

Diabetes and Periodontitis: A two-way relationship

15th Annual Southwest Nephrology Symposium February 25, 2023 Christine Cogil, DNP, MPS, RN, FNP-BC

THE UNIVERSITY OF NEW MEXICO

1

No competing financial interests



Objectives

- Identify characteristics of periodontal disease
- Assess signs and symptoms of periodontal disease
- Discuss the relationship between diabetes and periodontal disease



Diabetes and Oral Diseases

Disparities Affecting Diabetes and Oral Health

Diabetes	(percent)	Periodo
 Race and Ethnicity 		 Race a
 Native Ame 	erican 14.5	• Na
 Black 	12.1	• Bla
 Hispanic 	11.8	• His
 Asian 	9.5	• Asi
 White 	7.4	• Wh
 Education 		 Educat
 < high scho 	ool 13.4	• < h
 High schoo 	9.2	Current
 > high schoor 	ool 7.1	
 Income 		 Income
• < 100% FP	L 14.1	• < 1
 100 to 299° 	% FPL 10.8	• 100
• 300 to 499°	% FPL 7.8	• 200
• > 500% FP	L 5.6	• > 4

(percent) ontal Disease and Ethnicity tive American No data 56.6 ick 59.7 spanic No data ian 37.0 nite tion 66.9% igh school t Smokers 64.2%

Income
< 100% FPL
100 to 199% FPL
200 to 399% FPL
44.6
> 400% FPL
28.6

https://www.cdc.gov/diabetes/health-equity/diabetes-by-the-numbers.html (accessed 2/5/2023)

DIABETES IN THE U.S



Diabetes in the United States

National Diabetes Statistics Report 2022



Diabetes: a systemic disease affecting the body from head to toe



Pathophysiology of Disease: Multifactorial factors

- Shared risk factors
 - Smoking
 - Stress
 - Gender
 - Aging
 - Genetics
 - Diet



Oral Complications in Patients with Diabetes

Nazir, M. A., AlGhamdi, L., AlKadi, M., AlBeajan, N., AlRashoudi, L., & AlHussan, M. (2018). The burden of diabetes, its oral complications and their prevention and management. *Open access Macedonian journal of medical sciences*, *6*(8), 1545-1553 More than 90% of patients with diabetes have oral manifestations

- Periodontal disease
 - Tooth loss
- Taste and salivary gland dysfunction
 - Xerostomia
 - Dental caries
 - Burning mouth syndrome
- Lichen planus
- Candidiasis
- Delayed wound healing
- Geographic tongue



PHOTO From: Scully, C., & Carrozzo, M. (2008). Oral mucosal disease: Lichen planus. *British Journal of Oral and Maxillofacial Surgery*, *46*(1), 15-21.



Periodontal Disease

Porhyromonas gingivalis – main pathogen in periodontal and associated diseases

Chow, Y. C., Yam, H. C., Gunasekaran, B., Lai, W. Y., Wo, W. Y., Agarwal, T., ... & Tan, S. A. (2022). Implications of Porphyromonas gingivalis peptidyl arginine deiminase and gingipain R in human health and diseases. *Frontiers in Cellular and Infection Microbiology*, 1456.



Periodontal Disease

Description

- Inflammation and deterioration of the gums and bone that surround and support teeth
- 47.2% of adults 30 yrs
- 70.1% of adults <a> 65 yrs
- 56.4% of men
- 38.4% of women

Porphyromonas Gingivalis



https://www.cdc.gov/oralhealth/conditions/periodontal-disease.html

Warning Signs of Periodontitis

- Bad breath or bad taste that won't go away
- Red or swollen gums
- Tender or bleeding gums
- Painful chewing
- Loose teeth
- Sensitive teeth



- Gums that have pulled away from teeth
- Any change in the way teeth fit together when biting down
- Any change in the fit of partial dentures

Progression to Periodontitis







Periodontitis Images

Healthy Periodontium



Periodontal Disease



Gingivitis Clinical Signs

- Moderate to severe inflammation
- Underlying bluish hue may be present
- Painful to patient when touched
- Gums bleed easily or when brushing



caputable to 2007 Its Saundara, at imprint of Eleanoar in

Clinical Signs

- Gum recession- "long in the tooth"
- Tooth mobility



Copyright © 2007 by Saunders, an imprint of Elsevier I



Systemic Effect of Periodontitis

Ziukaite, L., Slot, D. E., & Van der Weijden, F. A. (2018). Prevalence of diabetes mellitus in people clinically diagnosed with periodontitis: a systematic review and meta-analysis of epidemiologic studies. *Journal of clinical periodontology*, 45(6), 650-662.



Periodontal Disease Treatment

- Typical cleaning occur every 6 months
- Non-surgical periodontal therapy
 - "Deep Cleaning"
 - Deep pockets requiring meticulous care every 3 months









Bi-directional relationship of diabetes and periodontitis

Periodontitis in People With NO Diabetes

In people who do not have diabetes

- · Periodontitis is associated with:
 - higher HbA1c,
 - fasting blood glucose,
 - and prevalence of prediabetes
- Severe periodontitis is associated with a statistically significant higher risk of developing diabetes (19-33% increased risk)

Bidirectional nature of diabetes and periodontitis

Ziukaite, L., Slot, D. E., & Van der Weijden, F. A. (2018). Prevalence of diabetes mellitus in people clinically diagnosed with periodontitis: a systematic review and meta-analysis of epidemiologic studies. *Journal of clinical periodontology*, 45(6), 650-662. Two thirds of people with diabetes have severe periodontal disease affecting diabetes control.

If your patient has diabetes, they have three times greater prevalence of having periodontal disease too.

Increased Risk of Death

Lamster, I. B., Lalla, E., Borgnakke, W. S., & Taylor, G. W. (2008). The relationship between oral health and diabetes mellitus. *The Journal of the American Dental Association*, *139*, 19S-24S.

Shultis, W. A., Weil, E. J., Looker, H. C., Curtis, J. M., Shlossman, M., Genco, R. J., ... & Nelson, R. G. (2007). Effect of periodontitis on overt nephropathy and endstage renal disease in type 2 diabetes. *Diabetes care*, *30*(2), 306-311. Two Longitudinal Studies of the Gila River Indian Community in Arizona (periodontal disease data collected from 1983-1990)

- 628 adults with severe periodontal disease
- 35 years and older
- Have had type 2 diabetes for a median of 11 years
- Death from cardiac or renal disease is 3.2 times higher than those with mild or moderate periodontitis
- The study concluded that periodontal disease is a predictor of overt nephropathy and end stage renal disease

Diabetes and Periodontal Disease (PD): A bidirectional relationship



Does periodontal treatment improve HbA1c?

Madianos, P. N., & Koromantzos, P. A. (2018). An update of the evidence on the potential impact of periodontal therapy on diabetes outcomes. *Journal of clinical periodontology*, *45*(2), 188-195. Clinically significant decrease at 3 months posttreatment

- HbA1c decrease of 0.4 0.6%
- Equal to adding an antidiabetic medication
- Treatment is safe and effective
- Decreased HbA1c leads to decreased risk of a major adverse cardiovascular risk
 - Coronary artery disease
 - Peripheral arterial disease
 - Stroke
 - Heart failure
- Less clinically significant decrease in HbA1c at 6 months posttreatment
- An average HbA1c reduction of 0.2% leads to an all-cause mortality reduction of approximately 10%

Impact of reduced HbA1c

Stratton, I. M., Adler, A. I., Neil, H. A. W., Matthews, D. R., Manley, S. E., Cull, C. A., ... & Holman, R. R. (2000). Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. *Bmj*, *321*(7258), 405-412.

- For each 1% reduction in HbA1c there is an approximate reduction in diabetes related diseases
 - 21% fewer diabetes-related deaths
 - 14% fewer myocardial infarctions
 - 37% reduction in microvascular complications
 - Peripheral vascular disease
 - Retinopathy
 - Altered wound healing
 - Cerebrovascular disease
 - Nephropathy
 - Neuropathy



What you can do to promote oral health!

4 Ls Oral Exam

✓ Lift/Lower the Lips



✓ Look at Teeth



✓Lap around the gums and palate



✓ Lasso the Tongue





Obtain annual oral health history

- Do they have symptoms of gum disease?
 - Swollen, red, tender gums
 - Bleeding with brushing of teeth
 - If symptoms exist, advise to seek care with a dental professional
- Do they have a dentist?
 - How often do they see their dentist?
- What is their daily oral care routine?
 - Twice daily brushing with fluoridated toothpaste
 - Daily flossing
 - Explain or reaffirm that daily care is part of diabetes management





Periodontal Disease Treatment Options Chlorhexidine 12% rinse 30 seconds and spit BID

- An antibiotic rinse to be used until seen by dentist/dental hygienist
- Stop immediately if causes dark brown staining of teeth
- Available on \$4 list at many pharmacies
- Sodium Fluoride 1.1% toothpaste, use pea-sized amount BID
 - Added fluoride for exposed dental roots



Appointment with dentist or dental hygienist within 2-4 weeks



For patients with diabetes - Health Care Providers

- Recommend yearly visit to an optometrist/ophthalmologist
- Assess urine microalbuminuria
- Check HbA1c every 3-6 months
- Examine neuro-sensation feet with a microfilament or equivalent
- Encourage an annual influenza injection
- Please <u>ADD</u> a <u>yearly check up with a dental</u> provider

Periodontal Treatment Cost of Care Savings

Jeffcoat MK, Jeffcoat RL, Gladowski PA, Bramson JB, Blum JJ. Impact of periodontal therapy on general health: evidence from insurance data for five systemic conditions. *American Journal of Preventive Medicine.* 2014;47(2):166–74.

- Can reduce health care costs (2022)
 - \$3,176 per person annually for persons with diabetes
 - \$6,363 for those with cardiovascular disease
 - Periodontal Treatment
 - Decreases hospitalization rates
 - Prevents periodontal disease systemic disease progression



FQHC settings

Dental Schools and Residencies

Dental Hygiene schools

Community Resources Dental

Local Dentists





Thank You!

References

- Ahmad, R., & Haque, M. (2021). Oral health messiers: Diabetes mellitus relevance. *Diabetes, metabolic syndrome and obesity: targets and therapy*, 3001-3015.
- Borgnakke, W. S. (2019). IDF Diabetes Atlas: Diabetes and oral health–A two-way relationship of clinical importance. *Diabetes research and clinical practice*, *157*, 107839.
- Centers for Disease Control and Prevention. <u>https://www.cdc.gov/diabetes/health-equity/diabetes-by-the-numbers.html</u> (accessed 2/5/2023)
- Chow, Y. C., Yam, H. C., Gunasekaran, B., Lai, W. Y., Wo, W. Y., Agarwal, T., ... & Tan, S. A. (2022). Implications of Porphyromonas gingivalis peptidyl arginine deiminase and gingipain R in human health and diseases. *Frontiers in Cellular and Infection Microbiology*, 1456-
- Coll, P. P., Lindsay, A., Meng, J., Gopalakrishna, A., Raghavendra, S., Bysani, P., & O'Brien, D. (2020). The prevention of infections in older adults: oral health. *Journal of the American Geriatrics Society*, *68*(2), 411-416.
- Darling-Fisher, C. S., Kanjirath, P. P., Peters, M. C., & Borgnakke, W. S. (2015). Oral health: an untapped resource in managing glycemic control in diabetes and promoting overall health. *The Journal for Nurse Practitioners*, *11*(9), 889-896.
- Genco, R. J., Graziani, F., & Hasturk, H. (2020). Effects of periodontal disease on glycemic control, complications, and incidence of diabetes mellitus. *Periodontology 2000*, *83*(1), 59-65.
- Jeffcoat MK, Jeffcoat RL, Gladowski PA, Bramson JB, Blum JJ. Impact of periodontal therapy on general health: evidence from insurance data for five systemic conditions. *American Journal*
- Kapila, Y. L. (2021). Oral health's inextricable connection to systemic health: Special populations bring to bear multimodal relationships and factors connecting periodontal disease to systemic diseases and conditions. *Periodontology 2000*, 87(1), 11-16.
- Kudiyirickal, M. G., & Pappachan, J. M. (2015). Diabetes mellitus and oral health. *Endocrine*, 49(1), 27-34.

References

- Lamster, I. B., Lalla, E., Borgnakke, W. S., & Taylor, G. W. (2008). The relationship between oral health and diabetes mellitus. *The Journal of the American Dental Association*, 139, 19S-24S.
- Madianos, P. N., & Koromantzos, P. A. (2018). An update of the evidence on the potential impact of periodontal therapy on diabetes outcomes. *Journal of clinical periodontology*, 45(2), 188-195.
- Maia, M. B., Souza, J. G., Bertolini, M., Costa, R. C., Costa, G. S., Torres, S. D. A., ... & Martins, A. M. (2023). Knowledge of bidirectional relationship between diabetes and periodontal disease among diabetes patients: A systematic review. *International Journal of Dental Hygiene*, 21(1), 28-40.
- Nazir, M. A., AlGhamdi, L., AlKadi, M., AlBeajan, N., AlRashoudi, L., & AlHussan, M. (2018). The burden of diabetes, its oral complications and their prevention and management. *Open access Macedonian journal of medical sciences*, 6(8), 1545-1553.
- Nguyen, A. T. M., Akhter, R., Garde, S., Scott, C., Twigg, S. M., Colagiuri, S., ... & Eberhard, J. (2020). The association of periodontal disease with the complications of diabetes mellitus. A systematic review. *Diabetes research and clinical practice*, *165*, 108244.
- Preshaw, P. M., & Bissett, S. M. (2019). Periodontitis and diabetes. British dental journal, 227(7), 577-584.
- Saremi, A., Nelson, R. G., Tulloch-Reid, M., Hanson, R. L., Sievers, M. L., Taylor, G. W., ... & Knowler, W. C. (2005). Periodontal disease and mortality in type 2 diabetes. *Diabetes care*, *28*(1), 27-32.
- Shultis, W. A., Weil, E. J., Looker, H. C., Curtis, J. M., Shlossman, M., Genco, R. J., ... & Nelson, R. G. (2007). Effect of periodontitis on overt nephropathy and end-stage renal disease in type 2 diabetes. *Diabetes care*, 30(2), 306-311.
- Swapna, L. A., Koppolu, P., & Prince, J. (2017). Oral health in diabetic and nondiabetic patients with chronic kidney disease. Saudi Journal of Kidney Diseases and Transplantation, 28(5), 1099.
- Ziukaite, L., Slot, D. E., & Van der Weijden, F. A. (2018). Prevalence of diabetes mellitus in people clinically diagnosed with periodontitis: a systematic review and meta-analysis of epidemiologic studies. *Journal of clinical periodontology*, *45*(6), 650-662.