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Influence of dental calculus on tooth abnormalities in cats and contributing factors

Putri Arnolia Zahra, Tetty Barunawati Siagian*

Veterinary Paramedic Study Program, Vocational School, IPB University, Bogor, Indonesia

ABSTRACT: Dental plaque is a thin biofilm composed of bacteria that accumulate on tooth surfaces. If not adequately removed, plaque can mineralize into dental calculus, which is associated with various oral health issues. In cats, this condition may lead to dental abnormalities, such as malocclusion and tooth resorption; however, reports from Indonesia remain limited. This study investigated the relationship between dental calculus and dental disorders in 45 cats, as well as the contributing factors of this relationship. Clinical examinations were performed to assess calculus formation and to identify dental abnormalities. A structured questionnaire was administered to cat owners regarding their oral health awareness and management practices. Data were analyzed descriptively and using Fisher's Exact Test to evaluate the association between calculus and dental abnormalities. Of the 45 cats examined, 28 (62.2%) had dental calculus, of which eight (28.6%) exhibited dental abnormalities. Owner surveys revealed that although 82% were aware of tartar, only 8.9% reported performing routine dental examinations on their pets. In conclusion, dental calculus significantly contributes to the development of dental abnormalities in cats, with feeding habits identified as a key influencing factor.

Keywords:
cat, dental calculus, malocclusion, tooth resorption

■ INTRODUCTION

Cats (*Felis catus*) are among the most common companion animals worldwide (Khairunnisa *et al*. 2021). Responsible pet ownership emphasizes food, shelter, vaccination, and preventive health care, including oral management. Oral health is fundamental to overall well-being but is often overlooked. Improper feeding practices may promote microbial colonization by bacteria, viruses, and fungi, accelerating the development of periodontal disease (Pratama *et al*. 2018). The prevalence of periodontal disease in adult cats in Indonesia is 85% (Maciel *et al.* 2020), compared to 21% in the United States (Banfield Pet Hospital 2016). This disparity highlights gaps in preventive care and raises concerns regarding risk factors, including feeding habits and access to veterinary services. Despite its significance, research on the contribution of dental calculus to tooth abnormalities in Indonesian cats remains scarce. This study aimed to determine the association between dental calculus and dental abnormalities in cats and to identify the key contributing factors.

■ MATERIALS AND METHODS

This study was conducted on 45 cats that were presented to the Xing Pet Care and Clinic, Indonesia, between August 5 and November 5, 2024. The clinical data included assessments of dental calculus and observations of dental abnormalities, and additional information was obtained through structured questionnaires administered to cat owners. Dental calculus occurrence was then categorized into five severity grades (0–4) based on the classification of the Willow Creek Veterinary Center (2024). The collected data were summarized descriptively and expressed as percentages. To evaluate the association between dental calculus and dental abnormalities, Fisher's Exact Test was employed, given the relatively small sample size and the presence of zero counts within some categories. Statistical significance was set at $p < 0.05$.

■ RESULTS AND DISCUSSION

Dental examinations showed that 28 of the 45 cats (62.2%) had dental calculus, while 37.8% did not (Table 1). Calculus severity was classified into five grades: grade 0 (no calculus) and grade 1 (mild calculus) comprised 28.9% of the sample, grade 2 (moderate) comprised 17.8%, grade 3 (severe) comprised 11.1%, and grade 4 (very severe) comprised 4.4%. Grade 2 calculus was most frequent, mainly in cats aged 1–3 years. This age group encounters varied diets and textures, potentially leading to the formation of calculus. Contributing factors include diet composition, feeding behaviors, and outdoor exposure.

Table 1 Distribution of dental calculus severity in cats.

Severity of Dental Calculus	Total (n=45)	Percentage (%)
No dental calculus (Grade 0)	17	37.8
Mild calculus (Grade 1)	13	28.9
Moderate calculus (Grade 2)	8	17.8
Severe calculus (Grade 3)	5	11.1
Very severe calculus (Grade 4)	2	4.4

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Table 2 Distribution of dental abnormalities based on the presence of dental calculus in cats

Dental Calculus	Teeth Abnormalities	
	Present	None
Present	8	21
None	0	16
Total	8	37

According to the Willow Creek Veterinary Center (2024), the clinical signs of dental calculus in cats vary in severity. At Grade 1, soft plaque begins to accumulate and mineralize into calculus. By Grade 2, moderate accumulation leads to gingival displacement, creating pockets for food debris, bacteria, and other particles. Grade 3 is characterized by significant plaque and calculus deposition, with infection developing along the tooth. Grade 4 is characterized by extensive calculus accompanied by severe periodontal disease. The presence of calculus markedly increases the risk of periodontal disease, which is influenced by multiple factors, including age, breed, genetics, diet, overall health, habitat, oral hygiene, and oral microbiota composition (Özavci *et al.* 2019, Niemiec *et al*. 2020).

Among the 28 cats with dental calculus, eight (28.6%) had dental abnormalities. These included malocclusions (25%) and tooth resorption (75%), as illustrated in Figure 1. The overall distribution of dental abnormalities in the 45 cats is presented in Table 2. Statistical analysis using Fisher's Exact Test demonstrated a significant association between dental calculus and dental abnormalities ($p = 0.036$). Notably, none of the cats without calculus exhibited dental problems, underscoring the role of calculus in predisposing cats to conditions such as tooth resorption and dental malocclusion. Tooth resorption was observed more frequently in older cats, consistent with Gorrel (2015) report that the prevalence of this condition increases with age of the cat. In contrast, malocclusion was primarily observed in cats transitioning into adulthood, likely resulting from retained deciduous teeth that impede the eruption of permanent dentition (Putter 2021).

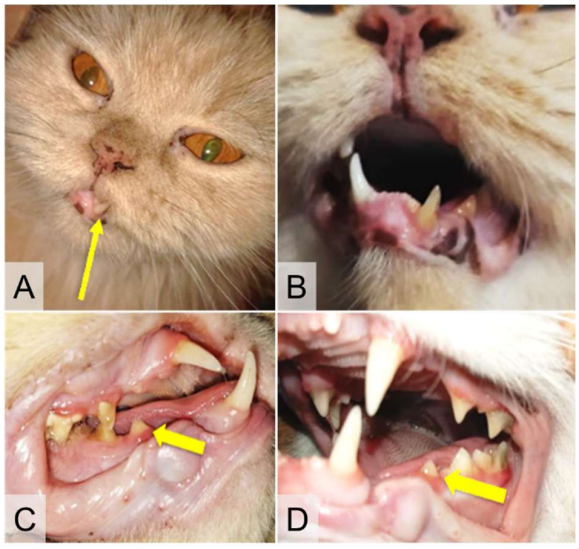

Figure 1. Clinical presentation of dental abnormalities in cats, including malocclusion undershot (A), malocclusion closer (B), and tooth resorption affecting premolar 307 (C) and premolar 407 (D).

The owner questionnaire further highlighted deficiencies in awareness and preventive practices regarding dental health in cats. While the majority of owners (82%) were aware of dental calculus, only 8.9% reported performing routine dental examinations on their cats. This finding suggests that dental care remains a low priority in feline health management, despite its recognized impact on the overall well-being.

■ CONCLUSION

Dental calculus plays a significant role in the development of tooth abnormalities in cats. Among the various predisposing factors, feeding habits have emerged as the most influential factor in the formation and progression of calculus.

■ AUTHOR INFORMATION

Corresponding Author

*TBS: tettybarunawatisiagian@apps.ipb.ac.id
Veterinary Paramedic Study Program, Vocational School IPB University, Kampus IPB Cilibende Jl Kumbang No. 14 Bogor 16151, West Java, INDONESIA.

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