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Risk factors analysis and drugs effective against dermatophytosis in rabbits

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Abstract

Dermatophytosis is a highly zoonotic and group of cutaneous diseases widely distributed in human and animals including rabbits. It causes serious infection in some human cases and economic losses in farm animals. The primary aim of this study is to conduct an investigation of potential risk factors causing dermatophytosis and efficacy of common therapeutic drugs against dermatophytosis. During the present study, a total of 105 rabbits were taken out of which 63 rabbits were found positive for dermatophytosis all the positive cases further processed for the testing of effectiveness of antifungal drugs as individual and in combination form. In the present study risk factors like diet with vitamin and mineral supplement and deworming of animal was significant effect, other parameters like sex, age, body weight and ectoparasite was not significant effect in the infection of dermatophytosis in rabbits. Among the drugs taken for testing in the present study the most effective drugs combination was ketoconazole orally @ 10-15 mg/kg/day with 2.5% lime sulphur solution (dip twice in a week) which completely cured the infected rabbits about 92.30% (12/13) within 2-3 weeks of treatment and other drugs also showed good ability against infection. Due to its zoonotic point of view early diagnosis and treatment should be performed.

Keywords: Dermatophytosis, rabbit, risk factors, antifungal drugs

Introduction

Dermatophytosis or ringworm is a potentially zoonotic and often asymptomatic infection of rabbit. Dermatophytosis is a zoonotic disease so it can be transmitted to human when people come in close contact with the infected rabbits. In our country rabbits used as a laboratory animal and often purchased as a pet so that many children are also involved [1]. A large number of dermatophytes have been found on several animals, but three species, *Microsporum canis*, *Trichophyton verrucosum* and *T. mentagrophytes* are consistently recovered from human dermatophytosis [2]. *Trichophyton mentagrophytes* is a common dermatophyte that is beneficial to both humans and animals, and is widely seen in rabbits. Dermatophytosis is a skin, hair, and nail illness that affects the stratum corneum. *Trichophyton mentagrophytes* is the most common cause of dermatophytosis in rabbits. *Microsporum* species are less common in rabbits; however this species may be more common in pet rabbits. Dermatophytosis affects young rabbits more frequently, presumably due to their underdeveloped immune systems and low levels of fungistatic fatty acids in their sebum. Overcrowding, hunger, or other illnesses might cause asymptomatic carriers to develop lesions. Ecto-parasites, particularly mites, fleas and ticks can have a role in the development and spread of dermatophytosis [3]. Dermatophytes infect the epidermis and adherent structures, such as hair follicles and shafts. Dry reddish lesion, pruritis, patchy alopecia and erythema are the frequent symptoms, which occur most commonly on the face, usually on or around the head [4]. In many circumstances, the rabbit's lesions will manifest themselves initially on his head, legs and feet. Scratching these places might lead to more skin irritation and bacterial infection. Animals that live in overcrowded conditions in locations with high humidity, in areas with inadequate sanitation or in areas where they do not receive adequate nourishment are more prone to develop ringworm. Considering the above mentioned facts the present study was designed to diagnose the Dermatophytosis and specific treatment of rabbits.

Materials and Methods

The present study was conducted in the rabbit farm house located at ILFC farm, Apollo College of Veterinary Medicine, Jaipur, Rajasthan, India, from March 2020 to May 2021.

During the present study, a total of 105 rabbits were taken for study. All rabbits in the farm screened for dermatophytosis by woods lamp methods. For the risk factors analysis the parameters like sex, age, body weight, diet, ectoparasite infestation and deworming were taken. All the positive rabbits were again experimented for the testing of most effectiveness of drugs in combination form (oral with topical application) against dermatophytosis viz. griseofulvin orally in individual as well as in combination with povidine iodine ointment, ketoconazole orally in individual as well as in combination with povidine ointment topically and ketoconazole orally with lime sulfur solution topically. As ringworm can be transferred to humans, particularly those who have immunocompromised so this is important that wear gloves while handling with infected rabbit. Clip fur near to the skin in the area next to the lesion before topical applying drug to the affected area. The grooming equipments properly sanitized to avoid spreading spores to other rabbits. The rabbits' environment, including as bedding and kennels, should be thoroughly cleaned and disinfected. The testing of the effectiveness of the drug for the treatment of dermatophytosis took four to five weeks.

Results and Discussion

Risk factors analysis of dermatophytosis

During the present study out of 105 rabbits 63 was found positive against dermatophytosis. On the basis of risk factors analysis (table.1) the prevalence of dermatophytosis in female rabbits was 62.90% (39/62) which was higher compared to male rabbit 55.81% (24/43), in case of age group the prevalence of dermatophytosis in the rabbits under 1-15 month age was 63.23% (43/68) which was higher than rabbit above 15 month 54.05% (20/37). In case of body weight the prevalence of dermatophytosis in the rabbits below 3 kg was 66.67% (42/63) which was higher than rabbit above 3 kg body weight 50.00% (21/42). In case of diet provide to the rabbit the prevalence of dermatophytosis in the rabbits that

was given diet with vitamin & mineral supplement was 37.14% (12/35) which was less than the rabbit which was provide diet without Vitamin & mineral supplement 71.42% (51/70). In the present study it seems that the prevalence of dermatophytosis in the rabbits which was ectoparasite was 65.21% (15/23) higher the rabbits were ectoparasite infestation was not present 58.53% (48/82). In case of deworming risk factor the prevalence of dermatophytosis in dewormed rabbits was 28.00% (7/28) which was lower than the rabbit without dewormed 70.00% (56/80). This study showed insignificant effects of age, sex, body weight and ectoparasite infestation status for the occurrence of dermatophytosis in rabbit while in case of diet with mineral and vitamin supplement and deworming was significant effect. Several researchers conducted prominent investigations on the prevalence rate of dermatophytosis in rabbits [5, 6]. The frequency of dermatophytosis in rabbits was 25% in male rabbits and 50% in female rabbits [7]. In previous investigations [8, 9] there was no sex propensity for dermatophytosis incidence, and younger animals were more frequently affected. Some researchers [5] argued that dermatophytosis in rabbits was more common in male rabbits, contradicting the current research findings [10, 11] When it comes to age, the results of this study are consistent with those of [12, 13, 14] who stated that rabbits under the age of 12 months were more frequently infected with dermatophytosis than other age groups, but other researchers [15] not agree. Even if the small number of animals with mange prevents a definitive conclusion, the presence of mites is not a predisposing factor for dermatophytes infection [16]. Deworming has a significant effect in animal stress management. Diets rich in vitamins and minerals provide good nutritional value and maintain rabbit immune systems, so that minimise the risk of dermatophytic infection. Previous research has also suggested that a well-balanced diet reduces fungal infection [15].

Table 1: Dermatophytosis analysis in rabbits on the basis of risk factors

S. No.	Variables	Categories	Total No. of rabbits	Positive	Prevalence (%)	p-value
1.	Sex	Male	43	24	55.81	0.838
		Female	62	39	62.90	
2.	Age	1-15 month	68	43	63.23	0.643
		≥15	37	20	54.05	
3.	Body weight	Below 3 kg	63	42	66.67	0.746
		Above 3 kg	42	21	50	
4.	Diet	With Vitamin & mineral supplement	35	12	37.14	0.045*
		Without Vitamin & mineral supplement	70	51	71.42	
5.	Ectoparasite infestation	Yes	23	15	65.21	0.775
		No	82	48	58.53	
6	Deworming	Yes	25	7	28.00	0.042*
		No	80	56	70.00	

* $p < 0.05$ at 5% level of significance so that variable is significant.

Efficacy of antifungal drugs against dermatophytosis

In the present study the antifungal drugs testing in respect of individual and in combination form it seems to be that the antifungal drugs in combination form have more efficient than individual. In this study the most effective drugs combination was ketoconazole orally @ 10-15 mg/kg/day with 2.5% lime sulphur solution (dip twice in a week) which completely cured the infected rabbits about 92.30% (12/13) within 2-3 weeks of treatment the efficacy of the other drugs given in the table.2. The drugs in combination form (oral with topical) have good affinity because of it protects the further infection to the skin and also protects from different secondary

infections of the other microorganism like bacterial and ectoparasite and make animal cured in very less period of time. dermatophytic fungus infections is able to survive for a very long time so this is important that the environment of your rabbit be thoroughly cleaned with disinfectants also to prevent further transmission of infections. Some previous workers also find that the effectiveness of oral dose of griseofulvin 25–30 mg/kg bodyweight once daily during 5–6 weeks is given [17, 18]. In case of local lesion some researchers [19, 20, 21] also suggests topical treatment is preferred with miconazole or other azoles. Topical miconazole twice a week for 3 to 5 weeks is recommended [22].

Table 2: Efficacy of antifungal drugs in dermatophytic rabbits

S. No.	Number of infected rabbits taken	Drugs, dose rate and methods of application	Result of therapeutic management
1	12	Griseofulvin orally @ 25 mg/kg/day	75.00% (9/12) infected rabbits completely cured within 4 to 5 week of treatment
2	12	Griseofulvin orally @ 25 mg/kg/day with povidone iodine ointment (2.5% w/w) topically applied	91.67% (11/12) infected rabbits completely cured within 3 to 4 week of treatment
3	13	Ketoconazole orally @ 10-15 mg/kg/day	About 76.92% (10/13) infected rabbits completely cured within 3-4 week of treatment
4	13	Ketoconazole orally @ 10-15 mg/kg/day with miconazole ointment (2% w/w) topically applied	About 92.30% (12/13) infected rabbits completely cured within 3-4 week of treatment
5	13	Ketoconazole orally @ 10-15 mg/kg/day with 2.5% lime sulphur solution (dip twice in a week)	92.30% (12/13) infected rabbits completely cured within 2-3 weeks of treatment

Conclusion

The incidence of Dermatophytosis cases is increasing over the recent year's especially in developing countries due to poor management, limited resources and increased trade and frequent used as a laboratory animals and testing of various drugs, diagnosis of microorganism etc. The disease is highly zoonotic in nature, so that while handling such cases veterinarian and care takers should take proper protection. The transmission of the disease posing a substantial threat to the human population as well as a significant economic impact due to lost production and management of the rabbit population so that the treatment of infected animal carry out as soon as possible with most effective antifungal drugs.

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