RESEARCH ARTICLE

Molecular Detection and Clinical Management of *Microsporum canis* in Felines

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Abstract

Dermatophytosis, primarily caused by *Microsporum canis*, is a highly contagious fungal infection in felines with significant zoonotic risk. This study evaluated 12 suspected cases, predominantly Persian cats, exhibiting chronic erythema, crusting, and alopecia. Wood's lamp examination and direct microscopy provided preliminary evidence and PCR confirmed *M. canis* in five cases by yielding a specific 176 bp amplicon. Positive cats were managed using a multimodal treatment regimen consisting of oral itraconazole pulse therapy (5-10 mg/kg, week-on/week-off) combined with topical antifungal shampoos and lime sulfur solutions. By the fourth week of treatment, all cats demonstrated significant clinical recovery, including the resolution of lesions and visible hair regrowth. These findings highlight that PCR offers a highly sensitive and specific diagnostic approach. The findings underscore that PCR-based molecular diagnostics provide a highly sensitive and specific approach for diagnosing *M. canis*. Early molecular detection combined with targeted systemic and topical antifungal therapy is highly effective in managing feline dermatophytosis and mitigating zoonotic transmission risks.

Key words: Cats, Dermatophytosis, Itraconazole, *Microsporum canis*, PCR.

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Introduction

Dermatophytosis is a highly contagious, superficial fungal infection of keratinized tissues that represents a major dermatological and zoonotic concern in feline medicine (Moriello, 2014; Quinn, 2025). The principal etiological agent in cats is *Microsporum canis*, which is readily transmitted through direct contact with infected symptomatic or asymptomatic carriers, as well as indirectly via environmental fomites contaminated with infectious arthrospores (Chermette *et al*., 2008). Affected felines can exhibit a wide variety of clinical manifestations, ranging from localized erythematous and alopecic lesions to severe, generalized crusting. The clinical diagnosis of dermatophytosis is often complicated by the lack of a single, rapidly yielding gold standard test, necessitating a multimodal diagnostic approach (Bond, 2010; Scott *et al*., 2013). While traditional diagnostic methods such as Wood's lamp evaluation and direct microscopy are valuable for preliminary screening, they frequently lack high sensitivity or species-level specificity.

The implementation of advanced molecular techniques, such as PCR, has become increasingly critical for the rapid, highly sensitive and definitive identification of *M. canis*. Accurate species identification is paramount for initiating timely, targeted antifungal therapy and implementing strict environmental control measures (Cafarchia and Otranto, 2008; Moriello *et al.,* 2017). Consequently, the objective of this study was to evaluate the clinical presentation of suspected feline dermatophytosis, confirm the specific presence of *M. canis* using species-targeted PCR, and document the clinical efficacy of a combined systemic and topical therapeutic regimen.

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Materials And Methods

The clinical examination and sample collection procedures were conducted following standard Veterinary clinical protocols. As this study involved standard diagnostic procedures on clinical patients, formal ethical approval was waived, but all procedures were performed with the informed consent of the animal owners.

Twelve cats presented at the Department of Veterinary Clinical Complex, Madras Veterinary College, Chennai, India, with a history of erythematous, crusty, and alopecic skin lesions of various durations were included in the study. The work was carried out at the Department of Veterinary

Biotechnology, Madras veterinary college, Chennai-600007. The affected animals, predominantly Persian breeds, exhibited lesions on their faces, limbs, trunks, and periocular areas. In every instance, a thorough clinical evaluation was performed. Samples for diagnostic evaluation were collected from the active periphery of the lesions. Samples were collected using the Mackenzie toothbrush technique by combing the affected areas with a sterile toothbrush. Affected areas were investigated using a Wood's lamp generating ultraviolet light at a peak wavelength of 365 nm. The apple-green fluorescence of the hair shafts was considered indicative of a *Microsporum canis* infection. Hair samples and skin scrapings were evaluated using lactophenol cotton blue tape preparations. The samples were examined microscopically for the presence of ectothrix spores, microconidia clusters, and microconidia with corneocytes connected to hair shafts.

Genomic DNA was harvested from the collected samples. Extraction was performed using the DNeasy Blood & Tissue Kit, Qiagen, Hilden, Germany strictly adhering to the manufacturer's protocol. Species-specific primers targeting the ITS-1 region of the ribosomal DNA cassette were employed for the molecular detection of *M. canis*. The specific primers used were Mcfor (5' GTGTGATGGACGACCGTCCCCCCT 3') as the forward primer and Mcrev (5' ATAATACATGGTGCGTTAGGCCAGCCTG 3') as the reverse primer (Brillowska-Dabrowska *et al.,* 2013). A final reaction volume of 25 µL was used for PCR, which included 12.5 µL of master mix (Ampliqon, Denmark), 1 µL each of forward and reverse primers, 8.5 µL of nuclease-free water, and 2 µL of sample DNA (Thermal Cycler T100, Bio-Rad, USA). The thermal cycling conditions consisted of an initial denaturation at 94°C for 3 min, followed by 40 cycles of denaturation at 94°C for 45 s, annealing at 62°C for 45 s, and elongation at 72°C for 45 s, concluding with a final extension at 72°C for 10 min. The products were analyzed using gel electrophoresis on a 1.5% agarose gel stained with ethidium bromide. The presence of a specific 176 bp PCR product (Fig. 1) was visualized under UV light (Gel Doc XR+, Bio-Rad, USA).

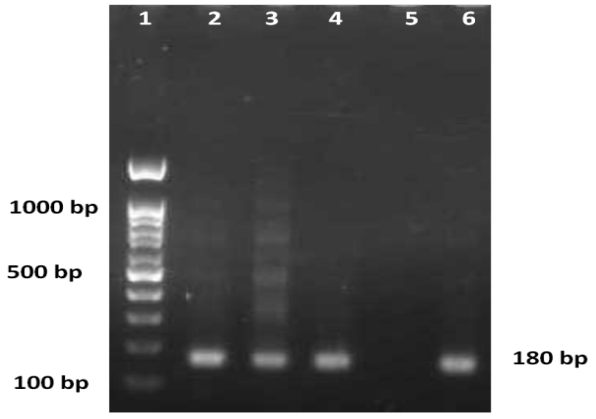

Fig. 1: Molecular screening for the *Microsporum canis* genome amplifying the 176 bp ITS-1 region. Lane 1: 100 bp DNA Ladder; Lanes 2-4: Clinical cat samples; Lane 5: Non-template control (NTC); Lane 6: Positive control.

Results and Discussion

Dermatophytosis is one of the most frequent infectious skin illnesses in felines, with *Microsporum canis* acting as the principal etiological agent (Scott *et al.,* 2013; Moriello, 2014). The high incidence of suspected cases observed in Persian cats in this study aligned with previous reports suggesting that genetic predisposition, a thick hair coat, and grooming challenges may increase susceptibility to infection (Moriello, 2014). Initial screening with a Wood's lamp revealed the characteristic apple-green fluorescence of diseased hairs in 7/12 (58.33%) suspected cases (Fig. 2). While Wood's lamp examination is a helpful and non-invasive screening method, its sensitivity is inherently restricted, as only approximately 50% of *Microsporum canis* strains exhibit fluorescence (Scott *et al*., 2013; Moriello *et al*., 2017). Subsequent direct microscopic inspection of lactophenol cotton blue preparations provided rapid preliminary evidence of fungal infection, exhibiting ectothrix spores, rows and clusters of microconidia, and fungal elements adhering to the hair shafts (Fig. 3) (Bond, 2010; Scott *et al*., 2013).

The molecular screening successfully identified the distinctive 176 bp amplicon (Fig. 1), confirming a conclusive diagnosis of *Microsporum canis* infection in 5 out of the 12 (41.7%) suspected feline cases in accordance with earlier work (Cafarchia and Otranto, 2008; Chermette *et al*., 2008). The remaining 7 cats tested negative for *Microsporum canis* by PCR. The cases were suspected to be infected by other dermatophyte species not targeted by the specific primers used. While direct microscopy offers quick preliminary proof, it lacks species specificity; in contrast, PCR-based molecular diagnostics offer a rapid, highly sensitive, and specific approach for diagnosing *Microsporum canis*, permitting the early initiation of targeted therapeutic medication (Cafarchia and Otranto, 2008; Chermette *et al*., 2008).

Following confirmation, the affected cats were therapeutically managed with a week-on/week-off oral itraconazole pulse therapy (5-10 mg/kg body weight) (Scott *et al.,* 2013; Moriello *et al*., 2017). Because of its excellent pharmacokinetic profile, high efficacy, and safety margin, itraconazole has been extensively suggested as the medication of choice for treating feline dermatophytosis. The systemic treatment was complemented with topical antifungal shampoo, lime sulfur solution, liver tonics, and immune boosters. Weekly clinical assessments were encouraged, and noticeable clinical improvement characterized by the resolution of crusty lesions and new hair growth was observed four weeks post-therapy (Fig. 4). The positive therapeutic response documented in this investigation supports previous reports demonstrating the superior efficacy of combining systemic and topical medications. Ultimately, early specific diagnosis, thorough multimodal treatment, and strict environmental decontamination remain crucial to arresting recurrence and mitigating the zoonotic risk associated with *Microsporum canis* (Moriello, 2014; Moriello *et al*., 2017).

Fig. 2: Clinical presentation and Wood's lamp evaluation of suspected feline dermatophytosis. **(A)** Positive Wood's lamp examination demonstrating characteristic apple-green fluorescence on the hair coats of affected two-month-old kittens. **(B)** Localized intense fluorescence over the facial region of a 1.5-year-old Persian cat, indicating active *Microsporum canis* infection.

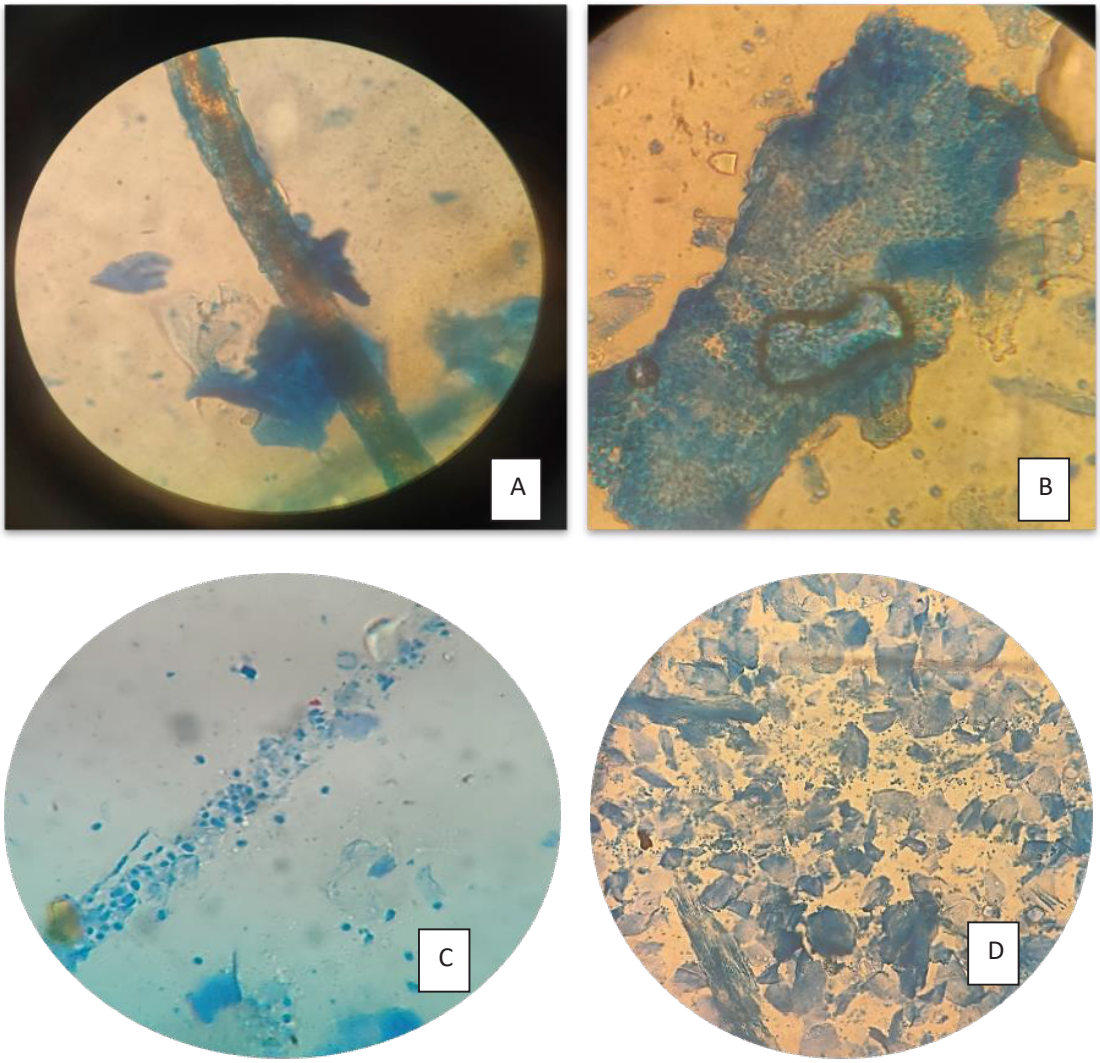

Fig. 3: Direct microscopic evaluation of hair and skin scrapings using lactophenol cotton blue stain. **(A)** Infected hair shaft demonstrating the accumulation of ectothrix spores. **(B)** Characteristic chains and clusters of microconidia (Original magnification x100). **(C)** and **D)** 100X and 4X Rows of Microconidia adhering to desquamated corneocytes.

Fig. 4: Clinical resolution following multimodal antifungal therapy. **(A)** Pre-treatment presentation of a 3-year-old female Persian cat exhibiting facial crusting and alopecia. **(B)** Complete clinical resolution and hair regrowth in the same patient following four weeks of oral itraconazole pulse therapy and topical management. **(C)** Pre-treatment presentation of a 4-month-old kitten. **(D)** Complete clinical and mycological resolution (Wood's lamp negative) observed two months post-treatment.

Conclusion

In general, molecular detection of *Microsporum canis* using species-specific PCR offers a highly sensitive, rapid and definitive diagnostic tool compared to traditional screening methods. Early and accurate identification, coupled with a multimodal therapeutic approach involving oral itraconazole pulse therapy and topical treatments, is essential for successful clinical management and mitigating zoonotic transmission in felines.

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