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Prevalence of and Demographic Profile of People with Tungiasis Living in Danida Village, Jinja District, Uganda.

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ABSTRACT

Tungiasis, a parasitic skin condition caused by the sand flea Tunga penetrans, is characterized by the pregnant flea burrowing into the skin and toes, resulting in irritation and inflammation. This disease is prevalent in tropical regions such as America and Africa, commonly affecting areas like the feet, hands, elbows, and occasionally the buttocks. This study aims to assess the prevalence and demographic characteristics of individuals with tungiasis in Danida village, Jinja district, Uganda. A community-based cross-sectional and descriptive study design was employed, utilizing simple random sampling. A sample size of 268 was determined using Kish and Leslie's formula. Data collection was carried out through self-administered questionnaires, and analysis was conducted using quantitative methods, including Microsoft Excel for creating charts and graphs. Additionally, analysis software was used for further processing, with results presented in tables and frequencies. The prevalence of tungiasis among participants was found to be 26.9%, with 72 out of 268 individuals affected. Among the participants, 57% had a primary level of education, and 82% of those infested were male. The age bracket most affected was 11-30 years, comprising 59.7% of cases. Furthermore, 63% of individuals with tungiasis came from families that reared animals. In conclusion, the prevalence of tungiasis in Danida village was notably high. Individuals with lower educational levels, aged between 11-30 years, males, and those from families involved in animal rearing were found to be the demographic groups with a higher incidence of Tunga penetrans infestation.

Keywords: Tungiasis, Tunga penetrans, Animals, Education, Male gender.

INTRODUCTION

Tungiasis is a parasitic skin disease with origin in South America [1]. It is widely spread in tropical America and Africa. It is caused by the sand fly Tunga penetrans. The pregnant flea burrows into the skin and toes and produces a large number of eggs, which causes irritation and inflammation. Secondary infection of tunga lesions is common [2]. The flea has many common names, being known in various locations as the chigger flea, sand flea, chigoe, jigger, nigua, pigue, or le bicho de pe [3]. Tungiasis commonly affects the feet, hands, elbows and sometimes buttocks [4]. Tungiasis is associated with considerable acute and chronic morbidity "Jiggers can easily kill young children by sucking their blood and cause early deaths in grown-ups than have other diseases, most of those infected especially the elderly and children cannot walk" James Kakooza, Uganda's minister of state for primary health care told a press conference [5]. Uganda has had more than one outbreak of jiggers, and the one in 2008 prompted unusual political responses, where a member of parliament called for the arrest of people infected with jiggers for ostensibly flaunting public health laws [5]. Tunga penetrans are distributed in tropical and subtropical regions of the world. In South America, tungiasis has been reported from Columbia to Argentina. Historical records indicate that tungiasis occurred in almost all countries in Central America. However, reliable data on the occurrence of T.penetrans and tungiasis do not exist at the national or regional level [6]. Tungiasis was first reported in crewmen who sailed with Christopher Columbus. The flea is indigenous to the West Indies/Caribbean/Central American region, but it has spread to Africa, India, Pakistan, and South America. Tungiasis is rarely diagnosed in North America, but it should no longer be obscured to physicians because of increasing international travel to tropical destinations [7]. There is anecdotal evidence that T.penetrans was imported to Africa at the end of the 19th century. Since then, it has spread to almost all countries in sub-Saharan Africa [6]. To produce, the flea requires a warm-blooded host. In addition to humans, reservoir hosts include pigs, dogs, cats, cattle, sheep, horses, mules, rats, mice, and other wild animals [7]. Besides physical suffering,

individuals and family members of persons with tungiasis suffer from stigma associated with the condition and are often socially excluded. Review of literature shows that little research has investigated the specifics of tungiasis stigma in tungiasis endemic areas. In murang'a county, Kenya, the analysis and description of the nature of stigma communication associated with tungiasis were based on stigma communication theory (SCT). The findings of the study suggest that besides stigma messages (mark, label, peril and responsibility) attributes provided by SCT, the nature tungiasis stigma communication would be understood best as an intersection of tungiasis stigma beliefs and stereotype associated with tungiasis. Causes of tungiasis identified by interviewees included curses and witchcraft. Sufferers of severe infestations were stereotyped as lazy and unhygienic, and possessing "jigger attracting blood." Both physical deformity and moral stigma were associated with tungiasis [8]. People must change their attitudes toward the disease and stop believing that this is witchcraft." said simon wanjala a medical official based in eastern Uganda. "Now they simply wait and die instead of trying to remove the pests from their bodies, so many of those affected end up seeking treatment from traditional healers instead of seeking conventional health care givers."

Statement of Problem

Despite the substantial disease burden caused by embedded sandfleas, tungiasis is basically neglected by the health care providers, policy makers, the scientific community and pharmaceutical industry. No drug has been found, and only prevention is the means to control morbidity [9]. In a cross sectional study done in house hold rearing animals in 10 endemic villages in Bugiri district in Uganda, T.penetrans infections were detected in pigs, dogs , goats and cats. The prevalence of households with tungiasis ranged from 0% to 71.4 % (median 22.2) for animals and from 5 to 71.4% (median 27.8%) for humans. The prevalence of human tungiasis also varied among population of the villages. (median 7%, range 1.3-37.3%). Pig infections had the widest distribution (9/10 villages), pigs also had a higher number of imbedded sand fleas than all the other species combined. ($p<0.0001$). dog tungiasis in 5/10 villages with low prevalences (median of 2%, range of 0-26.9%). Only 2 goats and a cat had tungiasis.The prevalence of animal and human tungiasis correlated at both villages ($rho=0.89, p=0.0005$) and house hold($rho=0.4$, $p<0.0001$). the median number of lesions in house hold animals correlated with the median intensity of infection in children 3 to 8 years of age ($rho=0.47$, $p<0.0001$). animal tungiasis increased the odds of occurrence of human cases in households sixfold (OR=6.1, 95%Cl3.3-11.4, p,0.001) [10]. Therefore, this research will determine the prevalence and demographic profile of people living with tungiasis in Danida village, Jinja district, Uganda.

METHODOLOGY

Study design

A community-based cross-sectional and descriptive study design [11] was used to determine the prevalence and demographic profile of people with tungiasis living in Danida village, Jinja district, Uganda.

Area of Study

The research study will be conducted in Danida village, Walukuba East Parish, Walukuba/Masese Sub- County, Jinja Municipality, Jinja district, Uganda. Jinja Municipality has a total population of 140,697 people, with 67,704 males and 72,993 females. It has 27,850 households with 16180 households depending on farming, Walukuba/Masese has a population of between 42773 and 50478 [12].

Target population

The study consisted of the people that will be living in Danida village, Jinja district, Uganda from June 2019 to August 2020.

Sample size determination

Sample size was calculated using Kish and Leslie's formula [13]

$n = (Z^2PQ)/d^2$

n = Sample size

Z = Z-score (n a normal distribution curve corresponding to a 95% confidence interval) =1.96.

P= The proportion of respondents with tungiasis was found to be ≈ 22.5% [14].

Q =1- P

d= Absolute precision of 5% = 0.05

$n = 1.96^2 \times 0.225 (1- 0.225) / 0.05^2$

n =268

n=278

The calculated sample size will be 268 but increased by 10 to cater for the people who may not be able to turn up.

Inclusion criteria

All the People that were living in Danida village and had consented to participate in the study were included.

Exclusion criteria

People who live in Danida village who were not found at home at the time of the study. All people who live in Danida village but had not consented to take part in the study.

Sampling technique

Simple random sampling method was used.

Sampling procedure

For every 10 households, one was randomly selected to participate in the research. Every family member had to choose a piece of folded paper, the one that chose the paper with the word participant did participate in the study.

Data collection and management

Data was collected using a structured questionnaire, where relevant questions to the topic were formulated to guide both the researcher and participants.

Quality control

Three research assistants were trained on how to fill in the questionnaire and interview the participants to collect data effectively. The questionnaire was tested in the central village for applicability and accuracy.

Data analysis

Data was entered into Microsoft Excel, cleaned and then imported into SPSS for analysis. The analysis was done per objective and presented informs of graphs and pie charts.

Ethical considerations

The authority to conduct the research was obtained from the Kampala International University Research Committee. Permission was further sought from the District Health Officer and Local Council 1 chairperson of Danida village. The participants' informed consent was also sought and were assured of the highest level of confidentiality and no harm during the study, however in case of any harm, there would be compensation.

RESULTS

Prevalence of Tungiasis in Danida Village, Jinja District, Uganda.

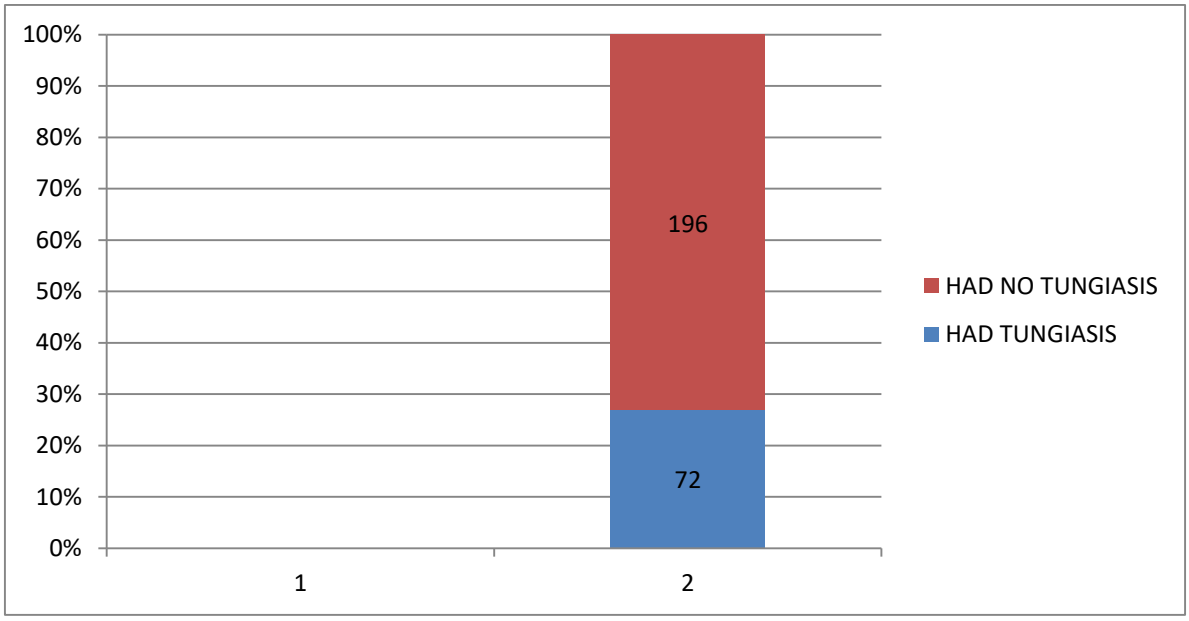

Figure 1: A Graph Showing 268 participants studied, 72(26.9%) having Tunga penetrans

Demographic Profiles

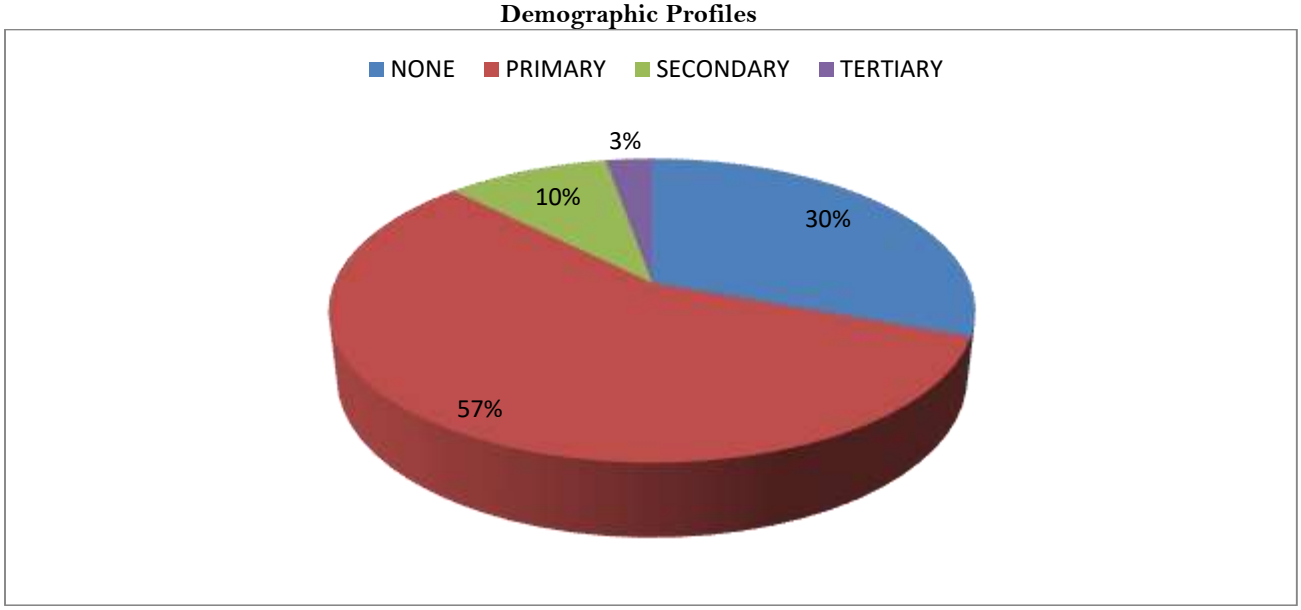

Figure 2: Education Level

Majority of the participants that had tungiasis had attained only primary education 41(57%). followed by those that had not attained any formal education 22(30%).

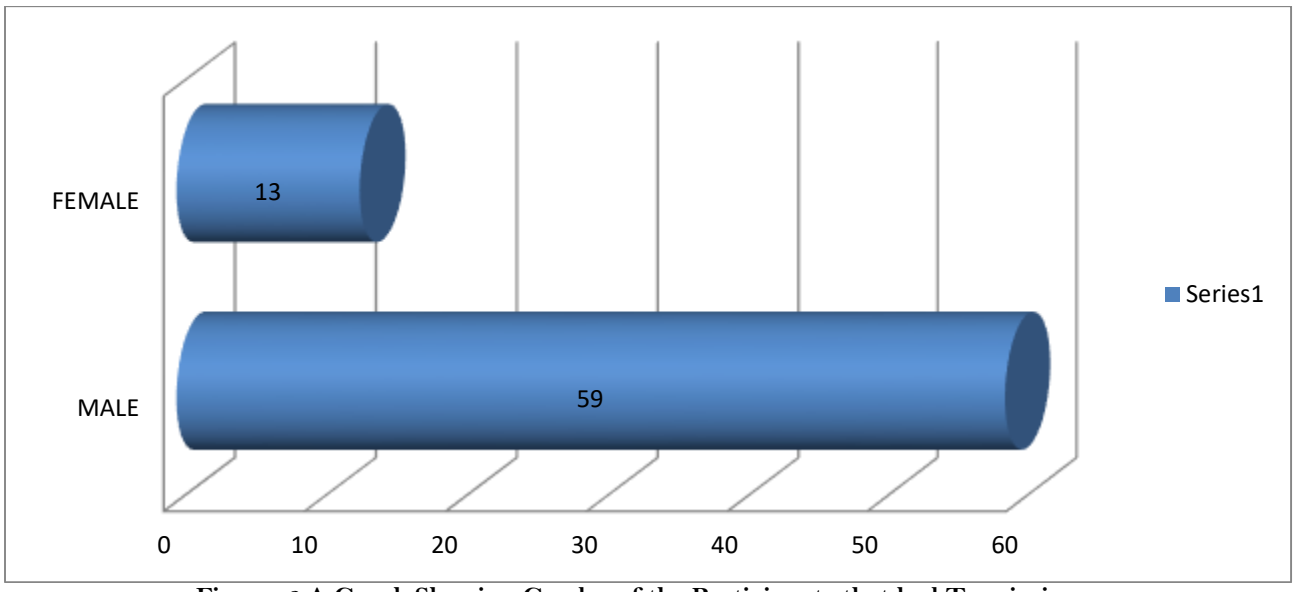

Figure: 3 A Graph Showing Gender of the Participants that had Tungiasis

Majority 59(82%) of the participants that had Tungiasis were male and 13(18%) were female.

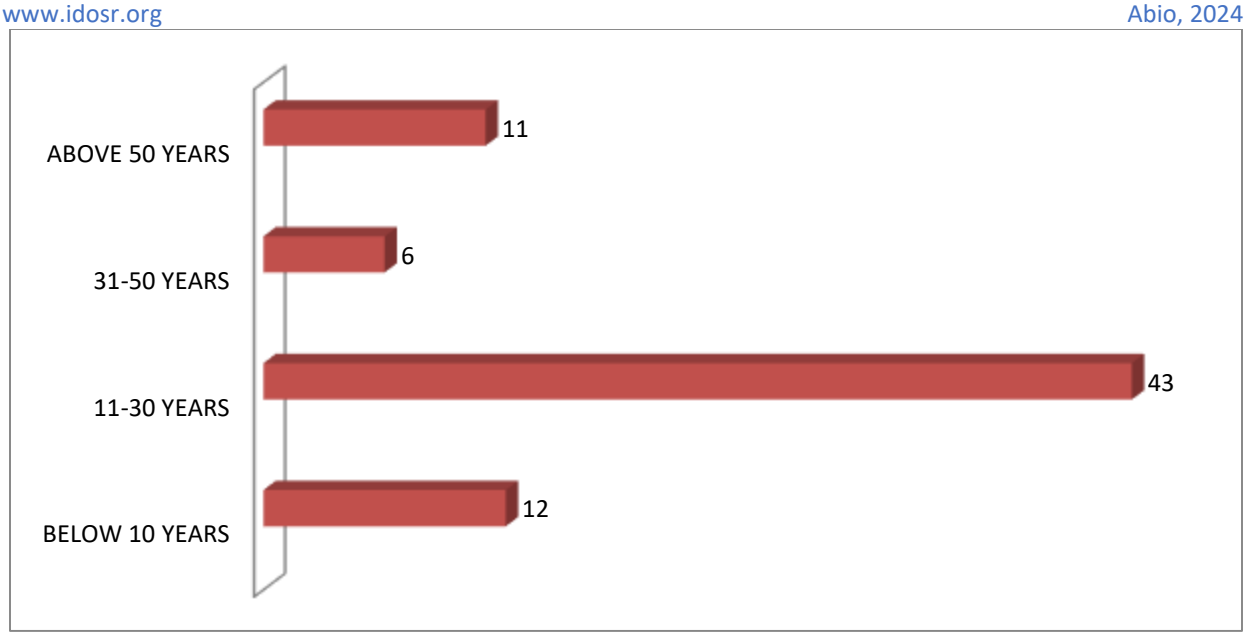

Figure 4: A Graph Showing the Age Ranges of Participants that had Tungiasis

Majority 43(59.7%) of the participants that had tungiasis were between 11-30 years. Followed by those below 10 years 12(16.7%).

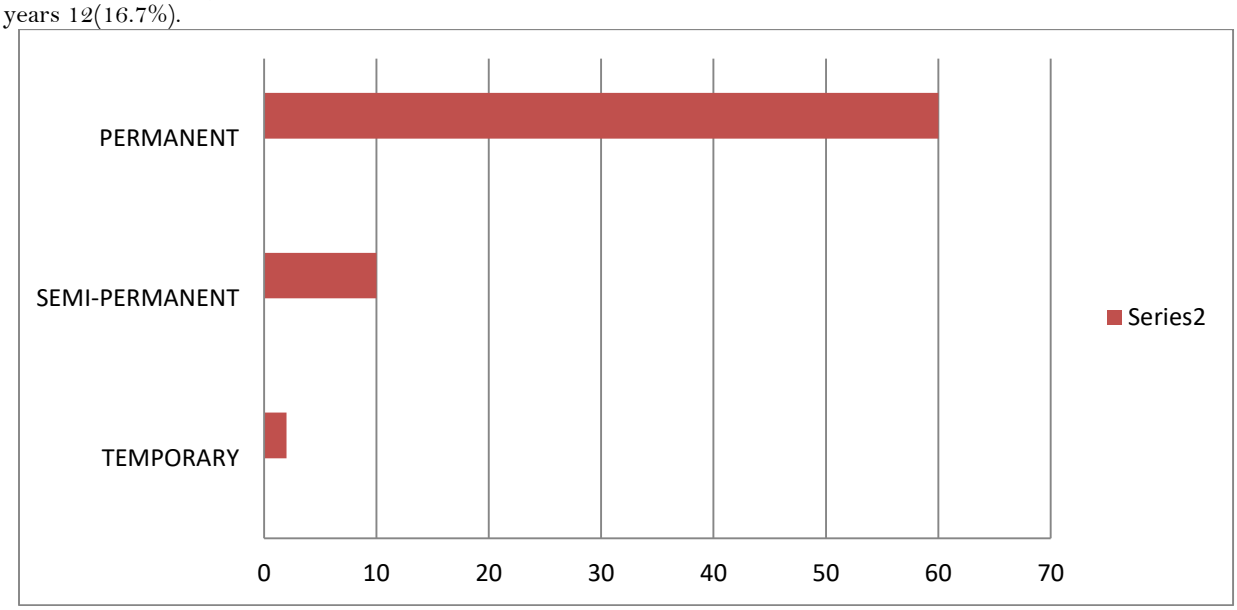

Figure 5: Type of Housing

The majority 60 (83.3%) of the participants that had tungiasis lived in permanent houses. 10(13.9%) in semi-permanent and 2(2.8%) in temporary houses.

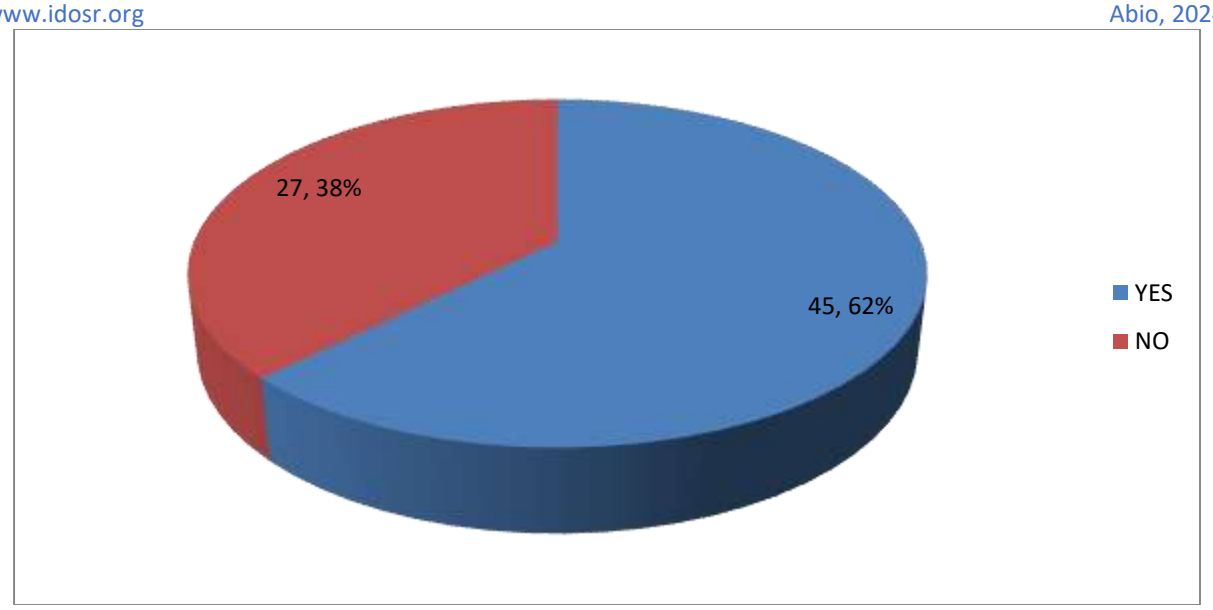

Figure 6: Reared Animals

The majority (45, 62%) of the participants with tungiasis reared animals compared to (27,38%) who did not rear animals but had tungiasis.

DISCUSSION

The prevalence of tungiasis in Danida village, Jinja district, Uganda was 26.9%. This was slightly higher than the prevalence of tungiasis (22.5%) in the Mayuge district, Eastern Uganda. [14]. The slight difference was probably due to using the findings from this study in calculating the sample size of the study in Danida village. In a study done in Kilifi County to assess the prevalence, intensity and risk factors of tungiasis, Kenya, the overall prevalence of tungiasis was 25.0%. [15]. As compared to the results obtained in Danida village (26.9%), Danida had a slightly higher prevalence of tungiasis. However, from the results obtained in my study, Danida village had a lower prevalence of tungiasis compared to Bangoa, west Cameroon where the prevalence in the population was 32.7%, with infestation more frequent in males (P = 0.013), mostly in children aged 1 to 5 years [16]. Also, Danida village had a lower prevalence of tungiasis (26.9%) compared to the Wensho district. In a study to determine the Prevalence and risk factors of tungiasis among children of Wensho district, southern Ethiopia, two hundred and fifteen of the 366 children were found to have tungiasis, thus making the prevalence of tungiasis among children in Wensho 58.7% [17]. In a study to determine the Spatial distribution, prevalence and potential risk factors of Tungiasis in Vihiga County, Kenya. A total of 437 people consented and participated in the study with 231 (52.9%) being males and 206 (47.1%) females. Out of the 437 participants, 94 (21.5%; 95% CI: 17.7–25.3%) were infested with jiggers. This prevalence was low as compared to the 26.9% obtained in Danida village, probably due to a larger sample size used in the study in Kenya.

Education Level

Results from the study showed that participants that had attained only primary education and no education had the highest percentages hence were mostly infested with tungiasis as compared to the participants that had attained secondary and tertiary education. This was probably because the more educated one is, the more likely they were to observe personal hygiene. A study was carried out with the aim of determining the prevalence of tungiasis and associated risk factors in Bukatube sub-county, Mayuge district in Eastern Uganda, results showed, attainment of secondary level education was found to be protective for tungiasis. This finding is understandable as people with secondary and tertiary level of education are more informed and observe high levels of hygiene. These results match those that have been observed in earlier studies in Kenya. This finding emphasizes the importance of education and raising awareness in the prevention and control of T. penetrans. In Danida village,78% of the participants who had tungiasis were aware of the cause/risk factors for acquiring tunga penetrans as compared to 22% who did not know the cause and risks of the infestation. The participants associated dusty floors, rearing pigs, having dogs, dirty environments and not wearing shoes as the risk factors for being

infested with tunga penetrans. The participants also believed that avoiding the risk factors was a way of preventing the infestation. In a study conducted in northeast Brazil, knowledge about the etiological agent of tungiasis and its transmission was high, 90% knew the flea as the etiological agent, the transmission was thought to be related to sandy soil, the presence of animals, walking barefoot, and the presence of garbage littering in the area. The health sector neither provided health education nor treatment [18]. A study in Mayuge district, Uganda also discovered that Individuals who were knowledgeable about jigger prevention had reduced chances of being persistently infested with jiggers, 74% of the participants that had tungiasis were aware of the management and 26% of the participants did not know how to manage the infestation.

Gender

Results obtained in Danida village showed that the Majority (59,82%) of the participants that had tungiasis were male as compared to (13,18%) who were female, therefore the male gender was a risk factor for being infested with Tunga penetrants. The males were probably less likely to have good personal hygiene and also had more contact with animals as compared to the females. In a study done in Kenya schools, data was collected from 508 pupils that participated in the study. Boys were 259 (50.98 %) and girls were 249 (49.01 %). Pupils infested with T. penetrans were 97, a prevalence of 19.1 %. A total of 52 boys were infested, a prevalence of 20.1 % while 45 girls were infested which was a prevalence of 18.1 % [19]. The research findings indicated that males were more infested than the females and so were my findings in danida village.

Age

The majority (43,59.7%) of the participants that had tungiasis in Danida village were between 11-30 years. As compared to those below 10, between 31-50, and above 50 years. (12,16.7%,6,8.3%,11,15.3% respectively) In a study carried out in Tanzania, one of the highest prevalence rates *was* reported for northern Tanzania. In endemic communities, there was a maximum prevalence in children between 5 and 14 years, followed by disabled and elderly people [20]. In a study done in Kenya schools, data was collected from 508 pupils that participated in the study. The prevalence of tungiasis in pupils about their age brackets was observed to have a unique trend that assumed a sigmoid curve. This is because pupils of 4–6 years had a prevalence of 12.5 %, while those of 7–9 years had a prevalence of 18.3 %. The peak was in children of 10–12 years whose prevalence was 21.5 %. This prevalence then decreased so that children between 13–15 years had a prevalence of 16.5 % and those of 16–18 years had a prevalence of 8.3 % [19]. In a study conducted in west Cameroon, Bangou, the prevalence in the population was 32.7%, with infestation more frequent in males (P = 0.013), mostly in children aged 1 to 5 years [21].

In Nigeria studies showed Prevalence followed an S-shaped pattern and was highest in children 5 to 9 years of age, 10 to 15-years old adolescents and the elderly. The highest proportion of individuals with heavy infestation was observed in the elderly [22]. From the above studies carried out, the prevalence of tungiasis was highest in participants that were below 10 years and the elderly, which contradicts my research findings in Danida village, were the age group with the highest prevalence was between 11 to 30years. These findings were probably due to the fact that in my simple random sampling, majority of my participants were in this age group, thereby increasing the chance of having a higher number of this age group infested.

Social Economic Status

Majority (60, 83.3%) of the participants that had tungiasis in Danida village lived in permanent house. (10, 13.9%) and (2, 2.8%) of the participants with tungiasis lived in semi-permanent and temporary houses respectively. Majority (45,62%) of the participants with tungiasis in Danida village reared animals compared to (27,38%) who did not rear animals but had tungiasis. Majority (63,87%) of the participants with tungiasis in Danida village had footwear compared to (9,13%) of those that did not have footwear. In a study carried out in Mayuge district, Eastern Uganda, conditions related to poor housing were also associated with the prevalence of tungiasis. Living in a house with cracked, rough and dirty walls, earthen, dusty, dirty and cracked floors and littered and dusty compounds were found to be associated with tungiasis [23]. In a study in Murang Kenya, results showed the overall prevalence of tungiasis in pupils in the study area was 19.1 %. In multinomial logistic regression analysis, some factors were identified to be associated with tungiasis such as lack of regular use of closed footwear [19]. Growing urbanization, improved housing and the use of appropriate footwear presumably have led to an overall reduction of the occurrence of tungiasis in many Latin American and African countries. However, it is still a highly prevalent disease where people live in poverty, towns with stray dogs and cats, pigs in close vicinity to living quarters, unpaved streets, mud floors in houses, insufficient or non-existent sanitation; and infestation with rats and mice especially in areas without rubbish disposal [24]. Poverty influences the epidemiology of EPSD in many ways. It favours the presence of animal reservoirs, ensures ongoing transmission, facilitates atypical ways of spreading the infectious agent and

increases the chances of exposure. This results in an extraordinarily high prevalence and intensity of infestation and significant morbidity of EPSD [25]. The above studies indicate that the prevalence of tungiasis is directly proportional to poverty as poor people cannot afford to buy footwear and live in houses with earthened dusty floors. However, in my study in Danida village, the majority of the participants with tungiasis lived in permanent houses and had footwear though not all the time. Probably the participants bought the footwear after already being infested with tunga penetrans, and most of their footwear were sandals instead of closed shoes and therefore offered minimal protection against being infested. Results from the above studies also showed that having animals (dogs, cows, pigs) in the environment increased the prevalence of tungiasis, as these acts as reservoirs and enhance the transmission and spread of tungiasis among people in the vicinity. These results corresponded with the results in Danida village, as people who reared animals were more affected by tungiasis than those who did not rear animals.

CONCLUSION

The prevalence of tungiasis in Danida village was high 26.9%. Low education level, being of a male gender and rearing animals were the main contributing factors to this high prevalence. Awareness about the cause/risk factors and management, having footwear and sleeping in temporary housing to a small extent, contributed to this prevalence.

Recommendation

I recommend that higher education should be provided to the people in Danida village since it is a protective factor against tungiasis. I recommend the primary health care team in Danida village to equip the people rearing animals with knowledge and skills on how to prevent the spread of the infestation. I recommend that more research be carried out in Danida village to establish the risk factors for the high prevalence of tungiasis and preventive measures for the infestations in the area.

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