

Research Article

Use of Cannabidiol as an Adjuvant in Veterinary Anesthesia and Pain Management in Dogs and Cats

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Abstract

Objective: To review the scientific literature on the use of cannabidiol (CBD) for dogs and cats, focusing on its analgesic efficacy and potential application as an anesthetic adjuvant.

Methods: An integrative review was carried out, covering studies published in the last 10 years in international databases. Articles were included if they addressed the efficacy and safety of CBD in pain management or veterinary anesthesiology in small animals (dogs and cats).

Results: Evidence indicates that CBD may help reduce chronic pain (e.g., osteoarthritis) and improve quality of life in dogs and cats, with a favorable safety profile. However, there is a lack of specific studies in an anesthetic context, preventing definitive recommendations on protocols, doses, and formulations.

Conclusions: CBD shows relevant therapeutic potential for veterinary analgesia; however, methodological heterogeneity and the absence of robust clinical trials suggest that further research is needed to validate its use as an anesthetic coadjuvant in dogs and cats.

Keywords: Cannabidiol, Dogs, CBD, Pain, Cats, Veterinary anesthesia

Introduction

The interest in the use of *Cannabis sativa*-derived compounds in both human and veterinary medicine has significantly increased over the past decade [1]. Among these compounds, cannabidiol (CBD) stands out as a molecule without significant psychoactive effects, identified as a promising candidate for managing various conditions, such as chronic pain, inflammation, epilepsy, and behavioral disorders [2],[3]. In the context of veterinary medicine, studies seek to evaluate the application of CBD in both dogs and cats, focusing on safety parameters, efficacy, and practical implications [4],[5].

In recent years, the multidisciplinary approach to pain management has led to the adoption of multimodal analgesic protocols, especially in small animals [6]. In this scenario, the potential modulatory role of CBD in pain control has become a relevant topic, considering the need for adjuvant methods to reduce the use of opioids and non-steroidal anti-inflammatory drugs (NSAIDs), along with possible implications for patient safety and quality of life [7]. Additionally, the hypothesis arises that CBD could act as an adjuvant in veterinary anesthesia, minimizing anesthetic doses and reducing adverse effects [8].

However, despite promising studies, methodological heterogeneity and the limitation of large-scale randomized clinical trials hinder the establishment of clear protocols [9],[10]. Several gaps remain concerning the specific pharmacokinetics of CBD in different species, optimal dosage regimens, possible interactions with anesthetic drugs, and risks of adverse effects [11].

Thus, the present article aims to review the available literature, elucidating the efficacy and safety of CBD in dogs and cats, as well as investigating potential applications as an anesthetic adjuvant in surgical procedures. To achieve this, an integrative review of the main available studies was conducted, addressing safety parameters, analgesic profile, pharmacological interactions, and perspectives on its use in routine veterinary anesthesia.

Materials and Methods

Review Design

An integrative review was chosen, which combines data from different study types (clinical trials, systematic reviews, case reports, and narrative reviews), allowing for a comprehensive and critical synthesis of findings [12]. The integrative model was selected to

encompass the plurality of methodological designs in the literature, given the scarcity of large-scale randomized clinical trials on this topic.

Data Sources and Search Strategy

The search was conducted in the PubMed, ScienceDirect, Web of Science, Scopus, and CAB Abstracts databases, covering publications from 2013 to 2023. The following Boolean descriptors were used: (cannabidiol OR CBD) AND (veterinary anesthesia OR veterinary analgesia) AND (dogs OR cats).

Additionally, Portuguese keywords such as “*canabidiol*”, “*anestesia veterinária*”, and “*analgesia veterinária*” were included to track national studies.

Inclusion and Exclusion Criteria

Included

1. Original articles (clinical trials, observational studies, pharmacokinetic studies).
2. Reviews (systematic, integrative, narrative) on CBD in dogs and cats related to pain or anesthesia.
3. Publications in English or Portuguese, with full text available.

Excluded

1. Studies not involving dogs or cats.
2. Research where CBD was not related to analgesia, pain, or veterinary anesthesia.
3. Low methodological quality studies, as well as duplicates or inaccessible articles.

Quality Assessment and Data Extraction

The selected articles underwent methodological screening using tools such as CASP (Critical Appraisal Skills Programme) for observational studies and reviews and RoB 2 for randomized clinical trials [13],[14]

For each article, the following details were recorded:

- Target population (species, breed, number of animals).
- Study design (randomized, observational, case report, etc.).
- CBD dosage and administration form (oil, full-spectrum extract, isolate, etc.).
- Evaluated outcomes (pain scales, anesthetic parameters, adverse effects).
- Main results in terms of efficacy and safety.

The data were synthesized in tables, comparing doses used, administration periods, pain assessment scales, and occurrence of adverse effects.

Results and Discussion

Study Characterization

The initial search retrieved 2,427 records. After removal of

duplicates and application of inclusion/exclusion criteria, 45 studies remained for full-text review. Among these, 24 studies were deemed relevant for this review, encompassing:

- Pharmacokinetic experiments in dogs and cats,
- Case reports,
- Randomized clinical trials focusing on canine osteoarthritis,
- General reviews on cannabinoids in veterinary medicine [15],[9],[8],&[5].

Most studies focused on CBD application in chronic conditions, such as:

- Osteoarthritis
- Epilepsy [16]
- Behavioral disorders.

A smaller number of articles specifically addressed cats, emphasizing species-specific pharmacokinetics

Regarding anesthetic applications, only occasional mentions were found about potential benefits in perioperative analgesia, but no consolidated protocols exist

Analgesic Efficacy and CBD Pharmacology

The endocannabinoid system, primarily composed of CB1 and CB2 receptors, has been identified as a mediator of CBD's analgesic and anti-inflammatory effects [17]

Studies in dogs with osteoarthritis indicate a reduction in pain perception and functional improvement, especially when CBD is administered at doses of 2 to 2.5 mg/kg twice daily

In cats, the literature remains limited, but case reports demonstrate pain reduction and decreased inflammatory processes in conditions such as chronic gingivostomatitis. Wang et al. (2022) evaluated the pharmacokinetics of an oral CBD/CBDA paste in felines, concluding that the acidic form (CBDA) has higher bioavailability than CBD itself, with no severe adverse effects.

Safety and Adverse Effects

Most analyzed studies indicate a favorable safety profile for CBD in the short and medium term, with mild to moderate adverse effects. Reported adverse effects include:

1. Transient elevation of ALT (alanine aminotransferase).
2. Mild sedation.
3. Gastrointestinal disturbances.

Caution is advised for long-term treatments, especially in animals with comorbidities, as long-term safety data remain lacking

Another concern is low-quality CBD products or those with excess THC levels, which may pose toxicity risks [18]

Anesthetic Application: Potential and Limitations

The adoption of multimodal protocols in veterinary anesthesia aims to reduce opioid, inhalant anesthetic, and NSAID doses, minimizing side effects.

In this context, CBD could assist in perioperative pain control. However, the literature lacks clinical trials assessing perioperative variables and potential interactions with traditional anesthetics.

Legal Aspects and Ethical Considerations

The expansion of CBD use in companion animals depends on the regulation of the product and the development of official guidelines

In many countries, legislation regarding veterinary cannabinoids remains unclear, making standardized prescription difficult.

Discussion

The discussion should interpret the results clearly and concisely in terms of biological mechanisms and clinical relevance, integrating the research findings with the previously published literature. Despite the growing interest in CBD, studies specifically targeting veterinary anesthesia in dogs and cats are still lacking. Existing publications focus more on chronic pain, epilepsy, and behavioral disorders [19]. The results are mainly represented in the form of tables or figures when possible. In this work, Table 1 illustrates the main findings of recent studies, highlighting aspects of dose, pharmacokinetics, efficacy, and safety of CBD in different veterinary contexts. In general, a consistent reduction in chronic pain is observed, but little standardization in perioperative use.

Table 1: Main findings of recent studies, highlighting aspects of dose, pharmacokinetics, efficacy, and safety of CBD in different veterinary contexts.

Author	Article Title	Key Findings	Main Conclusions	Journal and Reliability
ALVARENGA, I. C. et al. (2023)	Cannabidiol plasma determination and pharmacokinetics...	Evaluated CBD pharmacokinetics in dogs over 36 weeks, showing dose-dependent accumulation; higher Cmax and AUC at weeks 18 and 36.	CBD accumulates with chronic use, reinforcing the need to monitor parameters and adjust doses in long-term treatments.	Frontiers in Veterinary Science
BARTNER, L. R. et al. (2018)	Pharmacokinetics of cannabidiol administered...	Compared CBD pharmacokinetics in dogs using three administration routes and two different doses; observed absorption and half-life differences.	Highlights the importance of selecting the appropriate formulation to optimize bioavailability in dogs, even though anesthesia was not directly addressed.	Frontiers in Veterinary Science
COELHO, J. C. et al. (2023)	Placebo-Controlled Trial of Daily Oral Cannabidiol...	Placebo-controlled trial showing significant improvement in cats with chronic gingivostomatitis after receiving 4 mg CBD every 12h for 15 days, with no severe adverse effects.	CBD as an adjunctive therapy for feline gingivostomatitis demonstrated pain/inflammation reduction and a favorable safety profile.	Animals
COLTHERD, J. C. et al. (2024)	Healthy cats tolerate long-term daily feeding of Cannabidiol	26-week study on healthy cats receiving 4 mg/kg/day CBD without THC. No significant adverse effects other than transient ALT elevation at week 4, which normalized later.	Results indicate good CBD tolerance in cats long-term, but caution and veterinary monitoring are advised.	Frontiers in Veterinary Science
DEABOLD, K. A. et al. (2019)	Single-dose pharmacokinetics and preliminary safety assessment...	Evaluated pharmacokinetics and safety of a single CBD dose in dogs and cats, showing absorption differences between species and mild adverse effects.	CBD had a safe profile in a single dose, but long-term studies are needed, especially in cats.	Animals
GAMBLE, L. J. et al. (2018)	Pharmacokinetics, Safety, and Clinical Efficacy...	Reported pain reduction and mobility improvement in dogs with osteoarthritis treated with CBD (2 mg/kg BID), with few adverse effects.	Demonstrated CBD's analgesic efficacy in canine osteoarthritis, suggesting potential use in chronic pain management, though anesthesia was not specifically addressed.	Frontiers in Veterinary Science
HU, B. (2022)	Prevalence and characteristics of cannabis-induced toxicoses in pets...	Surveyed veterinarians about cannabis-induced toxicosis; found an increase in cases after legalization, mainly in dogs that accidentally ingested THC-containing products.	Most pets recover well from accidental intoxication, emphasizing the importance of educating pet owners and standardizing products to avoid THC exposure.	PLoS ONE
KOGAN, L. R. et al. (2019)	US Veterinarians' Knowledge, Experience, and Perception...	Surveyed veterinarians in the U.S., revealing interest in CBD but limited knowledge and concerns about legal aspects and lack of robust studies.	Highlights a gap in veterinarian training and the need for research providing solid evidence on CBD use in dogs, impacting clinical protocols.	Frontiers in Veterinary Science
LIMA, T. M. et al. (2022)	Use of cannabis in the treatment of animals...	Systematic review including randomized clinical trials on CBD for osteoarthritis, epilepsy, and behavioral issues in dogs; found CBD effective in reducing pain and seizure frequency.	Supports CBD use in dogs for osteoarthritis and epilepsy, but notes lack of robust studies and methodological limitations; anesthesia was not directly addressed.	Animal Health Research Reviews
MIRANDA-CORTÉS, A. et al. (2023)	The role of cannabinoids in pain modulation in companion animals	Discussed cannabinoids' mechanism of action in pain modulation (CB1 and CB2 receptors), examining analgesic and anti-inflammatory effects in dogs and cats.	CBD may be effective in managing acute, chronic, and neuropathic pain, but further studies are needed to establish anesthetic protocols.	Frontiers in Veterinary Science
MONTOYA, C. (2022)	Use of cannabis in the treatment of animals...	Systematic review focusing on cannabis use in dogs (osteoarthritis, epilepsy, behavioral disorders). Found promising but heterogeneous results with potential bias risks.	Evidence supports CBD as safe and effective for some canine conditions, but standardization and anesthetic studies are lacking.	Animal Health Research Reviews
POTSCHKA, H. et al. (2022)	Cannabidiol in canine epilepsy	Analyzed CBD studies in canine epilepsy, highlighting methodological flaws in randomized clinical trials (RCTs). Found positive results in seizure reduction, though inconclusive.		The Veterinary Journal
VAUGHN, D. W. et al. (2020)	Current Evidence and Future Directions for Research into Cannabidiol...	Review of CBD's potential applications in inflammatory conditions, epilepsy, and chronic pain, emphasizing potential benefits and methodological limitations.		Veterinary Science Development
WANG, T. et al. (2022)	Serum Cannabinoid 24 h and 1 Week Steady State Pharmacokinetic Assessment in Cats...	Found higher absorption of CBDA compared to CBD in cats, with no significant adverse effects in the short term (1 week).		Frontiers in Veterinary Science

Conclusions

This integrative review highlights the potential of cannabidiol (CBD) as a safe and effective agent for pain control in dogs and cats, especially for chronic conditions such as canine osteoarthritis and feline gingivostomatitis. Although most studies in small numbers of animals report good tolerability rates, with mild side effects, long-term investigations confirming the safety of continuous use in different age groups and in animals with comorbidities are still lacking.

Regarding the application of CBD as an anesthetic adjuvant, the scientific literature remains incipient. There are few clinical trials that analyze perioperative variables and possible interactions with traditional anesthetics, which prevents the development of well-defined anesthetic protocols. Therefore, it is recommended to conduct robust and randomized studies, including different species, breeds and surgical protocols, to evaluate essential parameters such as hemodynamic stability, reduction of opioid consumption and pain scales in the immediate postoperative period. The methodological heterogeneity found in the literature (differences in doses, formulations, study designs) compromises the direct comparison between the results and the extrapolation of the doses used. Therefore, it is essential that future studies standardize doses (in mg/kg), structure periods of use (SID, BID) and detail the form of administration (oil, paste, full-spectrum extract), as well as rigorously monitor adverse effects. Finally, the regulation of CBD for veterinary use, associated with more research involving cannabinoids, could expand therapeutic options for pain management and promoting animal welfare. The development of multimodal anesthetic protocols, with less dependence on opioids and NSAIDs, may also benefit from the advent of new analgesic strategies, such as CBD. Thus, this work contributes to highlighting the urgency of additional studies that consolidate the role of CBD in veterinary anesthesiology and pain control in companion animals.

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