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Studies on the prevalence of fungi in enteric and pneumonic cases of sheep population in Gajapati District, Odisha state

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Abstract
The present study was carried out in sheep population in an organized livestock farm having cattle buffaloes, sheep, goats and swine population in R. Sitapur village, Gajapati district of Odisha state for the prevalence of fungi affected with pneumonic and enteric symptoms. The clinical signs observed in this sheep populations were pneumonia and enteritis. The sabouraud dextrose agar culture of the nasal and enteric samples collected from the infected sheep population followed by staining with lactophenol cotton blue revealed the prevalence of *Microsporum* Sp, *Alternaria alternata*, *Candida albicans* and *Mucor* Sp. Factors associated for the causation of multiple fungal infections in this sheep population were the warmth climatic conditions, humidity, infected floor, poor sanitation of the sheep shed and absence of regular monitoring of the animals for fungal infections.

Keywords: Fungi, prevalence, pneumonic, enteric, sheep

Introduction
Fungal infections are common contagious diseases caused by fungi. Some species live in the environment and act as parasites rarely. In live animals the dermatophytes are inhabitant of the superficial tissues like hair, nails, subcutaneous tissues and other sites and are reported more in immune compromised animals. Dermatophytosis caused mostly by three genera, namely Trichophyton, Microsporum and Epidermophyton. Most fungi are available in the soil and in living tissues. (Spickler *et al.* 2013) [22]. Fungal infections are more relatively in healthy and immune competent animals because of their presence in the environment. (Kohler *et al.* 2015; Gnat *et al.* (2020) [15, 13]. The prevalence of fungal dermatophytosis are low and recurrent infections caused by true and opportunistic pathogens in animals and human beings. Ringworm infections of animals and human beings are more in animals and human beings in hot and humid climates. (Radostits *et al.* 2000) [17]. The prevalence of goat and sheep dermatophytes were 8.9 and 7.0 % in Nigeria respectively (Nweze 2011) [16], and it was 6.4 and 6.1% in West Bengal respectively (Biswas *et al.* 2015). The prevalence of *Tricophyton mentagrophytes* and *Tricophyton verrucosum* were 25.5 and 23.8% respectively in goat and sheep population in Nigeria (Dalis *et al.* 2023) [7]. Emenuga and Oyeka (2013) [8] reported 19.64% *T. verrucosum*, 20.54% of *T. mentagrophytes* 5.8% *M. gypseum* in sheep and goat in Nigeria. CFSPH (2004-2013) reported the prevalence of *M.audouinii*, *T. rubrum*, *T. tonsurans* and *E. floccosum* in all livestock species including goats and pets. Studies on the prevalence of fungal infections in various animals both systemic and cutaneous origins were carried out extensively by many authors. In this study an attempt was made to study the prevailing fungal infections in sheep population affected with enteritis and pneumonia in an organized livestock farm complex.

Materials and Methods
Location: The present study was carried out in an organized livestock farm in Sitapur village in Gajapati district of Odisha state.

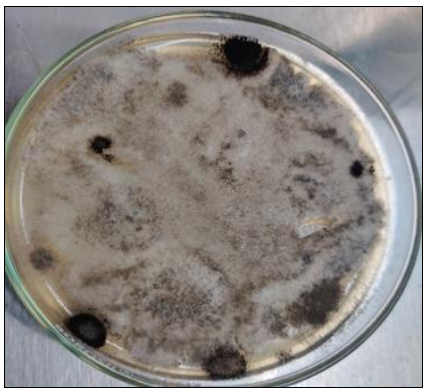
Clinical examination of the animals

A total number of 22 sheep, out of 42, showed the clinical signs for enteritis and pneumonia and these animals were screened for these fungi prevalence. All these animals were kept in semi-intensive system of rearing and vaccinated for foot and mouth disease, hemorrhagic septicemia, black quarter and dewormed regularly.

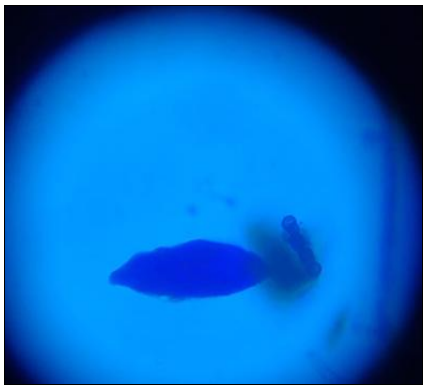
Laboratory examination for fungal infections

Nasal and enteric samples were collected from the clinically positive sheep and subjected for sabouraud dextrose agar media (SDA) culture followed by lacto phenol cotton blue staining (LPCB).

Results



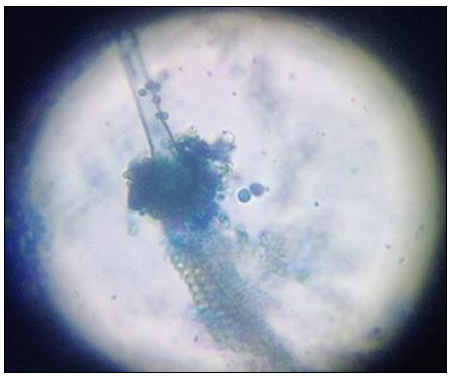
Combined fungi-SDA-Culture



Microsporum Sp

Candida albicans

Alternaria alternata



Mucor Sp

The SDA culture and LPCB staining of the infected samples from the affected sheep population with enteritis and pneumonia revealed the presence of *Microsporum* Sp, *Alternaria alternata, Candida albicans* and *Mucor* Sp.

Discussion

In this study *Microsporum* Sp, *Alternaria alternata, Candida albicans* and *Mucor* Sp were identified in the enteric and pneumonic cases of sheep in Sitapur village of Gajapati district in Odisha state where the hot and cold climates prevails throughout the year. Emenuga and Oyeka (2013) [8] isolated *T. verrucosum, T. mentagrophytes, M. gypseum, Sporothrix schenckii, Candida albicans, Fusarium solani, Geotricum candidum* and *Aspergilus* species in sheep and goats. Scott *et al.* (2001) [19] reported the prevalence of *Tricophyton* Sp, *Microsporum* Sp and *Epidermophyton* Sp. in animal hosts for extended periods. Santos and Marin 2005; Costa *et al.* (1993) [6] reported yeasts and fungi as opportunistic organisms under weak defence mechanism of the dairy cattle with mastitis. Jensen *et al.* (1994) [14] reported the respiratory and systemic invasion of the fungi to cause enteritis, endometritis and encephalitis in cattle and horse. Slaviero *et al.* (2020) [21] suggested mucorales as saprophytic opportunistic organisms. Ganesan and Anamika Meena (2024) [11] reported the prevalence of *M.gypseum, M. nanum, T. tonsurans* and *Exserohilum rostratum* in goat populations of Rajasthan state. Sharma *et al.* (2010) [20] reported *Microsporum gypseum, Tricophyton mentagrophytes* and *Mucor* Sp as a contaminants in cattle population in Rajasthan state. Ajello and Chermette *et al.* (1962) [2] reported the carrier status of the fungal organisms in the living animals. Sravani and Ganesan (2024) [9] reported the prevalence of *Microsporum* and *Mucor* species in buffaloe population of Rajasthan state. Ganesan *et al.* (2024) [10] reported the reservoir status of *M. audouinii. M. gypseum, M. nanum, T. tonsurans, E. rostratum* and *Alternaria alternata* in sheep population in Rajasthan state. Gawaz and Weisal (2018) [12] reported mixed infections of yeast like fungi, dermatophytes or moulds within the same lesions. Vipparti (2014) [25] reported mixed infextions of *Aspergillus flavus* with *Candida albicans* in an immuno compromised patient. Walsh 2004. Upton and Marr 2006 [24]; Almyroudis *et al.* (2006) [1] reported prevalence of *Aspergilus* Sp, *Alternaria alternata* and *Exserhilum rostratum* species as opportunistic pathogens with the clinical signs i.e cutaneous lesions, intestinal disorders, pulmonary and cerebral diseases. Ganesan *et al.* (2024) [11] reported the prevalence of *T. verrucosum, M. audouinii, M. gypseum, A. niger, E. rostratum P. braziliensis* and *Alternaria alternata* in Sirohi and Beetal goat breeds of Rajasthan state. Baumgardner (2017) [3] reported the prevalence of fungal infections due to infected beddings, warm environmetal temperature and humidiy. The present study was carried out in sheep population in an organised livestock farm in R. Sitapur village in Gajapati district of

Odisha state, where the climatic conditions were in extreme status of hot and cold. This study revealed the existence of the *Microsporum* Sp, *Candida albicans*, *Mucor* Species and *Alternaria alternata* in sheep populations with enteric and pneumonic conditions. This study suggests the prevalence of *Microsporum* Sp, *Alternaria alternata*, *Candida albicans*, *Mucor* Sp as co opportunistic pathogens in the sheep populations due to contaminated premises.

Conclusions

Clinical examination of the affected population of the sheep with enteric and pneumonic problems revealed the prevalence of *Microsporum* Sp. *Candida albicans*, *Mucor* Species and *Alternaria alternata*. The attributed risk factors associated for the prevalence of the above fungal and yeast infections were due to the wet and dry conditions existing in the sheep unit through out the year. A detailed study on the prevalence of the pathogenic microbes needed in this sheep unit for successful management of the sheep population and to avoid the spillage of fungi to other healthy livestock of this farm and to rule out the co-pathogenic status of the studied fungi infections in the affected sheep population.

Conflict of Interest: Not available

Financial Support: Not available

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