

The prevalence of trauma from occlusion as the aggravating factors of periodontitis

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ABSTRACT Trauma from occlusion (TFO) is a local factor that can exacerbate tissue inflammation in periodontitis cases. There have been many clinical studies on TFO, but the prevalence of patients is currently unknown. The purpose of this study was to determine the majority of TFO cases as a factor that aggravates periodontitis based on the medic records at Oral and Dental Hospital, Universitas Syiah Kuala, Banda Aceh, Indonesia in 2017-2019. This study used a comprehensive sampling approach to evaluate 10,532 medical records associated with periodontal disease, including factors such as age, sex, causes, and TFO treatment. Descriptive data analysis showed that from a total of 10,532 medical records, there were 391 medical records related to periodontia. A total of 194 samples matched the inclusion criteria. There were 79 TFO patients (40.7%), 3 TFO cases (1.5%), and 112 cases (57.7%) other periodontal diseases without TFO. The prevalence of TFO as a dominant factor aggravating chronic periodontitis at the Oral and Dental Hospital, Syiah Kuala University, Banda Aceh Indonesia in 2017-2019. Patients with elderly age and female sex predominantly experience periodontitis which is aggravated by TFO.

KEYWORDS: Occlusal adjustment blocking method, periodontitis, Trauma from occlusion

INTRODUCTION

Periodontitis is an inflammatory disease caused by oral bacteria. It activities causes infection of subgingival plaque and calculus accumulation. The impact of these infections destroys the periodontal ligament and alveolar bone.¹ Aljehani reports that about 400 species bacteria habitation in the subgingival area in periodontitis infections. The oral bacteria that often influenced periodontitis are *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Prevotella intermedia*, and *Treponema*.^{2,3} These bacteria require local predisposing factors to influence plaque accumulation in periodontal tissue infections.^{4,5}

The predisposing factors most often reported are systemic diseases, such as diabetes mellitus and Human Immunodeficiency Virus (HIV) infection.⁴ While, environmental factors such as smoking and stress can affect host response to bacterial plaque accumulation. One of the local predisposing factors that can influence plaque accumulation is trauma from occlusion (TFO).¹ Clinically, the TFO has characteristics betwixt tooth mobility, fremitus, premature occlusal, migration, tooth fracture.⁶ Also,

there is a widening of the periodontal ligament space, especially at the alveolar crest and thickening of the lamina dura laterally, apically, and root bifurcation.^{7,8}

Glickman⁹ reported the TFO is a risk factor if it occurs together with inflammation, which will worsen periodontitis. Raju¹⁰ said that TFO yields mixed and contradictory results as a factor that aggravates periodontitis. In contrast, Svanberg and Lindhe¹¹ from the University of Gothenburg, Sweden, found that TFO can increase periodontal damage, exacerbating periodontitis. Polson¹² reported that periodontitis no influenced by the presence or absence of mechanical injury. Information from several previous researchers can be a reference for this study, currently, there is no accurate data relating to the prevalence of TFO cases as a factor that aggravates periodontitis. Specifically, this study uses medical records as a database to determine TFO as a factor that aggravates periodontitis

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MATERIALS AND METHODS

The research design was a cross-sectional study which was analyzed descriptively. A total of 10,532 medical records for Periodontics patients at the Oral and Dental Hospital, Universitas Syiah Kuala Banda Aceh, Indonesia, 2017-2019. Furthermore, they were selected to become 391 medical records related to TFO. Sampling using a total sampling method where the entire population as the research sample. The study began by collecting Periodontic medical records at RSGM Unsyiah and selected based on the inclusion and exclusion criteria of the study. The medical records are then grouped according to the years from 2017-2019 and tabulated. The table consists of medical record number, patient name, age, gender, disease

diagnosis, presence or absence of TFO, causes and treatments for TFO.

Furthermore, the prevalence data calculated using the prevalence formula, namely the number of TFO cases in 2017-2019 divided by the number of periodontic medical records for 2017-2019 then multiplied by 100%. Reports presented in the form of a frequency distribution table processed using Microsoft Excel. Process editing and coding carried out to explain the association of periodontitis infection with TFO.

RESULTS

The Total medical records for 2017-2019 is 10,532. The medical records of periodontic patients were 39, while the medical records and samples that matched the inclusion and exclusion criteria of the study were 194. The number of Trauma From Occlusion (TFO) cases from all samples of periodontic medical records were 82 cases (42.2%). There were 79 cases of periodontitis aggravated by TFO (40.7%) and TFO in only three patients (1.5%).

Meanwhile, 112 other claims (57.7%) not accompanied by TFO. The TFO cases dominated by women 53 subjects (64%) while men totalled 29 subjects (35%).

Table 1 shows that the chronic periodontitis that accompanied TFO 66 cases (83.5%). In contrast, the gingivitis and operculite not found to have TFO (0%).

Tabel 1. Distribusi Frekuensi Penyakit Periodontal yang Disertai TFO

Cases	Frequency (n)	Percentage (%)
Periodontitis kronis	66	83,5
Periodontitis agresif	11	13,9
Periodontitis dimodifikasi penyakit sistemik	2	2,5
Gingivitis	0	0
Operkulitis	0	0
Total	79	100

There were 38 cases of chronic periodontitis accompanied by TFO at age > 46 years (57.6%). Conversely, the age of 12-25 years was 4 cases (6%). In cases of aggressive periodontitis accompanied by TFO, the dominant period was 26-25 years nine patients (81.8%), while 12-25 years old and > 46 years

old were only 1 case (9%). In cases of modified periodontitis, the dominant age was 26-45 years and age > 46 years, only 1 case (50%), while patients aged 12-25 had no TFO. Table 2 shows that TFO caused by several triggers, including blocking with a total of 33 cases (40.2%).

Table 2. The Distribution of Causes of TFO frequency

Causes of TFO	Frequency (n)	Percentage (%)
<i>Blocking</i>	33	40,2
Premature of contact	5	6
<i>Edontolus</i>	6	7,5
Crown-root ratio	1	1,2
Rest of the roots	2	2,4
<i>Overbite</i>	3	3,6
<i>Open bite</i>	1	1,2
<i>Deep bite</i>	1	1,2
<i>Palatal bite</i>	1	1,2
Abfraction	1	1,2
<i>Over bite, palatal bite</i>	1	1,2
<i>Open bite, Crown-root ratio</i>	1	1,2
<i>Blocking, Crown-root ratio</i>	1	1,2
<i>Blocking, Premature of contact</i>	12	14,6
<i>Blocking, deep bite</i>	3	3,6
<i>Bruksism, edentulous</i>	1	1,2
<i>Blocking, edentulous</i>	3	3,6
<i>Premature of contact, edentulous</i>	1	1,2
<i>Deep bite, edentulous</i>	1	1,2
Unknown	4	4,9
Total	82	100

The primary treatment for TFO that mostly carried out was an occlusal adjustment (OA), namely 31 patients (37.8%) of TFO, and the least was splinting, amounting to 2 cases (2.4%). (Table 3).

Table 3. The distribution of TFO handling

TFO Treatment Types	Frequency (n)	Percentage (%)
OA	31	37,8
Splinting	2	2,4
OA + Splinting	11	13,4
Extraction	3	3,7
Without the primary treatment of TFO	35	42,7
Total	82	100

DISCUSSION

The results of the study reported 40.7% of cases of periodontitis with TFO. The TFO case, including chronic periodontitis, aggressive, and as periodontitis were affected by systemic disease. It is consistent with research by Rezeki at RSGM-P FKG UI in 2005-2006, which found that there were 47% cases of occlusal trauma from the 207 patients studied.¹³ Referring to the hypothesis of Glickman and Smullov¹⁴ that excessive occlusal forces can be a co-factor in the development of the periodontal disease. Its process occurs by changing the pathway and spreading inflammation to the deeper tissues.

In periodontitis, inflamed tissue is more susceptible to injury, so that pressure applied either commonly or abnormally can cause trauma. Branchofsky et al.¹⁵ reported that the secondary TFO found in periodontitis patients. Its prevalence of TFO was also positively correlated with the loss of tissue attachment. in the TFO cases without periodontitis was 1.5%. Also, the study sample was 57.7% of patients included periodontitis, gingivitis and operculate without TFO. TFO acts as a factor that aggravates the progression of periodontitis by creating lesions in the periodontal tissues and gingival tissues, increasing tissue permeability,

facilitating penetration of bacterial toxins, and increasing the formation of immune complexes.¹⁶

The results of the study reported that twice as many women had TFO with or without periodontitis than men. This result is different from the prevalence of periodontitis, where men are higher than women, namely 57%:39%. The difference in immune response resistance between men and women is known to be one of the factors that men are more susceptible to periodontitis.¹⁷ Besides, the level of oral dental hygiene in men is lower than in women, which can lead to periodontitis. However, there are differences in the results of the study with existing epidemiological data, possibly influenced by predisposing factors such as hormones, genetics, behaviour, stress, socio-economic, as well as access to care.¹⁸

In addition, based on the age factors found the chronic periodontitis accompanied by TFO aged > 46 years, 57.6% and age 12-25 years 6%. The prevalence of chronic periodontitis often occurs in adults but can also be observed in children, and increases with age.¹⁹ In the elderly, the susceptibility of periodontitis increases due to increased alveolar bone loss and the accumulation of plaque and calculus.²⁰ From the research results, it reported that the cause of TFO was blocking, namely 40.2%, then blocking accompanied by premature contact was 14.6%. Edontolus causes TFO 7.5% and premature contact 6%. Besides, other reasons for TFO are root

residual, bruxism and overbite, crown-root ratio. Other supporting factors are overbite, deep bite, open bite. Rezeki¹³ concluded that the leading cause of occlusion trauma was an occlusal obstruction in articulation (blocking) with a percentage of 77.2% and followed by occlusal resistance during centric occlusion (premature contact) in 5.9% of all TFO cases.

Specifically, the cause of TFO is a non-physiological occlusion that can cause tissue injury. Malocclusion reported as a risk factor that increases the severity of marginal chronic periodontitis. It has maintains the periodontal inflammation by changing the intensity and direction of occlusal forces.²¹ Harel *et al.*²² reported that deepening the pocket of occlusal discrepancy was more significant than in patients without an occlusal distinction in the progression of periodontal disease. This study also reported that Occlusal Adjustment (OA) was the primary treatment for TFO cases with a percentage of 37.8%. The combination of the OA method with splinting 13.4%, 3.7% extraction, and yes splinting 2.4%, while 42.7% of cases did not undergo primary treatment with TFO. Burgett *et al.*²³ reported that OA could be used to reduce tooth mobility before periodontal treatment, thereby increasing gingival attachment when probing. In the case of TFO, OA is performed to prevent excessive damage to the periodontium and loss of tooth structure.

CONCLUSION

The Trauma from occlusion (TFO) cases as a dominant factor aggravating chronic periodontitis at the Oral and Dental Hospital, Syiah Kuala University, Banda Aceh Indonesia in 2017-2019. Patients with elderly age and female sex

predominantly experience periodontitis which is aggravated by TFO. The leading causes of TFO are blocking method and occlusal adjustment (OA) in periodontal treatment.

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