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Impact of Age and Gender on the Severity and Progression of Periodontitis: Implications for Prosthodontic Treatment and Tooth Loss Risk

Abstract:

Background: Periodontitis is a condition that is caused by inflammation of the supporting structures of the tooth that causes loss of the teeth in case of non-treatment. Grading and staging are two distinct indicators of the degree of complexity and intensity of the disease respectively. **Materials and Method:** Age and gender effects on stages and grades of periodontitis were studied using data of 100 periodontitis patients measured through a questionnaire of their age, gender, systemic history and education level. Each patient was measured on the following periodontal parameters plaque index, bleeding on probing, probing pocket depth, and clinical attachment loss. Patients were categorized according to age and gender and the staging and grading compared. **Results:** The study observed that the most number of patients presented were with stage III and grade B in age group 31-40 with significant differences among the groups. There was no significant difference on staging and grading by gender. **Conclusion:** Age has a great impact on the periodontitis severity, particularly in regard to loss of teeth, abutment prognosis, and restorative planning, whereas gender does not. These results have vital ramifications on the planning of the treatment of prosthodontics particularly in the field of restorative dentistry where the severity of periodontitis influences the choice of implants and fixed prostheses.

Introduction:

Periodontitis is the inflammatory condition of tissues that uphold the tooth. When it is not treated, it will permanently destroy the periodontium and bone loss will take place causing loss of teeth. The condition keeps advancing due to the continuous microbial attacks, which makes it hard to manage and prognose (1). Periodontitis is one of the most common conditions in humans because it is found in about 62 per cent of adults between 2011 and 2020 (2). Periodontitis is a complicated disease that has many causal factors as well as clinical manifestations. This fluctuation is caused by pathogenesis and inflammatory state.

The course of periodontitis is usually unpredictable and the periods of inactivity are succeeded by the active period of the disease. In most instances, the untreated periodontitis is progressive and the clinical loss of attachment and bone loss is caused gradually over the years or decades (1). The periodontitis diagnosis is done according to the 2017 classification of periodontal diseases, which is a comprehensive staging and grading scheme of periodontitis (3).

As people age, periodontitis severity and prevalence levels increase as well, presumably because periodontal tissues degenerate. Moreover, age, together with the cumulative effects of risk factors, such as smoking and poor oral hygiene, compound the effects (4). An increase in the age-associated dysbiosis of the oral microbiome may also play a role in higher levels of periodontitis in older patients (5). It has been demonstrated that age affects the prevalence and bacterial load of periodontal pathogens including Aggregatibacter actinomycetemcomitans that reduce as people age (5).

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Gender also contributes to incidence and severity of periodontitis besides age. Research indicates that males are more likely to be affected and the disease is more severe in males as compared to females. Besides, oral microbial profile can be influenced by gender differences. Females have been found to have reduced concentrations of some types of bacteria resulting in improved periodontal situation (6). According to the National Health and Nutrition Examination Survey III, irrespective of the age, female patients are less likely to have advanced periodontitis and less clinical attachment loss and shallower pockets compared to their male counterparts (7). This indicates that periodontitis has a gender effect, which is most probably genetic, hormonal and environmental in nature (8).

Prosthodontic Relevance:
The severity levels of periodontitis especially in the advanced stages (III/IV) and grades (B/C) have a direct influence on the process of prosthodontic treatment and restorative choices. This is because severe forms of periodontitis normally result in loss of tooth, making it difficult to retain fixed prosthesis or any dental implant. Given that advanced periodontitis involves loss of abutment support, the stability and success of fixed prostheses is largely influenced by abutment support loss in such cases. Moreover, patients having a severe periodontitis can experience a risk of implant failure, which is mainly caused by insufficient bone volume and quality. These risks need to be considered in restorative planning, and that is why the stage and grade of periodontitis should be known to make a decision regarding the prosthodontic. This study highlights the relevance of pre-prosthetic periodontal therapy in treating patients with severe periodontitis to achieve optimum restorative results in the long-run.

Literature Review:
Periodontitis literature usually dwells on its pathophysiology, epidemiology and treatment interventions. Nonetheless, an increasing amount of evidence points to the relevance of the prosthodontic when treating periodontitis patients. The survival of abumentment tooth, the effect of periodontal health on the result of the prosthetic, and the effect of periodontal risk on the planning and prognosis of the prosthetic are vital factors in restorative dentistry.

A number of studies have established that the severity of periodontal diseases is directly related to the success and survival of fixed prostheses. In cases of loss of periodontal health, the remaining teeth might not offer sufficient support to prosthetic restorations to ensure failure or complication of the prosthetic device occurs (1) (2). Moreover, periodontal disease is also a major contraindication of implant failure, particularly among individuals who lack bone support because of severe periodontitis (3).

Besides, the necessity of pre-prosthetic periodontal therapy is highlighted in the literature. Periodontal therapy is able to enhance the prognosis of fixed and removable prosthesis through periodontal restoration prior to restorative therapy. Periodontal health of abutment teeth, particularly at the chronic stages of periodontitis (III and IV), should also be considered in order to guarantee the success of the final restoration (4) (5).

Patients and method
In the present study, the number of participants was 100 patients aged between 20-70 years. They reported to Periodontics Department, University of Babylon in search of periodontal treatment. All the patients were diagnosed with periodontitis based on the 2017 periodontal conditions and diseases classification (1).

Prosthodontic Related Variables:
Besides the periodontal parameters, various prosthodontic parameters were also noted to determine their influence on the outcome of restorative effects:
• Missing teeth: This is one of the factors that are used to assess the necessity of prosthetic replacement as well as to identify whether the person is fit to be provided with the implant.
• The state of the posterior teeth, especially their existence or the necessity to restore it, is an important factor in the design of fixed prostheses and implants.
• Potential Abutment Teeth: It is important to find the teeth that will be used as abutment teeth in case of future prostheses in order to plan restoratively.

Informed consent was signed by all the patients to take part in the current study. The information that was gathered about the participants involved was their age, gender, education level, smoking level, medical history, and the history of undergoing prosthodontically performed treatments. All the patients were in excellent general health without any history of systemic illnesses or smoking. The sample was separated based on gender into two groups male (50) and female (50). Another classification was done according to age where the patients were classified into five groups:
• Group 1: 20-30 years
• Group 2: 31-40 years
• Group 3: 41-50 years
• Group 4: 51-60 years
• Group 5: 61-70 years

Inclusion criteria
1.   The age of patients diagnosed with periodontitis is between 20-70 years old.
2.   The participants must be systematically healthy and without any underlying systemic diseases.
3.   In the oral cavity, at least 20 teeth are to be identified.

Exclusion criteria
1.Systemically diseased patients or pregnant women.
2.Periodontally well subjects.
3.Those patients that had used drugs within the past 3 months or periodontal therapy within the past 6 months.
4.Either current or former smokers.

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Clinical periodontal recordings of six surfaces of every single tooth were recorded by one examiner on every patient. Measurements included:

• Clinical Attachment Loss (CAL): This is the measure between the bottom of the crevice/periodontal pocket and the cemento-enamel junction.

• Probing Pocket Depth (PPD): This is the distance of the depth of the crevice/periodontal pocket to the gingival margin.

• Plaque Index (PI): as concluded by Silness and Loe (9).

• Bleeding on Probing (BOP) (10).

A Michigan O periodontal probe with William markings was used to perform the periodontal examination. Each patient was staged and graded based on the 2017 classification and compared between groups (3). The fact that the variables of prosthodontic related variables are introduced makes the study not only in the severity of periodontitis but also in the effects it influences on the restorative planning and the decision-making regarding prosthodontic.

Clinical Assessment and Measurements:

Clinical periodontal recordings of one examiner on six surfaces of each tooth were made on each patient. Measurements included:

• Clinical Attachment Loss (CAL): This is based on the distance between the bottom of the crevice/periodontal pocket and cemento-enamel junction.

• Probing Pocket Depth (PPD): It is the measurement of the distance between the base of the crevice/periodontal pocket and gingivial margin.

• Plaque Index (PI): As Silness and Loe (9) put it.

• Bleeding on Probing (BOP) (10).

Besides the periodontal parameters, a number of prosthodontic variables were also noted to determine their effects on the restorative outcomes:

• Missing Teeth: One of the most important parameters to assess the importance of the prosthesis replacement and the appropriate placement of the implants.

• Posterior Support Zones: The status of the posterior teeth such as being intact or needing restoration is very important in the planning of fixed prosthesis and implants.

• Abutment Potential Teeth: The identification of teeth that can be used as abutment in future prostheses is very important in the restorative planning.

Periodontal examination was done by use of Michigan O periodontal probe with William markings. Each patient was staged and graded periodontitis based on the 2017 classification and compared the results between groups (3). The consideration of the variables related to the field of prosthodontics will also help to ensure that the study not only evaluates the severity of periodontitis but also reflects on the effects that periodontitis has on the planning of restorative and prosthodontic decisions.

Statistical analysis

The data was summarized using descriptive statistics such as the mean, standard deviations and percentages. The comparative analysis of the clinical values of periodontitis (Clinical Attachment Loss (CAL), Probing Pocket Depth (PPD), Plaque Index (PI), and Bleeding on Probing (BOP)) in terms of age and gender groups was analyzed. The variables related to prosthodontics were also incorporated in the analysis to determine their influence on the decision-making process of the prosthodontic and the possibility of pre-prosthetic periodontal therapy requirement. The variables included the number of missing teeth, the zone of posterior support, and the possibility of having abutment teeth.

Chi-square test was employed in the evaluation of the differences in groups having categorical variables (e.g., gender, stage and grade of periodontitis) and t-tests in the evaluation of continuous variables (e.g., CAL, PPD, BOP). Statistical analysis was done using Statistical Package of the Social Sciences (SPSS version 20). Those p-values that were less than or equal to 0.05 were taken as statistically significant and further analysis was done to see the effect of periodontal severity on the outcomes of prosthodontics, like placement of the implants and suitability of the fixed prostheses.

Results:

The sample of current study revealed that the average age of the male group was 39.5 ± 13.2 years. The average plaque index, clinical attachment loss (CAL) of the worst tooth and the probing pocket depth (PPD) of the worst tooth were 1.2 ± 0.4, 5.62 ± 1.96 and 5.34 ± 2.22, respectively. As Table 1 indicates, the mean percentage of bleeding on probing (BOP) was 20.72, and the standard deviation was 24.2. These results imply that males of the present study were moderate or severe periodontal disease as reflected in the comparatively high CAL and PPD values, which are important variables in assessing the stability and appropriateness of the abutment teeth to fixed prostheses or implant positioning.

Table 1 : Mean and standard deviation of age, plaque index, bleeding on probing percentage, CAL for whole teeth, CAL for worst tooth, PPD for whole teeth, and PPD for worst tooth in the male group.

Male group	Mean	Std. Deviation
Age	39.5	13.2
Plaque index	1.2	0.4
BOP	20.72	24.2
CAL whole teeth	1.7918	1.54
CAL worst tooth	5.62	1.96
PPD whole teeth	2.9	1.9
PPD worst tooth	5.34	2.22

Meanwhile, the female group had a mean age of 43.44 ± 10.9. The average plaque index, clinical attachment loss (CAL) of the worst tooth and probing pocket depth (PPD) of the worst tooth were 1.16 ± 0.44, 5.9 ± 1.7 and 5.34 ± 1.15, respectively. Table 2 displays the mean percentage of bleeding on probing (BOP) of 34.8 with a standard deviation of 32.53. The results of the female population report a marginally worse periodontal impression and particularly in the CAL and PPD measures, which indicate a greater amount of tissue loss. This can lead to the probability of developing implant failure or retention of fixed prostheses as a result of inadequate abutment stability or bone loss.

Table 2 : Mean and standard deviation of age, plaque index, bleeding on probing percentage, CAL for whole teeth, CAL for worst tooth, PPD for whole teeth, and PPD for worst tooth in the female group.

Female	Mean	Std. Deviation
AGE	43.44	10.90
Plaque index	1.16	.44
BOP	34.80%	32.53
CAL whole	2	1.43
CAL worst	5.9	1.7
PPD whole	2.84	1.01
PPD worst	5.34	1.15

In terms of periodontitis staging, most patients were presented with the stage III disease, with a greater number of female patients presenting with stage III than the male patients. Nevertheless, Table 3 and Figure 1 reveal that there were no substantial differences between the groups (p-value = 0.551). The periodontitis stage III may necessitate loss of a major part of the teeth and bone which may complicate the planning of the prosthetics. Abutment loss could become a constraint to both fixed prostheses or implants at this stage and require close evaluation of the remaining teeth and bone.

Table 3: Stages of periodontitis comparison according to gender differences.

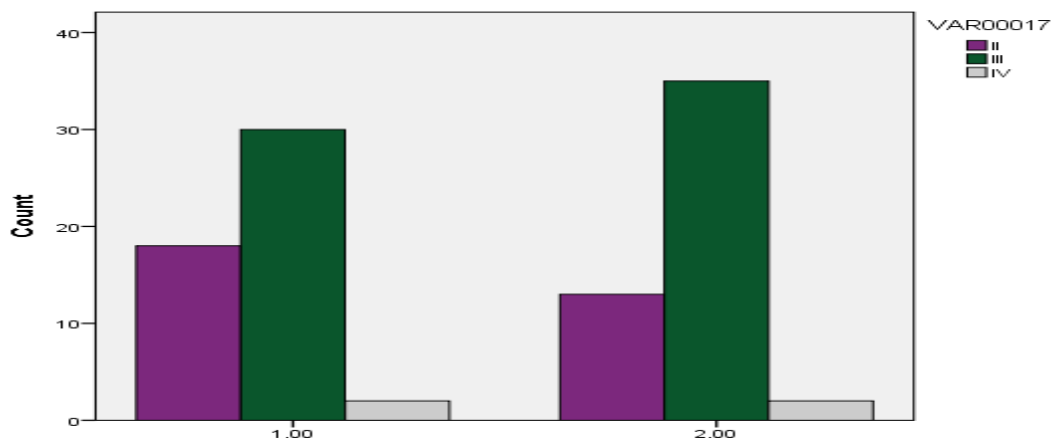|		Stages				Total	Chi − square	P − value
		I	II	III	IV			
Gender	Male	--	18(36%)	30 (60%)	2(4%)	50 (50%)	1.19	0. 551
	female	--	13 (26%)	35(70%)	2 (4%)	50(50%)		
Total			31(31%)	65 (65%)	4 (4%)	100 (100%)		

Figure 1: Comparison of the stages of periodontitis between male and female groups.

In the comparison of the stages of periodontitis among various age categories, it was determined that stage II was more predominant in the 20-30 years age group, stage III was more common in the 31-40 years age group, and stage IV was more common in the 41-50 years age group. These results show that the severity of periodontitis also tends to escalate with the increase in age and this is a major factor to consider in the treatment of prosthodontics. Tooth loss and bone insufficiency may impact on implant planning and possible fixed prostheses in the older patients.

Table 4: Comparison of the stages of periodontitis among different age groups.

	Stages				Total	Chi − square	P −value
	I	II					

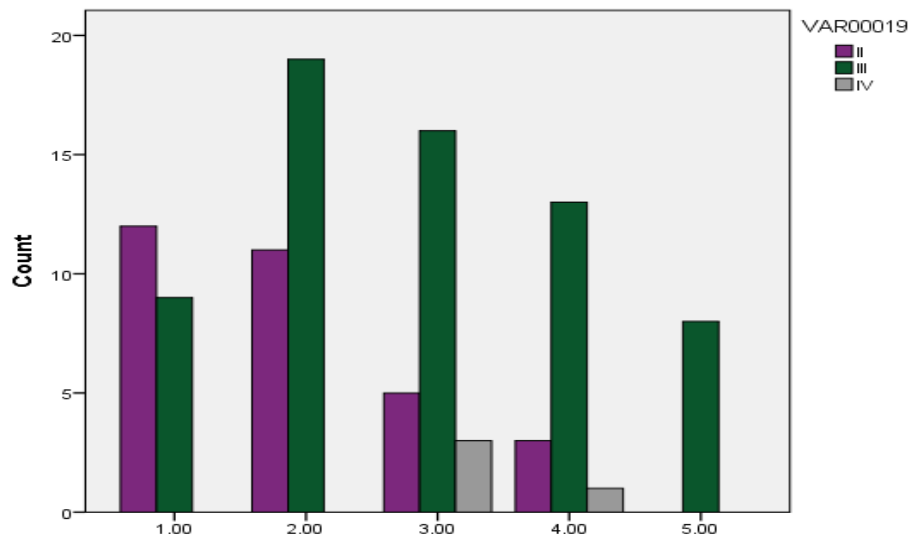|								
Age groups	Group (20-30)	---	12 (57.1%)	9(42.9%)	0	21 (21%)	19.5	0.012*
	Group (31-40)	---	11(36.7%)	19 (63.3%)	0	30 (30%)		
	Group (41-50)	---	5 (20.8%)	16 (66.7%)	3(12.5%)	24 (24%)		
	Group (51-60)	---	3 (17.6%)	13 (76.5%)	1 (5.9%)	17 (17%)		
	Group (61-70)	---	0	8 (100%)	0	8 (8%)		
Total		---	31 (31%)	65 (65%)	4 (4%)	100		

Figure 2: Comparison of the stages of periodontitis among different age groups.

In terms of the periodontitis grading, the grade B was found to be the most prevalent in both the male and female groups and grade C was more prevalent in the female group. Nevertheless, the differences were not statistically significant, as it is presented in Table 5 and Figure 3. The moderate progression of grade B periodontitis does not necessarily affect the prosthodontic options as much as grade C (severe progression). In the case of grade C, there is an increased risk of implant failure, and the prosthetic rehabilitation can take more serious planning.

Table 5: Grades of periodontitis comparison according to gender differences.

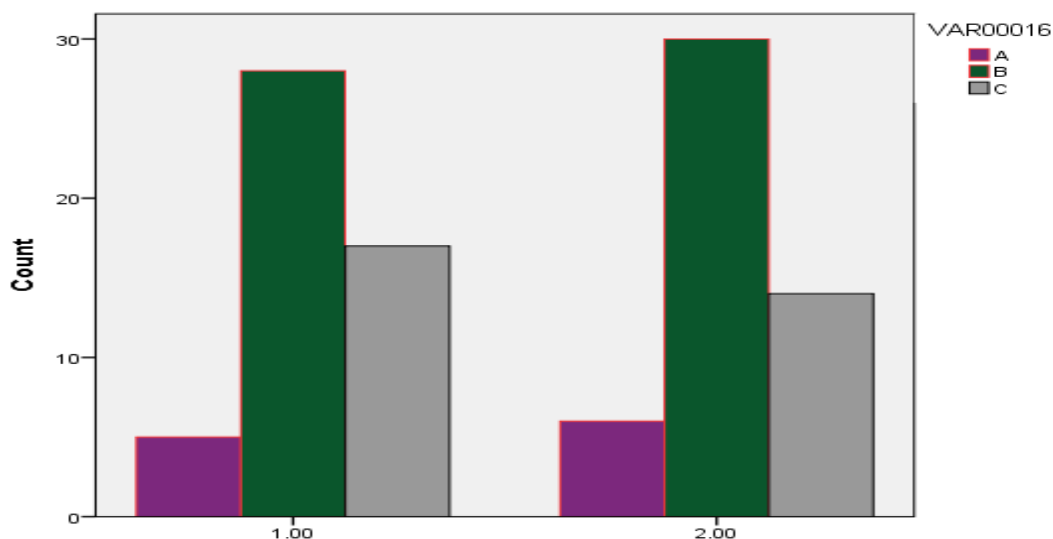|		Grade			Total	Chi – square	P – value
		A	B	C			
gender	male	5 (10%)	28 (56%)	17 (34%)	50 (50%)	0.450	0.798
	female	6 (12%)	30 (60%)	14 (28%)	50 (50%)		
Total		11 (11%)	58 (58%)	31 (31%)	100 (100%)		

Figure 3: Comparison of the grades of periodontitis between male and female groups.

Periodontitis grade B was more common in 31-40 years group whereas in 20-30 years and 31-40 years the percentage of periodontitis grade C was higher. Grade A was predominant in the 41-50 years group. The age factor of periodontitis highlights the necessity of age-related prosthodontic care where younger people would be served with more conservative care and old people with more radical procedures like implants or removable dentures.

Table 6: Comparison of the grades of periodontitis among different age groups.

		Grades			Total	Chi – square	P –value
		A	B	C			
Age groups	Group (20-30)	0	9 (42.9%)	12 (57.1%)	21 (21%)		
	Group (31-40)	0	18 (60%)	12 (40%)	30 (30%)		
	Group (41-50)	5 (20.8%)	13 (54.2%)	6 (25%)	24(24%)	24.98	0.002*
	Group (51-60)	4 (23.5%)	12 (70.6%)	1 (5.9%)	17 (17%)		
	Group (61-70)	2 (25%)	6 (75%)	0	8 (8%)		
Total		11 (11 %)	58 (58%)	31 (31%)	100 (100%)		
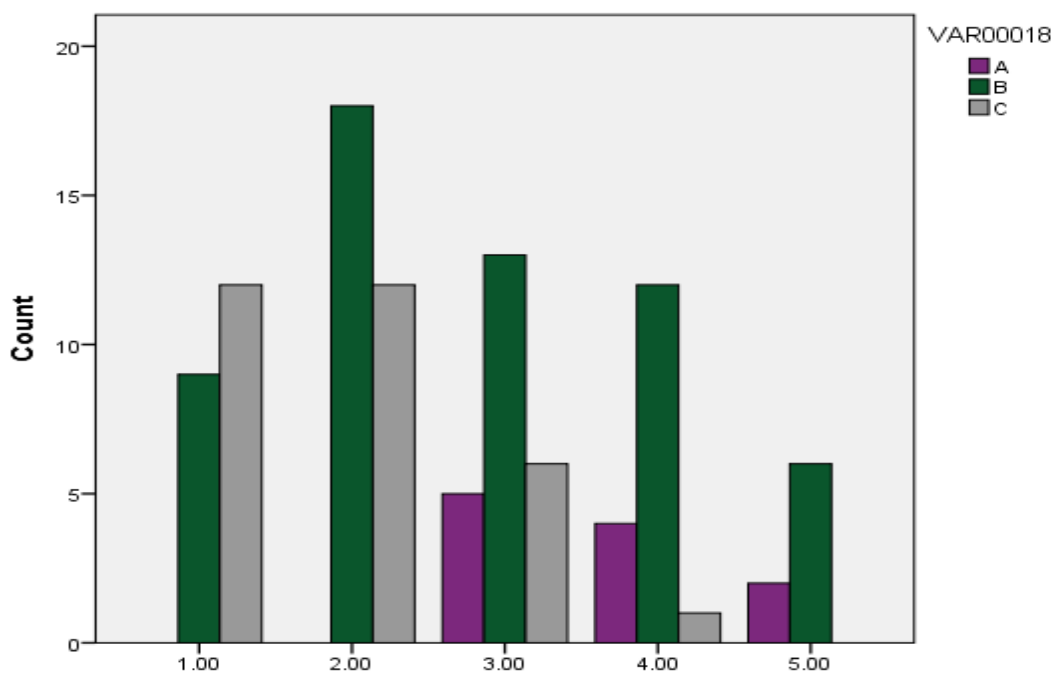
Figure 4: Comparison of the grades of periodontitis among different age groups.

Discussion

Microbial dysbiosis is based on the etiological basis of periodontitis, but the multifactorial etiology and the chronic inflammatory character of periodontitis are universally recognized (3). Findings of the study indicated that stage III periodontitis presented the greatest number of patients, followed by fewer stage IV patients and the female group presented higher periodontitis as a stage III as compared to the male group. But the difference between gender groups in terms of the stage of the disease was not statistically significant. This conclusion is in line with the work of Al-Abdaly et al. (2019), who also found that there were gender differences in clinical findings but cited the presence of hormonal differences (11). Contrastingly, Wulandari et al. (2022) found statistically significant association between the severity of periodontitis and gender, with the latter having higher prevalence of stage IV in males (12). These results highlight the importance of the biological differences based on gender including

hormonal effects that can lead to the differences in severity of disease.

The periodontitis development that has been observed in the current study as per age agrees with other studies. The periodontitis stage II was the most common in the 20-30 years, stage III in the 31-40 years, and stage IV in the 41-50 years group with a vast level of difference between these age groups. The same trend enhanced with age is evidenced by the outcomes of Al-Abdaly et al. (2019) and Wulandari et al. (2022), whose studies have shown that the severity of periodontitis rose with age, and stage III and stage IV were predominant among older patients (11) (12). This implies that the older patients grow, their chances of losing bones, teeth, and requiring more sophisticated prosthodontic services are higher. It was also found by Jassim (2017) that chronic periodontitis increases with age (13).

The research also established that grade B periodontitis was more common among the 31-40 years, whereas grade C was more common among 20-30 years and 31-40 years of age. The Grade A was more prevalent in the

41-50 years group and statistically significant differences were found between age groups. These results align with the earlier studies by Al-Abdaly et al. (2019) and Wulandari et al. (2022) which reported higher incidences of grade C periodontitis, which is a sign of a quick disease progression, in young patients (11) (12). The prevalence of the grade B in the 31-40 years group is alarming because it means that the disease progression is moderate and thus may lead to severe loss of teeth and bone, which eventually affects the prosthodontic planning.

The correlation between the severity of periodontal disease and the risk of prosthodontics is also present since tooth loss, decreased abutment support, and bone loss make the processes of restorations more complicated. Periodontitis (III/IV) at its advanced stages presents special problems during the treatment of the prosthodontics. Such patients usually demand pre-prosthetic periodontal therapy to maximize the situation in the case of implant placement or fixed prostheses. The literacy of abutment support of prosthetic restorations by severe periodontal disease is a major factor on the stability and longevity of the prosthetic restoration. Moreover, patients with a high stage of periodontitis face a higher risk of implant failure, which is mainly explained by the lack of bone quality and its volume. Knowledge of the staging and grading of periodontitis assists in making the decisions of the prosthodontics so that the right treatment alternatives (i.e. implants or removable prostheses) are chosen according to the severity of periodontal diseases present. This research supports the application of prosthodontics to restorative dentistry in a major way. The later the periodontitis is in its progression, the more complicated the choice of prosthodontics becomes, and the higher the stages (III/IV) and the grade of the tooth (B/C) the more attentive to the loss of teeth, the bone support, and the suitability of the implants should be. In such progressive cases, a more detailed restorative program should be crafted including previous periodontal therapy before restorative procedures are performed.

The paper has noted that periodontitis in the advanced stages may lead to tooth loss and bone loss of the abutment teeth, which greatly affects the outcomes of the fixed prostheses and implant rehabilitation. Removable prostheses may need to be used in instances where the abutment support is compromised such as in cases where a lot of bone loss occurs, or an implant can be placed after bone grafting processes. These correlations can be important when prosthodontists make decisions that will benefit their long-term restorative results.

The shortcomings of this study should be noted. The outcomes of the prosthetic were not studied or the success of the long-term success of the restorative treatment as implants or fixed prostheses. The area of investigation that may be explored in the future is to assess the level of prosthetic success amongst different levels of periodontitis severity in patients. Although this research was able to point at sufficient information regarding periodontal health and its effects on prosthodontics, the fact that no information is available on the effects of prosthetic restoration on patients with advanced periodontitis constrains the possibility of drawing definite conclusions regarding the effectiveness of various restorative strategies.

Conclusion

This research shows that stage and grade of periodontitis greatly depend on the age, during which period, stage II and grade C are common among young age groups, and stage III and grade B are common among age groups. These results have clinical implications on the practice of restorative dentistry. The more severe periodontitis, the more complicated the choice of a prosthodontist. Abutment support loss and bone loss in severe cases of periodontitis may make the process of rehabilitation by using a prosthetic challenging, making pre-prosthetic periodontal therapy more important and implants or removable prostheses harder to aim. Even though, the prevalence of stage II and grade B periodontitis among the female group was higher, the differences between males and females were not statistically significant. This is an indication that gender might have no significant impact on the progression periodontal disease but it might have an impact with the clinical presentation and the kind of prosthodontic intervention needed. The paper highlights the significance of an interdisciplinary strategy, the combination of periodontal care with the treatment of prosthodontics. With the help of the combined knowledge in the two areas, prosthodontists would be more capable of improving treatment planning and restoration results so that the patient obtains the best that can be provided depending on the severity of the periodontal problems. The research has a contribution to interdisciplinary treatment planning especially in periodontal and prosthodontic collaboration. Periodontal assessments should be incorporated in the decision making process of the prosthodontist to enhance the results of restoration. Periodontal health is directly related to the completion of prosthetic restorations and, therefore, periodontists and prosthodontists must cooperate with each other to deliver high-quality treatment to patients.

Reference

1. Newman, Michael G., et al. Newman and Carranza's Clinical periodontology E-book. Elsevier Health Sciences, 2018.

2. Trindade D, Carvalho R, Machado V, Chambrone L, Mendes JJ, Botelho J. Prevalence of periodontitis in dentate people between 2011 and 2020: A systematic review and meta-analysis of epidemiological studies. *J Clin Periodontol.* 2023;50(5):604-626.

3. Tonetti, Maurizio S., Henry Greenwell, and Kenneth S. Kornman. "Staging and grading of periodontitis: Framework and proposal of a new classification and case definition." Journal of periodontology 89 (2018): S159-S172.

4. Bhadbhade S. Aging and Periodontium. Int J Dentistry Oral Sci. 2015;2(6):79-83.

5. Rodenburg, J. P., et al. "Occurrence of Bacteroides gingivalis, Bacteroides intermedius and Actinobacillus actinomycetemcomitans in severe periodontitis in relation to age and treatment

history." Journal of clinical periodontology 17.6 (1990): 392-399.

6. Lira-Junior, Ronaldo, et al. "Salivary microbial profiles in relation to age, periodontal, and systemic diseases." PloS one 13.3 (2018): e0189374.

7. Albandar, Jasim M. "Periodontal diseases in north america." Periodontology 2000 29.1 (2002): 31-69.

8. Ferraro, Maria, and Alexandre R. Vieira. "Explaining gender differences in caries: a multifactorial approach to a multifactorial disease." International journal of dentistry 2010 (2010).

9. Silness J, Loe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. J Acta Odontol Scand 1964; 22(1): 121-135.

10. Carranza FA, Newman MG. Clinical Periodontology. 8th ed. St. Louis: Saunders; 1996.15

11. Al-Abdaly, M.M.A.A., AlQahtani, H.S.H. and AlQahtani, S.S.H. (2019) The Impact of Age and Gender on Severity and Types of Periodontal Diseases among Patients from Two Regions in Saudi Arabia. Open Journal of Stomatology, 9, 39-50.

12. Wulandari et al./Dent. J. (Majalah Kedokteran Gigi) 2022 March; 55(1): 16–20.

13. Jassim, S.D.(2017) Effects of Age, Gender and Educational Level on the Severity of Chronic Periodontitis. Medical Journal of Babylon Vol. 14-No. 4 : 657 – 662.

14. Sağlam G, Dağ A. Evaluating Factors Influencing Periodontal Bone Loss Using Cone Beam Computed Tomography: A Retrospective Study. Med Sci Monit. 2025 May 2;31:e947759.

15. Eke PI, Dye BA, Wei L, et al. Prevalence of periodontitis in adults in the United States: 2009 and 2010. J Dent Res. 2012;91(10):914–20.

16. Germen M, Baser U, Lacin CC, et al. Periodontitis prevalence, severity, and risk factors: A Comparison of the AAP/CDC Case Definition and the EFP/AAP Classification. Int J Environ Res Public Health. 2021;18(7):3459.

17. Zardawi, Faraedon & Aboud, Alaa & Khursheed, Dler. (2014). A retrospective panoramic study for alveolar bone loss among young adults in Sulaimani City, Iraq. Sulaimani Dental Journal,. 1. 94-98. 10.17656/sdj.10028.

18. Sulijaya B, Tadjoedin FM, et al. (2017) The correlation between age and periodontal diseases. Journal of International Dental and Medical Research ISSN 1309-100X.

19. Alwan, A. H. . The Impact of Age and Gender on Periodontal Conditions in Iraqi People: A Retrospective Study. *Al-Rafidain Journal of Medical Sciences 2024; 7*(2): 38–42.

20. Singh A, Agarwal V, Tuli A, Khattak BP. Prevalence of chronic periodontitis in Meerut: A cross-sectional survey. J Indian Soc Periodontol 2012;16:529-32.

21. Lipsky MS, Su S, Crespo CJ, Hung M. Men and Oral Health: A Review of Sex and Gender Differences. *Am J Mens Health*. 2021;15(3):15579883211016361.

22. Doyal L., Naidoo S. Why dentists should take a greater interest in sex and gender.Br Dent J. 2010;209:335–337.

23. Worni, S., Schmidlin, P. R., & Liu, C. C. (2025). Influence of gender on periodontitis: prevention, prevalence and etiology in a narrative review. *SWISS DENTAL JOURNAL SSO – Science and Clinical Topics*, *135*(01), 23-37.