



Chronic periodontitis and its correlation with socio-demographic and oral health parameters: A retrospective study in adult population

Munirah Yaacob^{*1}, Nurul Farahin Mahirah Fazid², Siti Mahirah Sao'di², Juzaily Hussain¹, Suhaila Muhammad Ali¹, Siti Mahirah Sao'di²

¹Periodontic Unit, Restorative Department, Kulliyyah of Dentistry, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Kuantan, 25200, Pahang, Malaysia

²Kulliyyah of Dentistry, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Kuantan, 25200, Pahang, Malaysia

Article History:

Received on: 04.07.2019

Revised on: 18.10.2019

Accepted on: 29.10.2019

Keywords:

chronic periodontitis, socio-demographic, periodontal parameters

ABSTRACT

Chronic periodontitis is the second most common oral disease worldwide. It is a multifactorial disease with a bacterial plaque as the necessary factors; however, other factors such as age, systemic conditions and social habits do play a determining role in the development of periodontitis. Therefore, this study evaluated the correlation between the severity of chronic periodontitis with a series of socio-demographic background and clinical variables. This was a retrospective, observational study of chronic periodontitis population that attended IIUM Dental Clinic from the year 2014 to 2017. The data was extracted from patients' case records systematically using structured data extraction form. Only case records with full clinical history and periodontal charting were undertaken as samples. IBM SPSS-24 was used for data analysis. Chi-square (χ^2) and Mann-Whitney U tests were applied to infer the above relationship. Those who are professional workers, suffered from systemic diseases and were addicted to tobacco exhibited more severe disease, though statistically not significant. Patients with moderate and severe chronic periodontitis showed greater plaque deposits and had deeper periodontal pockets than those with mild form ($p < 0.05$). Severe chronic periodontitis was found prevalent in the studied population. As a conclusion, the clinical and socio-demographic characteristics showed non-significant correlations with the severity of the disease except for gender, plaque control levels, and a number of deep pocket sites. Future studies should consider including more sample size from multicenter population.



*Corresponding Author

Name: Munirah Yaacob

Phone: +609 5705516

Email: mun_ira@iium.edu.my

ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v10i4.1739>

Production and Hosted by

IJRPS | <https://ijrps.com>

© 2019 | All rights reserved.

INTRODUCTION

The recent Global Burden of Disease study reported that periodontitis is the 6th most common oral disease worldwide with an overall prevalence of 11.2% and around 743 million people are affected (Tonetti *et al.*, 2017). Some epidemiological studies had reported a higher prevalence of the disease in females compared to males, which range from 50% to 55% (Rao *et al.*, 2016). This has been attributed to hormonal imbalance, poor nutrition and frequent childbirths (Reddy, 1992). In contrast, male genders were most affected in some other studies (NOHSA,

2010; Eke *et al.*, 2015).

Periodontitis is a multifactorial inflammatory disease with risk factors such as diabetes mellitus, smoking and most commonly inadequate oral hygiene (Bakdash, 1994). The adherence of plaque biofilm to tooth surface releases a toxin, which triggers a cascade of inflammatory response and infection that leads to the destruction of tooth-supporting structures including bone, periodontal ligament and cementum. Subsequently, it resulted in gingival recession, tooth mobility and higher chances of tooth loss. The accumulation of plaque biofilm is usually caused by improper tooth brushing technique, failure to carry out interdental cleaning and irregular dental visits (Lertpimonchai *et al.*, 2017). The most devastating impact of the disease is multiple tooth loss, where affected individuals may suffer from edentulism and masticatory dysfunction that affects their nutrition, quality of life and self-esteem (Pihlstrom *et al.*, 2005; Petersen and Ogawa, 2012). Moreover, severe periodontitis has been associated with other systemic diseases, like HIV infection, adverse pregnancy outcomes and cardiovascular disease (Kumar *et al.*, 2013; Stewart and West, 2016). With such a relationship between oral health and general health, it is therefore paramount to recognize periodontitis individuals, treat the disease and prevent its progression.

One of the critical elements in the disease management is the control of risk factors and promotion of healthy lifestyle, including optimal self-performed oral hygiene combined with control of periodontal inflammation via professional biofilm removal in the supra- and subgingival environments (Tonetti *et al.*, 2017). Furthermore, studies have shown that modification of other risk factors such as smoking and diabetes during periodontitis treatment improves the outcomes post-periodontal therapy (Preshaw *et al.*, 2005; Teeuw *et al.*, 2010).

To date, there is still limited information on the prevalence and oral health parameters of chronic periodontitis in Kuantan, Pahang, Malaysia. Such data are important to identify people at high risk for periodontal disease and undertake strategic planning for preventive and therapeutic programs. Therefore, our study was aimed to assess the relationship of socio-demographic data and oral health parameters with different severity of chronic periodontitis population attending the IIUM Dental Clinic, Kuantan, Pahang.

MATERIALS AND METHODS

This is a retrospective, descriptive cross-sectional study of patients' treatment records. Ethical

approval was obtained from the International Islamic University Malaysia (IIUM) Research Ethical Committee (IREC no. 693). The study population consisted of screened chronic periodontitis patients who visited IIUM Dental Clinic, Kuantan, Pahang from the year 2014 up to June 2017. The list of chronic periodontitis patients was gathered from the specialist's clinic, outpatients and student's list where the redundant names were excluded. Patients with incomplete details and those seeking dental treatment from the year 2013 backwards were also excluded.

Data extraction forms consisted of three parts, which are socio-demographic information, etiology of disease, full periodontal charting, course of treatment that has been provided and current status of patients. The first part of data collection focused on patients' basic information such as name, age, date of birth, race, gender and occupation. This to facilitate an understanding of the factors that may account for observed differences in prevalence across studies.

The second part focused on the etiology of the disease, including environmental factors such as smoking, oral hygiene practice, and diabetes mellitus status. The third part consisted of full periodontal parameters assessment to assess the clinical presentation, distribution and severity of the disease. This includes full mouth plaque score (FMPS), full mouth bleeding score (FMBS), probing pocket depth (PPD) and missing teeth. Only completed data were analysed.

The collected data were analyzed using IBM Statistical Package for Social Science (IBM-SPSS) Version 24. For a detailed understanding of demographic characteristics of the disease, chronic periodontitis was initially divided into three groups based on the severity of the disease - mild, moderate and severe. However, the moderate to severe chronic periodontitis group were then combined when analysis of the relationship with periodontal health parameters was performed.

A subject-level analysis was performed statistically for each parameter. The frequency and percentage were calculated as summary measures for condensing raw data. Chi-square test was employed to find a significant proportion difference in various types of chronic periodontitis. Mann-Whitney U test was performed to find the relationship between different oral health parameters with different severity of chronic periodontitis. A calculated p-value of less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

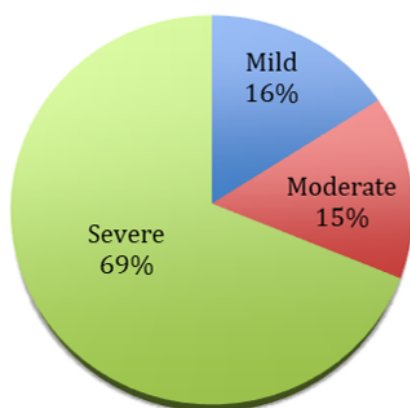


Figure 1: The distribution of chronic periodontitis severity based on AAP Classification 1999

The descriptive analysis showed that the majority (69%) of chronic periodontitis patients had severe attachment loss (Figure 1). Table 1 outline the difference in socio-demographic variables according to the severity of chronic periodontitis. Male patients were found to have more severe chronic periodontitis as compared to female patients ($p < 0.05$). Majority of the severe chronic periodontitis patients were in the age group of 50 to 64 years old. About 79.3% of patients who worked in the professional/technical/managerial area also presented with severe chronic periodontitis, although the difference was found insignificant in comparison to other areas of work ($p > 0.05$).

Twenty-one patients (84%) who were smokers presented with severe chronic periodontitis whilst one (4%) has a mild form. About 64% of patients with diabetes and 20% with hypertension have severe disease. Most of the severe chronic periodontitis patients brush twice daily, but only 23 of them were using floss, 12 were using sticks, and one was using an interdental brush. However, no significant difference was found in interdental cleaning aids usage between the severities of chronic periodontitis. Table 2 shows that the FMPS is significantly higher between moderate to severe chronic periodontitis as compared to mild chronic periodontitis group ($p = 0.024$). The number of sites with pocket depth, $PD < 4\text{mm}$ are also significantly lower in moderate to severe forms compared to mild chronic periodontitis. In contrast, the deep pockets ($PD \geq 6\text{mm}$) is significantly higher in moderate to severe chronic periodontitis group.

As chronic periodontitis is multifactorial, effective disease management requires a clear under-

standing on the prevalence, etiology and pattern of chronic periodontitis in a population. Hence, this study describes the disease in the Kuantan population attending the IIUM Dental Clinic. The present study follows the recommendations based on the (Task Force of American Academy of Periodontology Board of Trustees, 2015) Update by the Task Force of American Academy of Periodontology Board of Trustees-2014 for the determination of diagnosis and reporting of the prevalence.

In this study, the prevalence of severe chronic periodontitis in male was significantly higher than the female group. This concurred with multiple studies in the literatures (NOHSA, 2010; Shiau and Reynolds, 2010; Machado *et al.*, 2018). This difference has been associated with the habits of smoking and poor oral hygiene in male and traditionally considered to be a reflection of better oral hygiene practices in females and/or increase utilization of oral healthcare services among women (Reddy, 1992). Furthermore, recent literature has proposed the sex-specific and biological difference was observed in the immune response and prevalence of the subgingival periodontal pathogen in male with periodontitis compared to female (Ioannidou, 2017). However, the prevalence assessed among these types of samples should be interpreted carefully as the clinic care-based population may reflect the group which are more accessible to dental facilities and those who have dental problems.

Patients within the age group between 50 to 64 years old presented with the highest prevalence of chronic periodontitis and more severe periodontal destruction compared to other age groups. A survey at the national level had reported female and male within the age group of 45 to 54 and 55 to 64 years old presented with shallow and deep pocket respectively (NOHSA, 2010). Whereas, the United States National Health and Nutritional Examination Survey (NHNES) found that young adults from the 30s and more for both gender are commonly affected by periodontitis (Eke *et al.*, 2015). However, both national surveys used the Community Periodontal Index of Treatment Needs (CPITN) examination for estimating the prevalence which has been associated with 50% of error (Eke *et al.*, 2015). The estimation of prevalence using full-mouth periodontal examination is considered more valid for chronic periodontitis disease. Such study using full periodontal examination was conducted in an epidemiological study of a Portuguese population, where they reported the prevalence of chronic periodontitis the highest in the 45 to 65 years age group (Machado *et al.*, 2018). Age has been shown to be a risk factor for the periodontal disease, but age itself does

Table 1: The relationship between socio-demographic variables with different severities of chronic periodontitis.(n=157)

Variables	Sub-group	Mild n=25 n (%)	Moderate n=24 n (%)	Severe n=108 n (%)	P-value		
Gender	Male (n=85)	8 (9.4)	11(12.9)	66 (77.6)	0.021*		
	Female (n=72)	17 (23.6)	13 (18.1)	42 (58.3)			
Age (years)	20 to 34	3 (23.1)	4 (30.8)	6 (46.2)	0.532		
	35 to 49	7 (13.5)	8 (15.4)	37 (71.2)			
	50 to 64	14 (17.5)	11(13.8)	55(68.8)			
	More than 65	1 (8.3)	1 (8.3)	10 (83.3)			
Race	Malay	10 (11.4)	15 (13.2)	63 (55.4)	0.01*		
	Chinese	10 (23.8)	6 (14.3)	26 (61.9)			
	Indian	4 (23.5)	1 (5.9)	12 (70.6)			
Occupation	Professional/technical /managerial	1(3.4)	5(17.2)	23(79.3)	0.517		
	Agriculture/fishery	1(50)	0	1 (50)			
	Military/Police /fireman	0	1(25)	3(73)			
	Factory worker	0	0	2(100)			
	Clerical/sales	3(50)	2(33.3)	1 ((16.7)			
	Services (domestic/water /security)	2(16.7)	2(16.7)	8(66.7)			
	Housewife	4(17.4)	3(13)	16(69.6)			
	Own business	6(26.1)	3(13)	14(60.9)			
	Student	0	1(33.3)	2(66.7)			
	Retired	2(10)	2(10)	16(80)			
	Unemployed	1(33.3)	2(10)	2(66.7)			
	Smoking habit	Yes	1(4)	3(12)		21(84)	0.232
	Medical status	Diabetes mellitus (Yes)	5(20)	4(16)		16(64.1)	0.729
Hypertension (Yes)		6(10.7)	5(12.1)	20(55)	0.727		
Hypercholesteromia (Yes)		0	1(20)	4(80)			
Brushing habits	Once	0	4 (30.8)	9(69.2)	0.091		
	Twice	14(16.3)	16(18.6)	56(65.1)			
	More than twice	11(19.3)	4(7)	42(73.3)			
Interproximal cleaning	Flossing (Yes)	8 (21.1)	7(13.4)	23(60.5)	0.063		
	Sticks (Yes)	4(21.1)	3(15.8)	12(63.2)	0.791		
	Interdental brush (Yes)	1(50)	0	1(50)	0.4		

not affect the periodontal status. It is the cumulative effect of untreated disease and reaction on the plaque where the inflammation develops more rapidly and healing proceeds slowly (Velden, 1984).

The present study found that the Malay group was identified as most affected by chronic periodontitis. The findings merely reflect the geographic location of the study, which is a Malay populated area. Majority of the chronic periodontitis patients worked in professional/ managerial field and housewives com-

pared to other professions. Similarly, a study of periodontal disease prevalence had reported more than 50% of their subjects were housewives (Qah-tani *et al.*, 2017). Timely, housewives can be considered to have more accessibility to seek dental treatment and willing to spend time attending dental clinics compared to working individuals. Nevertheless, those who work in professional/managerial field may be more conscious of self-presentation, which is important in their career as well.

Table 2: The relationship of clinical periodontal parameters with different severity of chronic periodontitis

Periodontal par	Mild		Moderate and severe periodontitis		P values
	Median (interquartile range)	Min, Max	Moderate and severe periodontitis	Min, Max	
Full mouth bleeding score (FMBS)	69.5 (IQR=37)	Min=12, Max=100	75.5 (IQR=37)	Min=1, Max=100	0.302
Full mouth plaque score (FMPS)	72 (IQR=55)	Min=9, Max=100	85 (IQR=25)	Min=11, Max=100	0.024*
Number of sites with PD <4mm	115.50 (IQR=53)	Min=32, Max=166	80.50 (IQR=74)	Min=0, Max=178	0.005*
Number of sites with PD ≥ 4mm	15 (IQR=30)	Min=1, Max=67	22 (IQR =29)	Min=0, Max=102	0.082
Number of sites with PD ≥ 6mm	1 (IQR=5)	Min=0, Max=17	5 (IQR=9)	Min=3, Max=51	0.004*
Absent tooth	8 (IQR=12.5)	Min=1, Max=25	11 (IQR=12)	Min=1, Max=28	0.115
Tooth present	24 (IQR=13)	Min=7, Max=32	19.7 (IQR=12)	Min=4, Max=32	0.121

Although not statistically significant, the smokers' group showed a high prevalence for a severe form of chronic periodontitis. Smoking habits have been shown to impair the host-immune-inflammatory response that resulted in advanced periodontal destruction ([Grossi et al., 1995](#)). Significant clinical attachment loss was reported in smokers compared to non-smokers group in Kerala, India ([Shereef et al., 2015](#)). A multicenter study in Germany also confirmed the smoking impact on periodontitis severity ([Zimmermann et al., 2015](#)).

The overall oral hygiene status of a severe and moderate form of chronic periodontitis subjects in the present study could be considered as poor with a high degree of inflammation. It has been reported that patients with 16% and more of bleeding on probing (BOP) sites had higher chances of losing attachment and the presence of BOP had been corroborated to indicate the number of subgingival deposits ([Checchi et al., 2009](#)). The severe group showed significantly more sites with PPD ≥ 6mm as compared to the mild form. Many studies have reported that the amount of inflammation has a positive correlation with the number of deep sites ([Zimmermann et al., 2015](#)). The number of missing teeth was insignificantly associated with severity of

chronic periodontitis. Using retrospective data to assess the cause of missing teeth related to periodontitis were found difficult and unreliable as caries has been the major cause of tooth loss in Malaysia.

The presence of supra and subgingival biofilms has a fundamental role in initiating inflammation that leads to clinical signs of gingivitis and periodontitis. Therefore, the home and professional plaque control still remain the most critical part of disease management ([Axelsson et al., 2004](#)). Although most of the subjects claimed to practice brushing twice daily, the percentage of FMPS was still high. The teeth cleanliness does not depend on the frequency only but also the time spent and technique ([Slot et al., 2012](#)). Two minutes of brushing teeth are recommended by many guidelines ([Slot et al., 2012](#)) as it will remove twice more plaques (40%) than brushing less than two minutes ([Slot et al., 2012](#)). However, the data was not collected for the present study and should be considered for future research if assessing the oral hygiene practice of the subjects.

Similar to another study, the use of floss as interdental cleaning aid was considered as low among chronic periodontitis patients compared to brushing habits ([Qahtani et al., 2017](#)). Studies found

that the cost, ease of use and motivation were the reasons for subjects not keen to use interdental aid (Mahtani and Lakshmanan, 2017; Umanah and Braimoh, 2017). As tooth brushing cannot efficiently reach the interproximal areas where periodontal disease is prevalent (Hodges and Blanco, 1991; Cancro and Fischman, 1995), interdental self-care with dental flossing is a common method for disrupting the oral biofilm to achieve and maintain periodontal health. Therefore, it is critical to inculcate at least twice-two minutes-brushing habits amongst the chronic periodontitis patients whilst recommending for a minimum daily flossing or interdental cleaning use.

CONCLUSION

Within the limitation of this study, it can be concluded that the prevalence of a severe form of chronic periodontitis in the studied population was high. In the present study, male gender was mostly affected, subjects showed poor plaque control and a high degree of inflammation, and deep pockets are significantly associated with the severity of periodontitis. They also suffered more tooth loss. Smokers and subjects with diabetes and hypertension are presented with a severe degree of chronic periodontitis. Despite that majority practised at least twice daily brushing teeth, much fewer use interdental cleaning. With the availability of such data, preventive and treatment measures could be targeted to the most affected group. However, future study should consider including more sample size from multicenter population.

ACKNOWLEDGEMENT

We would like to thank Kulliyah of Dentistry, IIUM Kuantan, Malaysia, for their enormous support to this study. This publication is supported by IIUM RIGS 16-330-0494.

REFERENCES

- Axelsson, P., Nystrom, B., Lindhe, J. 2004. The long-term effect of a plaque control program on tooth mortality, caries and periodontal disease in adults. Results after 30 years of maintenance. *Journal of Clinical Periodontology*, 31(9):749–757.
- Bakdash, B. 1994. Oral Hygiene and Compliance as Risk Factors in Periodontitis. *Journal of Periodontology*, 65(5):539–544.
- Cancro, L. P., Fischman, S. L. 1995. The expected effect on oral health of dental plaque control through mechanical removal. *Periodontology*, 2000(8):60–74.
- Checchi, L., Montecvecchi, M., Checchi, V., Zappulla, F. 2009. The Relationship Between Bleeding on Probing and Subgingival Deposits. An Endoscopic Evaluation. *The Open Dentistry Journal*, 3(1):154–160.
- Eke, P. I., Dye, B. A., Wei, L., Slade, G. D., Thornton-Evans, G. O., Borgnakke, W. S., Genco, R. J. 2015. Prevalence of periodontitis in adults in the United States: 2009 and 2010. *J Dent Res*, 86(5):611–622.
- Grossi, S. G., Genco, R. J., Machtet, E. E., Ho, A. W., Koch, G., Dunford, R., Hausmann, E. 1995. Assessment of Risk for Periodontal Disease. II. Risk Indicators for Alveolar Bone Loss. *Journal of Periodontology*, 66(1):23–29.
- Hodges, C. A., Blanco, L. P. 1991. Dental plaque under timed intervals of toothbrushing. *Journal of Dental Research*, 60:425.
- Ioannidou, E. 2017. *The Sex and Gender Intersection in Chronic Periodontitis*, volume 5.
- Kumar, A., Basra, M., Begum, N., Rani, V., Prasad, S., Lamba, A. K., Sharma, S. 2013. Association of maternal periodontal health with adverse pregnancy outcome. *Journal of Obstetrics and Gynaecology Research*, 39(1):40–45.
- Lertpimonchai, A., Rattanasiri, S., Vallibhakara, S. A.-O., Attia, J., Thakkinstian, A. 2017. The association between oral hygiene and periodontitis: a systematic review and meta-analysis. *International Dental Journal*, 67(6):332–343.
- Machado, V., Botelho, J., Amaral, A., Proença, L., Alves, R., Rua, J., Mendes, J. J. 2018. 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. *PeerJ*, 6:5258.
- Mahtani, A. A., Lakshmanan, R. 2017. Awareness of interdental aids and thier regular use in daily oral hygeine- a questionnaire based study. *Journal of Pharmaceutical Sciences and Research*, 9(2):202–204.
- NOHSA 2010. National oral health survey 2013. Oral Health Division, Ministry of health Malaysia.
- Petersen, P. E., Ogawa, H. 2012. The global burden of periodontal disease: towards integration with chronic disease prevention and control. *Periodontology*, 2000(60):15–39.
- Pihlstrom, B. L., Michalowicz, B. S., Johnson, N. W. 2005. Periodontal diseases. *The Lancet*, 366(9499):1809–1820.
- Preshaw, P. M., Heasman, L., Stacey, F., Steen, N., McCracken, G. I., Heasman, P. A. 2005. The effect of quitting smoking on chronic periodontitis. *Journal*

- of Clinical Periodontology*, 32(8):869–879.
- Qahtani, N. A. A., Joseph, B., Deepthi, A., Vijayakumari, B. K. 2017. Prevalence of chronic periodontitis and its risk determinants among female patients in the Aseer Region of KSA. *Journal of Taibah University Medical Sciences*, 12(3):241–248.
- Rao, M. R., Katari, P., Vegi, L., Bypureddy, T., Rao, K. P., Tejaswi, K. 2016. Prevalence of periodontal diseases among rural population of Mustabad Krishna District. *Journal of International Society of Preventive and Community Dentistry*, 6(7):59.
- Reddy, J. 1992. The WHO Oral Health goals for the year 2000 in South Africa. *International Dental Journal*, 42:150–156.
- Shereef, M., Sanara, P., Karuppanan, S., Noorudeen, A., Joseph, K. 2015. The effect of cigarette smoking on the severity of periodontal diseases among adults of Kothamangalam Town. *Kerala Journal of Pharmacy and Bioallied Sciences*, 7(6):648–1379.
- Shiau, H. J., Reynolds, M. A. 2010. Sex Differences in Destructive Periodontal Disease: A Systematic Review. *Journal of Periodontology*, 81(10):1379–1389.
- Slot, D., Wiggelinkhuizen, L., Rosema, N., Weijden, G. 2012. The efficacy of manual toothbrushes following a brushing exercise: a systematic review. *International Journal of Dental Hygiene*, 10(3):187–197.
- Stewart, R., West, M. 2016. Increasing Evidence for an Association Between Periodontitis and Cardiovascular Disease. *Circulation*, 133(549):551–10.
- Task Force of American Academy of Periodontology Board of Trustees 2015. American academy of periodontology task force report on the update to the 1999 classification of periodontal diseases and conditions. 2015. *Journal of Periodontology*. volume 86, pages 835e–838.
- Teeuw, W. J., Gerdes, V. E. A., Loos, B. G. 2010. Effect of Periodontal Treatment on Glycemic Control of Diabetic Patients: A systematic review and meta-analysis. *Diabetes Care*, 33(2):421–427.
- Tonetti, M. S., Jepsen, S., Jin, L., Otomo-Corgel, J. 2017. Impact of the global burden of periodontal diseases on health, nutrition and wellbeing of mankind: A call for global action. *Journal of Clinical Periodontology*, 44(5):456–462.
- Umanah, A., Braimoh, O. 2017. Oral hygiene practices and factors influencing the choice of oral hygiene materials among undergraduate students at the University of Port Harcourt Rivers State, Nigeria. *Journal of Dental and Allied Sciences*, 6(1):3.
- Velden, U. 1984. Effect of age on the periodontium. *Journal of Clinical Periodontology*, 11(5):281–294.
- Zimmermann, H., Hagenfeld, D., Diercke, K., El-Sayed, N., Fricke, J., Greiser, K. H., Becher, H. 2015. Pocket depth and bleeding on probing and their associations with dental, lifestyle, socioeconomic and blood variables: a cross-sectional, multicenter feasibility study of the German National Cohort. *BMC Oral Health*, 15(1):7.