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Dermatophytes and fungal infections identified in sheep and goats' mastitis milk

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Abstract

Studies on the prevalence of dermatophytes and fungal infections in mastitis milk samples of sheep and goat carried out in a farm in Sitapur village, Gajapati District Odisha state. In this study a total number of 45 sheep and 48 goats were examined for this purpose using SDA culture media. The identification of dermatophytes and fungal organisms were carried out by their morphology in culture and by Lacto phenol cotton blue staining technique. The study revealed the prevalence of *T. mentagrophytes* (7.52%), *Trichophyton rubrum* (6.45%), *Candida* Sp (11.8%) and *Penicillium* Sp (5.37%) with an overall prevalence of 31.18% in the milk samples of sheep and goats. The environmental factors speculated for the prevalence of these infections in the mastitis milk samples were the contamination of the litter materials inside the sheep and goat sheds, conducive atmospheric temperature prevailing in the farm areas throughout the year, absence of regular screening of the sheep and goat population in the organized farm shelters for dermatophytes and fungal infections. The study discussed the health hazards occurring to the affected animals and to human beings due to the infections of *T. mentagrophytes*, *T. rubrum*, *Candida* Sp and *Penicillium* Sp.

Keywords: Dermatophytes-fungi-sheep-goat-mastitis

Introduction

Trichophyton, Microsporum and Epidermophyton are the 3 major genera in dermatophytes causing contagious diseases both in animals and human. (Spicler *et al* 2013). Yeasts and fungi are soil floras and they attack the udder skin in moderate numbers. (Santos and Marin 2005) [26]. Most environmental infections are caused by bacteria and fungi. (Mercer and Stewart, 2019) [19]. Fungal infections are common under improper management conditions and as saprophytes thrive well in moist, warm and humid climate by utilizing the dead materials and thrive on hair shafts and develop mycotoxins. Transmission of the fungal agents occurs by direct contact or by indirect ways from animals and human with infected skin and hair. (Baumgardner 2017) [4] Costa *et al* (1993) [8] reported yeasts as opportunistic pathogens and develop infection by udder infiltration. Amrani Meriem *et al* (2020) [2] reported majority of *Penicillium* Sp were able to develop mycotoxins i.e citrinin and ochratoxin A. This suggests that contaminated goats' dairy products could be a risk to the health of consumers. Park *et al* 2013 [23], Abera *et al* (2016) [1] reported the unpasteurized infected milk is unhealthy to human beings and it has to be evaluated for zoonosis. With this back round the milk samples from sheep and goats were screened for the prevalence of dermatophytes and fungal infections with mastitis in order to follow these positive animals and their offsprings for their pathogenesis in due course.

Materials and Methods

Milk samples collection

Milk samples were collected from the milch sheep and goats from a farm in Sitapur village of Gajapati district in Odisha state. California Mastitis Test (CMT) was performed to confirm mastitis. In this study 28 sheep and 32 goat samples were found negative. These animals were utilized for culture studies (Table.1). All the sheep and goats being reared under semi-intensive

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system of rearing and all these animals were dewormed and vaccinated against B.Q, H.S and FMD vaccines as per schedule.

Laboratory studies on the dermatophytes and fungal organisms

The negative milk samples of the sheep and goats with CMT were utilized for Sabouraud Dextrose Agar (SDA) culture, followed by lactophenol cotton blue by staining. The dermatophytes and fungal culture organisms were identified on the basis of their morphological studies and by lactophenol cotton blue staining technique as per standard procedures.

Results

Table 1: The milk samples of sheep and goats infected with dermatophytes and fungal infections

Parameters	Sheep milk	Goat milk	Total	Percentage positives
Total population screened	45	48	93	
Total CMT positive milk samples for mastitis	28	32	60	64.51%
Positive for				
<i>T. mentagraphytes</i>	3	4	7	7.52%
<i>T. rubrum</i>	4	2	6	6.45%
<i>Candida albicans</i>	6	5	11	11.8%
<i>Penicillium sp</i>	3	2	5	5.37%
Total positives	16	13	29	31.18%

The milk samples of sheep and goats infected with dermatophytes and fungal infections were given in Table 1. Out of 93 animals milk samples screened by CMT 60 animals milk samples (64.51%) were found positive for mastitis. All the negative milk samples with CMT were found positive for *T. mentagraphytes* (7.52%), *Tricophyton rubrum* (6.45%), *Candida Sp* (11.8%) and *Penicillium Sp* (5.37%). The overall positives for dermatophytes and fungal infections were 31.18% (Table 1).

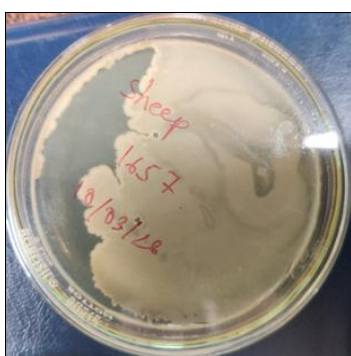


Fig 1: *T. mentagraphytes* – sheep.

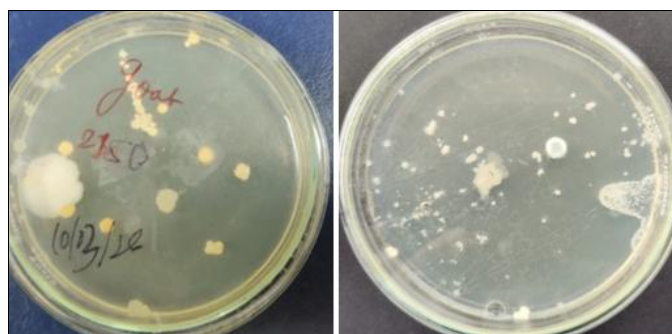


Fig 2: Combined colonies of *T. mentagraphytes*, *T. rubrum*, *Candida Sp* & *Penicillium Sp* - goat

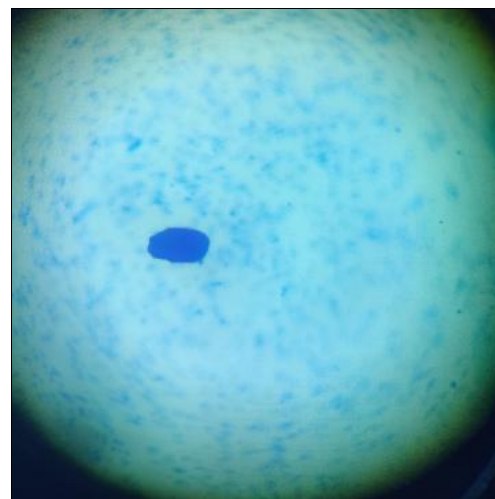


Fig 3: *T. mentagraphytes*



Fig 4: *T. rubrum*



Fig 5: *Candida Sp*



Fig 6: *Penicillium Sp.*

Discussion

In this study the prevalence of *T. mentagraphytes*, *T. rubrum*, *Candida* Sp and *Penicillium* Sp were confirmed in the milk samples of sheep and goats affected with mastitis. Ganesan *et al* (2025a) ^[14] studied the prevalence of *M.audouinii*, *mucormycetes*, and *Fusarium oxysporum* infections in subclinical mastitis buffalo milk in Gajapati district, Odisha state. Ganesan and Meena (2024) ^[13] reported *Microsporium gypseum*, *M. nanum*, *T. tonsurans* and *E.rostratum* in normal goat milk samples in and around Jaipur city of Rajasthan state. Center for Food Security and Public Health (CFSPH) (2004) narrated the cases on *M. audouinii*, *T. rubrum*, *T. tonsurans* and *E. flocculosum* in all livestock species. Dalis *et al* (2023) ^[9] reported 23.8% of the goat population in Nigeria had the prevalence of *T. mentagraphytes* and *T. verrucosum*. The cow milk samples studied by Emenuga *et al* (2022) ^[11] confirmed the prevalence of *Tricophyton verrucosum*, *T.soudanense*, *T. mentagraphytes*, *Candida albicans*, *Aspergillus flavus* and *Geotrichum candidum* at 82% level. Papini *et al* (2010) ^[21] reported *T. rubrum* caused zoonotic infections in dairy farm workers by contact with infected cattle. Ganesan *et al* (2025b) ^[15] reported *Tricophyton* sp, *Microsporium* Sp and *Aspergillus niger* as invasive pathogens in endemic farm premises. The prevalence of *T. mentagraphytes* and *Penicillium* Sp in cattle in Rajasthan state, India was studied by Sharma *et al* (2010) ^[27]. Carolina Segundo Zaragoza *et al* (2021) ^[6] reported six species of *Candida* in clinically healthy and diseased goat milk from Mexico and suggested its role as an opportunistic pathogen. Alvaro Rafael Quintana *et al* (2020) ^[3] suggested microbial transfer of the yeast candida from farm environment to the milk, which included the use of feed for animal feeding. Machado *et al* (2018) ^[18] reported fungal mastitis in ruminants due to candida as a main genus. Buzzini *et al* (2017) ^[5] reported air as a vector of yeast transmission. Knuth *et al* (2019) ^[17] reported the subclinical mastitis due to candida infection in USA in sheep milk. The prevalence of candida species in the infected milk was attributed to the contamination of feed materials and the environmental pollution. In this study the prevalence of *T. mentagraphytes* was considered as an invasive pathogen to develop mastitis and the *T. rubrum* as a zoonotic pathogen. The prevalence of candida was considered as an opportunistic pathogen originated from feed and air. Emilie Delavenne *et al* (2011) ^[12] reported that the normal goat and ewe milk carrying 27 fungal species which included *Candida*, and *Aspergillus*. Mohamed Hassan *et al* (2018) ^[20] reported the prevalence of *A.fumigatus* (17.24%), *A.niger* (10.34%), *A.terreus* (6.89%) and *A.versicolor* (3.44%) in goat milk in Iraq. Jimenez *et al* (2018) ^[16] reported 14% prevalence of *Aspergillus* Sp by animal milk. Desoubreaux *et al* (2014) ^[10] reported *Aspergillus* as an opportunistic airborne fungal infection. Papri Nag *et al* (2022) ^[22] explained that the mycotoxins produced by *Aspergillus* Sp suppress the innate immune pathways in plants and animals. Samson *et al* (2004) ^[25] reported *Penicillium* as a soil borne prevalent in moderate and cool climate and they present in organic materials known to develop mycotoxins. Pitt (2014) ^[24] reported *Penicillium* fungus as a source of infection with mycotoxin production and it is attributed for the innate immunity dysfunction in the animals and human beings. Prevalence of *Penicillium* Sp in this mastitis milk is considered as a factor to dispose the infected population to a depressed immune status.

Conclusion

The studies on the prevalence of dermatophytes and fungal infections denotes the poor hygienic management of the sheep and goat sheds and the need for screening of the animals and the shed floors at regular intervals. The prevalence of *T. mentagraphytes* have to be avoided since it is considered as an invasive pathogen for mastitis occurrence and candida species as opportunistic pathogen and in the same way the prevalence of *T. rubrum* have to be avoided as it is considered as a zoonotic pathogen. The prevalence of *Penicillium* Sp in the milk samples have to be avoided to restore the innate immunity intact. Antifungal agents or flame gun usage to control the dermatophytes and fungal infections suggested to reduce the burden of these pathogens in general.

Conflict of Interest

Not available

Financial Support

Not available

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