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Original scientific paper

Thermography as a method for the evaluation of periodontal disease in cats

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ABSTRACT

This study aimed to establish the range of temperature of cats' gums based on gingival index (GI) degrees, and to detect temperature variations using a thermal camera. The study was performed on 50 cats (22 female and 28 male). Their body weights were between 2 and 6 kg (3.58±0.87), and ages between 1 and 5 years (2.05±1.22). The gingival temperatures of three different anatomical regions (Free Gingiva (FG), Attached Gingiva (AG), Alveolar Mucosa (AM)) and disease grades were recorded, determined according to three different GI systems. There was a significant temperature difference (r) in the maxilla between cats with grade 0 GI and cats with grade 1 GI, which was observed in the FG (0.86°C, P<0.05) but not in the AG (0.66°C, P>0.05) and AM (0.47°C, P>0.05). Notably, a significant decrease was observed in FG among these regions. In the mandible, significant temperature changes were observed among the groups in the FG (GI0-GI1 0.93°C, GI1-GI2 2.15°C, GI0-GI2 1.22°C; P=0.001), AG (GI0-GI1 0.78°C, GI1-GI2 -2.02°C; P=0.002), and AM (GI0-GI1 0.41°C, GI1-GI2 -1.89°C, GI0-GI2 -1.48°C; P=0.002) regions as the severity of GI increased. In conclusion, in light of the findings obtained in this study, it was concluded that a thermal camera may be an effective preliminary diagnostic tool that provides a more objective evaluation compared to GI systems in determining the inflammatory picture of gingival inflammation in cats.

Key words: gingival index; gingivitis; thermal camera; feline

Introduction

Periodontal disease is categorized into two stages: gingivitis and periodontitis. Gingivitis represents the initial and reversible phase of the disease process, characterized by inflammation limited to the gingival tissues, without affecting the periodontal ligament or alveolar bone (HARVEY, 2005; BELLOWS, 2010). Gingivitis, initiated by plaque bacteria, can be reversed with preventive treatment and home care (GORREL et al., 2013). Periodontitis follows gingivitis, and is defined as an inflammatory disease affecting the deeper supporting structures of the tooth, including the periodontal ligament and alveolar bone, caused by microorganisms (FROST and WILLIAMS, 1986; BELLOWS, 2010). It is reported that periodontal disease affects 70% of cats between 20 and 27 months of age, and 85% of cats older than 6 years (FROST and WILLIAMS, 1986; NIEMEC, 2008; BELLOWS, 2010). In a study by VERHAET and WETTER (2004), periodontal disease was identified as the most prevalent oral disease encountered during examinations of 753 cats (73.2% gingivitis and 18.5% periodontitis). Diagno-

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sis of periodontal disease requires a comprehensive periodontal examination involving dental exploration and periodontal probing (LEWIS and MILLER, 2010), supported by full-mouth dental radiography (TSUGAWA and VERSTRAETE, 2000; TSUGAWA et al., 2003). However, it is important to note that radiographs may provide an incomplete assessment of the status of the periodontium (VIJAY and RAGHAVAN, 2013).

Infrared thermography (IRT) is a contemporary, non-invasive and safe technique for visualizing thermal profiles (KUNC et al., 2007). Unlike methods involving X-rays or gamma radiation, which may pose potential harm, thermography safely assesses variations that may indicate underlying issues at a general level. It facilitates real-time visual perception through color variations, and enables swift data capture from stationary targets, while capturing thermal patterns (BERZ and SAUER, 2007; SIKDAR et al., 2010; LAHIRI et al., 2012). In a study conducted by YANMAZ et al. (2015) on Kangal dogs, the researchers concluded that comparing rectal temperature and ocular temperature obtained with a thermal camera could serve as an alternative method for determining body temperature. In another study, BARNETT et al. (1989) utilized computer-based thermographic imaging techniques to visualize the free gingiva and attached gingiva regions of healthy, mildly inflamed, and moderately to severely inflamed gingiva. They observed temperature differences in these regions. Similarly, a study by KOMORIYAMA et al. (2003) noted temperature differences between different parts of the gingiva using a thermal camera. YIGITARSLAN et al. (2023) reported that IRT can be used to determine thermal changes in the oral tissues of dogs with gingivitis, as evidenced by clinical and IRT examinations of the gingiva of 458 teeth from 16 dogs.

This study aimed to establish reference temperature ranges for cat gums, under propofol anesthesia with diazepam, based on index degrees, and to detect temperature variations using a thermal camera. Our hypothesis is that thermography may provide veterinarians with objective information about periodontal inflammation levels in tissues during oral and gingival examinations of cats.

Materials and methods

This study was conducted within the framework of an experimental design protocol approved by the Burdur Mehmet Akif Ersoy University Experimental Animals Local Ethics Committee in Turkey (21.10.2020/675).

Pre-Anesthetic Examination. The animals eligible for this study were those that had undergone ovariohysterectomy and orchiectomy procedures at Burdur Mehmet Akif Ersoy University Faculty of Veterinary Medicine Animal Hospital between 2020 and 2022. Inclusion criteria included non-brachycephalic cats, adult cats with a calm and docile temperament, and an ASA (American Society of Anesthesiologists) status of less than II. Cats were required to have had no history of medication use for a minimum of four weeks prior to the start of the experiment. Kittens and young cats with deciduous teeth, cats displaying aggressive behavior, and cats with chronic illnesses were excluded from the study.

Anesthesia. Diazepam (Diazem amp® IM/IV, 10 mg/2 ml, Deva, Istanbul) at a dose of 0.1 mg/ kg was administered as the preanesthetic and propo- fol (Propofol® 1% Fresenius, Germany) at a dose of 3 mg/kg was given intravenously for induction. Orotracheal intubation with an endotracheal tube (3.0, 3.5 no Bıçakçılar A.Ş., Istanbul) was then performed, connected to a double vaporizer gas anesthesia device (Draeger, Primus®, Germany) with an automatic ventilator.

Gingival index degrees. The degree of plaque on each tooth was recorded according to the Plaque Index of LÖE (1967). Clinical findings, such as redness, edema and bleeding in the gingiva, were evaluated and graded according to the gingival index of LÖE and SILNESS (1963). The tip of the periodontal probe was gently inserted into the periodontal pockets and the occurrence of bleeding was graded according to the Modified Papillary Bleeding Index (YIGITARSLAN et al., 2023).

Thermography. Rectal temperatures were measured by one person using a digital thermometer (Kruuse Digital Thermometer; Jørgen Kruuse, Denmark). For the thermographic examination, the cat was allowed to rest in a temperature-stabilized (between 20-25ºC) examination room for 30 min-

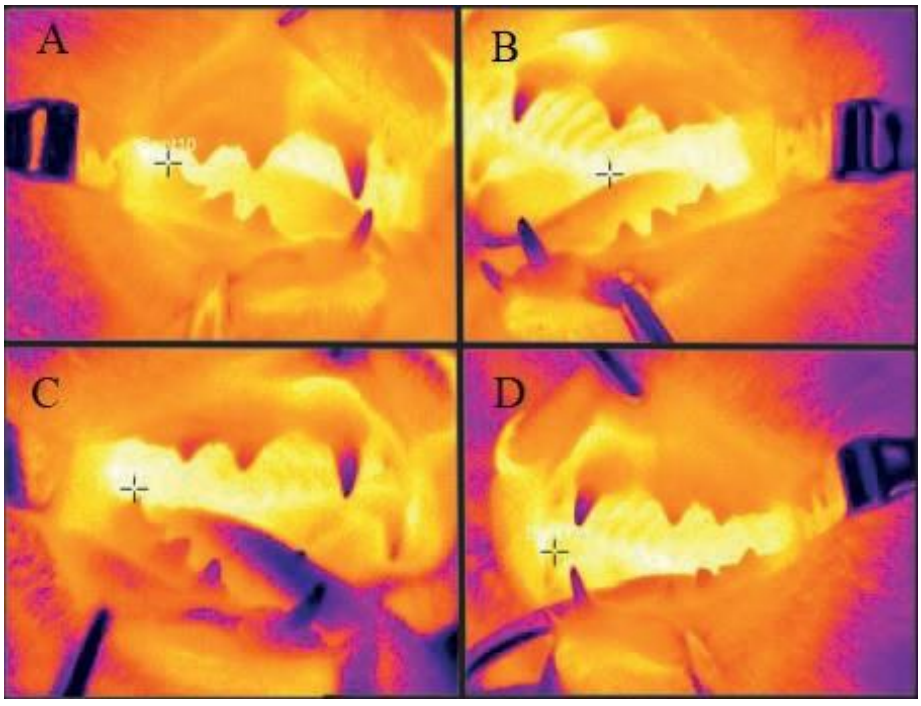

Fig. 1. A, B: Lateral thermographic image of teeth and gums before intubation, C, D: Lateral thermographic image of teeth and gums after intubation

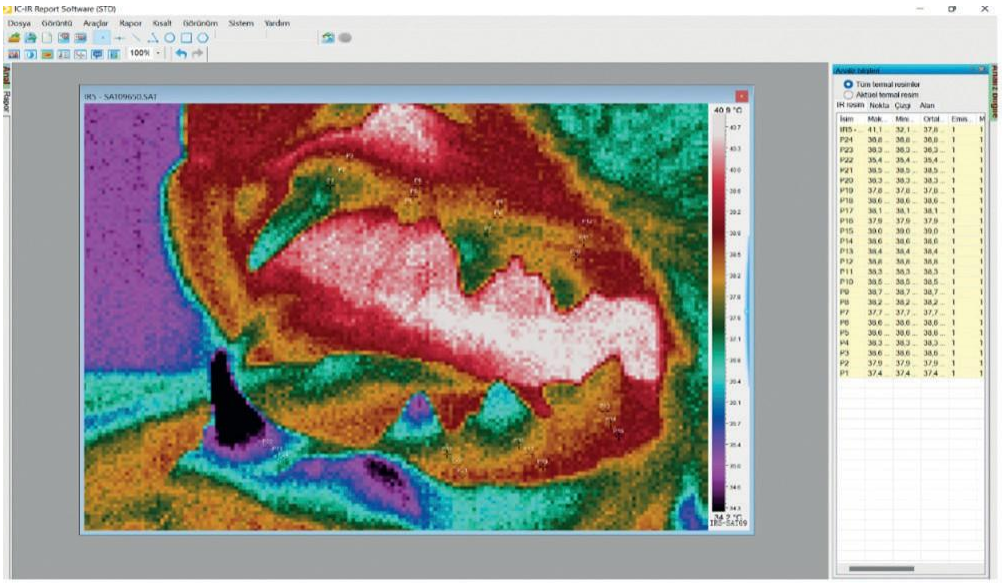

Fig. 2. Analysis of thermal images with IC IR Report Software®

utes with the owner. Pre- and post-intubation thermographic images were taken with an IRT camera (Trotec® EC060V, 160x120 pixels, Germany) at a distance of 20 cm from the buccal surface gingiva of the incisor, canine, premolar and molar teeth in the right and left maxillary and mandible (Fig. 1). The thermal images were then analyzed with the help of IC IR Report Software®, and the temperature values of the free gingiva (FG), attached gingiva (AG), and alveolar mucosa (AM) at the level of the canine, premolar, and molar teeth were determined and recorded pointwise (Fig. 2).

Table 1. Representation of surface temperatures of maxillary and mandibular gingival areas according to Gingival index (GI), Papillary bleeding index (PBI), Plaque index (PI) grades

Maxilla	GI0 (N:310)	GI1 (N:67)	GI2 (N:23)	Maxilla	PBI0 (N:375)	PBI1 (N:16)	PBI2 (N:9)	Maxilla	PI0 (N:360)	PI1 (N:26)	PI2 (N:14)
FG	33.65 ±2.8^{a}	32.78 ±2.0^{b}	34.15 ±2.36^{a}	FG	33.51 ±2.70^{a}	33.91 ±2.33^{a}	33.96 ±2.63^{a}	FG	33.59 ±2.75^{a}	32.55 ±1.86^{b}	33.97 ±1.74^{c}
AG	34.02 ±2.7^{a}	33.36 ±1.88^{a}	34.60 ±2.31^{a}	AG	33.91 ±2.63^{a}	34.35 ±2.32^{a}	34.44 ±2.50^{a}	AG	33.97 ±2.69^{a}	33.27 ±1.83^{a}	34.39 ±1.59^{a}
AM	34.56 ±2.5^{a}	34.08 ±1.71^{a}	35.10 ±2.23^{a}	AM	34.48 ±2.47^{a}	34.78 ±2.32^{a}	35.15 ±2.22^{a}	AM	34.53 ±2.53^{a}	34.03 ±1.73^{a}	34.94 ±1.42^{a}
Mandible	**GI0 (N:327)**	**GI1 (N:52)**	**GI2 (N:21)**	**Mandible**	**PBI0 (N:375)**	**PBI1 (N:16)**	**PBI2 (N:9)**	**Mandible**	**PI0 (N:382)**	**PI1 (N:15)**	**PI2 (N:3)**
FG	33.23 ±3.03^{a}	32.30 ±2.41^{b}	34.45 ±1.45^{c}	FG	33.10 ±2.97^{a}	33.96 ±1.90^{a}	34.81 ±0.99^{a}	FG	33.20 ±2.95^{a}	32.32 ±1.92^{a}	33.66 ±3.49^{a}
AG	33.56 ±3.06^{a}	32.78 ±2.36^{b}	34.80 ±1.34^{c}	AG	33.46 ±2.98^{a}	34.32 ±1.83^{a}	35.12 ±0.93^{a}	AG	33.55 ±2.97^{a}	32.87 ±1.92^{a}	34.16 ±3.10^{a}
AM	33.63 ±2.94^{a}	33.22 ±2.23^{b}	35.11 ±1.28^{c}	AM	33.85 ±2.86^{a}	34.53 ±1.77^{b}	35.50 ±0.90^{c}	AM	33.93 ±2.85^{a}	33.32 ±1.89^{a}	34.43 ±2.88^{a}

^{a,b,c} : The difference between groups with different letters in the same row is statistically significant.

FG: Free gingiva; AG: Attached gingiva; AM: Alveolar mucosa; GI: Gingival index; PBI: Papillary bleeding index; PI: Plaque index; N: Number of teeth

Statistical Analysis. SPSS v.27.0 (IBM, United States of America) was used for data analysis. Skewness and kurtosis values were taken into consideration in the evaluation of normal distribution. Data with skewness and kurtosis values between -1.5 and +1.5 were considered to be normally distributed. To compare the significance of the temperature difference between the gingival regions of the cats with the same index grades, the T test was used for those with normal distribution, and the Mann Whitney U test for those without normal distribution. The ANOVA Tukey test was used in the analysis of the data with normal distribution, and the Kruskal Wallis test in the analysis of the data without normal distribution, in the control of the importance of the temperature differences between the gingival regions in relation to the indexes. Pearson correlation analysis was performed to determine the relationship between the gingival index degrees and the age of the cats. $P<0.05$ was considered statistically significant. The data obtained were presented as mean ± standard deviation.

Results

The study was performed on 50 cats (22 female and 28 male). Their body weights were between 2 and 6 kg (3.58±0.87), their ages were between 1 and 5 years (2.05±1.22), and their mean rectal temperatures were 37.84±0.74°C. A total of 800 teeth were examined in this study. These teeth were dis-

tributed as follows: 100 canines and 300 premolars in the maxilla, and 100 canines, 200 premolars, and 100 molars in the mandible.

The mean temperature values of the different gingival regions are shown in Table 1. In the maxilla, there was a significant temperature difference (r) between cats with grade 0 GI and cats with grade 1 GI, which was observed in the FG (0.86°C, P<0.05) but not in the AG (0.66°C, P>0.05) and AM (0.47°C, P>0.05). Notably, a significant decrease was observed in the FG among these regions. In the mandible, significant temperature changes were observed in the groups in the FG (GI0-GI1 0.93°C, GI1-GI2 2.15°C, GI0-GI2 1.22°C; P=0.001), AG (GI0-GI1 0.78°C, GI1-GI2 -2.02°C; P=0.002), and AM (GI0-GI1 0.41°C, GI1-GI2 -1.89°C, GI0-GI2 -1.48°C; P=0.002) regions as the severity of GI increased.

In the maxillary gingiva, significant temperature differences were observed between different regions, specifically between AG and FG temperatures (0.370°C, P=0.207), AM and FG temperatures (0.909°C, P=0.001), and AM and AG temperatures (0.538°C, P=0.037). Similarly, in the mandibular gingiva, the analysis also revealed temperature disparities between AG and FG temperatures (0.196°C, P=0.563), AM and FG temperatures (0.706°C, P=0.001), and AM and AG temperatures (0.510°C, P=0.022). While the temperature differences between the FG regions in the maxilla and mandible (0.419±0.231°C, P=0.071) were not statistically significant, there was a statistically significant temperature difference between the AG regions (0.457±0.231°C, P=0.048) and the AM regions (0.612±0.23°C, P=0.006).

There was a negative correlation between the age of the cats and the degree of maxillary gingival inflammation (P=0.011). In contrast, a positive correlation was observed between the age of the cats and both the degree of maxillary gingival inflammation (P=0.004) and of mandibular plaque accumulation (P=0.015) (Table 2). No statisti- cally significant differences in gingival tempera- tures were found between the pre-intubated and post-intubated stages.

Table 2. Correlation between age and index grades of maxillary and mandibular gingiva in cats

			Maxilla			Mandible		
		Age	Gingival index	Papillary bleeding index	Plaque index	Gingival index	Papillary bleeding index	Plaque index
Age	Pearson correlation	1	-0.127*	0.028	0.143**	-0.084	-0.032	0.121*
	p		0.019	0.013	0.000	0.093	0.527	0.015
	N	400	400	400	400	400	400	400
Gingival index	Pearson correlation	-.127*	1	0.714**	0.274**	1	0.728**	0.333**
	p	0.011		0.000	0.000		0.000	0.000
	N	400	400	400	400	400	400	400
Papillary bleeding index	Pearson correlation	-0.028	0.714**	1	0.023	0.728**	1	0.194**
	p	0.580	0.000		0.643	,000		.000
	N	400	400	400	400	400	400	400
Plaque index	Pearson correlation	0.143**	0.274**	0.023	1	0.333**	0.194**	1
	p	0.004	0.000	0.643		0.000	0.000	
	N	400	400	400	400	-0.127*	-0.028	0.143**

*: P< 0,05 **: P< 0,01 N: Number of teeth

Discussion

The objective of this study was to establish reference temperature ranges for cat gums under propofol anesthesia with diazepam, based on index degrees, and to detect temperature variations using a thermal camera. To the best of the authors' knowledge, no study has examined thermograph- ic findings related to the degrees of GI in cats. By conducting thermographic examinations of the cats' gums using the GI system, one can identify temperature differences across various degrees of GI. Consequently, thermography can be a valuable tool for assessing gingiva-related diseases. A previous study in dogs also provided support for the same argument (YIGITARSLAN et al., 2023).

In the present study, it was observed that gingival temperature tends to decrease when the GI falls within the range of GIO to GI1, but is expected to rise when the GI falls within the range of GI1 to GI2. This phenomenon can be attributed to the expansion of capillary rings in inflamed gingiva, with platelets partially obstructing blood flow by adhering to the vessel walls. Consequently, this leads to a stasis effect in the gingival margin (HANSSON et al., 1968), resulting in the lower temperature values observed in GI0 and GI1. The formation of plaque leads to subsequent vascular proliferation, resulting in the development of new vascular loops, as documented in previous studies (EGELBERG, 1966; NUKI and HOCK, 1974). This expanded vascular network enhances blood flow to the affected area, potentially causing an elevation in temperature within the gingival sulci. Plaque growth imparts pathogenic properties by stimulating the expansion of microvasculature in the gingival sulcus tissues. This vascular response intensifies local blood flow, ultimately resulting in an increase in temperature within the gingival crevices (MAEDA et al., 1979). This phenomenon explains why, in the current study, an elevation in temperature was observed when the gingival index falls within the range of GI1 to GI2.

In this study, the level of GI0 exhibited a trend in temperature that increased from the coronal to the apical region, with the lowest temperature observed in the FG, followed by the AG, and the highest temperature recorded in the AM. However, in the case of humans, it has been proposed that there exists a temperature difference between various regions of the gingiva, with the FG having a higher temperature than the AG, and the AM exhibiting the highest temperature (KOMORIYAMA et al., 2003). This variation could be linked to regional differences in blood flow, as previously mentioned (BAAB et al., 1986; KERDVONGBUNDIT et al., 2002).

A previous study found that the temperatures measured in the gingival papillae were consistently higher in the lower jaw compared to the upper jaw. This difference is likely attributed to the lower maxillary temperatures being the result of the cooling effect of air flowing through the nasal cavities during respiration (BERGSTRÖM and VARGA, 1971). However, in the present study, we observed that temperatures of the maxilla were higher than the mandible in the AG and AM regions. Our findings align with a study conducted in dogs (YIGITARSLAN et al., 2023). Additionally, a prior study on humans reported higher blood flow in the gingiva of the anterior region of the maxilla compared to the mandible. This disparity in blood flow could be attributed to the mandible's higher bone densi- ty, which indirectly leads to lower vascular support compared to the maxilla (KERDVONGBUNDIT et al., 2002).

A primary limitation of the present study pertains to the relatively small sample size, potentially constraining the applicability of the findings to a broader feline population. Additionally, the study overlooks breed variability, despite the known disparities in feline breeds concerning their susceptibility to periodontal disease (O'NEIL et al., 2023). The study did not account for breed-specific differences, which could influence gingival temperature variations. Moreover, the study exclusively focused on cats aged between 1 to 5 years. Given that periodontal disease can affect cats across various age groups (O'NEIL et al., 2023), it remains plausible that different age cohorts may exhibit distinct temperature patterns. Addressing these limitations in future research could involve expanding the sample size, considering breed differences, and widening the age range under investigation.

Conclusions

In summary, this study demonstrates the potential of infrared thermography as a non-invasive tool for assessing gingival temperature variations in cats on the basis of GI degrees, crucial for early detection and management of periodontal disease in felines. The findings offer a foundation for further research, providing veterinarians with a promising means of objectively evaluating periodontal tissues during oral and gingival examinations in cats, and advancing our understanding of periodontal disease diagnosis and management in these animals.

Ethics approval

This study was conducted within the framework of an experimental design protocol approved by the Burdur Mehmet Akif Ersoy University Experimental Animals Local Ethics Committee in Turkey (21.10.2020/675).

Declaration of competing interest

The authors of this article have no conflict of interest to declare.

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References

BAAB, D. A., P. A. ÖBERG, G. A. HOLLOWAY (1986): Gingival blood flow measured with a laser Doppler flowmeter. J. Periodontal Res. 21, 73-85. https://10.1111/j.1600-0765.1986.tb01440.x.

BARNETT, M. L., R. M. GILMAN, C. H. CHARLES, L. L. BARTELS (1989): Computer-Based Thermal Imaging of Human Gingiva: Preliminary Investigation. J. Periodontol. 60, 628-633. https://doi.org/10.1902/jop.1989.60.11.628

BELLOWS, J. (2010): Chapter 1 Anatomy. In: Feline Dentistry Oral Assessment, Treatment and Preventative Care. (Bellows, J., Eds.), Iowa, Wiley and Blackwell, pp. 17-39.

BERGSTRÖM, J., G. VARGA (1971): Temperatures of the oral cavity in 50 healthy students. Sven. Tandlak. Tidskr. 64, 157-164.

BERZ, R., H. SAUER (2007): The Medical Use of Infrared-Thermography History and Recent Applications. Thermografie-Kolloquium, Proceedings of the Joint Conference of all Thermography Working Groups, 27-28 September, Stuttgart, Germany, pp. 1-12.

EGELBERG, J. (1966): Permeability of the dento-gingival blood vessels. 3. Chronically inflamed gingivae. J. Periodontal Res. 1, 287-296. https://doi.org/10.1111/j.1600-0765.1966.tb01873.x

FROST, P., C. A. WILLIAMS (1986): Feline Dental Disease. Vet. Clin. North Am. Small Anim. Pract. 16, 851-873 https://doi.org/10.1016/s0195-5616(86)50305-3

GORREL, C., S. ANDERSSON, L. VERHAERT (2013): Periodontal disease. In: Veterinary Dentistry for the General Practitioner, 2nd ed. (Gorrel, C., S. Andersson, L. Verhaert, Eds.), London, Elsevier Saunders, pp. 97- 119.

HANSSON, B. O., J. LINDHE, P. I. BRANEMARK (1968): Microvascular topography and function in clinically healthy and chronically inflamed dentogingival tissues – a vital microscopic study in dogs. Periodontics 6, 264-271.

HARVEY, C. E. (2005): Management of periodontal disease: Understanding the options. Vet. Clin. North Am. Small Anim. Pract 35, 819-836. https://doi.org/10.1016/j.cvsm.2005.03.002

KERDVONGBUNDIT, V., N. VONGSAVAN, S. SOOAMPON, P. PHANKOSOL, A. HASEGAWA (2002): Microcirculation of the healthy human gingiva. Odontology 90, 48-51. https://doi.org/10.1007/s102660200007

KOMORIYAMA, M., R. NOMOTO, R. TANAKA, N. HOSOYA, K. GOMI, F. IINO, A. YASHIMA, Y. TAKAYAMA, M. TSURUTA, H. TOKİWA, K. KAWASAKI, T. ARAI, H. HOSOI, A. HIRASHITA, S. HIRANO (2003): Application of Thermography in Dentistry; Visulization of Tempeture Distribution on Oral Tissues. Dent. Mater. J. 22, 436-443. https://doi.org/10.4012/dmj.22.436

KUNC, P., I. KNÍŽKOVÁ, M. PŘIKRYL, J. MALOUN (2007): Infrared thermography as a tool to study the milking process: a review. Agric. Trop. Subtrop. 40, 29-32.

LAHIRI, B. B., S. BAGAVATHIAPPAN, T. JAYAKUMAR, J. PHILIP (2012): Medical applications of infrared thermography: a review. Infrared Phys. Technol. 55, 221-235. https://doi.org/10.1016/j.infrared.2012.03.007

LEWIS, J. R., B. R. MILLER (2010): Dentistry and oral surgery. In: McCurnin's Clinical Textbook for Veterinary Technicians, 7th ed. (Bassert, J. M., D. M. McCurnin, Eds.), Saunders, Philadelphia, pp. 1093-1148.

LÖE, H. (1967): The Gingival Index, the Plaque Index, and the Retention Index Systems. J. Periodontol. 38, S610-S616. https://doi.org/10.1902/jop.1967.38.6.610

LÖE, H., J. SILNESS (1963): Periodontal disease in pregnancy I. Prevalence and severity. Acta Odontol. Scand. 21, 533-551.
https://doi.org/10.3109/00016356309011240

MAEDA, T., E. E. L. GHAMRAWYF, H. KROONE, J. RUNOV (1979): Crevicular temperature rises stimulated by plaque formation. J. Oral Rehabil. 6, 229-234.
https://doi.org/10.1111/j.1365-2842.1979.tb01500.x

NIEMEC, B. A. (2008): Periodontal Disease. Top Companion Anim. Med. 23, 72-80.
https://doi.org/10.1053/j.tcam.2008.02.003

NUKI, K., J. HOCK (1974): The organisation of the gingival vasculature. J. Periodontal Res. 9, 305-313.
https://doi.org/10.1111/j.1600-0765.1974.tb00686.x

O'NEILL, D. G., A. BLENKARN, D. C. BRODBELT, D. B. CHURCH, A. FREEMAN (2023): Periodontal disease in cats under primary veterinary care in the UK: frequency and risk factors. J. Feline Med. Surg. 25.
https://doi.org/10.1177/1098612X231158154

SIKDAR, S. D., A. KHANDELWAL, S. GHOM, R. DIWAN, F. M. DEBTA (2010): Thermography: a new diagnostic tool in dentistry. J. Indian Acad. Oral Med. Radiol. 22, 206-210.

TSUGAWA, A. J., F. J. VERSTRAETE, P. H. KASS, C. GÖRREL (2003): Diagnostic value of the use of lateral and occlusal radiographic views in comparison with periodontal probing for the assessment of periodontal attachment of the canine teeth in dogs. Am. J. Vet. Res. 64, 255-261.
https://doi.org/10.2460/ajvr.2003.64.255

TSUGAWA, A. J., F. J. VERSTRAETE (2000): How to obtain and interpret periodontal radiographs in dogs. Clin. Tech. Small Anim. Pract.15, 204-210.
https://doi.org/10.1053/svms.2000.21042

VERHAERT, L., C. VAN WETTER (2004): Survey of oral diseases in cats in Flanders. Vlaams Diergeneeskundig Tijdschrift 73, 331-341.

VİJAY, G., V. RAGHAVAN (2013): Radiology in periodontics. J. Indian Acad. Oral Med. Radiol. 25, 24-29.
https://doi.org/10.5005/jp-journals-10011-1334

YANMAZ, L. E., E. DOGAN, Z. OKUMUS, M. G. SENOCAK, F. YİLDİRİM, (2015): Comparison of rectal, eye and ear temperatures in kangal breed dogs. Kafkas Univ. Vet. Fak. Derg, 21, 615-617.
https://doi.org/10.9775/kvfd.2015.13037

YIGITARSLAN, K. A., C. OZCAN, B. CETINTAV (2023): Thermographic Examination of the Gingiva of 16 Dogs. J. Vet. Dent. 40, 38-46.
https://doi.org/10.1177/08987564221117738

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SAŽETAK

Cilj istraživanja bio je, uz pomoć termalne kamere, ustanoviti stupanj gingivnog indeksa (GI) odnosno raspon i varijacije temperature gingive u mačaka. Istraživanje je provedeno na 50 mačaka (22 ženki i 28 mužjaka). Njihova je tjelesna masa bila između 2 i 6 kg (3,58±0,87), a dob između 1 i 5 godina (2,05±1,22). Zabilježene su temperature gingive triju različitih anatomskih područja: slobodna gingiva (FG), pričvrsna gingiva (AG) i alveolarna sluznica (AM), a stupnjevi bolesti određeni su prema tri različita GI sustava. Uočena je znakovita razlika u temperaturi (r) u maksili između mačaka sa stupnjem 0 GI i mačaka sa stupnjem 1 GI, što je uočeno u području slobodne gingive (0,86°C; P<0,05), ali ne i u područjima pričvrsne gingive (0,66°C; P>0,05) i alveolarne sluznice (0,47°C, P>0,05). Posebno je zapaženo znakovito smanjenje temperature slobodne gingive u odnosu na pričvrsnu gingivu i alveolarnu sluznicu. Što se tiče mandibule, uočene su znakovite temperaturne promjene među skupinama u područjima FG (GI0-GI1 0,93°C; GI1-GI2 2,15°C; GI0-GI2 1,22°C; P=0,001), AG (GI0-GI1 0,78°C; GI1-GI2 -2,02°C; P=0,002) i AM (GI0-GI1 0,41°C; GI1-GI2 -1,89°C; GI0-GI2 -1,48°C; P=0,002) uz porast stupnja gingivnog indeksa. Zaključeno je da termalna kamera može biti učinkovit preliminarni dijagnostički alat koji u usporedbi s GI sustavima pruža objektivniju procjenu upala gingive u mačaka.

Ključne riječi: gingivni indeks; gingivitis; termalna kamera; mačke