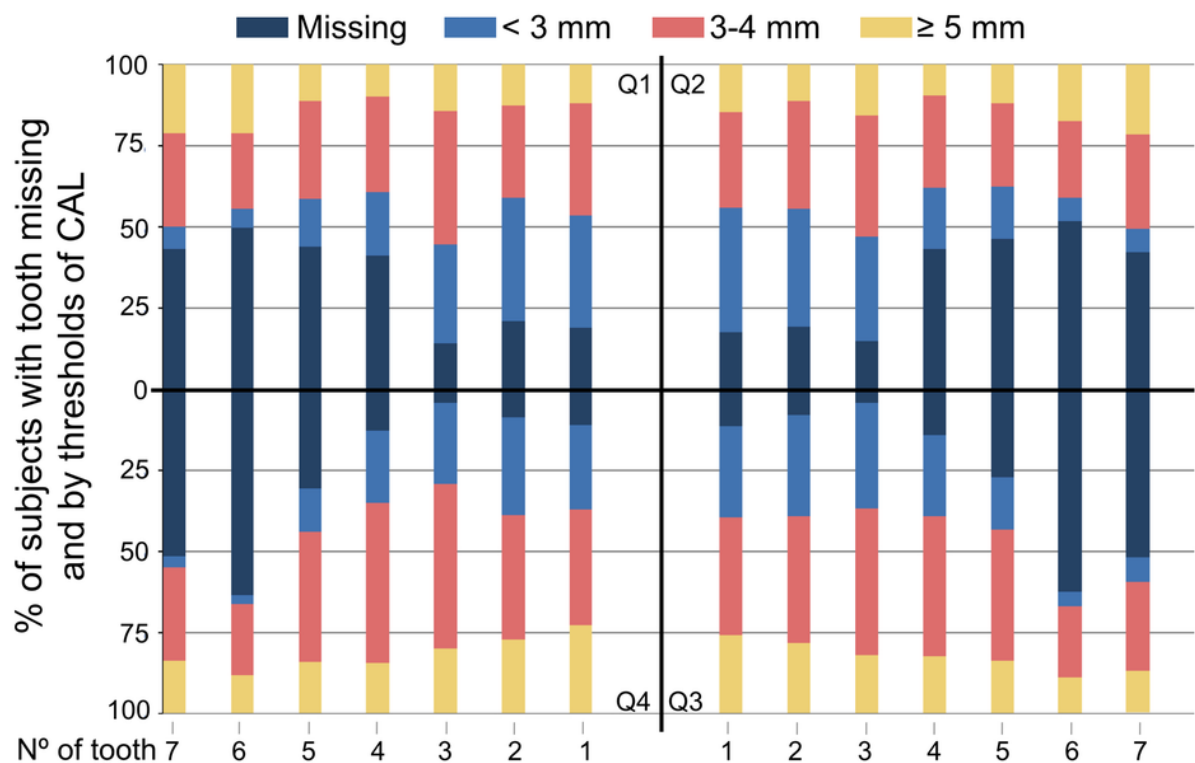
Figure 1

Percentage of subjects with the respective tooth present and by thresholds of CAL (mm), at each specific position, for all teeth in all quadrants

The black lines indicate the separation by each quadrant. (Dark blue) percentage of missing teeth, (Blue) percentage of teeth with less than 3mm of CAL, (pink) percentage of teeth with 3-4 mm of CAL, (yellow) percentage of teeth over 4 mm of CAL

Sociodemographic, behavioral, biometric and oral hygiene data (N = 405).

1   Table 1 - Sociodemographic, behavioural, biometric and oral hygiene data (N = 405)

Variable		n (%)
Gender	Female	225 (55.6)
	Male	180 (44.4)
Age (years)	20 - 44	90 (22.2)
	45 - 64	217 (53.6)
	≥ 65	98 (24.2)
Smoking status	Smoker	141 (34.8)
	Non-smoker	264 (65.2)
Active smokers (cigarettes per day) (n=141)	Light (< 10)	41 (29.1)
	Medium (10-20)	93 (66.0)
	Heavy (>20)	7 (5.0)
Education	Elementary	157 (38.8)
	Middle	155 (38.3)
	Higher	93 (23.0)
Employment status	Employed	210 (51.9)
	Unemployed	63 (15.6)
	Retired	132 (32.6)
BMI (kg/m^2)	< 18.5	5 (1.2)
	18.5 - 24.9	162 (40.0)

	25.0 - 29.9	159 (39.3)
	≥ 30	79 (19.5)
Last dental visit	< 1 year	185 (45.7)
	1 - 2 years	57 (14.1)
	3 - 4 years	75 (18.5)
	≥ 5 years	83 (20.5)
	Never	5 (1.2)
Consultation motive	Routine	125 (30.9)
	Aesthetics	35 (8.6)
	Pain	73 (18.0)
	Functional	157 (38.8)
	Other	15 (3.7)
Dental floss usage	Yes	141 (34.8)
	No	264 (65.2)
Toothbrush frequency	2 - 3 times / daily	313 (77.3)
	1 time / daily	75 (18.5)
	2 - 6 times / weekly	17 (4.2)

4   BMI (kg/m^2) – Body Mass Index (kilogram/meter^2)
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Periodontal clinical data (presented as mean ± standard deviation) as a function of gender, age and smoking status (N = 405).

1 Table 2 - Periodontal clinical data (presented as mean ± standard deviation) as a function of gender, age and smoking status (N =
2 405).

		SB (%)	BOP (%)	PD (mm)	REC (mm)	Missing teeth (n)	Teeth w/ mobility (n)	Teeth w/ furcation lesions (n)	Deep periodontal pockets (≥ 5 mm) (n)	CAL			
										Total	≥ 3 mm (%)	≥ 5 mm (%)	≥ 7 mm (%)
Gender	Female	34.6 ± 22.8	9.1 ± 12.6	3.1 ± 0.7 *	1.0 ± 0.9	8.5 ± 5.9	5.2 ± 5.0	0.4 ± 0.8 *	15.0 ± 18.8 *	4.0 ± 1.2	77.6 ± 19.8 *	33.2 ± 24.8	11.1 ± 15.8 *
	Male	37.4 ± 23.6	11.3 ± 15.7	3.3 ± 0.8 *	1.0 ± 0.9	8.1 ± 5.6	4.4 ± 4.2	0.5 ± 0.9 *	20.1 ± 19.8 *	4.3 ± 1.5	81.5 ± 17.7 *	38.4 ± 27.1	14.8 ± 18.9 *
Age (years)	20 - 44	33.3 ± 20.9	9.9 ± 12.3	3.1 ± 0.7	0.6 ± 0.7 **	5.3 ± 5.0 **	4.0 ± 4.7 **	0.2 ± 0.5 **	18.4 ± 19.9	3.6 ± 1.2 **	72.5 ± 21.2 **	25.6 ± 24.3 **	7.6 ± 15.1 **
	45 - 64	35.4 ± 23.5	10.1 ± 14.6	3.3 ± 0.8	1.0 ± 0.9 **	8.5 ± 5.5 **	5.4 ± 5.0 **	0.5 ± 0.9 **	19.1 ± 21.2	4.3 ± 1.3 **	81.5 ± 18.2 **	38.5 ± 25.9 **	13.9 ± 17.4 **
	≥ 65	39.0 ± 24.1	10.1 ± 14.5	3.1 ± 0.7	1.2 ± 1.0 **	10.7 ± 6.0 **	4.5 ± 3.6 **	0.6 ± 0.9 **	12.3 ± 12.8	4.3 ± 1.4 **	80.8 ± 17.2 **	38.0 ± 25.5 **	14.7 ± 18.3 **
Smoking status	Smoker	38.7 ± 23.9 *	8.6 ± 14.2	3.4 ± 0.8 *	1.1 ± 1.0	8.2 ± 5.8	5.3 ± 5.2	0.4 ± 0.8	22.5 ± 22.0 *	4.5 ± 1.4 *	85.5 ± 16.1 *	42.9 ± 28.6 *	15.8 ± 19.6 *
	Non-smoker	34.3 ± 22.6 *	10.8 ± 13.9	3.1 ± 0.7 *	0.9 ± 0.8	8.4 ± 5.8	4.6 ± 4.3	0.5 ± 0.9	14.5 ± 17.3 *	3.9 ± 1.3 *	76.0 ± 19.6 *	31.6 ± 23.5 *	11.1 ± 15.8 *
Total		35.8 ± 23.1	10.1 ± 14.1	3.2 ± 0.8	1.0 ± 0.9	8.3 ± 5.8	4.8 ± 4.6	0.4 ± 0.9	17.3 ± 19.4	4.1 ± 1.3	79.3 ± 19.0	79.3 ± 19.0	79.3 ± 19.0

4 SB – Supragingival Biofilm, BOP – Bleeding on Probing, PD – Pocket Depth, REC – Recession, CAL – Clinical Attachment Loss

5 * Mann-Whitney test ($p < 0.05$), ** Kruskal-Wallis test ($p < 0.05$)

Percentage of patients, with 95% confidence interval (95% CI), by threshold of CAL (mm), severity and age group (years).

1 Table 3 - Percentage of patients, with 95% confidence interval (95% CI), by threshold of CAL (mm), severity and age group (years)

CAL (mm)	Subjects with chronic periodontitis								All subjects							
	20-44 (n = 59)		45-64 (n = 190)		≥ 65 (n = 89)		Total (n = 338)		20-44 (n = 90)		45-64 (n = 217)		≥ 65 (n = 98)		Total (n = 405)	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Prevalence (patients)																
≥ 3	100	100.0-100.0	100	100.0-100.0	100	100.0-100.0	100	100.0-100.0	65.6	56.1-75.1	87.6	83.5-91.7	90.8	85.3-96.3	83.5	80.4-86.6
≥ 4	42.4	30.0-54.8	62.1	55.7-68.6	59.6	49.7-69.5	58.0	53.4-62.6	27.8	18.8-36.8	54.4	48.3-60.5	54.1	44.6-63.6	48.4	44.2-52.6
≥ 5	20.3	10.2-30.4	30.0	23.9-36.1	25.8	17.0-34.6	15.4	12.0-18.8	13.3	6.5-20.1	26.3	20.9-31.7	23.5	15.4-31.6	12.8	10.0-15.6
≥ 6	8.5	1.515.5	13.2	8.7-17.7	12.4	5.8-19.0	12.1	9.0-15.2	5.6	1.0-10.2	11.5	7.6-15.4	11.2	5.2-17.2	10.1	7.6-12.6
≥ 7	5.1	0.0-10.6	0.5	0.0-1.4	5.6	1.0-10.2	5.0	3.0-7.1	3.3	0.0-6.9	4.1	1.7-6.5	5.1	0.9-9.3	4.2	2.5-5.9

3 CI- Confidence Interval, CAL – Clinical Attachment Loss

Percentage, with 95% confidence interval (95% CI), of sites (prevalence) and affected teeth (extent), by threshold of CAL (mm), severity and age group (years).

1 Table 4 - Percentage, with 95% confidence interval (95% CI), of sites (prevalence) and affected teeth (extent), by threshold of CAL
2 (mm), severity and age group (years)

CAL (mm)	Subjects with chronic periodontitis								All subjects							
	20-44 (n = 59)		45-64 (n = 190)		≥ 65 (n = 89)		Total (n = 338)		20-44 (n = 90)		45-64 (n = 217)		≥ 65 (n = 98)		Total (n = 405)	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Prevalence (sites)																
≥ 3	85.3	82.7-87.4	86.9	85.3-88.5	84.4	81.7-87.1	86.0	84.7-87.2	72.5	68.0-76.9	81.5	79.0-83.9	80.8	77.4-84.2	79.3	77.5-81.2
≥ 4	57.0	51.6-62.4	61.3	58.1-64.5	59.2	54.5-63.9	60.0	57.6-62.4	41.5	35.8-47.1	55.2	51.7-58.7	55.3	50.2-60.4	52.2	49.6-54.8
≥ 5	36.9	30.7-43.0	43.3	39.8-46.8	41.2	36.1-46.3	41.6	39.0-44.2	25.6	20.5-30.7	38.5	35.1-42.0	38.0	33.0-43.1	35.5	33.0-38.1
≥ 6	21.9	16.4-27.4	27.7	24.5-30.9	26.8	22.2-31.4	26.5	24.1-28.9	14.7	10.6-18.8	24.5	21.5-27.5	24.6	20.1-29.1	22.4	20.2-24.5
≥ 7	11.7	7.0-16.4	15.8	13.2-18.3	16.1	12.2-20.1	15.2	13.2-17.1	7.6	4.4-10.8	13.9	11.6-16.2	14.7	11.0-18.4	12.7	11.0-14.4
Extent (affected teeth)																
≥ 3	82.1	77.6-86.6	85.0	82.5-87.7	81.7	77.6-85.7	83.7	81.7-85.6	62.1	55.5-68.7	77.3	73.7-80.9	77.0	72.3-81.7	73.9	71.1-76.6
≥ 4	49.3	41.9-56.7	56.1	51.9-60.3	54.0	47.8-60.2	54.4	51.3-57.5	33.5	27.1-39.9	49.8	45.5-54.0	49.5	43.2-55.8	46.1	43.0-49.2
≥ 5	25.0	17.8-32.1	33.4	29.2-37.6	33.8	27.8-39.8	32.1	29.0-35.2	16.0	10.9-21.2	29.5	25.6-33.4	30.8	25.0-36.5	26.8	24.0-29.6
≥ 6	12.3	6.8-17.8	18.6	15.2-22.0	19.5	14.3-24.7	17.8	15.2-20.3	7.9	4.2-11.6	16.3	13.2-19.3	17.7	12.8-22.6	14.7	12.6-16.9
≥ 7	5.8	2.1-9.4	10.0	7.5-12.4	9.9	5.8-14.1	9.2	7.4-11.1	3.7	1.3-6.0	8.7	6.5-10.8	9.0	5.2-12.8	7.6	6.1-9.2

4 CI- Confidence Interval, CAL – Clinical Attachment Loss

6

Univariate logistic regression analysis of sociodemographic, behavioural, anthropometric and oral hygiene variables for the outcome variable CAL ≥ 3 mm (N = 405)

1 Table 5 - Univariate logistic regression analysis of sociodemographic, behavioural, anthropometric and oral hygiene variables for the
2 outcome variable CAL ≥ 3 mm (*N* = 405)

Predictor variables		OR (95% CI)	*p*
Gender	Female	1	-
	Male	1.32 (0.77-2.26)	*0.310*
Age (years)			*< 0.001*
	20 - 44	1	-
	45 - 64	3.70 (2.04-6.69)	*< 0.001*
	≥ 65	5.20 (2.31-11.70)	*< 0.001*
Smoking status	Smoker	2.06 (1.11-3.81)	*0.021*
	Non-smoker	1	-
Education (years)			*0.107*
	1 - 4	1.40 (0.74-2.66)	*0.298*
	5 - 12	2.09 (1.05-4.13)	*0.035*
	> 12	1	-
Employment status			*0.246*
	Employed	1	-
	Unemployed	1.67 (0.74-3.77)	*0.219*
	Retired	1.54 (0.84-2.81)	*0.163*
BMI (kg/m^2)			*0.699*
	< 18.5	1	-

	18.5 - 24.9	1.06 (0.11-9.79)	*0.961*
	25.0 - 29.9	1.48 (0.16-13.82)	*0.732*
	≥ 30	1.40 (0.14-13.59)	*0.774*
Last dental visit			*0.026*
	< 1 year	1	-
	1 - 2 years	1.39 (0.54-3.57)	*0.493*
	3 - 4 years	0.42 (0.22-0.81)	*0.009*
	>= 5 years	0.97 (0.46-2.03)	*0.930*
	Never	0.24 (0.04-1.54)	*0.134*
Consultation motive			*0.806*
	Routine	1	-
	Aesthetics	0.72 (0.29-1.80)	*0.483*
	Pain	1.09 (0.50-2.35)	*0.834*
	Functional	1.24 (0.66-2.36)	*0.502*
	Other	1.39 (0.29-6.60)	*0.680*
Dental floss use	Yes	1	-
	No	1.66 (0.97-2.82)	*0.063*
Toothbrush frequency			*0.803*
	2 - 3 times / daily	1	-
	1 time / daily	1.27 (0.63-2.56)	*0.508*
	2 - 6 times / weekly	-	*0.998*

4   BMI (kg/m²) – Body Mass Index (kilogram/meter²), CI- Confidence Interval, OR – Odds Ratio

Multivariate logistic regression analysis (final reduced model) (*) for the outcome variable CAL ≥ 3 mm (N = 405).

2 Table 6 - Multivariate logistic regression analysis (final reduced model) (*) for the outcome variable CAL ≥ 3 mm (N = 405)

Predictor variables		CAL ≥ 3 mm	
		OR (95% CI)	p
Age (years)	20-44	1	-
	45 - 64	4.85 (2.57-9.16)	< 0.001
	≥ 65	8.70 (3.66-20.69)	< 0.001
Smoking status	Non-smoker	1	-
	Smoker	3.55 (1.80-7.02)	< 0.001

4 CI- Confidence Interval, OR – Odds Ratio, CAL – Clinical Attachment Loss

5 (*) The model was statistically significant, $\chi^2(3)$ = 39.507, p < 0.001, explained 15.7% (Nagelkerke R^2) of the variance and correctly classified 83.5% of cases.
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7