



# Epidemiological and Clinico-therapeutic Studies on Dermatophytosis in Cattle at Parbhani

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## ABSTRACT

**Background:** To investigate prevalence, risk factors, diagnosis and alternative treatment regimens of dermatophytosis in cattle in and around Parbhani.

**Methods:** The overall period of prevalence study was from January, 2022 to December, 2022 in and around Parbhani. The presumptive diagnosis was done by SDA culture media and treatment was given to 18 selected positive cattle which was equally categorized into three group viz: Clove oil, Cow urine distillate and whitfield ointment/control group.

**Result:** The overall prevalence recorded was 17.2 per cent. The most affected cattle were 4 to 8 years of age group, non-descript breed and male cattle. Dermatophytosis in adult cattle is typically manifested as a circumscribed, crusty, whitish grey lesion with focal alopecia, whereas in calf asbestos, crusty lesion was observed. The hump, neck and back were the major sites of occurrence for dermatophytosis. On cultural examination, *Trichophyton verrucosum* was mostly isolated. On haematological investigation granulocytosis, monocytosis and lymphopenia were observed in affected cattle. The recovery period for Clove oil was 7 days, Cow urine distillate showed recovery in days and cattle treated with whitfield ointment recovered in 19 days.

**Key words:** Cattle, Clove oil, Cow urine distillate, Dermatophytosis, Prevalence, Whitfield ointment.

## INTRODUCTION

Dermatophytosis is one of the most frequent skin diseases among cattle (Fantaye and Melake, 2018). Dermatophytosis is a zoonotic skin disease affecting keratinized tissues caused by a specialized group of fungi called dermatophytes which is divided into three groups as anthropophilic, zoophilic and geophilic depending on their habitat and host preferences (Khatri *et al.*, 2017). Dermatophyte while growing on keratinized structures relies on the production of arthrospores for transmission. Dermatophytosis is responsible for huge economic losses to dairy farmers as a result of damage to skin. Because of the peculiarities in the makeup of its spore, it is challenging to remove it from the environment, making dermatophytosis a disease where an ounce of prevention is actually worth than pound of cure (Elgazzar *et al.*, 2011).

Dermatophytosis is frequent problem in cattle population of Parbhani and adjoining areas. Agro-climatic condition creates suitable environment for dermatophyte growth. Hence, the present research work on cattle dermatophytosis is bare need with alternative treatment protocol.

## MATERIALS AND METHODS

### Prevalence

The study included cattle with dermal lesions presented to Veterinary Clinical Complex, COVAS, Parbhani, nearby Agricultural Farm and nearby Veterinary Hospital, during period from January 2022 to December 2022. To study age wise prevalence cattle were divided into different age group as, 0-6 month, 6 month-4 year, 4-8 year, 8-12 year and 12

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year and above as per (Gafoorali 2011). The different native cattle breed such as Red Kandhari, Deoni, Gir, Khillar and Non-descript were screened for prevalence of dermatophytosis. The gender wise prevalence of dermatophytosis in male and female cattle was also recorded.

### Clinical observation

Anamnesis with particular reference to appetite, effect of type of housing on dermatophytosis and distribution of lesion were recorded.

### Laboratory diagnosis

#### Direct examination of skin scrapings

The skin scraping samples from the periphery of lesion collected and observed in a wet preparation of 20 per cent KOH. It was then examined under low power microscope

for presence of arthrospore and ectothrix/endothrix attachment to hair as per (Quinn *et al.*, 2011).

### Cultural examination of skin scrapping

The clinical samples were inoculated individually into plates of Sabouraud dextrose agar (SDA) containing 0.05% chloramphenicol and 0.5 per cent cycloheximide as per (Begum and Kumar, 2021). Part of culture plates were kept for 25°C and other plates were incubated for 7-10 days at 37°C with addition of thiamine and inositol as essential for their growth as *Trichophyton spp.* grow well at 37°C from other dermatophyte. (Quinn *et al.*, 2011). The fungus was identified based on the characteristics of the colony grown on SDA and by microscopic examination.

### Haematological investigation

For haematological investigation 18 positive cattle were selected and further divided into three groups belonging to three different treatment protocol *via*; Group I (Clove oil), Group II (Cow urine) and Group III (Whitfield ointment) and compared with normal healthy animal given by (Aiello and Moses, 2016) to assess the comparative changes in blood parameter before treatment and after clinical recovery. Estimate of haemoglobin (Hb), packed cell volume (PCV), total leukocyte count (TLC) and differential leukocyte count (DLC) were performed as per procedure described by (Brar *et al.*, 2011).

### Treatment

The treatment protocol given is shown in Table 1. Before applying topical medication, clipping of the hair was done as it facilitates better penetration of treatment application and crusts of affected area were removed by scraping or brushing with a soft wire brush and the selected medicament was rubbed in vigorously according to (Constable *et al.*, 2017).

## RESULTS AND DISCUSSION

### Prevalence

Among 616 dermatological cases with clinical manifestation, 106 cattle were found to be positive for dermatophytosis on the basis of cultural examination and overall prevalence recorded was 17.20 per cent. Similar findings were recorded by 15.35 per cent (Guo *et al.*, 2020) and 23 per cent (Lagowski *et al.*, 2021). However, lower prevalence of dermatophytosis was recorded 8.32% by (Ambilo and

Kebede, 2019) and 11 (Dalis *et al.*, 2019). In contrast, higher prevalence was recorded as 53.39 by (Begum and Kumar, 2021) 79.72 per cent by (Tartor *et al.*, 2020). Higher prevalence of dermatophytosis in cattle in present study might be due to high humidity, frequent change in atmospheric condition, poor management and lack of awareness about animal health in livestock owner. An abrupt use of corticosteroid and antibiotic for treatment of any illness in animals and the presence of infected debris material around barns (Constable *et al.*, 2017) may increase the prevalence of dermatophytosis in cattle.

The age wise prevalence of dermatophytosis in cattle were more in 4-8 year age group (Table 2) which commonly used for agricultural purpose, draught purpose and for other heavy work. They were usually exposed to wear and tear, ectoparasite infestation, harsh environment and minor trauma. Similar finding stated by (Ming *et al.*, 2006) that trauma leading to scarified skin ultimately increases the incidence of dermatophytosis in cattle. 4-8 year age group highest prevalence 43.39 percent recorded which was similar with the finding of (Gafoorali *et al.*, 2011) and (Bhikane *et al.*, 2015) who had noted highest prevalence in age group of 4-8 yr (43.20) and 5-8 yr (43.75), respectively.

Whereas, 12 years and above age group cattle were second most common affected for dermatophytosis (27.35) because they were senile had lower immunity due to age factor which predisposed them for dermatophytosis. The similar findings noted 18.51 by (Gafoorali *et al.*, 2011) and 31.25 by (Bhikane *et al.*, 2015). In contrast, the higher prevalence of dermatophyte infection in calves might be due to their weak immunity and alkaline skin pH (Constable *et al.*, 2017).

In present study, male cattle were more commonly affected than female (Table 2). Similar findings were noted as 46.75% (Terefe *et al.*, 2017), 96.55% (Jalil, 2017) who recorded infection rate of dermatophytosis in male as compare to female. On contrary, (Dalise *et al.*, 2019) observed that females (13%) were more prone to dermatophytosis. In present study males were more infected because in Parbhani district male cattle were primarily reared for agricultural/farm purpose and are raise in open area and with no special housing system /barn design for their shelter. Therefore, bullocks were commonly exposed to ectoparasites, adverse climatic conditions, major and minor skin trauma (leading to scarified skin) which predisposes them

**Table 1:** Treatment protocol for dermatophytosis affected cattle.

Group	No. of cattle	Therapeutic drug /preparation	Route of application and duration of therapy
I	06	Clove oil(diluted in DMSO) (Pinto <i>et al.</i> , 2009) (Abdeen and Diasty 2015)	Locally twice daily Till recovery
II	06	Cow urine distillate (Jandaik <i>et al.</i> , 2015)	Locally twice daily Till recovery
II	06	Whitefield ointment/Control group (Al-Farha and Mahmood 2021)	Locally twice daily Till recovery

to ringworm infection. Whereas, (Gafoorali *et al.*, 2011) documented that variation in skin pH and difference in cutaneous fatty acid secretion among male and female might be responsible for sex predilection.

The highest prevalence of dermatophytosis in non-descript breed 24.85 (Table 2) were also recorded by (Gafoorali *et al.*, 2011) followed by Red kandhari 17.19 and Khillar was least affected 1.36. Similarly, (Bhikaneet *et al.*, 2015) found prevalence of dermatophytosis among different breed as in Non-descript, Red kandhari and Deoni were 59.37 per cent, 31.25 per cent and 9.37 per cent, respectively. The higher prevalence of dermatophytosis in Non-descript could be due to rearing of more non-descript cattle in study area.

### Clinical observation

#### Appetite

The dermatophytosis has relative no effect on appetite of animal whereas in some cases it caused a decrease of food intake. Similar finding was stated by Smith, (2009) who has reported dermatophytosis has no effect on appetite of animal.

#### Distribution of lesion

The lesions distributed in adult cattle were observed more commonly on hump, neck, back than other parts of the body. These sites were more exposed than other parts as a result they were more subjected to excessive contact, wetness and maceration by rain. The present finding was to (Swai and Sanka, 2012) who reported similar distribution of lesion. Beginning of lesion in an animal with an established dermatophyte can be present on the coat of cows that appear healthy for 2 to 8 weeks prior to the onset of clinical signs. (Olhoff, 2003).

While in calves face, dorsum and sides of the body was most preferred site of occurrence of dermatophyte lesions. This might be due to close contact between calves and their dam while nursing which result in spread of infection over the body (Ambilo and Melaku 2013). Whereas, in suckling calf particularly face was continuously subjected to constant wetting by mammary secretion while suckling which results into continue maceration and wetness which could predispose to fungal infection (Swai and Sanka, 2012).

#### Effect of type of housing on dermatophytosis in cattle

Dermatophytosis was developed in a free grazing system as a result of exposure to unfavourable ecological conditions such as dust, pollution, ectoparasites and contact with plants that cause allergies and skin infections during grazing. While, the close contact between the cattle, stress, humidity, lack of exercise, very limited exposure to sunlight were the major reasons for development of dermatophytosis in intensive type of housing. Similarly, outbreaks of dermatophytosis in cattle occurred in intensive housing and in winter months due to overcrowding and contact with infected objects mangers and walls as per (Eiashmawy and Ali, 2016).

#### Laboratory diagnosis

##### Examination of fungal culture

The result obtained were hyaline-septated arthroconidia hyphae masses of round spores in clumps attached to partially lysed hairs which showed ectothrixtype of invasion suggested characteristics of *Trichophyton spp.* Sabouraud Dextrose Agar /Culture media. Similar findings reported by (Lagowski *et al.*, 2021) who had found white and yellow orange on periphery colonies of *Trichophyton spp.* While, (Begum and Kumar, 2021) noted similar characteristics

**Table 2:** Prevalence of different risk factors.

Group	No. of cattle suspected	No. of cattle positive	Per cent prevalence(%)	Overall per cent Prevalence (%)	Chi square value
Age					
0-6 month	52	7	13.46	6.6	2.145
6 month 4 year	103	14	13.59	13.20	
4 -8 year	196	40	20.40	37.74	
8-12 year	160	26	16.25	24.53	
12 year and above	105	19	18.09	17.93	
Total	616	106			
Sex					
Male	357	77	21.56	72.64	8.14
Female	259	29	11.19	27.36	
Total	616	106			
Breed					
Non-descript	217	39	17.97	36.79	0.266
Red Kandhari	162	29	17.90	27.36	
Gir	94	15	15.96	14.15	
Deoni	74	12	16.21	11.32	
Khillar	69	11	15.94	10.38	
Total	616	106			

lactophenol stained finding of hyphae and micro/macro conidia.

### Prevalence of causative organism

The rodents are the reservoir of *Trichophyton mentagrophyte* and plays important role in spread of *T. mentagrophyte*. (Moretti *et al.*, 1998). Similar finding were noted by Debnath *et al.* (2012) who documented that *Trichophytonverucosum*, *Trichophyton mentagrophyte* *Trichophyton rubrum* and *Microsporum gypseum* on cultural examination. In contrast, Emman-Abdeen and El-Diasty (2015) who screened 60 samples and found most prevalent genera of dermatophyte isolated were *Trichophyton mentagrophyte* (42.85 per cent) and *Microsporum gypseum* (10.71 per cent) but none of species of *Trichophyton verrucosum* were detected.

### Haematological alteration

Haematological observations revealed non-significant changes in haemoglobin (Table 3). Similar finding were obtained by Gafoorali *et al.*, (2011) who reported non-significant change in haemoglobin value in dermatophytosis affected cattle (12.75±35 versus 12.70±2 g/dl). In dermatophytosis affected cattle there was no significant changes in PCV (Table 3). similar finding was recorded by (Gupta *et al.*, 2014) In erythrocyte count after comparison with before and after treatment, it had slightly significant changes similar result were obtained by (Bhikane *et al.*, 2015). There was no significant changes in platelets count before and after treatment. Similar finding were recorded by (Bhikane *et al.*, (2015). Total leukocyte count value revealed non-significant change before and after treatment in dermatophytosis affected cattle similar with (9.20±0.97 versus 9.45±0.54) (Bhikane *et al.*, 2015). In case of differential leukocyte count significant variations were found. Similar result was observed by (Bhikane *et al.*, 2015).

## TREATMENT

### Clove oil /*Syzygium aromaticum* (Group I)

The recovery period of clove oil was less (Table 4) than whitfield ointment probably, due to presence of eugenol in clove oil which was most potent and active anti-dermatophytic component (Park *et al.*, 2007) which act by inhibition of ergosterol synthesis and interfere with integrity and functionality of cell membrane of fungus (De Oliveira

Pereira, 2013). Another important factor was dilution in DMSO can be used as non-irritating delivery vehicles to increase dermal bioavailability of therapeutics (Notman *et al.*, 2007). Therefore, efficacy of clove oil was better as compared to whitfield ointment (control group). The present findings were similar with Abdeen and El-Diasty (2015) noticed healing of affected lesion within 7-1 day. Similar observations were recorded by Park *et al.*, (2007) that hypha growth of *Trichophyton spp.* was inhibited within 7 days of treatment. In addition, they noticed expansion of endoplasmic reticulum and inner mitochondrial membrane of *Trichophyton spp.* partially destroyed with complete destruction of cell wall of hyphae when treated with eugenol by electron microscopic examination.

### Cow urine distillate (Group II)

The effect of cow urine distillate was mostly seen in early stage of infection, where lesion was not widespread in nature. It is also observed that recovery period in this group was more compared to whitfield ointment (control group). The antifungal potential of cow urine distillate is due to considerably alkaline pH. In present work pH of cow urine distillate was reported to be 9.4. The findings was similar with (Krishnamurthi *et al.*, 2004) who reported that stored cow urine distillate has high alkaline pH (around 9-10) while, the fungi preferably to grow within pH ranged from 3 to 8 as per (Ali *et al.*, 2017).

### Whitfield ointment / control group (Group III)

Whitfield ointment had strong efficacy against dermatophytosis and considered to havekeratolytic, antimicrobial and antifungal effects as per (Constable *et al.*, 2017). Topically salicylic acid application has keratoplastic, anti-seborrhoeic, antiseptic and fungistatic action. Its keratolytic action is useful for dermal penetration of drug and it also provide antiseptic property. Whereas, benzoic acid has both bacteriostatic and fungistatic action for dermatophyte infection particularly for *Trichophyton spp.* with deeper layer penetration as stated by (Sandhu, 2013) and (Fonseka *et al.*, 2021).

Present observation was similar with the (Gafoorali *et al.*, 2011). Who observed 19 days as the overall recovery period for dermatophytosis affected cattle with whitfield ointment. Whereas, (Al-Farha and Mahmood, 2021) reported early recovery period of as 14 days with whitfield ointment. Hence, it is concluded that that clove oil has better efficacy than

**Table 3:** Haematological alteration in dermatophytosis affected cattle.

	Haematological parameter		
Hb (gm%)	11.97±0.25	11.90±0.08	0.26 <sup>NS</sup>
PCV (%)	32.50±1.42	32.25±0.36	2.16 <sup>NS</sup>
TEC (× 10 <sup>6</sup> )	7.43±0.13	6.60±0.13	3.66*
TLC (× 10 <sup>3</sup> )	9±0.05	9.1±0.04	1.52 <sup>NS</sup>
N (%)	37.17±0.48	23±1.03	9.64**
L (%)	34.33±0.42	62.50±0.34	42.07**
E (%)	24.50±0.56	13.17±0.91	9.66**
M (%)	4±0.26	1.33±0.21	8**
Platelets(×10 <sup>3</sup> )	257±0.52	256.16±1.3	0.6 <sup>NS</sup>

**Table 4:** Result of three treatment protocol for dermatophytosis affected cattle.

Cattle no	Age (Month/year)	Breed	Duration of illness (Days/ months)	Site of lesion	Recovery period (days)
<b>Clove oil</b>					
1	4 year	N.D	6 month	Hump	7
2	9 month	R.K	2 month	Head	7
3	6 year	N.D	20 days	Tail	8
4	3 year	Gir	5 month	Neck, Hump, Back	8
5	9 year	N.D	4 month	Hump, Back	7
6	2 year	Khillar	30 days	Neck, Head	6
Average (days)					7.16
<b>Cow urine distillate</b>					
1	10 month	R.K	20 days	Neck, Hump, Back	25
2	3 year	Deoni	2 month	Head	24
3	5 year	N.D	2 month	Hump	26
4	8 year	N.D	4 month	Hump, Back, Neck	Not recovered
5	2 year	Gir	5 month	Head, Neck, Hump	27
6	12 year	N.D	2 month	Hump, Neck	Not recovered
Average (days)					25.5
<b>Whitfield ointment</b>					
1	4 year	ND	15 days	Hump, Neck	19
2	8 month	RK	3 month	Head	20
3	3 year	Khillar	2 month	Tail	18
4	8 year	ND	30 days	Hump	17
5	5 year	Gir	3 month	Neck, Hump, Back	Not recovered
6	9 year	ND	6 month	Hump , Back	19
Average days					18.6

whitfield ointment but cow urine was distillate less effective for treatment of dermatophytosis in cattle. The important aspect in recovery of animal against dermatophytosis was establishment of strong cell-mediated response and the start of delayed type hypersensitivity both these factors helpful in spontaneous regression, which leads to elimination of dermatophytes, resolution of lesions and local resistance to reinfection (Smith, 2009). While accelerated stratum corneal desquamation causes the epidermis to become more permeable, allowing inflammatory fluid to penetrate. (Wagner and Sohnle, 1995). When infected cattle are unable to mount a successful immunological response, persistent infection results. (Yaharaeyat *et al.*, 2009).

## CONCLUSION

Clove oil diluted in DMSO can be used more effectively for treating dermatophytosis cases in cattle at field level.

## Conflict of interest

All author declare that they have no conflict of interest.

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