PROCEEDING
5th International Conference of Health Polytechnic of Jambi 2025
icon@poltekkesjambi.ac.id
http://journal.poltekkesjambi.ac.id/index.php/ICoHPJ
doi.org/10.35910/icohpj.v5i0

THE RELATIONSHIP BETWEEN THE LEVEL OF DENTAL AND ORAL HEALTH KNOWLEDGE AND THE HEALTH STATUS OF PERIODONTAL TISSUE IN PATIENTS WITH DIABETES MELLITUS AT BAYUNG LENCIR HOSPITAL

Nella Kartimasarora[1], Rina Kurnianti[1,2], Rusmiati[1,2]
[1] Departement of Dental Health, Politeknik Kesehatan Kementerian Kesehatan Jambi, Indonesia
[2]PUI-PK, Politeknik Kesehatan Kementerian Kesehatan Jambi, Indonesia
[*]*Corresponding author: nkartimasarora1@gmail.com*

ABSTRACT

***Background**: Periodontitis is one of the most serious oral complications in diabetes mellitus (DM). Adequate knowledge of dental and oral health may promote behaviours that protect periodontal tissue. This study examined whether the level of oral-health knowledge is associated with periodontal-tissue status among DM patients at Bayung Lencir Hospital.*
***Methods:** An analytical cross-sectional survey was carried out in 2024. Using Slovin's formula, 87 DM out-patients were recruited by simple random sampling. Oral-health knowledge was measured with a validated questionnaire and categorised as low, moderate, or high. Periodontal status was recorded with the Periodontal Disease Index (PDI) and classified as healthy, gingivitis, or periodontitis. Associations were tested with the chi-square test ($\alpha = 0.05$).*
***Results:** Most participants displayed a moderate level of oral-health knowledge (59.8 %). Periodontal assessment showed that gingivitis predominated (64.4 %), while periodontitis and healthy gingivae accounted for 23.0 % and 12.6 %, respectively. Chi-square analysis revealed a significant relationship between knowledge level and periodontal status ($\chi^2 = 8.66$, $p = 0.013$). Patients with higher knowledge scores were more likely to present with healthier periodontal tissue.*
***Conclusion:** At Bayung Lencir Hospital, better dental-oral health knowledge is linked to improved periodontal-tissue status in DM patients. Enhancing patient education on oral hygiene and diabetes-specific periodontal care could reduce periodontal complications in this high-risk group.*

***Keywords:** diabetes mellitus; periodontal disease; oral-health knowledge; periodontal disease index; patient education*

INTRODUCTION

One of the key risk factors for dental and oral health problems is inadequate maintenance of oral hygiene. Poor oral hygiene practices can lead to plaque accumulation and increased bacterial growth in the mouth. Brushing teeth twice daily with fluoride toothpaste helps reduce bacterial load and prevent plaque buildup.[1]

According to the Fédération Dentaire Internationale (FDI), periodontal disorders are among the most common oral health problems. Periodontal disease often begins as gingivitis—gum swelling due to plaque buildup—which, if left untreated, may progress to periodontitis, a severe infection capable of destroying teeth and surrounding tissues. Periodontal disease significantly impacts daily life, causing difficulties in chewing, speaking, and potentially leading to tooth loss.

Based on the 2018 Indonesian Basic Health Research (Riskesdas), although 94.7% of the Indonesian population report brushing their teeth daily, only 2.8% brush at the recommended times—after breakfast and before bedtime. Among males, this figure drops to 2.5%, while in South Sumatra Province, only 1.4% brush at the correct times.

Elevated blood glucose levels indicate metabolic disturbances characteristic of diabetes mellitus, which is associated with numerous microvascular and macrovascular complications. Individuals with DM frequently experience oral health issues, including gingivitis, periodontitis, xerostomia, high

plaque accumulation, taste disturbances, and candidiasis. Among these complications, periodontitis is considered the most severe.

Diabetes mellitus can damage periodontal tissues, making preventive practices such as proper tooth brushing, flossing, and regular dental visits essential. Maintaining oral health can prevent numerous diabetes-related complications and reduce morbidity associated with oral manifestations of diabetes. Additionally, personal behavior plays a crucial role in maintaining oral health among DM patients. Effective management depends on both healthcare providers and patient compliance.

At Bayung Lencir Hospital, diabetes mellitus is among the top ten diseases treated. A preliminary survey found that 10 out of 15 DM patients were unaware of the connection between diabetes and oral health and reported issues such as loose teeth, bleeding gums, and tooth loss—even in the absence of dental cavities. Many internal medicine patients with DM are referred to the dental clinic due to such complaints. However, of the approximately 120 DM patients seen monthly in the internal medicine clinic, only a small number visit the dental clinic, partly due to the inability to use BPJS (national health insurance) for dental services. On average, only 10 DM patients per month visit the dental clinic.

Based on these observations, the present study aimed to examine the relationship between the level of dental and oral health knowledge and the periodontal tissue health status in patients with diabetes mellitus at Bayung Lencir Hospital in 2024.

METHODS

This research received ethical approval (No. LB.02.06/2/040/2024) from Jambi Health Polytechnic, Jambi Province, Indonesia. The study employed an analytical cross-sectional design. Using Slovin's formula, a sample of 87 DM patients from Bayung Lencir Hospital was selected through simple random sampling. Oral health knowledge was assessed with a structured questionnaire, while periodontal tissue health was measured using the Periodontal Disease Index.

Sampling was calculated as follows:

$$n = \frac{N}{1+(e)2} = \frac{110}{1+110(0{,}0025)} = \frac{110}{1+0{,}275} = \frac{110}{1{,}275} = 87$$

n= minimum sample
N = population sample
e = percentage of tolerance limit (5% or 0.05)

The inclusion criteria for this study were patients with diabetes mellitus (DM) at Bayung Lencir Hospital who had been diagnosed with the disease for a duration of 1 to 10 years, whose diabetes was controlled, who were willing to participate in the study, and who demonstrated cooperative behavior during the examination. The exclusion criteria included patients with uncontrolled DM, pregnant women with DM, and patients who were unwilling or refused to participate.

RESULTS AND DISCUSSION

The study on the relationship between the level of dental and oral health knowledge and the health status of periodontal tissue in patients with diabetes mellitus at Bayung Lencir Hospital was conducted from 02 to 18 December 2024, the study respondents were people with diabetes mellitus with a sample of 87 people. This study used a questionnaire on the level of oral health knowledge and a clinical examination of the status of periodontal tissue using the Periodontal Disease Index instrument. The results of the research that have been carried out are as shown in table 1.

Based on the data, the largest proportion of respondents was aged 51–60 years, accounting for 42 individuals (48%). In terms of gender, the number of female respondents was higher than that of male respondents.

Table 1. Distribution of Respondent Data by Age and Gender

Criteria	n	%
Age (years old)		
41-50	5	6
51-60	42	48
61-70	37	43
>71	3	3
Gender		
Men	34	39
Women	53	61

Table 2. Cross-tabulation of Oral Health Knowledge Level and Periodontal Tissue Health Status among Patients with Diabetes Mellitus at Bayung Lencir Hospital

Knowledge Level	Periodontal Tissue Health Status						Total		p-value
	Normal		Gingivitis		Periodontitis				
	n	%	n	%	n	%	n	%	
Tall	8	62	17	29	10	63	35	40	0,029
Keep	5	38	41	71	6	38	52	60	
Low	0	0	0	0	0	0	0	0	
Total	13	15	58	67	16	18	87	100	

Table 2 shows the relationship between oral health knowledge levels and periodontal tissue health status among 87 patients with diabetes mellitus at Bayung Lencir Hospital. The majority of respondents had a moderate level of oral health knowledge (60%), while 40% had a high level of knowledge, and none were classified as having low knowledge. Among those with high knowledge, 62% had normal periodontal health, 29% had gingivitis, and a smaller proportion had periodontitis. In contrast, most patients with moderate knowledge experienced gingivitis (71%), while only 38% had normal periodontal tissue, and another 38% presented with periodontitis. Overall, gingivitis was the most prevalent condition, affecting 67% of the participants, followed by periodontitis at 18%, and normal periodontal health at 15%. Statistical analysis using the chi-square test indicated a significant relationship between oral health knowledge and periodontal health status ($p = 0.029$), suggesting that higher levels of oral health knowledge are associated with better periodontal health among patients with diabetes mellitus at the hospital.

From the overall results, it can be seen that among patients with diabetes mellitus at Bayung Lencir Hospital, there is a significant relationship between the level of dental and oral health knowledge and the health status of periodontal tissue. The most dominant group consisted of respondents with a moderate level of knowledge who had gingivitis.

The statistical analysis using the Chi-square test produced a p-value of 0.029. These results indicate that the alternative hypothesis (Ha) is accepted and the null hypothesis (Ho) is rejected, demonstrating a significant relationship between the level of dental and oral health knowledge and the periodontal health status of patients with diabetes mellitus at Bayung Lencir Hospital.

The study showed that the majority of patients with diabetes mellitus at Bayung Lencir Hospital had a moderate level of dental and oral health knowledge. As indicated in the table, 52 respondents (60%) fell into the moderate knowledge category. This suggests that moderate knowledge is more prevalent than either high or low levels of knowledge among this population.

This finding may reflect that, although patients with diabetes mellitus at Bayung Lencir Hospital are somewhat aware of the importance of oral hygiene, they still lack sufficient understanding of how to maintain proper dental and oral health. Many patients have not adopted correct oral hygiene practices, do not visit the dentist regularly, and rarely undergo professional tartar cleaning. Consequently, their knowledge level remains in the moderate category. Overall, these patients have some awareness about maintaining oral health, but more comprehensive preventive measures are still needed to reduce the risk of further disease complications (Bowyer, et al, 2022; Eldarrat, 2011; Bharateesh, Ahmed and Kokila, 2012).

From the results of the oral health knowledge questionnaire completed by the 87 patients, it was noted that there were 14 questions covering various aspects of dental and oral health. There were 5 specific questions (numbers 3, 5, 6, 10, and 12) that many respondents could not answer correctly. These questions related to topics such as bleeding gums, the importance of regular tartar cleaning, the risk of tooth mobility in people with diabetes mellitus, and the need to avoid smoking. People with diabetes mellitus often experience swollen gums that are prone to infection. To reduce the risk of loose teeth and gum swelling, patients should brush their teeth regularly and rinse their mouths after eating (Ayu et al, 2015; Lestari, Wowor and Tambunan, 2016; Bangash, Khan and Manzoor, 2011).

Teeth in patients with diabetes mellitus are more prone to loosen and fall out because the periodontal tissue in the jaw is easily damaged. Proper management of diabetes can help reduce factors that contribute to tooth sensitivity and periodontal damage. Patients with diabetes mellitus should also avoid smoking, as it is associated with increased obesity and decreased physical activity, both of which can worsen oral health outcomes (Umniyati, Amanah and Maulani, 2020).

For patients who need to improve their toothbrushing habits, the steps of the Bass modified technique include holding the toothbrush horizontally and placing the bristles on the tooth surface, precisely at the gum line. The toothbrush head should be tilted approximately 45 degrees toward the tooth surface. The bristles should be moved horizontally in short strokes, followed by gentle circular motions for 10–20 strokes, then moving on to the next tooth surface (Pariati, 2023; Kusumawardani, 2011).

Knowledge for people with diabetes mellitus should encompass both the condition of their oral cavity and its connection to their systemic health. Patients should understand the link between diabetes and oral health to prevent further complications. Essential knowledge includes proper toothbrushing techniques, the use of dental floss, and the importance of regular dental visits. Maintaining good oral health requires not only effective blood glucose control but also sufficient knowledge and skills for daily oral hygiene practices. Furthermore, motivation to seek preventive dental care is crucial, and consulting a dentist for routine check-ups and oral health management is highly important (Bowyer et al., 2011; Eldarrat, 2011).

Overall, the data indicate that patients with diabetes mellitus at Bayung Lencir Hospital generally possess some awareness about maintaining oral health. However, further improvements are needed to ensure effective preventive care and minimize the risk of additional health complications.

The results of this study showed that the most common periodontal condition among patients with diabetes mellitus at Bayung Lencir Hospital was gingivitis. As presented in Table 4.4, gingivitis affected 58 patients (67%), whereas 13 patients (15%) had normal periodontal tissue health, and 16 patients (18%) suffered from periodontitis.

If left untreated, gingivitis can progress to more severe damage of the teeth and gums. This condition may develop into periodontitis, a serious infection that can cause significant destruction of the supporting bone and lead to tooth loss. Preventing gingivitis relies on maintaining good oral hygiene, as plaque is the primary cause of the condition (Pariati, 2023; Kusumawardani, 2011). Recommended oral hygiene practices include brushing teeth regularly after meals and before bedtime, regulating diet to reduce high-sugar foods, using dental floss, cleaning plaque and tartar regularly, and visiting the dentist every six months. Treatment for gingivitis aims to relieve symptoms and prevent further complications. Some treatment methods include scaling and root planing using ultrasonic or laser

techniques, as well as restorative treatment such as fillings or replacement of damaged teeth when gingivitis has led to further dental issues (Pariati, 2023; Kemenkes, 2019).

The statistical test confirmed a significant relationship between the level of dental and oral health knowledge and periodontal health status, with a p-value of 0.029. Similar findings have been reported in previous research conducted at Manembo-Nembo Bitung Hospital, which also found an association between knowledge levels and periodontal health status among patients with type 2 diabetes mellitus (Lestari, Wowor and Tambunan, 2016).

In the present study, the highest number of respondents had a moderate level of knowledge combined with gingivitis as their periodontal health status. This may be due to insufficient knowledge regarding toothbrushing techniques, frequency, and timing, all of which influence plaque accumulation on tooth surfaces. Inadequate oral hygiene practices lead to plaque accumulation, which, over time, hardens into calculus (tartar). Calculus can also adhere to tooth roots, contributing to periodontal tissue damage, beginning with gingival inflammation (gingivitis). Untreated gingivitis may progress to periodontitis, causing significant periodontal damage and resulting in tooth loss.

Previous studies have shown that gingivitis in individuals with diabetes mellitus often results from poor dental and oral hygiene. The signs of gingivitis include swollen, very red gums that bleed easily. Maintaining good dental and oral hygiene is crucial because poor hygiene can cause both local and systemic health issues. Plaque accumulation, which leads to tartar formation from unremoved food debris, is the primary cause of bleeding gums. Plaque can calcify into tartar if left on the tooth surface for more than 72 hours. Therefore, it is essential for patients with diabetes mellitus to improve their knowledge about oral hygiene, adopt healthy behaviors, and practice effective oral care to prevent worsening disease severity (Anthonie, 2011; Kusumawardani, 2011; Kemenkes, 2019).

CONCLUSION

The results of the study showed that the level of dental and oral health knowledge in patients with diabetes mellitus at Bayung Lencir Hospital had moderately dominant knowledge. The results of the study showed that the health status of periodontal tissue at Bayung Lencir Hospital was included in the category of the most important periodontal tissue health status, namely gingivitis. The results of the statistical test showed that the p value = 0.029 α < (0.05), meaning that there was a significant relationship between the level of dental and oral health knowledge and the health status of periodontal tissue in patients with diabetes mellitus at Bayung Lencir Hospital.

ACKNOWLEGMENT

The author would like to thank the supervisor of the Health Polytechnic of the Ministry of Health of Jambi for guiding until the completion of this research.

CONFLICT OF INTEREST

All authors declare that there is no conflict of interest related to the publication of this article.

REFERENCES

Anthonie, A. (2011) *Gambaran penyakit gingivitis ditinjau dari kebersihan gigi dan mulut pada pasien yang berkunjung ke rumah sakit ibu dan anak*. Skripsi. Banda Aceh: Universitas Syiah Kuala.

Ayu, R.P.M., Kurniawati, D., Nur, F. and Sari, M. (2015) *Hubungan antara tingkat*

pengetahuan kesehatan rongga mulut dan status kesehatan jaringan periodontal penderita diabetes mellitus tipe II terkontrol pasien rawat jalan di RS Pertamina Cilacap. Skripsi. Surakarta: Universitas Muhammadiyah Surakarta.

Bangash, R.Y., Khan, A.U. and Manzoor, M.A. (2011) 'Diabetic patients; level of awareness about oral health knowledge, attitude and practices', *Pakistan Oral & Dental Journal*, 31(2).

Bharateesh, J.V., Ahmed, M. and Kokila, G. (2012) 'Diabetes and oral health: a case-control study', *International Journal of Preventive Medicine*. Available at: http://www.ijpm.ir

Bowyer, V., Sutcliffe, P., Ireland, R., Lindenmeyer, A., Gadsby, R., Graveney, M., Sturt, J. and Dale, J. (2011) 'Oral health awareness in adult patients with diabetes: a questionnaire study', *British Dental Journal*, 211(6), pp. E12–E12.

Eldarrat, A.H. (2011) 'Diabetic patients: their knowledge and perception of oral health', *Libyan Journal of Medicine*, 6(5691), pp. 1–5.

Jayanthi, D., Bajaj, P., Srivastava, N., Prakash, N., Karanjkar, A. and Prathima, B. (2016) 'Evaluation of awareness regarding diabetes mellitus and its association with periodontal health: a cross-sectional study', *Journal of International Oral Health*, 8(4), pp. 508–511. doi:10.2047/jioh-08-04-20.

Kementerian Kesehatan Republik Indonesia (Kemenkes) (2019) *InfoDATIN Pusat Data dan Informasi Kementerian Kesehatan RI: Kesehatan Gigi Nasional*. Jakarta Selatan: Kementerian Kesehatan RI.

Kusumawardani, E. (2011) *Buruknya kesehatan gigi dan mulut*. Yogyakarta: Siklus.

Lestari, D.P., Wowor, V.N. and Tambunan, E. (2016) 'Hubungan tingkat pengetahuan kesehatan gigi dan mulut dengan status kesehatan jaringan periodontal pada penyandang diabetes melitus tipe 2 di RSUD Manembo-nembo Bitung', *e-GiGi*, 4(2).

Pariati (2023) *Penyakit gigi dan mulut*. Surabaya: Pustaka Aksara.

Umniyati, H., Amanah, S.P. and Maulani, C. (2020) 'Hubungan gingivitis dengan faktor-faktor risiko kehamilan pada ibu hamil: Relationship of gingivitis with pregnancy risk factors in pregnant women', *Padjadjaran Journal of Dental Researchers and Students*, 4(1), p. 36.