

## IDENTIFICATION OF MICROFLORA AND DERMATOPHYTES ON SKIN SURFACE OF SANITARY WORKERS

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### ABSTRACT

Dermatophytosis is a disease caused by dermatophytes, which attack and grow on dead animal keratin. Its management is a concern of global importance and a public health burden. Dermatophytes belong to three genera, namely, Epidermophyton, Microsporum, and Trichophyton. Poor socioeconomic status, high population densities, and poor sanitary conditions are some of the factors responsible for the high prevalence of dermatophytosis in many developing countries. Dermatophytes are prevalent causes of cutaneous mycoses and, unlike many other fungal pathogens, are able to cause disease in immune-competent individuals. They infect keratinized tissue such as skin, hair, and nails, resulting in tinea infections, including ringworm. One of the

most vulnerable populations who routinely get exposed to infections is that of sanitary workers by virtue of their occupation. These health hazards include exposure to harmful microbes, gases such as methane and hydrogen sulphide, cardiovascular degeneration, musculoskeletal disorders like osteoarthritic changes and intervertebral disc herniation, infections like hepatitis, leptospirosis and helicobacter, skin problems, respiratory system problems and altered pulmonary function parameters. The current review explores the studies done to assess the risk evaluation of microflora and dermatophytes in sanitary workers and relevant studies from PubMed, EMBASE and Cochrane database have been summarized, analyzed and cited here.

**KEYWORDS:** Dermatophytes, dermatophytosis, keratin, sanitary workers, cutaneous

mycoses, developing countries.

## INTRODUCTION

Dermatophytes are fungi that require keratin for their growth. They belong to mould group of fungi and cause cutaneous infections. These fungi can cause superficial infection of the skin, hair, and nails. Dermatophytes are spread by direct contact from other people (anthropophilic organism), animal (zoophilic organism), and soil (geophilic organism). *Microsporum*, *Trichophyton*, and *Epidermophyton* species are the most common pathogens in skin infection are caused by non- dermatophyte fungi. The dryness of skin's outer layer discourages colonization by microorganisms, and the shredding of epidermal cells keeps many microbes from establishing residence. Dermatophytosis are referred to as 'Tinea' infections. They are also named for the body site involved. (Hainer *et al.*, 2003).

Dermatophytosis are aerobic fungi that infect the keratinized layers of skin, hair, and nails. Cutaneous mycosis is a type of fungal infection caused by dermatophytes(dermatophytosis), *Candida* (candidiasis), *Malassezia* (pityriasis versicolor) species. Some bacterial infections such as *Corynebacterium minutissimum* (erythrasma) are also considered cutaneous mycoses. Cutaneous candidiasis usually occurs in warm, moist, and creased areas, such as the inguinal or inter gluteal areas. It is a fairly common opportunistic disease and is usually caused by maceration and trauma to the skin. (Mahmoudabadi and Izadi, 2011).

Sanitation means intervention in reducing people exposure to disease by providing a clean environment in which to live with measures to break the cycle of disease. This usually includes disposing and hygiene management of human and animal excreta, refuse and waste water control of disease vectors and provisions of washing facilities for personal and domestic hygiene. The regular exposure of waste material with sanitary workers may lead to skin, gastrointestinal, respiratory, and orthopaedic problems. (Ahire and Bhalerao).

### Some common disease found in sanitary workers

According to some studies, it is found that sanitary workers are often exposed to a variety of infective organisms, chemicals, animal excreta, sun exposure, cold air, and dirt, which could induce dermatological problems in their face, hands, feet, and rest of exposed skin of the body, and other health hazards which can cause chronic diseases. Some of these diseases are cited here:

**1. Leptospirosis (Ambekar et al., 2004)**

It is a common disease affecting people coming in contact with animal discharge. Rodents and other animals usually carry leptospira. Leptospira are excreted in the urine of the infected animals. Usually rodents are abundant in underground sewers, thus these workers have a high risk of leptospirosis.

**2. Hepatitis (Keeffe and Gastroenterol, 2004)**

Hepatitis is a vaccine preventable disease. Some studies suggested that workers in the solid waste industry may theoretically be at high risk of infectious disease occupationally.

**3. *Helicobacter pylori* (Friis et al., 1996)**

*Helicobacter pylori* (*H. Pylori*) is a type of bacteria. These germ can enter the human body and live in the digestive tract of the human body. After many years, they can cause sores, called ulcers. In some people this infection can cause gastric cancer. Several studies have been described that these workers have high risk of gastric cancer due to this bacterial infection. Several other infections like parasitic infection, gastroenteritis, and Pontiac fever are also described among these workers.

**4. Respiratory symptoms (Thorn et al., 2002)**

Some studies revealed abnormal respiratory functions in these workers. This may be due to exposure to endotoxins and airborne bacteria. According to some study sewage workers and sanitary workers are exposed to different noxious agents, which may lead to the development of chronic lung functions.

**5. Diarrhoea (Matthew et al., 2017)**

Diarrhoea is a pathogenic disease, caused by viruses, bacteria, and protozoans. Diarrhoeal pathogens are primarily transmitted via human feces.

**6. Trachoma (Matthew et al., 2017)**

Trachoma is a bacterial infection which is caused by bacteria *Chlamydia trachomatis*. It causes scarring of the inner eyelid; repeated infection can lead to inward turning of eyelid and, without proper treatment it can cause, corneal opacity and blindness. *C. Trachomatis* is spread through sycophantic flies that reproduce in human feces.

## 7. Mycoses (Fungal infection) (Surendran *et. al.*, 2014)

According to some studies, the occupational infections, occurs usually on the hands: onychomycosis (nail), paronychia (around the nail bed), inter-digital mycosis (between the figure and toes). Wearing gloves and boots (wet workers) can develop these infections.

Some studies have been done to explore the risk of dermatophytes and microbial infections prevalent in sanitary workers who work in any part of the sanitation chain. They ensure that our contact with the human waste ends when we leave the toilets, one of the most important jobs in the society, and yet they remain mostly unseen and unappreciated. These workers often come into direct contact with human waste, working with no equipment or protection making them highly prone towards infections and a variety of health hazards associated with it. Toxic gases, such as ammonia, carbon monoxide and sulphur dioxide in septic tanks and sewers can cause workers to lose consciousness or die. According to some study it is estimated that three sanitation workers die every five days in India (Dalberg Associates, The Sanitary Workers Project, 2018). Many such workers suffer frequent recurrent infections and injuries that in extreme cases even cut their lives short. Family members of the sanitation workers do struggle too, both due to the stigma of the work and due to the life losses or health consequences in their families

Dermatophytosis refers to an infection caused by a dermatophyte, but not all dermatophytes may cause infection. The fungus colonizes the stratum corneum and then grows in a radial manner without penetrating viable tissue. Invasion of hair, which is non-living tissue, is an example of colonization. If the fungus enters viable tissue and continues to grow, then infection is present. Colonization or infection may result in disease if there is structural or functional harm. These may be evident as damaged or destroyed hair and nails, hyperkeratosis, pruritus, inflammation, or alopecia. Dermatophytes induce a dermal inflammatory response which leads to erythema and scaling, which cause itching.

In a study done by Bischel *et al.*, (2019), health risks for sanitation service workers were assessed especially with regard to urine infections in urine collectors. The study demonstrated how pathogens in urine may be transmitted and routes of transmission and this understanding can help in communicating risks to those involved in manual urine collection or processing and to identify appropriate intervention strategies. The results highlight the need to direct the attention towards proper training and implementation of safety protocols in the expansion of CBS, urine collection and waste resource recovery and the importance of the health of

sanitation service workers.

To the best of our knowledge, there is currently no review article on published findings on identification of dermatophytosis on the skin surface of sanitary workers. This information will be of interest to the medical and research community since dermatophytosis is a major public health challenge in many parts of the world especially in developing countries, and health and safety of sanitary workers has been inadequately addressed in public health research.

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