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Isolation and detection of fungal infections in both humans and cats with ringworm of the body, as well as antifungal sensitivity to treatments

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Abstract

Dermatophytosis is a dangerous infectious skin disorder that is impacting cats globally and is usually caused by Microsporum canis. The illness often manifests as asymptomatically in adult cats. Adults or kittens with impaired immune systems comprise the majority of cases with severe clinical signs. The illness may be prevalent in shelters or catteries, and inadequate hygiene is a risk factor. People who are easily impacted by skin conditions may develop similar conditions. Infectious arthrospores generated by dermatophytes have an environmental lifetime of around a year. They can be transferred by dust, clothes, brushes, and other external things, as well as by contact with healthy or ill cats. Utilizing commercially manufactured paper disks, antifungal medications (Ketoconazole KT, Bacitracin B, Miconazole MIC, Clotrimazole CC, Nystatin NS, and Amphotericin-B AP) were tested on blood agar. The results indicated that the best inhibition zone was found in Bacitracin B and Ketoconazole, while Amphotericin-B did not show any reaction.

Keywords: zoonotic, Ringworm, Drugs. MIC, human health, animal health.

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Introduction

Dermatophytosis (ringworm) is a common superficial skin infection caused by a fungal infection of the hair, nails, and skin [1]. Cutaneous fungal infections have been observed globally and are predicted to impact 20-25% of the global population [2,3]. Fungal infections are classified into three genera: Tricophyton, Microsporum, and Epidermophyton [4]. Dermatophytosis is a skin infection caused by a dermatophytic fungus in keratinized tissues[5]. Dermatophytosis in Human can be characterized depending on the location infection in Tinea corporis: (non-hairy skin on the body) Tinea cruris (groin), Tinea barbae (beards on the areas of the face and neck), Tinea capitis, also known as capitis (scalp), Tinea ungium (nail infection), Tinea pedis (athlete's feet) and [6,7] Humans become infected with fungal disease through infected animals, especially cats and dogs[8]. In the wild, infectious ringworms may live for over a year. They can be transmitted by touching sick or normal carriers, and also through dust particles, tools, clothing, and other fomites[9]. Dermatophytosis is a prevalent fungal skin illness in tropical and subtropical nations such as Iraq due to their hot and humid climate. Bacteria may subsequently infect areas that were first affected by dermatophytes. Usually, symptoms start to show up at the site of infection (four to fourteen days) after exposure [10]. The lesion's gross appearance comprises an outside ring of active, progressive infection, with clear area inside the ring and flat patch of itchy skin, color rang from white to redness scaling Ring worm in infected cats was a circular red alopecia, desquamation and in Human Causes itching most dermatophytic infections are diagnosed clinically, but because topical steroid ointments and creams are frequently used to treat skin infections, they are frequently misdiagnosed and mistreated[11]. In rare cases, dermatophytes can also infiltrate the skin tissue and even deep organs, especially in immunocompromised individuals with acquired or congenital immunodeficiency[12]. If proper treatment is not received, these infections can worsen and become life-threatening[13]. Furthermore, the majority of nations either lack sufficient knowledge or have not identified the fungal species that are causing skin infections in their populations. Therefore, the aim of the study was to recognize and isolate ringworm fungi related to superficial fungal infection and medical choose for treatment for both animal and human.

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Material and Methods

Sample Collection

The samples from humans and their pets' cats were collected in 30 total. Using swabs soaked in 70% ethanol to decrease contamination in the affected region. A sterile scalpel was used to remove the lesions, which were then gathered on sterile Petri plates and disposed of before being sent to a lab for mycological examination. The specimens, the patient's name is written on it, gender, age, date of collection, and location of site infection, were collected and sealed in sterile dry Petri plates. A portion of the materials was kept aside for microscopic investigation, and another for culture.

Using Wood's Lamp

A typical Wood lamp is a low-output mercury arc protected by a Wood filtering (barium silicate and 9% nickel oxide) that emits wavelengths 320-450 nm (peak 365 nm). (Figure 1). Examination is a diagnostic procedure in which the skin or hair is examined while exposed to the black light produced by the Wood lamp. Because it resides in the UV spectrum, blacklight has a wavelength that is somewhat shorter than violet [14].

Direct Microscopically Examination

According [15] to Part of each skin scrape was put on a sterile glass slide from site of infection in human and cats. The process involved use of (10%) Potassium Hydroxide (KOH) to digestion the keratin substance, using KOH direct microscopic examination is an inexpensive and quick technique to do on hairs and scales. Although it is a quick procedure, its sensitivity is low (56%) and it can produce false-positive findings, particularly if the sample contains saprophytic fungus spores After that, a fresh glass was placed over the solution, and it was heated slowly for one minute. Under 10X and 40X magnifications, The slide was inspected for hyphae and fungus spores under a microscope).

Isolation and identification of Dermatophytes

Culture on Sabouraud dextrose agar

For up to six weeks, colonies were isolated and cultivated on (SDA) Sabouraud dextrose agar supplemented with blood agar and chloramphenicol (0.05 mg/ml) and cyclohexamide (0.5 mg/ml) at 27°C. The growth rate, obverse, and reverse pigmentation of recovered colonies were

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noted [16]. Ring worm were identified using both macroscopically (color, pigmentation, topography, and texture) and microscopic aspects of the colonies [17]. It is the most reliable technique for identifying dermatophytes, and it can identify the species).

Testing for Antifungal Susceptibility (AFST) using Disk Diffusion Methods Blood agar culture

Antifungal Susceptibility Testing (AFST) by using Disk Diffusion Methods Culture on blood agar. In this study use blood Agar (figure 3-A) is a general purpose enriched medium often used to grow fastidious organisms [18].

Results

Immunocompetent cats with isolated lesions may not need treatment since they recover on their own in one to three months. On the other hand, treating such instances will accelerate the course of the illness, lower the risk to humans and other animals, and lessen pollution in the environment. In cats, topical therapy can be less effective than in humans because of the limited drug penetration through the hair coat, the fact that many cats do not tolerate this treatment, and the potential for invisible little lesions (Figure 2). As a result, treatment plans have to include both topical and systemic medicine that is administered for a minimum of 10 weeks. In general, cats should be treated until the dermatophyte cannot be cultivated from their hairs following at least two consecutive brushings one to three weeks apart, in addition to until the lesions have completely disappeared. Dermatophyte infection in catteries and shelters is extremely difficult, time-consuming, and costly to eliminate. Good compliance by the owner is consequently required. A treatment strategy is required, as well as total isolation of sick and uninfected animals and extensive environmental cleansing. This will force the halting of breeding projects and performances. All animals in the cattery must be treated. A considerably less favourable option is to separate the cats into groups and treat based on infection status. When handling affected animals, special hygiene precautions should be followed to avoid human infection.

Treatment

Topical therapy

Cats with few lesions should have their hair trimmed away from the edges of the lesions, leaving a large margin. To prevent the infection from spreading because of microtrauma,

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clipping should be done gently. It is advised to shampoo, dip, or rinse the entire body instead of treating lesions on the spot, as this approach may not be as effective. Clipping the entire cat helps facilitate the application of topical medication and improve drug penetration in individuals with generalized disease, longhaired cats, and for cattery cleansing.

Discussion

According to [19] the agar diffusion test The standard procedure for susceptibility testing for the fungal isolate to be tested is to draw it uniformly across the culture plate, and paper discs impregnated with the different antifungals to be tested are placed on the surface of the gelatin agar. Agar-disk diffusion methods use for Quantification of zone of inhibition on agar after incubation for 48h at 37˚C which consider low cost and ease of interpretation [20,21]. commercially prepared paper disks contain on antifungal drugs according to [22] (Ketoconazole KT, Bacitracin B, Miconazole MIC, Clotrimazole CC, Nystatin NS and Amphotericin-B AP) . During agar plate incubation, The antifungal spreads over the surrounding agar from the disks. The size of the inhibition zone around the disk is established by a medication that effectively inhibits fungal growth (figure 3-B). Itraconazole is licensed for the treatment of feline dermatophytosis and is now the medicine of choice, despite its relatively high cost) [23]. Anorexia is the only adverse response that is occasionally observed. Itraconazole also appears to have less teratogenicity and embryotoxicity than ketoconazole. However, it is not advised to take it when pregnant. Kittens as young as six weeks old may be used. has been frequently used for the treatment of systemic and cutaneous fungal infections because of its broad scope and safety profile in both human and veterinary medicine [24]. In addition to being efficient, this strategy lowers treatment costs. It has been recommended to administer a pulse of 5 mg/kg/day for one week, every two weeks for six weeks [25] Topical therapy strategy restricts the spores' ability to infect humans, other animals, and the environment. All contaminated hairs should be wrapped and disinfected before being disposed of, and the complete coat of hair, including the whiskers, should be carefully cut [9] Instrument sterilization by heat or chemical means is necessary. In order to prevent environmental contamination, veterinarian facilities shouldn't trim cats' hair. The cat's own home, where the air is already polluted, is the ideal location for clipping. The efficiency of topical antifungal medications varies greatly. One of the best treatments is using an

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antifungal cream such as Ketoconazole (kt) or Bacitracin B after the (human- figure 5) has had a total body treatment with Povidone-iodine solution twice a day until the cat is dry.

Conclusion

When exposed to infected cats, it is preferable to isolate the animal to prevent transmission of the infection to humans.

Fig. 1. Wood's Lamp

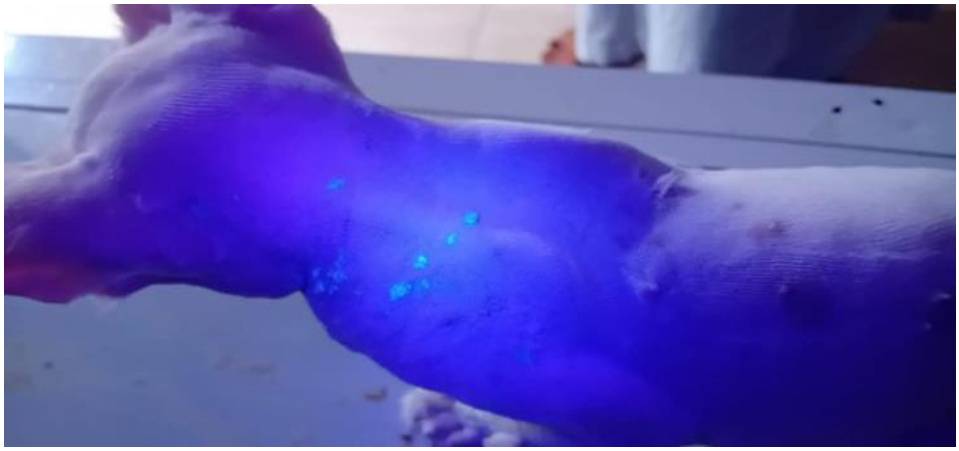

Fig. 2. Some dermatophytosis infection may become visible only after clipping

Fig. 3. fungal culture on blood agar: Disk Diffusion Methods Culture on blood agar.

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Fig. 4. Ring worm in Human (A, B, C, D and E), in Cats (F) before treatment

Fig. 5. Human treated by topical Ketoconazole

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