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KNOWLEDGE, ATTITUDE AND PRACTICES REGARDING TUNGIASIS IN POPULATION OF CHINIOT, PUNJAB, PAKISTAN

Original Article

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ABSTRACT

Background: Tungiasis is a neglected tropical disease caused by sand fleas, predominantly affecting economically distressed communities with poor housing conditions, limited healthcare access, and inadequate sanitation. This parasitic skin disease impacts both humans and animals, leading to significant physical, social, and economic challenges. Despite its public health importance, awareness and preventive measures remain insufficient in many endemic regions, highlighting the need for targeted research and interventions.

Objective: The study aimed to assess the knowledge, attitudes, and practices (KAP) regarding tungiasis among the population of Chiniot, Punjab, Pakistan, with a focus on identifying gaps in understanding and prevention strategies.

Methods: A cross-sectional study was conducted in 15 villages of Chiniot, involving 800 respondents. Sociodemographic data and KAP variables were collected through a structured questionnaire comprising 15 questions, categorized into knowledge, attitude, and practices. Data were analyzed using SPSS version 25.0, employing descriptive statistics to identify trends and patterns.

Results: Among respondents, 84.87% were aware of tungiasis, while 15.13% had no knowledge of the disease. Seasonal variations in tungiasis prevalence were identified by 85.2% of participants. Animal infections were notably high, with buffaloes and cows being the most affected (62.3%). Preventive practices included regular cleaning of animal shelters (66.3%) and the use of insecticidal sprays (51.4%). Traditional treatments, such as ethanol (41%), coconut oil (30.8%), and glycerin (27.3%), were commonly used. Most participants (88.6%) wore shoes as a protective measure, and 60.7% reported washing hands after handling animals. However, only 71.2% recognized the dangers of using unsterile instruments for flea extraction.

Conclusion: The study highlights a moderate level of awareness regarding tungiasis but reveals significant gaps in knowledge about its transmission and prevention. Improved education, accessible resources, and consistent hygiene practices are essential to mitigating the disease's impact in endemic communities.

Keywords: Animals, community health, epidemiology, knowledge, practices, prevention, tungiasis.

INTRODUCTION

Tungiasis, a zoonotic skin disorder caused by female sand fleas (Tunga penetrans and Tunga trimamillata), is a significant public health concern, particularly in impoverished rural areas, traditional fishing communities, and urban slums. The condition results from the penetration of female fleas into the skin, where they feed on blood and exudates to mature their eggs, initiating a pathological process marked by swelling, itching, pain, and discomfort. This infestation often targets the periungual region of the feet, causing significant mobility impairments that hinder daily activities. The chronic impact of tungiasis, including tissue necrosis, fissures, ulcers, lymphoedema, and nail deformities, severely affects the quality of life, particularly in resource-constrained settings where treatment options are limited(1, 2). In endemic regions, the burden of tungiasis extends beyond human populations to domestic and livestock animals, which serve as reservoirs of infection. This zoonotic aspect complicates disease management, as veterinary care in these regions is often inaccessible or prohibitively expensive. While some chemical treatments, such as combinations of imidacloprid and permethrin, have shown effectiveness in animals, their application remains limited due to financial and logistical challenges. The absence of standardized management protocols exacerbates the situation, leaving affected communities reliant on rudimentary and often harmful methods of flea removal, including the use of non-sterile tools like needles and hairpins. These practices not only risk secondary infections but also increase the likelihood of transmitting bloodborne diseases such as HIV and hepatitis(3-5).

The acute phase of tungiasis is characterized by intense inflammation, erythema, and pruritus, often leading to bacterial superinfections. Common pathogens associated with these lesions include Clostridium tetani, Staphylococcus aureus, and Enterobacteriaceae species, highlighting the potential for severe complications, including tetanus. In unvaccinated individuals, this risk is particularly pronounced, as evidenced by studies linking tungiasis lesions to tetanus admissions in endemic areas. The chronic phase of the disease, marked by progressive morbidity and deformity, underscores the need for early and effective intervention to prevent long-term disability(6-8). Efforts to control tungiasis have explored various strategies, including the application of topical treatments derived from natural oils and pesticides to eliminate fleas and their habitats. Physical measures, such as improving environmental hygiene, moistening floors to reduce dust and organic matter, and isolating infected animals from human habitats, have also proven effective in reducing infestation rates. However, these interventions are often inconsistently implemented, reflecting broader challenges in public health infrastructure and education(9-11).

The devastating socioeconomic impact of tungiasis, compounded by the stigma and isolation experienced by affected individuals, necessitates an urgent and coordinated response. Effective control measures must integrate medical, veterinary, and environmental strategies while addressing the underlying poverty that perpetuates the disease. The objective of this study is to assess the knowledge, attitudes, and practices of the population in Chiniot, Punjab, regarding tungiasis, aiming to identify gaps in awareness and inform targeted interventions for its prevention and management(12-14).

METHODS

The study was conducted in Chiniot, a district located in central Punjab, Pakistan, characterized by a predominantly rural population (69.2%) and a smaller urban demographic (30.8%). The district has a sparse population with a gender distribution of 48.87% females, 51.11% males, and 0.02% transgender individuals. The research commenced in September 2021, with data collection and analysis designed to assess the knowledge, attitudes, and practices regarding tungiasis in the region(15, 16). A cross-sectional study design was employed to ensure comprehensive data collection from both urban and rural areas of Chiniot. A simple and structured questionnaire was developed, comprising 15 questions divided into four major categories, ensuring clarity and accessibility for respondents with varying educational and social backgrounds. The questionnaire aimed to elicit information about demographic characteristics, knowledge, attitudes, and practices related to tungiasis, enabling a thorough understanding of the population's perspective on the disease(17, 18).

Data collection began in January 2022 and was completed by April 27, 2022. The survey was conducted at 15 different locations across Chiniot to capture diverse responses from various communities. A total of 800 participants were included in the study, ensuring a robust sample size for statistical analysis. The study team consistently employed standardized data collection procedures, maintaining uniformity and reliability throughout the research process(19, 20). The collected data encompassed both dependent and independent variables. Independent variables included gender, age, and occupation, while dependent variables focused on tungiasis-related knowledge, attitudes, and practices. Data were initially recorded in an Excel database, where it underwent a rigorous cleaning process

to ensure accuracy and consistency. Subsequently, the data were transferred to SPSS version 25.0 for statistical analysis. Descriptive statistics, particularly frequency distributions, were utilized to summarize and present the findings effectively(21, 22).

Ethical approval for the study was obtained from the relevant ethics review board prior to its commencement, ensuring compliance with ethical standards for research involving human participants. Informed consent was obtained from all participants, and their anonymity and confidentiality were strictly maintained throughout the study. The gap between the initiation of the study in September 2021 and the commencement of data collection in January 2022 was due to the development and pilot testing of the questionnaire. This phase was essential to refine the questions for clarity, cultural relevance, and accuracy, ensuring the reliability of the data collected during the main survey(23, 24).

RESULTS

The study included 800 respondents from Chiniot, comprising 84.75% males and 15.25% females. The age distribution indicated that 2.4% of participants were aged up to 20 years, 30.1% were between 21 and 30 years, 41.3% were between 31 and 40 years, and 26.2% were above 40 years. Occupations varied among participants, with 46.8% engaged in agriculture, 26.2% in business, 21.2% employed in other sectors, and 5.6% being students. The findings revealed that 84.8% of respondents were aware of tungiasis, and 85.2% believed it to be a seasonal disease. However, only 30.2% recognized that female sand fleas are responsible for causing tungiasis. Among the participants, 66% reported that their animals had been affected by tungiasis, with cows and buffaloes being the most commonly infected (62.3%). Despite the high awareness, only 2.1% of respondents reported personal or familial tungiasis infection.

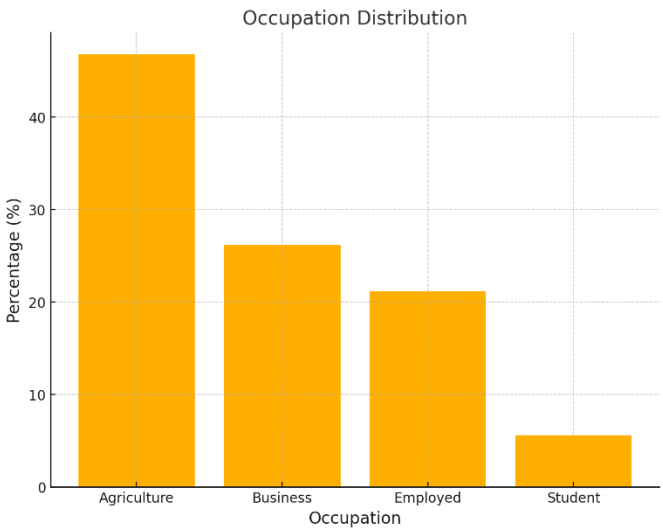
Table 1. Sociodemographic characteristics of 800 questionnaire respondents.

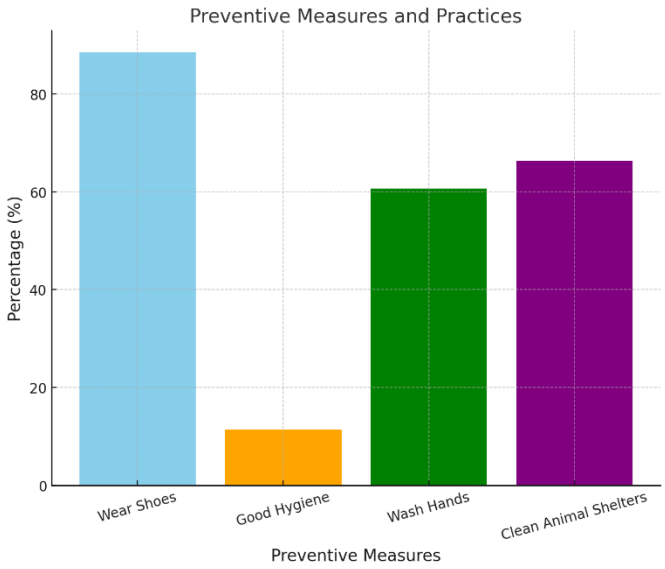
Socio-Demographic Characteristics	Number	(%)
Gender		
Male	678	84.75
Female	122	15.25
Age		
Upto 20	19	2.4
21 to 30	241	30.1
31 to 40	330	41.3
More than 40	210	26.2
Occupation		
Agriculture	375	46.8
Business	210	26.2
Employed	170	21.2
Student	45	5.6

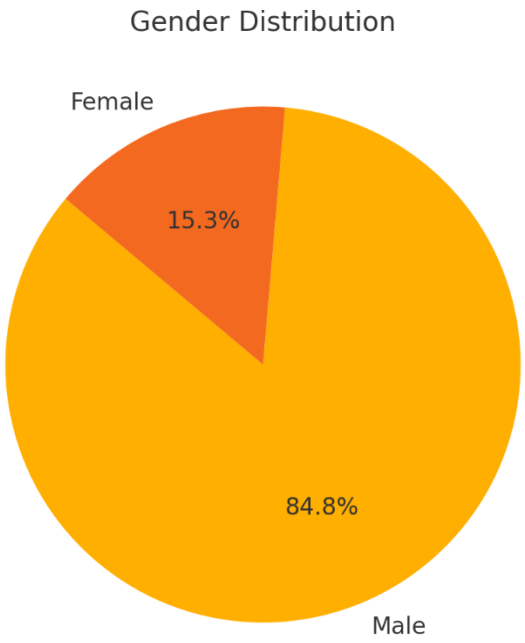
Table 2. Knowledge, Attitude and Practices frequencies regarding tungiasis

Knowledge based questions			
	Response	Number of responses	(%)
Do you know about Tungiasis?	No	121	15.1
	Yes	679	84.8
Do you think tungiasis is a seasonal disease?	No	118	14.7
	Yes	682	85.2
Do you know about female sand fleas caused tungiasis	No	558	9.7
	Yes	242	30.2
Have your animal ever get infected by tungiasis?	No	272	34
	Yes	528	66
Have you or your family member ever infected by tungiasis?	No	783	95.8
	Yes	17	2.1
Which animals affected most by tungiasis?	Buffalo, Cow	498	62.3
	Buffalo, Cow, Sheep, Goat	224	28.0
	Buffalo, Cow, Sheep, Goat, Horse, Donkey, Camel	30	3.8
	Dog, Cat, Sheep, Cow, Goat, Buffalo, Donkey, Horse, Camel	43	5.4
	Donkey, Horse	5	0.6
Attitude based questions			
Would you like to spray, to protect yourself and your animal from tungiasis?	No	389	48.6
	Yes	411	51.4
What traditional treatments would you prefer for your animals?	Coconut oil	253	30.8
	Ethanol	328	41.0
	Glycerin	219	27.3
Do you think using for extraction unsterile instruments in tungiasis leads to other diseases like AIDs, Hepatitis etc.	No	230	28.7
	Yes	570	71.2
Practice based questions			
What are preventive measures you take to protect yourself from tungiasis?	Keep good hygiene	91	11.4
	Wear shoes	709	88.6
Do you wash hands after dealing with your animals?	No	315	39.3
	Yes	485	60.7
Do you daily clean the place of your animals?	No	267	33.3
	Yes	533	66.3

Attitude-related responses indicated that 51.4% of participants were willing to spray the surroundings of their animals to prevent tungiasis. Among traditional treatments, ethanol was preferred by 41.0% of respondents, followed by coconut oil (30.8%) and glycerin (27.3%). A significant majority, 71.2%, recognized that using unsterile instruments for tungiasis extraction could lead to severe diseases such as hepatitis or HIV. Preventive practices showed that 88.6% of participants wore shoes to avoid exposure, while 11.4% maintained good hygiene when near animal shelters. Additionally, 60.7% of respondents reported washing their hands after dealing with animals, and 66.3% regularly cleaned their animals' shelters to minimize the risk of tungiasis and other diseases.







DISCUSSION

The findings of this study highlighted significant levels of awareness among respondents regarding tungiasis, with 84.87% demonstrating knowledge of the disease. A considerable number of individuals displayed an understanding of the parasite's lifecycle, including the biological traits of sand fleas, their zoonotic transmission, and the role of infected animals as reservoirs of infection. While awareness was notably high, knowledge gaps persisted, as only 30.2% of respondents identified female sand fleas as the causative agent of tungiasis, underscoring the need for targeted education campaigns to improve comprehension of the disease's etiology(25-27). The study revealed variations in the prevalence of tungiasis among animals, with buffaloes and cows being the most affected (62.3%), followed by sheep, goats, and other livestock. Such findings align with previous studies indicating that tungiasis is more common in animals closely associated with humans in rural settings. Seasonal fluctuations in prevalence were also observed, with 85.2% of respondents linking tungiasis outbreaks to changes in climate, particularly during harsh weather conditions. These seasonal patterns are

consistent with the environmental preferences of sand fleas, which thrive in dry and sandy soils, creating a cyclical pattern of disease prevalence(28-30).

Traditional practices for tungiasis treatment and prevention were widespread, though many involved unsafe methods. A significant proportion of respondents acknowledged the risks associated with using unsterile instruments, such as razors and needles, for flea extraction. Despite this awareness, the continued use of such tools remains a concern, as it poses a high risk for the transmission of bloodborne diseases, including hepatitis and HIV. This highlights the critical need for accessible, safe, and effective treatment options in endemic regions(31-33). Preventive practices reported by respondents included regular cleaning of animal shelters (66.3%) and the use of insecticidal sprays (51.4%). These measures align with established strategies for reducing the environmental burden of sand fleas and mitigating the risk of infection. However, the irregular implementation of these practices among some respondents reflects the broader challenge of ensuring consistent adherence to preventive measures in low-resource settings. Additionally, traditional treatments such as ethanol, coconut oil, and glycerin were commonly used, though their efficacy in managing tungiasis remains variable and may depend on local practices and availability(34).

This study provided valuable insights into the knowledge, attitudes, and practices regarding tungiasis in the study population. One of its strengths was the comprehensive approach to capturing data from diverse demographic groups, which facilitated a holistic understanding of community perceptions and behaviors. However, the study was limited by the reliance on self-reported data, which may have introduced recall bias. Additionally, the absence of direct clinical verification of tungiasis cases among respondents and their animals constrained the ability to correlate reported practices with actual disease outcomes(3). Despite these limitations, the study underscores the urgent need for integrated strategies to combat tungiasis. Public health initiatives should focus on enhancing community education, promoting safe treatment practices, and improving access to preventive tools such as insecticides and topical medications. Addressing the socioeconomic determinants of tungiasis, including poverty and inadequate sanitation, remains crucial to achieving long-term control and reducing the disease burden in affected populations(4).

CONCLUSION

This study highlighted the significant yet uneven levels of awareness, attitudes, and practices regarding tungiasis among the population of Chiniot, underscoring both strengths and gaps in community knowledge. While many individuals demonstrated an understanding of the disease and its transmission, misconceptions and risky practices persisted, particularly concerning the use of unsterile instruments and inconsistent preventive measures. The findings emphasize the critical need for comprehensive public health interventions to enhance awareness, promote safe and effective treatment methods, and foster consistent adherence to preventive practices. Addressing these gaps through targeted education and improved accessibility to resources can significantly reduce the burden of tungiasis, improve animal and human health, and contribute to broader public health goals in affected communities.

AUTHOR CONTRIBUTIONS

Author	Contribution
Muhammad Saqlain*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Zunaira Wasif	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Arooj Fatima	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Atija Waris	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Mehreen Kazmi	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Nimra Shahzad	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Rana M. Kamran Shabbir	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Sikandar Hayat	Writing - Review & Editing, Assistance with Data Curation
Imran Tipu	Writing - Review & Editing, Assistance with Data Curation

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