



ULST Timisoara

Multidisciplinary Conference on Sustainable Development

15-16 May 2025



The impact of Diabetes on Denthal Health in Companion Animals

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- Abstract:**Diabetes mellitus in companion animals is closely linked to poor dental health, increasing the risk of periodontal disease, gum inflammation, and tooth loss. These issues can worsen blood sugar control and systemic inflammation, reducing insulin effectiveness. Regular oral care and veterinary check-ups, including dental cleanings and procedures, are essential for improving insulin sensitivity and overall health. An integrated dental care approach can enhance the quality of life and reduce diabetes-related complications in affected animals.

Introduction

Deficiency or resistance [Ditzel, 1968; Gilor et al., 2016]. Type 1 diabetes is typical in dogs, while cats are more prone to type 2, often linked to obesity and inactivity [Mattin et al., 2014]. Beyond metabolic effects, diabetes causes systemic complications and weakens immune defenses, increasing infection risk [Gilor et al., 2016]. One key complication is periodontal disease, which shares a bidirectional relationship with diabetes and may impair glycemic control [DeBowes, 1998; Mealey, 2006; Verhulst et al., 2019]. Chronic oral inflammation promotes insulin resistance through cytokines like IL-6 and TNF-α, while diabetes alters saliva, favoring plaque and tartar buildup [Poppl et al., 2015; Taylor, 2003]. Although well studied in humans, this link remains underexplored in veterinary medicine [Bellows et al., 2019].

Material and method

This meta-analysis includes 49 scientific articles from databases like PubMed and eScience, examining how diabetes mellitus affects dental health in dogs and cats. Studies selected were clinical trials, observational research, and reviews focusing on conditions such as periodontal disease and tooth loss. Selection was based on methodological quality, relevance, and clarity. Key data were extracted to assess the prevalence of dental disorders in diabetic animals, related risk factors, and mechanisms such as inflammation, immune dysfunction, and microbiota changes due to hyperglycemia. Species differences, diagnostic methods, and treatments were also considered. The goal is to offer a clear synthesis of current evidence to help veterinarians improve care for diabetic animals with dental issues.

Results and discussions

1. Anatomy of the Dentition in Companion Animals.

The dentition in dogs and cats plays a critical role in their oral health, feeding efficiency, and overall well-being. Understanding the structure of their teeth is essential for diagnosing and treating dental conditions, particularly in diabetic animals, as dental health impacts metabolism and systemic health (Gioso and Carvalho, 2005; Pereira dos Santos et al., 2019; Van Valkenburgh, 1989).

Tooth Type	Number of Teeth (Dogs)	Number of Teeth (Cats)	Function
Incisors	12	12	Slicing food
Canines	4	4	Grasping prey
Premolars	16	10	Chewing and grinding
Molars	10	4	Crushing and processing food
Total Teeth	42	30	—

Tabel 1. Comparative dentition of companion animals [Gioso and Carvalho, 2005; Pereira dos Santos et al., 2019; Van Valkenburgh, 1989].



Figure 1 - Anatomical Structure of the Dentition in pets.

2. Common Dental Pathologies in Companion Animals

Dental pathologies in companion animals, particularly those with diabetes, significantly affect their oral and systemic health. Common conditions include periodontal disease, gingivitis, dental caries, and dental abscesses. Periodontal disease, caused by bacterial plaque accumulation and gingival inflammation, is common in diabetic animals due to systemic inflammation and metabolic changes (Bellows et al., 2019; Gioso and Carvalho, 2005). Gingivitis, an early form of periodontal disease, can be exacerbated by diabetes, leading to more severe periodontal issues (Mealey, 2006; Franco-Martínez et al., 2020). Dental caries, though less common, can occur due to bacterial acids and are more frequent in diabetic animals with elevated glucose levels in saliva (Bender and Bender, 2003; Kyllar and Kral, 2013). Dental abscesses, caused by bacterial infections at the tooth root, are also more common in diabetic animals, requiring immediate veterinary intervention to avoid complications (Franco-Martínez et al., 2020; Gosteva, 2022). These conditions can severely affect the animal's quality of life if left untreated.



Figure 2- Diverse Dental Pathologies in Companion Animals.

3. The Correlation Between Diabetes in Companion Animals and Dental Health.

Diabetes in companion animals is linked to increased risk of dental issues, particularly periodontal disease, due to changes in glucose metabolism and systemic inflammation (Cunha et al., 2025; Verhulst et al., 2019). Periodontal disease can worsen glycemic control, creating a vicious cycle between oral and metabolic health (Mealey, 2006; Taylor, 2003). Chronic inflammation and immune dysfunction in diabetic animals contribute to gingival tissue deterioration, facilitating bacterial invasion (DeBowes, 1998; Gensini et al., 1992). Studies show that dental treatments improve glycemic control, with interventions reducing gingival inflammation and improving blood glucose levels (Oda et al., 2011; Taylor, 1999; Verhulst et al., 2019). Maintaining good oral health is crucial for managing diabetes and preventing further complications in diabetic companion animals (Bellows et al., 2019; Cunha et al., 2025).



Figure 3 – Gingival Tissue Destruction.

4. Impact of Glycemic Control on Dental Health.

Glycemic control is vital for diabetic dogs, reducing the risk of dental issues like gingivitis and periodontal disease [Gioso and Carvalho, 2005; Cunha et al., 2024]. Proper blood glucose management minimizes gingival inflammation, lowers bacterial infections, and prevents halitosis [Bender and Bender, 2003; Bellows et al., 2019]. Well-controlled diabetes helps maintain long-term oral health by reducing tissue changes and the prevalence of periodontal conditions [Mealey, 2000; Franco-Martínez et al., 2020]. Effective glycemic control ultimately improves both metabolic and dental health in diabetic dogs [Stella et al., 2018; Van Valkenburgh, 1989].



Figure 4 – Halitosis in Companion Animals



Figure 5 – Methods of Blood Glucose Monitoring.

5. Factors Influencing Oral Health in Diabetic Companion Animals.

Oral health in diabetic pets is influenced by blood sugar control, diet, hygiene, microbiota, genetics, and other diseases. Diabetes alters immunity and promotes harmful bacteria, increasing the risk of periodontal disease [Brown et al., 2014; White, 2017]. Soft or carb-rich diets worsen plaque buildup, while balanced diets help reduce risk [Smith et al., 2010]. Daily brushing and regular dental cleanings are essential. Small breeds and pets with other systemic illnesses are more vulnerable. Integrated care is key to preventing dental complications in diabetic animals [Taylor, 2018].

Factor	Impact on Oral Health
Glycemic Control	Poor control leads to infections and inflammation.
Diet	High-carb foods increase plaque; special diets help maintain oral health.
Oral Hygiene	Regular brushing prevents plaque and periodontal disease.
Oral Microbiota	Imbalances lead to plaque and gum inflammation.
Genetic Predisposition	Small breeds are more prone to oral issues.
Other Systemic Conditions	Diabetes with other conditions accelerates periodontal disease.
Inflammation	Chronic high blood sugar increases inflammation.
Bacterial Species	Pathogenic bacteria cause tissue damage and bone loss.
Dental Care	Regular cleanings prevent severe oral infections.

Table 2. Factors influencing oral health in diabetic pets [Brown et al., 2014; Miller et al., 2012; Smith et al., 2010; White, 2017].

6. Prevalence of Dental Diseases in Diabetic pets.

Diabetic dogs show a 30–40% higher prevalence of dental diseases compared to healthy ones, due to elevated salivary glucose, weakened immunity, and rapid plaque accumulation [Brown et al., 2013; Stella et al., 2018]. Advanced age, high-carbohydrate diets, poor oral hygiene, and lack of dental treatment increase the risk [Mattin et al., 2014; Taylor, 2018; Kyllar and Kral, 2013; Hirschfeld, 1934; Nelson, 2015; Oda et al., 2011]. Oral care and glycemic control can reduce disease severity and improve quality of life [Brown et al., 2013; Nelson, 2015; Taylor, 2018].

Epidemiological Factors	Explanation
Increased Salivary Glucose	Contributes to bacterial plaque development and favors the proliferation of pathogenic microorganisms.
Immune Alterations	Decreases the body's ability to fight infections, increasing the risk of oral diseases.
Age	Geriatric patients are more prone to dental conditions compared to younger ones due to physiological changes and dental wear.
Dental Care Regimen	Proper oral hygiene is associated with a lower prevalence of dental diseases.

Table 3. Epidemiological Factors Involved in the Prevalence of Dental Diseases in Diabetic pets.

7. Treatment of Dental Pathologies and Their Effects on Diabetes.

The dental diseases worsen diabetes in animals by increasing inflammation and insulin resistance [Mealey, 2006; Taylor, 2003; Verhulst, 2019]. Treatments like scaling, extractions, and antibiotics help reduce inflammation and stabilize blood sugar [Logan, 2021; Oda, 2011; Van Valkenburgh, 1989; Taylor, 1999]. Good pain control and regular dental care—brushing, dental diets, and check-ups—are key to managing both oral and diabetic health [Miller, 1994; Logan, 2021; Van Valkenburgh, 1989].



Figure 6 – Dental Procedures in pets.

Conclusions

Diabetes mellitus increases the risk of dental diseases in companion animals, but appropriate dental treatments can improve glycemic control and reduce systemic inflammation. Oral hygiene, regular brushing, and routine veterinary dental check-ups are essential for preventing complications. An integrated approach—combining prevention and treatment—helps improve overall health and quality of life in diabetic pets.