

Treatment options for medical conditions in adults with Down syndrome: dental care.

Brooke L. Goodspeed, PhD, CRNP¹; Bari R. Levine DMD, MPH²; Mihaela Petrova Tzvetkova³; Alex Fossi, MPH¹; and Wendy J. Ross, MD¹

1) Center for Autism and Neurodiversity, Thomas Jefferson University, 2) Pediatric Dentist, Growing Smiles Main Line Pediatric Dentistry, 3) American College of Sofia.

BACKGROUND

Individuals with Down syndrome (DS) have unique oral health needs and experience certain dental conditions more frequently than the general population.¹⁻⁵ These include the following:

- **Gingivitis and Periodontal Disease:** Individuals with DS have an increased prevalence, severity and susceptibility to periodontitis.
- **Dental conditions** including delayed eruption of both primary and permanent teeth, microdontia, hypodontia, oligodontia, malocclusion, bruxism, enamel hypocalcification/hypoplasia, short tooth roots, tooth loss, and secondary complications from medications used to treat common comorbid medical conditions associated with DS.
- **Craniofacial features** including protruding tongue, macroglossia, glossoptosis, high-arched palate, incomplete development of the mid-face, and upper narrow airways which are associated with obstructive sleep apnea (OSA).
- **Oral mucosal manifestations** include dry mouth, fissured tongue, lip fissures, cheilitis, geographic tongue, and *Candida spp.*
- **Oral hygiene challenges** resulting from motor challenges, behavioral conditions, hypotonia, cognitive impairments related to intellectual disability, Alzheimer's' disease.
- **Related comorbid medical conditions that influence oral health management:** cardiac conditions, leukemia, osteoporosis, neurologic disease, endocrine disorders, visual and hearing impairments, and underlying immunologic dysfunction .

Systematic literature reviews on this topic are mainly in the pediatric Down syndrome population and there is a lack of consensus on the dental care guidelines for adults with Down syndrome.

OBJECTIVES/AIMS

1. Identify original research articles in peer-reviewed medical journals that focus on key questions about dental disease and oral health care needs of adult patients with DS.
2. Evaluate the quality of the existing evidence to identify deficiencies in current clinical knowledge to suggest directions for future research.
3. Begin to formulate evidence-based clinical practice guidelines for dental practitioners for the care of adults with DS.

DESIGN/METHODS

A literature search in PubMed (1960 to present) was conducted using the Medical Subject Headings (MeSH) terms [Down syndrome] and [dental care] and [stomatognathic disease]. An additional search was conducted using refined MeSH terms using the published recommendations for Clinical Queries search strategies of treatment from Medline⁶.

DSMIG-USA Adult-Health Working Group Key Questions:

1. What is the prevalence of dental conditions adults with DS?
2. What is the severity of dental conditions in adults with DS?
3. Among adults with DS, can those at ultra-high risk for dental conditions and poor dental outcomes be identified?
4. What are the accepted, screening or evaluation tests utilized?
5. Does evaluation for these conditions lead to reduced morbidity or mortality in those individuals?
6. What are the financial costs, potential benefits or harms of evaluation?
7. What are the available treatments for dental conditions in adults with DS?
8. Do the treatment options differ for adults with DS?
9. Do the treatments of dental conditions impact the morbidity or mortality in those individuals?
10. What are the barriers to treatments, including financial costs, accessibility, and potential harms?
11. Is standard treatment effective?

RESULTS/SUMMARY

AIM 1: SEARCH RESULTS

The initial PubMed search yielded 40 studies, from which 15 studies were eligible for inclusion in this review based on DSMIG-USA Adult Health Workgroup protocols. Follow-up search using refined MeSH terms yielded an additional 55 studies, from which and additional 4 studies met the inclusion criteria.

A total of 19 studies⁶⁻²⁴ were included in this review.

AIM 2: QUALITY OF THE EVIDENCE

Most of the published literature on these topics have weak methodology, use small sample sizes, and do not have comparison groups, limiting the interpretation of these findings for the development of clinical guidelines.

FINDINGS FROM THE LITERATURE REVIEW

Oral Health Conditions

- Dental caries rates may be lower among adult patients with DS
- Prevalence, extent and severity of periodontal disease are noted to be significantly higher in the adult DS population
- Increased rates of bone and tooth loss in this population
- Oral hygiene may play a minor role in the pathogenesis of periodontitis, as increased rates of periodontal disease are likely driven by an underlying immune dysfunction

Cognitive, Behavioral, and Sensory Needs

- Behavior can limit ability to provide necessary treatment
- Degree of intellectual disability does not appear to impact oral health outcomes
- Sedation may be considered to increase cooperation and to perform dental treatment safely

Access to Specialized Dental Care

- Caregivers and adults with DS want more information and targeted dental care
- Caregivers recognize challenges such as poor dexterity and cognitive capacity may impact oral hygiene

CONCLUSIONS

Several factors contribute to poor oral health outcomes in individuals with DS, including 1. specific oral health conditions, 2. cognitive, behavioral, and sensory needs, and 3. difficulties in accessing appropriate dental care.

Recommendations to deliver patient-centered dental care to adults with DS include specialized dental care, behavior management, and collaboration with healthcare providers to provide comprehensive care for co-occurring medical and psychiatric conditions.

RESEARCH RECOMMENDATIONS

1. Large, population-based prevalence studies of oral disease among adults with DS.
2. Studies to examine preventive care and treatment interventions specifically for periodontal disease among adults with DS.
3. Studies to determine how systemic conditions including immune dysfunction, sleep disorders, and metabolic diseases that may be mediators and/or moderators of stomatognathic disease among adults with DS.
4. Strategies to improve oral health outcomes by incorporating cognitive, behavioral, and sensory needs of this population.

TREATMENT RECOMMENDATIONS

1. More frequent preventive visits may be helpful in controlling the progression of periodontal disease, however limited data support increased frequency of exams and preventive care to prevent periodontal disease.
2. Early referral to a periodontist.
3. Tailored periodontal disease treatment including:
 - Non-surgical and surgical interventions
 - Local and systemic antimicrobial agents
 - Host modulation therapies
4. Utilization of pharmacologic and non-pharmacologic strategies for behavior compliance with dental exams and treatment.
5. Training in dental and hygiene schools, and continuing education for dental care professionals to improve oral health providers' competency to care for adults with DS.

REFERENCES

1. Botero, Javier Enrique, et al. "A Comprehensive Review of the Relationship Between Oral Health and Down Syndrome." *Current Oral Health Reports* (2024): 1-8.
2. Nilchian, Firouzeh, et al. "Comparison of oral indices in patients with Down syndrome and healthy individuals: A meta-analysis study." *Dental Research Journal* 20.1 (2023): 104.
3. Vieira, Thiago Isidro, et al. "Tooth wear prevalence in individuals with Down syndrome: a systematic review." *Clinical Oral Investigations* 27.3 (2023): 943-953.
4. Ferreira, Rafael, et al. "Prevention and periodontal treatment in Down syndrome patients: a systematic review." *PLoS one* 11.6 (2016): e0158339.
5. Contaldo, Maria, et al. "Oral manifestations in children and young adults with down syndrome: a systematic review of the literature." *Applied Sciences* 11.12 (2021): 5408.
6. Haynes, R. Brian, et al. "Optimal search strategies for retrieving scientifically strong studies of treatment from Medline: analytical survey." *BMJ* 330.7501 (2005): 1179.
7. Cichon, P., L. Crawford, and W-D. Grimm. "Early-Onset Periodontitis Associated With Down's Syndrome-A Clinical Interventional Study." *Annals of periodontology* 3.1 (1998): 370-380.
8. Elrefadi, Roba, et al. "Oral health status in individuals with Down syndrome." *Libyan Journal of Medicine* 17.1 (2022).
9. Gufran, Khalid, et al. "Prevalence of dental caries and periodontal status among Down's syndrome population in Riyadh City." *Journal of Pharmacy and Biomedical Sciences* 11.Suppl 2 (2019): S252-S255.
10. Kaye, P. L., et al. "Views and experiences of parents and siblings of adults with Down Syndrome regarding oral healthcare: a qualitative and quantitative study." *British Dental Journal* 198.9 (2005): 571-578.
11. Khojati, Ahmed, Malvin Janal, and Bobby Turner. "Periodontal health in Down syndrome: contributions of mental disability, personal, and professional dental care." *Special Care in Dentistry* 30.3 (2010): 118-123.
12. Ferrary, Teresita, et al. "Psychophysics for oral conscious sedation for dental care in Down syndrome adults with behavioral disorder." *Special Care in Dentistry* 39.4 (2019): 389-398.
13. Hanookai, Delaram, et al. "Herpesviruses and periodontopathic bacteria in Trisomy 21 periodontitis." *Journal of periodontology* 71.3 (2000): 376-384.
14. Martinez-Martinez, Rita E., et al. "Characterization of periodontal biofilm in Down syndrome patients: a comparative study." *Journal of Clinical Pediatric Dentistry* 37.3 (2013): 289-296.
15. Martins, Fabiana, et al. "Efficacy of antimicrobial photodynamic therapy as an adjuvant in periodontal treatment in Down syndrome patients." *Lasers in medical science* 31 (2016): 1977-1981.
16. Nuernberg, M. A. A., et al. "Periodontal status of individuals with Down syndrome: sociodemographic, behavioural and family perception influence." *Journal of Intellectual Disability Research* 63.10 (2019): 1181-1192.
17. Porovic, Selma, et al. "Oral health of Down syndrome adults in Bosnia and Herzegovina." *Materia socio-medica* 28.6 (2016): 437.
18. Roba, I., et al. "Prevalence of Periodontal Disease in Young Adults with Down Syndrome." *J Oral Health Dent* 2.3 (2018): 304.
19. Shapira, Joseph, et al. "Caries levels, Streptococcus mutans counts, salivary pH, and periodontal treatment needs of adult Down syndrome patients." *Special Care in Dentistry* 11.6 (1991): 248-251.
20. Ulseth, Jens Otto, et al. "Dental caries and periodontitis in persons with Down syndrome." *Special Care in Dentistry* 11.2 (1991): 71-73.
21. Yoshihara, Toshihiro, et al. "Effect of periodic preventive care on the progression of periodontal disease in young adults with Down's syndrome." *Journal of clinical periodontology* 32.6 (2005): 556-560.
22. Zaldívar-Chiapa, R. M., et al. "Evaluation of surgical and non-surgical periodontal therapies, and immunological status, of young Down's syndrome patients." *Journal of periodontology* 76.7 (2005): 1061-1065.
23. Zigmund, Maora, et al. "The outcome of a preventive dental care programme on the prevalence of localized aggressive periodontitis in Down's syndrome individuals." *Journal of Intellectual Disability Research* 50.7 (2006): 492-500.
24. Zizzi, Antonio, et al. "Periodontal status in the Down's syndrome subjects living in central-eastern Italy: the effects of place of living." *International Journal of Dental Hygiene* 12.3 (2014): 193-198.