Original Research Article

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Prevalence of fungal skin infections among agricultural workers in Bangladesh

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Abstract

Background: Agricultural workers in tropical regions face significant occupational exposure to fungal skin infections due to constant contact with soil, manure, and high humidity. The specific disease burden in Bangladesh's large agrarian sector is poorly quantified, necessitating focused research to guide protective health policies.

Objective: This study aimed to investigate the prevalence and pattern of fungal dermatoses among agricultural workers.

Methods: A prospective observational study was conducted from January 2023 to December 2024. Using purposive sampling, 127 agricultural workers with skin complaints were enrolled. Diagnosis was based on clinical features and confirmed by potassium hydroxide microscopy. Data on sociodemographics and work practices were collected through a structured tool and analyzed using the Statistical Package for Social Sciences version 23.0.

Results: Among 127 participants, the prevalence of laboratory-confirmed fungal skin infections was 67.7% ($n = 86$). Tinea corporis was the most common type (41.9%), followed by tinea cruris (27.9%). Infection showed highly significant associations ($P < 0.001$) with lack of protective footwear, working barefoot, and poor post-work hygiene. The majority of cases were male (82.6%) and aged 31–45 years (58.1%).

Conclusion: The high prevalence of fungal infections is directly linked to occupational exposure. This critical public health issue requires urgent interventions, including hygiene education, protective equipment, and accessible dermatological care.

Keywords: Agricultural workers, fungal infection, prevalence, skin disease, tropical dermatology

Introduction

Occupational dermatoses represent a substantial, yet often preventable, burden of disease globally, with workers in specific sectors disproportionately affected.[1] Among these, agricultural workers constitute a highly vulnerable population, routinely exposed to a unique constellation of biological, chemical, and environmental hazards that predispose them to skin disorders.[2] Superficial fungal infections, primarily dermatophytosis and candidiasis, are a predominant form of occupational dermatosis in this group, leading to significant morbidity, reduced work productivity, and diminished quality of life.[3,4] The warm, humid tropical climate prevalent in many

agrarian regions creates an ideal milieu for the proliferation of fungal pathogens, a risk compounded by occupational practices that involve prolonged exposure to soil, organic matter, animal contact, and persistent moisture.[5] In the context of Bangladesh, a country where agriculture employs nearly 40% of the workforce and is a cornerstone of the national economy, the health of agricultural workers is of paramount importance to both individual livelihoods and food security.[6] Despite this, occupational health services remain underdeveloped, and research focusing on the dermatological health of this massive workforce is strikingly limited.[7] Existing national health surveys often aggregate data, obscuring the specific disease burdens borne by occupational subgroups. A few regional hospital-based studies have indicated a high clinical suspicion of skin infections among farmers, but there is a paucity of recent, methodologically rigorous studies that combine clinical examination with laboratory confirmation to accurately determine prevalence and associated risk factors.[8,9] The occupational ecosystem of an agricultural worker is replete with risk factors for mycotic infections. Constant handling of contaminated soil and compost, close contact with domesticated animals known reservoirs for zoophilic dermatophytes, and microtraumas to the skin barrier provide direct portals for fungal invasion.[10,11] Furthermore, occupational necessities such as wearing occlusive footwear for long hours, inadequate access to washing facilities, and limited use of personal protective equipment such as gloves and boots exacerbate the risk by creating warm, moist environments on the skin surface that facilitate fungal growth.[12] Socioeconomic constraints, including limited health literacy and poor healthcare access, often lead to delayed presentation, self-treatment with inappropriate topical steroids, and chronic or recurrent infections, complicating management and control.[13] Therefore, generating robust, contemporary epidemiological data is a critical first step in addressing this neglected area of public health. This study aimed to fill this knowledge gap by investigating the prevalence and pattern of laboratory-confirmed fungal skin infections among agricultural workers attending a tertiary care hospital in Dhaka, Bangladesh. By elucidating the specific occupational and behavioral correlates, the findings are intended to provide an evidence base for advocating targeted preventive strategies, guiding clinical practice, and informing policy interventions aimed at safeguarding the health of this essential workforce.

Methods

A purposive sample of 127 agricultural workers was enrolled for this prospective observational study. The study population comprised individuals engaged primarily in farming, poultry, or fisheries who attended the study time, presenting with dermatological complaints. Recruitment occurred over a 24-month period from January 2023 to December 2024.

Inclusion criteria

Participants were included if they were aged 18 years or older, had been employed in agriculture for a minimum of 1 year, and presented with clinically suspected superficial fungal skin infections. Written informed consent was obtained from all participants before enrollment in the study.

Exclusion criteria

Individuals were excluded if they had received any topical or systemic antifungal therapy within the 4 weeks preceding their outpatient department visit, had chronic systemic illnesses such as uncontrolled diabetes mellitus, or presented with primary non-fungal dermatological conditions.

Study procedure

Data collection was performed using a pre-designed, structured questionnaire administered via face-to-face interview. It captured sociodemographic details, occupational history, hygiene practices, and clinical characteristics. A thorough clinical examination was conducted, and the diagnosis

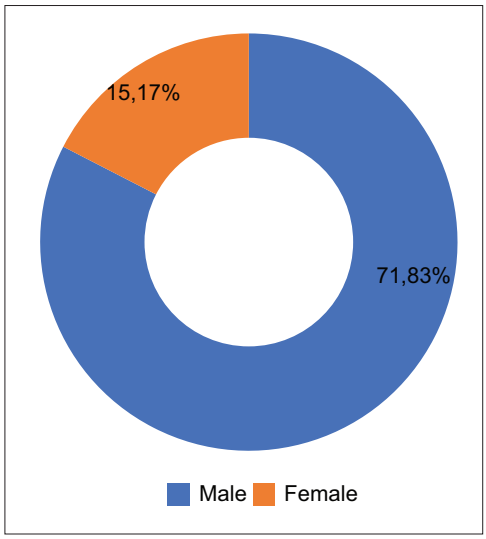

Figure 1: Gender distribution of infected participants (n = 86)

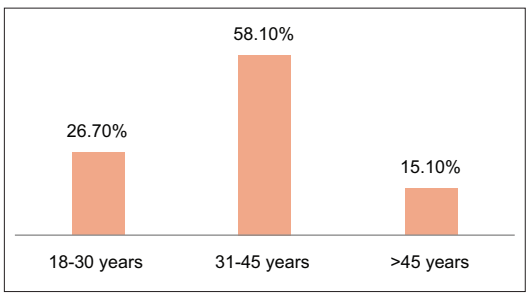

Figure 2: Age distribution of infected participants (n = 86)

Table 1: Prevalence of fungal skin infection among study participants (n=127)

Diagnostic category	*n*	Percentage
Confirmed fungal infection	86	67.7
Non-fungal/Other diagnosis	41	32.3
Total	127	100

of fungal infection was confirmed by potassium hydroxide (KOH) mount microscopy of skin scrapings from the active border of lesions.

Data analysis

All collected data were coded, entered, and statistically analyzed using IBM Statistical Package for the Social Sciences Statistics software, Version 23.0. Descriptive statistics were computed for demographic and clinical variables. The Chi-square test was employed to determine associations between fungal infection prevalence and various risk factors. $P < 0.05$ was considered statistically significant.

Results

The study enrolled 127 agricultural workers presenting with dermatological complaints. Among them, 86 individuals were diagnosed with a laboratory-confirmed fungal skin infection, yielding a high overall prevalence of 67.7% [Table 1]. An analysis of sociodemographic characteristics revealed a pronounced male predominance among the infected participants, with 71 individuals (82.6%) being male and 15 (17.4%) females [Figure 1]. The majority of infections occurred in the middle-aged working population, with the 31–45 years age group accounting for 50 cases (58.1%), followed by the 18–30 years age group with 23 cases (26.7%) [Figure 2]. The most common occupational subgroup affected was field crop farmers, constituting 49 cases (57.0%) [Figure 3]. Regarding the clinical spectrum, Tinea corporis was the most prevalent infection type, identified in 36 patients (41.9%). This was followed by Tinea cruris in 24 patients (27.9%) and Pityriasis versicolor in 13 patients (15.1%). Less frequent diagnoses included Candidal intertrigo and Tinea pedis [Figure 4]. The anatomical distribution of lesions showed a high predilection for exposed and intertriginous areas, with the trunk and groin being the most common sites. A key focus of the analysis was the association between specific occupational and behavioral risk factors and the presence of fungal infection [Table 2]. The use of protective footwear demonstrated a strong protective effect. Only 27.9% of infected workers reported regular use of protective footwear, compared to 70.7% of non-infected workers, a difference that was statistically highly significant. Similarly, the practice of changing and washing work clothes immediately after duty was significantly less common among the infected group (39.5%)

Table 2: Association of selected protective factors with fungal infection status

Protective factor	Category	Infected (*n*=86) (%)	Non-infected (*n*=41) (%)	*P*-value
Use of protective footwear	Regular use	24 (27.9)	29 (70.7)	<0.001
	Irregular/no use	62 (72.1)	12 (29.3)	
Post-work hygiene practice	Immediate change/wash	34 (39.5)	32 (78.0)	<0.001
	Delayed practice	52 (60.5)	9 (22.0)	

Analysis performed using the Chi-square test

Table 3: Association of selected exposure factors with fungal infection status

Exposure factor	Category	Infected (*n*=86) (%)	Non-infected (*n*=41) (%)	*P*-value
History of working barefoot	Yes	51 (59.3)	10 (24.4)	<0.001
	No	35 (40.7)	31 (75.6)	
Pre-existing skin abrasion	Present	38 (44.2)	8 (19.5)	0.007
	Absent	48 (55.8)	33 (80.5)	

Analysis performed using the Chi-square test

Table 4: Association of occupational variables with fungal infection status

Occupational variable	Category	Infected (*n*=86) (%)	Non-infected (*n*=41) (%)	*P*-value
Weekly working hours	>48 h	58 (67.4)	22 (53.7)	0.138
	≤48 h	28 (32.6)	19 (46.3)	
Type of farming	Crop-based	49 (57.0)	19 (46.3)	0.264
	Animal-based	37 (43.0)	22 (53.7)	

Analysis performed using the Chi-square test

compared to their non-infected counterparts (78.0%) [Table 3]. Other significant risk factors included a history of working barefoot, which was reported by 59.3% of infected participants versus 24.4% of non-infected participants, and the presence of pre-existing skin abrasions [Table 4].

Discussion

This prospective observational study, conducted in a tertiary hospital in Dhaka, reveals a strikingly high prevalence (67.7%) of confirmed fungal skin infections among agricultural workers presenting with dermatological complaints. This figure substantially exceeds the rates reported in general population studies from similar tropical settings and underscores agriculture as an occupation conferring an exceptionally high risk for superficial mycosis.[14] The prevalence aligns with, and even surpasses, findings from other regional studies on farm workers in South Asia, where reported rates range from 45% to 62%.[15,16] This high burden can be directly attributed to the confluence of environmental, occupational, and sociobehavioral factors endemic to the agricultural sector in Bangladesh. The demographic profile of infected individuals is predominantly male (82.6%) and within the 31–45 years age bracket accurately mirrors the core agricultural workforce in the region.[6] This distribution is not indicative of a biological susceptibility but rather reflects the gender and age composition of those engaged in the most intensive, field-based agricultural activities. The clinical spectrum observed, with Tinea corporis (41.9%) and Tinea cruris (27.9%) being most common, is consistent with the pathophysiology of occupational exposure. Dermatophytes thrive in warm, moist environments, and the trunk and groin are primary sites affected by friction, occlusion from clothing, and direct contact

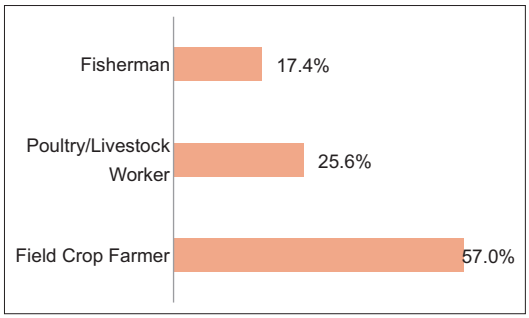

Figure 3: Distribution of primary occupation of infected participants (n = 86)

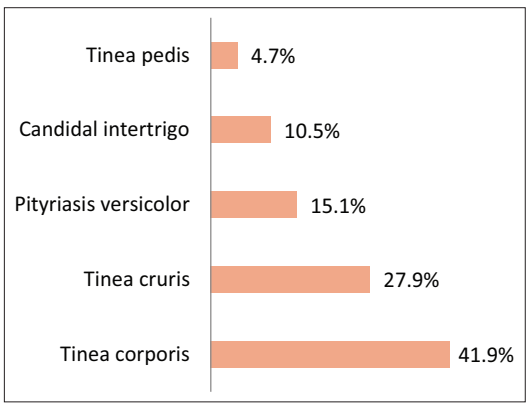

Figure 4: Distribution of types of fungal skin infections (n = 86)

with contaminated soil, vegetation, and animal husbandry equipment.[10,17] The prevalence of Pityriasis versicolor (15.1%), a yeast infection, further highlights the role of heat and sweating inherent to this physically demanding outdoor work.[5] The most critical findings of this study are the robust, statistically significant associations between infection status and modifiable risk factors. The strong protective effect of regular protective footwear use ($P < 0.001$) and immediate post-work hygiene ($P < 0.001$) provides clear, actionable evidence. Working barefoot and delayed washing allow prolonged skin contact with pathogenic fungi and humectants, facilitating inoculation and colonization.[18] These results validate and quantify observations from previous qualitative assessments and smaller studies.[12] Similarly, the significant association with pre-existing skin abrasions ($P = 0.007$) confirms that minor breaches in the epidermal barrier serve as direct portals of entry for fungal elements, a risk omnipresent in farm work involving handling of tools, crops, and animals.[11] Conversely, the lack of significant association with variables such as farming type (crop vs. animal) or weekly working hours, as shown in our analysis, is instructive. It suggests that the risk of fungal infection is pervasive across agricultural subsectors and that the key determinants are specific exposure practices (e.g., footwear use) rather than the mere duration or broad category of work. This shifts the focus from simply identifying "at-risk jobs" to promoting "safer practices" within all agricultural roles. Our findings must be interpreted within the study's limitations. The hospital-based, purposive sampling design limits the generalizability to the entire population of agricultural workers, as it captures only those seeking care, likely skewing toward more severe or symptomatic cases. Furthermore, the diagnosis relied on KOH microscopy, which, while specific, has lower sensitivity than fungal culture; some false negatives may have occurred.[19] Despite this, the confirmed prevalence is alarmingly high. This study quantifies a severe but preventable occupational health burden. The results move beyond establishing association to clearly pinpoint intervenable factors: The lack of protective footwear and poor post-exposure hygiene. Therefore, public health interventions must be pragmatic and targeted. Multi-component strategies should include: (1) workplace health education programs emphasizing the importance of barrier protection and immediate cleansing; (2) provision of subsidized protective gear, such as rubber boots and gloves, through agricultural cooperatives or government schemes; and (3) Integration of dermatological screening into basic occupational health services for early detection and management to prevent chronicity and complications.[20-23] Addressing this neglected issue is not merely a clinical concern but an economic and ethical imperative to safeguard the health and productivity of a workforce vital to national food security.[24,25]

Limitations

This hospital-based study used purposive sampling and KOH microscopy only. This limits generalizability and may underestimate true infection rates due to sampling bias and the limited sensitivity of the diagnostic method.

Conclusion

This study confirms a high prevalence of fungal skin infections among agricultural workers in Bangladesh, strongly linked to modifiable occupational practices such as inadequate footwear and poor hygiene. The findings highlight a significant public health concern requiring urgent, targeted interventions. Prioritizing the provision of protective equipment, enhancing workplace health education, and improving access to dermatological care are essential steps to reduce morbidity and safeguard the health of this vital workforce.

Recommendation

Future research should employ community-based random sampling and mycological culture. Public health initiatives must prioritize distributing protective footwear and implementing workplace hygiene education programs to mitigate the high burden of infection identified in this occupational group.

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