10 years ESJ
Special edition

Evaluation of Behavioral Factors for Periodontal Inflammatory Diseases in the Georgian Students Population and Correlations with Parents' Social Status

Nino Abaishvili, MD, PhD, Professor
Ilona Sakvarelidze, MD, PhD, Professor
Rusudan Devnozashvili, MD, PhD, Professor
Marika Shavlakadze, PhD, Associate Professor
Tbilisi Humanitarian Teaching University, Georgia
Levan Morchadze, MD, PhD, Assistant Professor
Akaki Tsereteli State University, Georgia

Doi: 10.19044/esj.2021.v17n18p21

Submitted: 02 November 2020
Accepted: 23 February 2021
Published: 01 June 2021

Cite As:
Abaishvili N., Sakvarelidze I., Devnozashvili R., Shavlakadze M. & Morchadze L. (2021). *Evaluation of Behavioral Factors for Periodontal Inflammatory Diseases in the Georgian Students Population and Correlations with Parents' Social Status*. European Scientific Journal, ESJ, 17(18), 21. https://doi.org/10.19044/esj.2021.v17n18p21

Abstract

Objective: This study examined the relationship between behavioral factors, parents' social status and inflammatory periodontal diseases among the Georgian students' population. **Methods:** The study was based on the results of the examination of 400 medical students aged 18 to 35 (mean age 20.94+1.98) in Tbilisi universities. Students were selected random. The study was conducted according to a questionnaire developed by us, which includes the probable predictors of the periodontium - socio-biological characteristics, hygienic habits, harmful habits, type of diet, and parents' social status. We used the Greene-Vermllion Hygiene Index to determine oral hygiene status. **Statistical Analysis:** Categorical variables are expressed by frequencies and percentag. Categorical variables were compared using Fisher's exact test. Correlation analysis between variables was performed by Spearman's correlation analysis. A p-value <0.05 was considered statistically significant. Statistical analyses were performed using SPSS for Windows, version 23.

Results : Among students who had inflammatory periodontal disease, had a high incidence of predominantly food carbohydrates, frequent consumption of sweet and spicy foods, fast foods and synthetic beverages, diet, smoking. Bad or very bad oral hygiene. It identifies the role of social factors in the manifestation of the disease. The hygiene index correlates with the periodontal index r=0.312, p=0.009. **Conclusion:** In Georgian population the inflammatory periodontal diseases have a incredibly high unsatisfactory hygenic status. The incidence of individuals is high, who undergo professional cleaning once or more rarely a year, and who use a circular movement, when brushing their teeth. Also who intake carbohydrates and fast and spicy foods, sweets, using of synthetic liquids and who smoke. A relation among inflammatory periodontal diseases, socio- economic status, and correlation of parents' social status to oral care habits have been identified. Awareness of the need for dental services, the development of oral care habits, healthy diet, the prevention of manageable risk factors, hygiene, and professional cleaning of teeth is recommended for the prevention of periodontal inflammatory diseases.

Keywords: Students, behavioral factors inflammatory periodontal disease

Introduction

Inflammatory diseases of the periodontium are considered to be one of the most common dental diseases [Bouchard, P., et.al., 2017]. The development of periodontal tissue diseases is associated with the influence of exogenous and endogenous factors [Madiba, T.K., 2018; Pham, T.A., et al. (2018). Abdulmedzhidova, D.M. Et al.2017. Kachkachishvili,et al., I.,2017.]. In our earlier study we showed the link between periodontal inflammatory disease and somatic disorders [Abaishvili N. et al., 2019]. The first factor in periodontal lesson is the bacterial flora of dental plaque, which is associated with such personal characteristics as: general attitude towards health; harmful habits: alcoholism; smoking [Harpenau LA, et.al., 2020; Sawitri, R. et al; 2018]; type of diet [Rahman N., et.al., 2020; Alotaibi, T. 2019. Jauhiainen, L. M. Et al. 2020.]; taking medications; social factors [Jo, J. Y., et.al., 2016]; and working conditions [Masumova V.V. et.al., 2009]. accepted that common diseases of the oral cavity, such as gingivitis and periodontitis, are preventable [Scannapieco, F. A., et al. 2020]. Psychosocial stress plays an important role in periodontal disease through biological and behavioral pathways[Sabbah, W. Et al., 2018, Abu-Gharbieh, et. Al. *2019*.]. The sound of understanding the psychosocial pathways of the behaviors that are strongly linked to periodontal disease – and how such psychological factors affect the response of the periodontal tissues to pathogens – is essential for improving periodontal health, whether at the personal or at the population level. Controlling

periodontitis in populations therefore requires a number of complementary strategies[Thomson, W. M. et al., 2012.]. How the behavioral factors affect the response of periodontal tissue to pathogens is essential for treatment planning and intervention[Sharma, S. et al, 2016]. Research on the social-biological interactions in oral diseases can help identify those at high risk for developing oral diseases due to adverse social circumstances, and prevent and/or control such disease experience[Gomaa, N., et al, 2016].

Students represent a special social stratum, characterized by specific living conditions, with disorders in working and resting regimen, and great psycho-emotional and mental load. Predictors of the disease show variability by populations, therefore, it caused interest to study inflammatory diseases of the periodontium in Georgian students.

Objective: The aim of the present paper is to study the role of behavioral factors in the manifestation of periodontal inflammatory diseases Georgian students' population.

Methods

The study was based on the results of the examination of 400 medical students aged 18 to 35(mean age 20.94±1.98) in Tbilisi universities. Students were selected at random. A cross-sectional study was conducted

Inclusion criteria: Students of Tbilisi Higher Education Institutions.

Exclusion criteria: refusal to participate in the study, severe systemic diseases, oncological pathologies, use of orthodontic devices.

The study was conducted according to a questionnaire developed by us, which included the probable predictors of the periodontium - socio-biological characteristics, hygienic habits, harmful habits, type of diet, and parents' social status(table 1).

Table 1: Questionnaire

	age
Harmful habits	Smocking
Periodontal evaluation	Periodontal index
	Higienic index
Parents' social status	Education
	Residing place
	Social status
Hygiene level	Good level
	Satisfactory
	Unsatisfactory
	Poor
Oral care habits	Brushing teeth
	Culture of rinsing mouth

	Using the floss
	Professional cleaning not or once yearly
	Professional cleaning more than once yearly
	Brush movement – vertical
	Brush movement - horizontal
	Brush movement – circular
The diet type	Predominantly carbohydrates Predominantly proteins
	Frequent intake of spicy foods
	Obligate allergens
	Frequent intake of sweets
	Predominantly fast intake of food
	Healthy dietary regimen
	Being on special diet
	Frequent intake of coffee
	Using of synthetic liquids

Were screened for the presence of the periodontium with Russell`s periodontal index[Russell, A. L. 1967]. All four surfaces (mesiofacial, midfacial, distofacial, and lingual) of all posterior teeth were examined. We used the Greene-Vermllion Hygiene Index to determine oral hygiene status(Greene J.C., et.al., 1960).

We compared students with and without periodontal inflammatory diseases.

Statistical Analysis

Categorical variables are expressed by frequencies and percentage Categorical variables were compared using Fisher's exact test. Correlation analysis between variables was performed by Spearman's correlation analysis. A p-value <0.05 was considered statistically significant. Statistical analyses were performed using SPSS for Windows, version 23.

Results: Inflammatory diseases of the periodontium were found in 25.3% of the examined students, 23% of them had gingivitis, and 3% - periodontitis.

The first factor in periodontal lesson is the bacterial flora of dental plaque, which is associated with such personal characteristics as: general attitude towards health; harmful habits: alcoholism; smoking; type of diet; taking medications; social factors; and working conditions.

Evaluation of hygienic status in the population of Georgian students with periodontal inflammatory diseasesis provided in Table 2.

Table 2: Evaluation of hygienic status in the population of Georgian students with periodontal inflammatory diseases

	With periodontal disease (n=101)	Without periodontal disease (n=299)	F	P
	Abs(%)	Abs(%)		
Good level	29(29%)	240(80%)	117.39	<0.0001
Satisfactory	17(17%)	52(17%)	0.02	0.8979
Unsatisfactory	32(32%)	9(3%)	80.76	<0.0001
Poor	19(19%)	2(1%)	56.80	<0.0001

Unsatisfactory and poor hygienic levels are incredibly high among patients.

The level of oral hygiene is related to the knowledge and habits of oral care. Prevention of diseases among students is considered necessary by 32% of patients and 65% of the intact group (F=36.8, p<0.001)

The hygiene index correlates with the periodontal index r=0.312, p=0.009.

To prevent the disease, it is recommended to keep oral hygiene and periodic professional cleaning of teeth.

The hygiene index in the population of Georgian students is a predictor of periodontal disease. Hygiene level was found to be related to the socio-economic factors of parents (Table 3).

Table 3: Relationship of students hygiene index and the socio-economic factors of parents

		Education		Residing place		Social status
Hygiene level		Higher	Secondary	Village	City	Socially vulnerable
Good level	r	0.403**	-0.029	- 0.087	0.079	-0.074
	p	<0.001	0.567	0.084	0.117	0.141
Satisfactory	r	-0.024	-0.061	0.014	0.089	-0.069
	p	0.633	0.224	0.775	0.074	0.167
Unsatisfactory	r	-0.317**	0.018	0.107*	- 0.147**	0.060
	p	0.000	0.723	0.033	0.003	0.232
Poor	r	-0.282**	0.140**	0.013	- 0.117*	0.191**
	p	0.000	0.005	0.803	0.019	<0.001

*- p<0.05; ** - p<0.01

With the factor ‘’Parents with high education’’ shows credibly a positive correlation and a good hygenic level,but negative shows unsatisfactory and poor hygenic levels.

With the factor "Parents with secondary education" shows credibly a positive correlation with unsatisfactory hygiene and poor hygiene.

With the factor ”Parents residing in the village". shows credibly a positive correlation with unsatisfactory hygiene.

With the factor "Parents residing in the city" negative correlation shows unsatisfactory and poor hygenic levels.

Socially vulnerable parents correlate with poor hygiene.

As far as oral hygiene is related to oral care habits, we studied the distribution of oral care habits among students (Table 4).

Table 4: Distribution of oral care habits among Georgian students with periodontal disease and without periodontal disease

Factors	With periodontal disease (n=101)	Without periodontal disease (n=299)	F	p
	Mean(%)	Mean(%)		
Brushing teeth	100(99%)	286(96%)	2.52	0.1130
Culture of rinsing mouth	51(50%)	121(40%)	3.11	0.0788
Using the floss	19(19%)	88(29%)	4.37	0.0372
Professional cleaning not or once yearly	20(20%)	2(1%)	61.02	<0.0001
Professional cleaning more than once yearly	1(1%)	123(41%)	65.99	<0.0001
Brush movement – vertical	33(33%)	214(72%)	46.35	<0.0001
Brush movement - horizontal	14(14%)	41(23%)	0.02	0.8979
Brush movement - circular	54(53%)	34(11%)	75.52	<0.0001

In the inflammatory periodontal diseases, there is a credibly high incidence of individuals who undergo professional cleaning once or more rarely a year and use a circular movement of the brush when brushing their teeth. In the intact group, there is a high incidence of using floss, professional cleaning more often than once a year and vertical movement of the brush. The incidence of smokers was credibly higher among the patients - 0.33 ± 0.471 in patients and 0.23+0.420 in intact students ($F=3.96$, $p=0.0472$), respectively.

Among students with periodontal disease, the incidence of those whose parents live in rural areas is credibly high, while low in the high educated parents children.

To find out what is the relationship of the social status of parents with oral care habits, we conducted a correlative analysis

Table 5. Relationship of parents' social status to oral care habits

		Education		Residing place		Social status
Factors		Higher	Secondary	Village	City	Socially vulnerable
Brushing teeth	r	0.024	0.025	-0.034	-0.042	0.029
	p	0.633	0.612	0.498	0.400	0.564
Culture of rinsing mouth	r	-0.042	0.000	-0.012	0.165**	0.004
	p	0.400	0.994	0.812	0.001	0.930
using the floss	r	0.121*	-0.038	0.059	0.140**	-0.016
	p	0.016	0.454	0.238	0.005	0.757
Visit to the dentist once a year or more rarely	r	-0.164**	0.072	0.092	-0.025	0.211**
	p	0.001	0.153	0.066	.625	0.000
Visit to the dentist more often than once a year	r	0.160**	-0.003	-0.013	.089	-0.025
	p	0.001	0.945	0.791	.075	0.618
Visit to the dentist if necessary	r	-0.100*	0.076	0.063	0.120*	-0.074
	p	0.045	0.128	0.207	.017	0.139
Do you consider that it is necessary to prevent oral diseases?	r	0.259**	0.002	-0.092	.207**	-0.173**
	p	0.000	0.972	0.065	.000	0.001
Professional cleaning once or more often yearly	r	0.307**	-0.048	-0.075	.048	-0.029
	p	0.000	0.336	0.132	.342	0.566
Professional cleaning more rarely than once yearly	r	-0.268**	-0.032	0.068	0.065	0.037
	p	0.000	0.521	0.176	.197	0.456
Brushing teeth once daily	r	-0.045	-0.097	-0.034	.139**	-0.040
	p	0.365	0.052	0.504	.005	0.426
Brushing teeth more often that once daily	r	.0145**	0.052	0.034	0.222**	0.123*
	p	0.004	0.301	0.495	.000	0.014
	r	0.591**	-0.013	-0.088	.248**	-0.123*

Brush movement – vertical	p	0.000	0.801	0.078	.000	0.014
Brush movement - horizontal	r	0.115*	-0.018	-0.098	0.215**	0.052
	P	0.021	0.715	0.050	.000	0.302
Brush movement – circular	r	-0.608**	-0.081	0.059	0.243**	0.175**
	p	0.000	0.107	0.238	.000	0.000

*- p<0.05; ** - p<0.01

The following factors show a positive correlation with the factors "Parents with higher education": the habit of using floss; considers it necessary to prevent diseases of the oral cavity; cleaning teeth 1 > a day; professional cleaning once or more often yearly; the vertical movement of the brush; the horizontal movement of the brush - visit the dentist > 1 a year; Negative- visit the dentist once a year or more rarely and only if necessary; professional cleaning <1 yearly; circular movement of the brush; brushing teeth.

Table 6: Statistic evaluation of the diet type in the population of Georgian students with periodontal inflammatory diseases

Diet type	With periodontal disease (n=101)		Without periodontal disease (n=299)			
	Abs	Mean	Abs	Mean	F	P
Predominantly carbohydrates	76(75%)		97(32%)		65.28	<0.0001
Predominantly proteins	25(25%)		200(67%)		62.74	<0.0001
Frequent intake of spicy foods	43(43%)		92(31%)		4.74	0.0301
Obligate allergens	11(11%)		19(06%)		2.24	0.1352
Frequent intake of sweets	71(70%)		86(29%)		62.94	<0.0001
Predominantly intake of fast food	47(47%)		103(34%)		4.74	0.0301
Healthy dietary regimen	18(18%)		154(52%)		38.10	<0.0001
Being on special diet	20(20%)		33(11%)		5.09	0.0247
Frequent intake of coffee	43(43%)		128(43%)		0.00	0.9672
Using of synthetic liquids	32(32%)		53(18%)		8.94	0.0030

In the Inflammatory diseases of the periodontium there is credibly high incidence of the following factors: predominantly carbohydrate or predominantly fast intake of food, frequent intake of sweets, frequent intake of spicy foods, keeping a special diet, use of synthetic liquids; and credibly low of predominantly protein and healthy dietary habits.

Discussion

Oral hygiene habits and hygienic level are of special importance in terms of the manifestation of inflammatory diseases of the Periodontium [Farhadtoski, K., et al.2020]. According to our study, unsatisfactory and poor hygiene levels of the oral cavity are credibly high among the students. These independent modifiable risk factors for periodontal disease include lifestyle factors, such as smoking [Genco, R. J., et al. 2013, Singla, R., et al., 2016], Which was confirmed by this study.

Dental care habits influence both oral hygiene and periodontal condition in general, which in themselves are interrelated. The percentage of people who use additional supplement for maintaining oral hygiene, such as interdentally brushes, dental floss or mouthwash. [Terzieva-Petrovska, O.,2019]. Changes in gum tissue and tooth abrasion, which contribute to periodontal disease, may be associated with overly aggressive cleaning of the teeth. Chronic trauma when brushing teeth causes gingival recession and root exposing, often the gums become thicker, denser, and sometimes eroding [Vouros, I.D., et.al. 2009, Mihaela, M. et.al.2019], which was also noted among the students we examined. In periodontal inflammatory disease, the incidence of individuals who undergo the professional cleaning once or more often yearly, and use a circular movement of the brush when brushing their teeth is credibly high. In the intact group there is a high incidence of using floss, professional cleaning more often than once a year, vertical movement of the brush.

Lack of protein prevents the proper functioning of the salivary glands [Rahman, N.,2020 et.al.,]. According to our data, the incidence of individuals who mention a predominantly protein diet and a healthy dietary regimen is significantly low among patients [Wright, D. M., et al. 2020]. Students' dental morbidity increases significantly after entering university. At the same time, students are more likely to encounter periodontal pathology. This is due to the low level of dental education of the students in the field of periodontal diseases [Masumova V.V., et.al., 2009].

Dental care habits and the frequency of visits to the dentist are much extent related to socio-economic status, thus the periodontium status varies according to the social status of the student's family [Słotwińska SM, et.al., 2014]. Social status is also related to diet type. According this study, among students with periodontal disease, the incidence of individuals representing agricultural workers' families is credibly higher and is significantly lower among families with higher education or urban residents.

The severity of periodontitis was associated with socio-demographic, behavioral, and comorbidity characteristics of periodontal patients [Paksoy, T., 2020, NamKoong, E. J., et al., 2019].

Oral health education should focus on improving knowledge and attitudes and removing barriers to daily oral health care. One must aim at identifying and enhancing the psychological features (such as selfefficacy) that characterise dental behaviours. Motivation and education play crucial role in changing attitude of patient and it should be the initial step in treating any patient [Sharma, S. et al, 2016].

Conclusion

- There is a credibly high unsatisfactory hygienic status, incidence of individuals who undergo professional cleaning once or more rarely a year, and usage of circular movement of the brush when brushing their teeth in the Georgian population. Besides that there are predominantly intake carbohydrates and fast food, frequent intake of spicy food, sweets and using of synthetic liquids. The incidence of smoking is reliably high.
- A relation between inflammatory periodontal diseases, socio-economic status and correlation of parents' social status to oral care habits was identified.
- Awareness of the need for dental services, the development of oral care habits, healthy diet, the prevention of manageable risk factors, hygiene and professional cleaning of teeth are recommended for the prevention of periodontal inflammatory diseases.

References:

1. Abaishvili, N., Morchadze, L., Sakvarelidze, I., & Taboridze, I. (2019). Correlation between periodontal inflammatory diseases and somatic disorders of the Georgian student population. *Black Sea Scientific Journal of Academic Research*, *45*(2), 10-15.
2. Abdulmedzhidova, D. M. (2017). Risk factors for periodontal disease in adults. *Russian Journal of Dentistry*, *21*(2), 72-75.
3. Abu-Gharbieh, E., Saddik, B., El-Faramawi, M., Hamidi, S., & Basheti, M. (2019). Oral health knowledge and behavior among adults in the United Arab Emirates. *BioMed research international*, *2019*.
4. Alotaibi, T. (2019). Malnutrition and Diet Role in Prevention of Oral Disease. *EC Dental Science*, *18*, 2206-2213.
5. Bouchard, P., Carra, M. C., Boillot, A., Mora, F., & Rangé, H. (2017). Risk factors in periodontology: a conceptual framework. *Journal of clinical periodontology*, *44*(2), 125-131.
6. Farhadtoski, K., Bayani, M., Sarlak, H., & Salimi, Z. (2020). Factors Associated With Chronic Periodontitis Risk: A Case-Control Study. *Journal of Arak University of Medical Sciences*, *23*(2), 264-277.

7. Genco, R. J., & Borgnakke, W. S. (2013). Risk factors for periodontal disease. *Periodontology 2000*, *62*(1), 59-94.
8. Gomaa, N., Glogauer, M., Tenenbaum, H., Siddiqi, A., & Quiñonez, C. (2016). Social-Biological Interactions in Oral Disease: A 'Cells to Society' View. *PloS one*, *11*(1), e0146218.
9. Greene, J. C., & Vermillion, J. R. (1960). The oral hygiene index: a method for classifying oral hygiene status. *The Journal of the American Dental Association*, *61*(2), 172-179.
10. Harpenau LA, Cheema AT, Zingale JA, Chambers DW, Lundergan WP. Rahman, N., & Walls, A. (2020). Nutrient Deficiencies and Oral Health. In *The Impact of Nutrition and Diet on Oral Health.* Vol. 28, pp. 114-124.
11. Jauhiainen, L. M., Ylöstalo, P. V., Knuuttila, M., Männistö, S., Kanerva, N., & Suominen, A. L. (2020). Poor diet predicts periodontal disease development in 11-year follow-up study. *Community Dentistry and Oral Epidemiology*, *48*(2), 143-151.
12. Jo, J. Y., Jeong, J. H., Lee, S. Y., Kwun, H. S., Park, K. L., Urm, S. H., & Yu, B. C. (2016). Influences of stress and fatigue on periodontal health indicators in patients with periodontal disease. *Journal of Korean Society of Dental Hygiene*, *16*(2), 225-231..
13. Kachkachishvili, I., Korsantia, B., Bakradze, M., Aladashvili, L., & Taboridze, I.(2017) Evaluation of the Clinical and Immunological Parameters During Treatment Chronic Periodontitis by Camelyn Mouthwash. European Scientific Journal May 2017 edition Vol.13(5), 1-9.
14. Madiba, T. K., & Bhayat, A. (2018). Periodontal disease-risk factors and treatment options. *South African Dental Journal*, *73*(9), 571-575.
15. Masumova V.V., Bulkina N.V., Savina E.A., Glybochko A.P., (2009). Study of dental status, qualities of individual oral hygiene and level of dental treatment in students from saratov and saratov region.Saratov Journal of Medical Scientific Research, , vol. 5, №1, p. 90-92.
16. Mihaela, M., Cristian, I. D., Ramona, D. A., & Condurache, G. G. (2019). Assessment of local risk factors in the etiology and evolution of periodontal diseases. *Romanian Journal of Oral Rehabilitation*, *11*(3).
17. NamKoong, E. J., Kim, H. K., & Kim, S. I. (2019). A study on stress levels and oral health symptoms of adolescents in multicultural families. *Journal of Korean society of Dental Hygiene*, *19*(2), 297-306.
18. Paksoy, T., Ustaoğlu, G., & Peker, K. (2020). Association of socio-demographic, behavioral, and comorbidity-related factors with severity of periodontitis in Turkish patients. *The Aging Male*, 1-10.

19. Pham, T. A., Kieu, T. Q., & Ngo, L. T. (2018). Risk factors of periodontal disease in Vietnamese patients. *Journal of investigative and clinical dentistry*, *9*(1), e12272.
20. Rahman, N., & Walls, A. (2020). Nutrient Deficiencies and Oral Health. In *The Impact of Nutrition and Diet on Oral Health.* Vol. 28, pp. 114-124
21. Russell, A. L. (1967). The periodontal index.
22. Sabbah, W., Gomaa, N., & Gireesh, A. (2018). Stress, allostatic load, and periodontal diseases. *Periodontology 2000*, *78*(1), 154-161.
23. Sawitri, R., Masulili, S. L. C., & Lessang, R. (2018). Analysis of Periodontal Disease by Age, Gender, and Smoking Habit. *Journal of International Dental and Medical Research*, *11*(3), 1040-1043.
24. Scannapieco, F. A., & Gershovich, E. (2020). The prevention of periodontal disease—An overview. *Periodontology 2000*, *84*(1), 9-13.
25. Sharma, S., Trivedi, H., Sharma, V. K., & Gupta, N. D. (2016). Behavioral Factors and Periodontal Disease. *European Journal of Pharmateutical and Medical Research*, *3*(7), 207-213.
26. Słotwińska SM, Słotwiński R. (2014). Host response, malnutrition and oral diseases. Part 2. *Central-European Journal of Immunology*.;39(4):522-524.
27. Terzieva-Petrovska, O., Petrovski, M., Minovska, A., Papakoca, K., & Spasov, D. (2019). Assessment of risk factors for periodontal diseases among high school students in Stip. In: 24 th BaSS Congress, 9-11 May 2019, Tirana, Albania
28. Thomson, W. M., Sheiham, A., & Spencer, A. J. (2012). Sociobehavioral aspects of periodontal disease. *Periodontology 2000*, *60*(1), 54-63.
29. Vouros, I.D. Kalpidis C. D. R, Chadjipantelis T., and Konstantinidis A. B., (2009)"Cigarette smoking associated with advanced periodontal destruction in a Greek sample population of patients with periodontal disease," Journal of the International Academy of Periodontology, vol. 11, no. 4, pp. 250–257.
30. Wright, D. M., McKenna, G., Nugent, A., Winning, L., Linden, G. J., & Woodside, J. V. (2020). Association between diet and periodontitis: a cross-sectional study of 10,000 NHANES participants. *The American Journal of Clinical Nutrition*, *112*(6), 1485-1491.