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Research Article

PREVALENCE OF BOVINE DERMATOPHILOSIS IN ANDHRA PRADESH

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ABSTRACT
A total of 727 samples (148 cattle, 579 buffalo) were examined for the presence of *Dermatophilus congolensis* using conventional microbiological techniques and Polymerase Chain Reaction (PCR) during the period from June 2010 to May 2011. Dermatophilosis was identified in 109 samples (14.99%) by direct microscopic examination, isolation and PCR from skin scrapings, crusts, scabs and plucked hair. A history of trauma to the skin was evident in all the animals, which is the predisposing factor for establishment of disease. Dermatophilosis was more prevalent in monsoon season (21.77%), rural household animals (27.37%), young (1year old-52.17%), male (27.27%) and cross breed animals (40.56%). This appears to be season, management condition, breed and age had highly significant ($p<0.01$) influence on the occurrence of bovine Dermatophilosis.

Keywords: *Prevalence, Bovine, Dermatophilosis, Dermatophilus Congolensis, Andhra Pradesh*

INTRODUCTION
Dermatophilosis is an economically important contagious zoonotic skin disease of livestock caused by Gram positive bacterium *Dermatophilus congolensis.* The disease was first reported in Belgian Congo by *Van Saceghem* in 1915, since then it has been reported worldwide (Zaria, 1993). The disease has a wide host range from domestic to wild and aquatic animals (Zaria, 1993). The domestic animals include cattle, buffalo, sheep, goat and horses, which are most frequently affected and pig, dog and cats, which are rarely affected. The disease is characterized by acute (or) chronic, local (or) progressive and sometimes fatal exudative epidermatitis with serous exudation and drying to form characteristic matting of hair and scab formation (Abdullahi, 2001; Loria *et al.,* 2005). The severe outbreaks of disease results in gradual loss of condition, decrease in milk and meat production, reduced working ability in draft animals, failure of reproduction due to severe infection of vulva in cows and severe leg lesions in bulls making them unable to mount (Oppong, 1976), deprived hide values and loss of body condition. The disease leads to distress sale by farmers and mortality up to 50% in the absence of treatment (Naves *et al.,* 1993). It indicated that Dermatophilosis is a potential determinant factor for the dairy development (Dejene *et al.,* 2012).
Andhra Pradesh has a population of approximately 601.75 lakhs (Integrated Sample Survey Report - A.P 2012-13) of livestock which contributing 6.32% of GDP to national economy. Cattle and sheep rearing have become an important component of rural economy. Though the clinical pictures suggestive of Dermatophilosis have been noticed in several districts of Andhra Pradesh, but the disease has not yet been confirmed and reported. Further little information is available on Dermatophilosis in other states of the country. For better prevention and control strategy of this disease, epidemiology of the disease is a prerequisite. Therefore, the present study was conducted to determine the prevalence and factors influencing on the occurrence of bovine Dermatophilosis.

MATERIALS AND METHODS
Experimental Design
A total of 727 animals (148-cattle, 579-buffalo) were examined in this study (Table-1). A wide variety of breeds including their crosses was represented (Indigenous buffalo-436, Graded Murrah buffalo-143, Jersey-81, Holstein Freisian-17 and ongole cattle-50). There were 44 male and 683 female, age ranging from one month to 13 years of ages. History of age, sex, breed, rearing system and clinical signs were

recorded during clinical examination. The cattle and buffaloes from different districts of Andhra Pradesh were examined clinically by close visual inspection and palpation of the entire skin surface of the body and the case selected on the basis of clinical signs.

Table 1: Details of samples (skin scabs/scrapings) collected to study epidemiology of Dermatophilosis in Andhra Pradesh

S. No	District	No of samples (skin scabs/scrappings) collected	
		Cattle	Buffalo
1	Kadapa	30	233
2	Kurnool	15	250
3	Chittor	103	-
4	Anantapoor	-	04
5	Prakasam	-	08
6	Nellore	-	11
7	Guntur	-	16
8	East Godavari	-	19
9	West Godavari	-	09
10	Krishna	-	02
11	Nalgonda	-	05
12	Vishakhapatnam	-	22
Total		148	579

Sample Collection

A total of 727 samples were collected aseptically comprising of skin scrapings, scabs, crusts and plucked hair. Swabs were collected by sterile swab sticks applying gentle rubbing on concave surfaces of scabs and raw lesions on the body. Immediately after collection the samples were put into sterile test tubes and carried to laboratory for inoculation into culture media. The impression smears prepared from the base of the freshly removed scabs, crusts, exudates and pustules were collected with proper aseptic precaution. The smears were stained with Giemsa stain and examined for the presence of *D. cogolensis*.

Isolation and Identification

The samples were processed for isolation of *D. congolensis* by Haalstra`s method with slight modification (OIE, 2008). The specimens were seeded on Brain Heart Infusion (BHI) agar (Himedia) and polymyxin-blood agar (OIE, 2004) plates (Polymyxin B sulfate @ 1000U/ml) and incubated for 48-72 hours at 37ºC under 10% CO_2 tension. Colonial morphology and growth characteristics of the organism were examined on blood agar and BHI agar plates (OIE, 2004). Motility test and Biochemical reactions viz. Catalase test, IMViC tests, Oxidase test, and sugar fermentation test with five sugars i.e. glucose, lactose, maltose, mannitol, and xylose were performed as per the standard procedure described by Babul *et al.*, (2010).

The polymerase chain reaction was also used for confirmatory diagnosis of Dermatophilosis. The sequences of oligonucleotide primers specific for *D. congolensis* were employed. Forward primer: 5'-ACATGCAAGTCGAACGATGA-3'; Reverse primer: 5'-ACGCTCGCACCCTACGTATT-3'. The target amplification of 500bp product of 16s ribosomal RNA gene was carried out as described by Shaibu *et al*., (2010).

Statistical Analysis

The data were subjected to Chi-Square test (Snedecor and Pochran, 1989) for analysis of significance.

RESULTS AND DISCUSSION

Results

Prevalence of Bovine Dermatophilosis

Of the 727 samples (cattle-148 and buffalo-579) examined *D. congolensis* was demonstrated in 21 out of 148 cattle (14.20%) and 88 out of 579 buffaloes (15.20%) by direct smear examination and PCR.

Dermatophilosis was found more prevalent in rural household farms (22.27%) than in the intensive dairy farms (1.92%) (Table 2).

Table 2: Prevalence of Dermatophilosis under farm and rural conditions in Andhra Pradesh

S. No	Management System	Animals Examined	Animals Infected	Percentage (%)
1	Intensive Dairy farm	260	05	1.92
2	Rural Households	467	104	22.27
		727	109	14.993
Chi Test (P-value)			0.0000**	

** *means (P< 0.01)*

Breed wise occurrence of dermatophilosis was analyzed and observed that the disease was more prevalent in Graded Murrah Buffaloes (40.56%) than indigenous buffaloes (6.88%). Among cattle, dermatophilosis found more in Ongole (20.0%), than Holstein Friesian cross breeds (17.65%) and Jersey cross breeds (9.88%). Prevalence of disease was found to be significantly high (p<0.01) in buffaloes than cattle (Table-3).

Table 3: Breed wise Prevalence of Dermatophilosis in Andhra Pradesh

S. No	Breed	Animals Examined	Animals Infected	Percentage (%)
1	Indigenous	436	30	6.88
2	GMB	143	58	40.56
3	HF	17	03	17.65
4	Jersey	81	08	9.88
5	Ongole	50	10	20.0
Total		727	109	14.993
Chi Test (P-value)			0.0000**	

** *means (P< 0.01)*

Age wise occurrence of dermatophilosis was analysed and observed that the disease was more prevalent (p<0.01) in one month to one year age group of animals (52.17%) followed by 2 to 4 years (19.09%), 8 to 12 years (14.67%), 4 to 6 years (12.77%), 6 to 8 years (12.62%), 12 years and above (12.50%) and 1 to 2 years (9.68%) (Table-4).

Table 4: Age wise prevalence of Dermatophilosis in AndhraPradesh

S. No	Age (years)	Animals Examined	Animals Infected	Percentage (%)
1	<1	23	12	52.17
2	1-2	31	03	9.68
3	2-4	110	21	19.09
4	4-6	274	35	12.77
5	6-8	206	26	12.62
6	8-12	75	11	14.67
7	>12	08	01	12.50
Total		727	109	14.993
Chi Test (P-value)			0.0000**	

**means *(P< 0.01)*

The incidence rate indicates higher prevalence (27.27%) in male than female (14.20%). However sex has no significant influence (p>0.01) on the occurrence of the disease (Table-5).

Table 5: Sex wise prevalence of Dermatophilosis in AndhraPradesh

S. No	Sexes	Animals Examined	Animals Infected	Percentage (%)
1	Male	44	12	27.27
2	Female	683	97	14.20
Total		727	109	14.993
Chi Test (P-value)			0.05355 NS	

NS – non significant

Influence of season on the prevalence of disease was also studied and highest incidence rate was recorded in south west monsoon (21.77%). A chi-square test revealed a highly significant ($p<0.01$) influence of management condition, season, breed and age on the occurrence of the disease (Table-6).

Table 6: Seasons wise prevalence of Dermatophilosis in Andhra Pradesh

S. No	Season	Number examined	Number positive	Percent positivity
1	Winter (January – March)	121	05	4.13
2	Summer (April – June)	218	46	11.93
3	South west Monsoon (July – September)	271	39	21.77
4	North east Monsoon (October – December)	117	19	16.24
Total		727	109	
Chi Test (P-value)		0.0032**		

***means (P< 0.01)*

Clinical Observations

Skin lesions present on all over the body. Lesions include vesicles, pustules, matting of hair, thick crusts and yellowish brown scabs. In generalized chronic cases of bovine Dermatophilosis, thick horny scabs often were confluent forming a mosaic pattern (Figure 1). Removal of crusts leaves a pinkish, moist surface and sometimes bleeds. Lameness was noted in animals with lesions affecting the limbs. A history of trauma was recorded in all the animals.

Isolation and Identification

In impression smears stained with Giemsa stain, *D. congolensis* was observed as thin, branched septate filaments with 2-6 rows of coccoid bodies giving characteristic tram track appearance (Figure 2).

All the isolates grew well at 37ºC under 10% CO_2 tension and produced multiple colonies with different sizes and shapes along the line of streaking.

Dermatophilus congolensis produced grayish-white, small, beta hemolytic, raised, round to square or irregular, adherent and rough granular colonies on polymyxin blood agar.

On microscopic examination it was motile, Gram positive, coccoid in nature with branching, septate and filamentous appearance.

In some cases the filaments divided into two to six rows of cocci giving characteristic tram-track appearance.

On biochemical examination *D. congolensis* found positive for catalase, oxidase and citrate utilization tests. It ferments glucose and produced acid without gas. However failed to ferment lactose, maltose, mannitol and xylose.

In the polymerase chain reaction, primers amplified the 500bp product of 16s ribosomal RNA gene of *D. congolensis* specifically and no amplification in the negative control. Hence the PCR can be used in confirmation of Dermatophilosis (Figure 3).

Discussion

Out of 727 samples examined, 21-cattle (14.20%) and 88-buffaloes (15.20%) were found positive for Dermatophilosis in Andhra Pradesh. The prevalence of Dermatophilosis was observed in this study is

14.99%, which is similar (13.55%) to the findings of Babul *et al.*, (2010). Similar observation of the disease was reported (13.51%) (Nooruddin and Khaleque, 1986).

Analysis of the data collected on the prevalence of Dermatophilosis under farm and rural conditions in Andhra Pradesh revealed that the disease is more prevalent in animals maintained under rural house hold conditions (22.27%) than intensive dairy farming system (1.92%) where cattle do not expose to thorny bushes and contaminated wallowing tanks. Similar observations were also made by Nooruddin and Khaleque (1986) and Babul *et al.*, (2010). Lowest prevalence in intensive dairy farming system was related to better management conditions.

Occurrence of Dermatophilosis was reported in all the seasons under natural conditions. Rain, moist weather and dew are important to release the zoospores. Continuous wetting of the feet and body from grazing in wet lands, wallowing etc. play a contributing role in occurrence of Dermatophilosis. In Andhra Pradesh South West Monsoon starts in the month of July and extended up to September, again follows with North East Monsoon between October to December. Increase in the prevalence of dermatophilosis was noticed in South West Monsoon period (21.77%) followed North East Monsoon period (16.24%). Prevalence of the Dermatophilosis (11.93%) was also recorded in summer. Habit of wallowing of buffaloes and cleaning the cattle in water tanks could be attributed to occurrence of Dermatophilosis in summer.

Dermatophilosis found to be more prevalent in Graded Murrah Buffaloes (40.56%) than indigenous buffaloes (6.88%). In contrast, Nooruddin and Khaleque (1986) reported higher prevalence in indigenous cattle particularly working bullocks and cows and attributed the reason for high incidence to the use of animals for draft purpose and related skin damage. Indigenous buffaloes appear to have higher resistance when compared to Graded Murrah Buffaloes. Susceptibility of buffaloes to Dermatophilosis was related to genetic markers BoLA-DR/DQ class II haplotype and used marker assisted selection to reduce the prevalence of Dermatophilosis in buffaloes. Similar studies need to be carried out in cattle and buffaloes in Andhra Pradesh to identify the markers related to the susceptibility of animals to Dermatophilosis and to take up suitable breeding programmes.

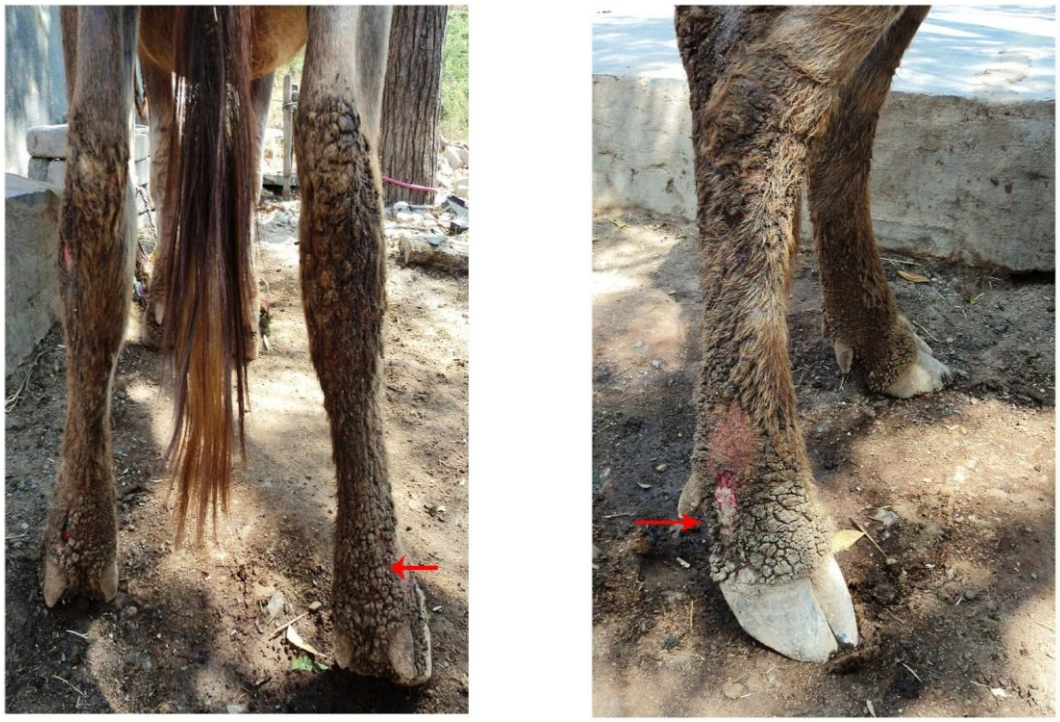
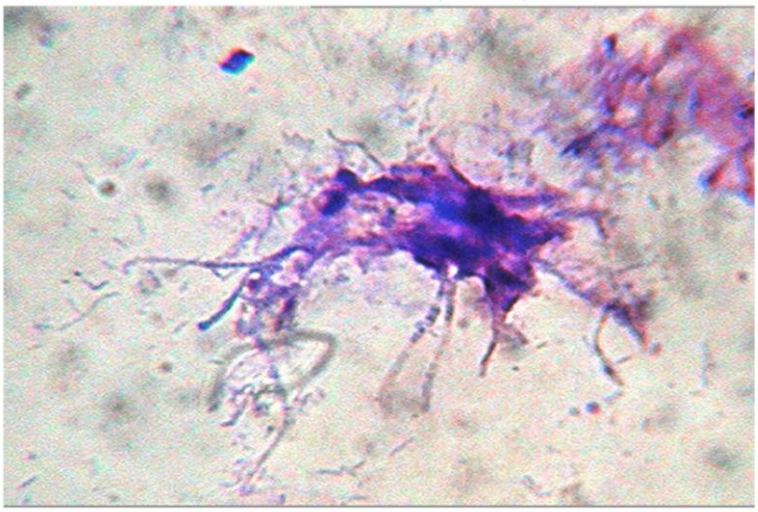
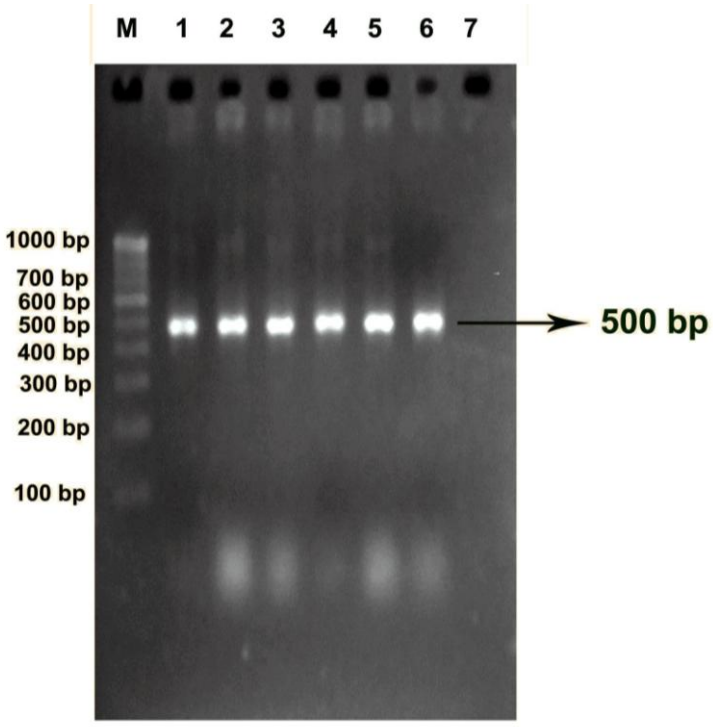


Figure 1: Dermatophilosis affected buffalo showing erythema, characteristic matting of hair and dence scab formation



Branched filamentus, transversely and longitudinally septation showing Tram-Track appearence of *D. congolensis*

Figure 2: Dermatophilosis infected skin scab smear stained with Giemsa's stain (1000x)



Lane M : 100 bp DNA marker

Lane1-6 : 500 bp PCR amplified product of 16SrRNA of *D. congolensis*

Lane 7 : Negative control

Figure 3: Amplification of 16SrRNA gene of Dermatophilus congolensis

Babul *et al.*, (2010) reported significantly high incidence of Dermatophilosis in young cattle (1 month to 1 year age group) in Bangladesh. In the present investigation, the disease was reported in all age groups. However, significantly high prevalence was recorded in young animals below one year age group. Susceptibility of young animals could be related to low immune status and the habit of not providing sufficient milk and feed supplements to calves and young animals.

Though males are reported to be more susceptible than females (Nooruddin and Khaleque, 1986; Babul *et al.*, 2010), the significant difference in susceptibility between sexes could not be established in the present investigation. Male animals usually use in draft purposes which might have increased the chances of skin damage that leads to higher susceptibility of to Dermatophilosis.

The clinical appearance of Dermatophilosis was noted in this study on rump, back sides, neck, withers, legs and tail which is very similar to the observation of Oduye (1976) and Nooruddin and Khaleque (1986) and the lesions recorded in this study was localized or generalized depending upon the areas and it was exposed.

In this study, bacterial colony isolated were grayish white, small, raised and very rough colonies, upon further incubation these colonies became yellowish and produced β-hemolysis. In sugar fermentation test the isolated *D. congolensis* was fermented glucose and produced only acid without gas but did not ferment lactose, maltose, mannitol and xylose which similar the statement of Babul *et al.*, (2010).

In the polymerase chain reaction, primers specifically amplified the 500bp product of 16s ribosomal RNA gene of *D. congolensis* which is similar to the findings of Shaibu *et al.*, (2010) in their studies.

Conclusion

The present study findings indicated that the occurrence of Dermatophilosis was established in Andhra Pradesh. Prevalence of the disease was noticed more in young buffalo and cattle during South West Monsoon season. The disease found to be more in animals maintained under rural house hold conditions than intensive dairy farming system. So this study provides evidence that good management is the valuable tool to control Dermatophilosis in field condition.

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