ORIGINAL ARTICLE

A Community Based Study on Tropical Phagedenic Ulcers in Shah Alam, Malaysia: Knowledge, Attitude and Practice

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ABSTRACT

Introduction: Tropical phagedenic ulcer is a skin disease caused by a cocktail of bacteria. This painful ulcer forms over the lower limbs. It is also associated with necrotic slough and foul-smelling discharge that eventually lead to amputation and permanent disabilities. Tropical phagedenic ulcer in Malaysia has not been given much attention. In light of this situation, this research was conducted to assess the knowledge, attitude and practice regarding tropical phagedenic ulcer among the public in Shah Alam, Selangor. **Methods:** The total respondents were 384, consisting of 164 males and 220 females who were randomly selected. Data were obtained qualitatively through structured questionnaires and analysed using the chi-square test to study the association between the dependent variables and demographic factors. **Results:** The collected data showed that the respondents (67.2%) had poor knowledge of tropical phagedenic ulcer; merely 65.4% considered it to be a health problem, whereas 29.7% believed it is contagious. Also, the data revealed an association between age (χ^2=13.587, p =0.004), marital status (χ^2=15.435, p=0.001), time spent in community (χ^2=6.438, p=0.04) and knowledge of the local name of tropical phagedenic ulcer. About 74.7% of the respondents did not know the cause of tropical phagedenic ulcer. Only 22.1% of the respondents had encountered tropical phagedenic ulcer patients and an association was found between the variable with gender (χ^2=4.672, p =0.031), age (χ^2=24.134, p =0.000) and marital status (χ^2=17.143, p =0.001). **Conclusion:** This study reveals misconceptions about the aetiology and transmission of tropical phagedenic ulcer which greatly influence the attitude of community members towards tropical phagedenic ulcer patients.

Keywords: Tropical phagedenic ulcer, *Lysibacillus fusiformis*, *Borrelia vincentii*, *Treponema vincentii*, *Fusobacterium ulcerans*

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INTRODUCTION

Tropical phagedenic ulcer (TBU) is a rapidly growing and painful sloughing ulcer. Typically found in the leg. It is also known as the phagedenic ulcer. It is most prevalent in hot, tropical zones. There are various names used to describe TPU such as: malignant ulcer, putrid ulcer, Cullen ulcer, gangrenous ulcer, phagedena gangrenosa, phagedena ("eating away"), progressive synergistic bacterial gangrene, acute dermal gangrene, and acute synergistic gangrene (1). However, reports are documenting the first observed case in the European continent (2). Tropical phagedenic ulcer is a multi-bacterial infection by the *Fusobacterium ulcerans* (3), which is present at the earlier stages of infection. Other bacteria such as *Lysibacillus fusiformis* and spirochetes (*Borrelia vincentii, Treponema vincentii* and *Spirochaeta schaudinni*) are ordinarily present in the late stages of infection (2, 4). It begins with painful papules which would disintegrate over three to five days to form a huge necrotic foul-smelling ulcer. Without proper treatment, this can further develop to become chronic ulcers or malignant cancer of squamous cell carcinoma (5-7). Other bacteria may also be present in tropical ulcers at a later stage; they include aerobic bacteria such as *S. aureus* and *P. aeruginosa*. (6, 8).

The quick breakdown of TPU, which subsequently forms an ulcer with an indurated edge, is one of the characteristics of this disease. It is typical for the ulcer to occur suddenly, characterized by its punched-out appearance, in the area of an exposed site. This occurrence is commonly accompanied by pain. The floor of the ulcer shows the presence of greyish purulent slough with a fetid odour (6). In addition to pain, individuals suffering from TPU may also experience fever and other constitutional symptoms. In many cases, it is difficult to distinguish TPU from ulcers that originate from other causes, for instance stasis ulcers.

TPU shares very similar characteristics with *cancrum oris* or pododermatitis in hoofed animals such as sheep and other infections of the soft tissue (8).

TPU is endemic in both rural and urban areas and predominantly affect children and young adults. Infection is more common among males compared to females (9). However, in certain regions such as Papua New Guinea, young adult women are reported (10) to have mainly been affected, which could be due to their daily activities involving fishing in a shallow waters. It is regrettable that the lack of knowledge and awareness about tropical phagedenic ulcer infections as well as misconceptions about it can tremendously affect a patient's social life and finance as well as result in failure to search for effective diagnosis and treatment (11). Although, TPU is unique to tropical and subtropical areas there are minimal reports on cases from Malaysia and the region. This could be due to diagnosing challenges and very close resemblance of clinical presentations with other skin ulcers such as Buruli ulcers, recalcitrant chronic leg ulcers, arterial and venous ulcers, and squamous cell carcinoma presented as ulcerating lesions. Thus, the purpose of this paper is to examine the knowledge, attitude, and practice regarding TPU among the community in Shah Alam, state of Selangor, Malaysia.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted using a simple random sampling technique among 384 respondents to assess their knowledge, attitude, and practices regarding tropical phagedenic ulcer among the public in Shah Alam, state of Selangor, Malaysia.

Area Selection

Respondents were recruited using a stratified sampling method. The study was conducted within the Shah Alam community, particularly in Section 2, Section 9, Section 13, Section 14 and Section 15 (Fig. 1). This included locations such as shopping malls, random streets, banks, fast food restaurants, small shops, bus stations and other public places.

Sample Size

The sample size was calculated using the following formula (12):

$n = [Z^2 \times (p) \times (1 - p)] \div d^2$

Where:

- n - estimated sample size
- Z - standard value of confidence level of 95% which is 1.96
- p - prevalence of people which is 50%
- d - margin error set at 10% which is 0.1

The estimated number of target sample needed were 384 respondents.

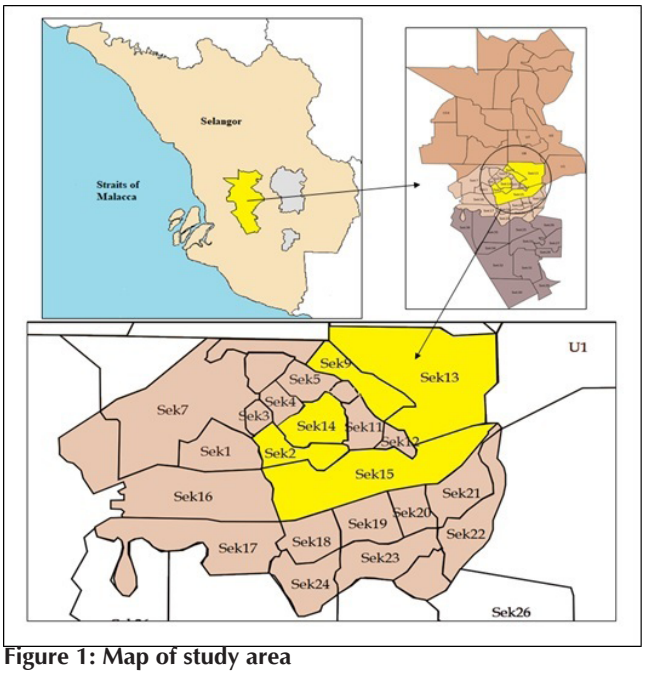

Figure 1: Map of study area

Questionnaires

Questionnaires were adopted following the existing survey (13). The questionnaire was divided into three sections: A - Demographical characteristics, B - Knowledge and C - Attitude and practice. The questionnaire was distributed at public places such as supermarkets, stadium, shopping malls, bus stations, etc. A pilot study was done to find out the reliability of statistics using a sample size of 10 respondents; the Cronbach's alpha value obtained for Section A (Demographic) was 0.126, whereas values for Section B (Knowledge) and Section C (Attitude and Practice) were 0.615 and 0.390, respectively.

Ethical Considerations

The study objectives were explained to all participants prior to the commencement of the study. Participants were also well-informed regarding their voluntary enrolment in the study. An informed consent form was given to the participants, indicating their willingness to participate in the study. This study was granted approval (MSU-RMC-02/FR01/02/L1/046) by Human Ethical Committee of the Management & Science University, Shah Alam, Selangor State, Malaysia.

Data Analysis

SPSS version 23.0 was used to analyse the data. Pearson's Chi-Square was used to analyse the variables mentioned. P-value < 0.05 was considered statistically significant.

RESULTS

As shown in Table I, the community in which the survey was conducted had more females (57.2%) than males (42.7%). The highest number of respondents belonged to the age group of 21-40 years (59.37%). Most of them

Table I: Demographic characteristics of community members and their understanding of TPU

Demographic Characteristics	N (%)	Knows what TPU is (%)		Knows local name of TPU (%)		Considers TPU a health problem (%)		Believes that TPU can be transmitted from one person to another (%)	
Total	384(100)	No	Yes	No	Yes	No	Yes	No	Yes
		67.2	32.8	84.4	15.6	34.6	65.4	70.3	29.7
Sex		χ^2=0.032, P=0.858		χ^2=2.332, P=0.127		χ^2=0.002, P=0.966		χ^2=0.145, P=0.703	
Female	220(57.2)	66.8	33.2	86.8	13.2	34.5	65.5	69.5	30.5
Male	164(47.2)	67.7	32.3	81.1	18.9	34.8	65.2	71.3	28.7
Age		χ^2=25.638, P=0.00		χ^2=13.587, P=0.004		χ^2=6.210, P=0.102		χ^2=1.771, P=0.621	
<20	39(10.1)	84.6	15.4	92.3	7.7	35.9	64.1	71.8	28.2
21-40	228(59.3)	73.2	26.8	88.2	11.8	37.3	62.7	68.0	32.0
41-60	97(25.2)	49.5	50.5	75.3	24.7	33.0	67.0	75.3	24.7
61+	20(5.2)	50.0	50.0	70.0	30.0	10.0	90.0	70.0	30.0
Race		χ^2=6.784, P=0.148		χ^2=7.042, P=0.134		χ^2=2.204, P=0.698		χ^2=6.964, P=0.138	
Malay	286 (74.4)	69.2	30.8	82.5	17.5	35.0	65.0	73.1	26.9
Chinese	28(7.2)	57.1	42.9	78.6	21.4	42.9	57.1	50.0	50.0
Indian	51(13.2)	68.6	31.4	94.1	5.9	29.4	70.6	66.7	33.3
Bumiputra	10(2.6)	60.0	40.0	90.0	10.0	40.0	60.0	70.0	30.0
Others	9(2.3)	33.3	66.7	100.0	0.0	22.2	77.8	66.7	33.3
Education level		χ^2=0.993, P=0.803		χ^2=2.852, P=0.415		χ^2=3.705, P=0.295		χ^2=3.324, P=0.344	
No education	2(0.5)	100.0	0.0	100.0	0.0	0.0	100.0	50.0	50.0
Primary school	6(1.5)	66.7	33.3	83.3	16.7	16.7	83.3	83.3	16.7
Secondary school	126(32.8)	66.7	33.3	80.2	19.8	39.7	60.3	75.4	24.6
University	250(65.1)	67.2	32.8	86.4	13.6	32.8	67.2	67.6	32.4
Marital status		χ^2=23.114, P=0.00		χ^2=15.435, P=0.001		χ^2=3.133, P=0.372		χ^2=4.370, P=0.224	
Married	181(47.1)	55.8	44.2	76.8	23.2	30.4	69.6	69.1	30.9
Single	193(50.2)	77.7	22.3	91.2	8.8	38.9	61.1	69.9	30.1
Widowed	6(1.5)	50.0	50.0	83.3	16.7	33.3	66.7	100.0	0.0
Divorced	4(1)	100.0	0.0	100.0	0.0	25.0	75.0	100.0	0.0
Occupation		χ^2=0.858, P=0.836		χ^2=1.125, P=0.771		χ^2=2.127, P=0.546		χ^2=2.805, P=0.423	
Private sector	164(42.7)	66.5	33.5	84.1	15.9	37.8	62.2	65.9	34.1
Government sector	36(10.1)	63.9	36.1	83.3	16.7	38.9	61.1	72.2	27.8
Self-employed	63(16.4)	65.1	34.9	81.0	19.0	31.7	68.3	73.0	27.0
Others	121(31.5)	70.2	29.8	86.8	13.2	30.6	69.4	74.4	25.6
Time spent in community		χ^2=3.198, P=0.202		χ^2=6.438, P=0.040		χX^2=0.811, P=0.666		χ^2=2.561, P=0.278	
< one year	45(11.7)	77.8	22.2	93.3	6.7	37.8	62.2	73.3	26.7
Between one and five years	85(22.1)	62.4	37.6	89.4	10.6	37.6	62.4	76.5	23.5
>Five years	254(66.1)	66.9	33.1	81.1	18.9	33.1	66.9	67.7	32.3

were Malay (74.47%), have a university education (65.1%), of single status (50.2%) and had resided in their respective community of Shah Alam (66.14%). Table I also shows that individuals who had received secondary level of education comprised 32.8% of the study population.

Awareness of Tropical Phagedenic Ulcer and its Aetiology

Based on the results obtained, 32.8% of the respondents knew about TPU, with 15.6% knowing the local name of the tropical phagedenic ulcer. 65.4% of them considered TPU to be a health problem, while 29.7% believed TPU is transmittable between individuals (Table I). A demographic characteristics analysis gives a deep understanding of the awareness of TPU and its causes. Respondents aged 41-60 knew about TPU (χ^2=25.638, p=0.000); however, only the group aged 60 and above knew its local name (χ^2=13.587, p=0.004). Widowers (χ^2=23.114, p=0.00) knew about TPU while married respondents knew about TPU's local name. Other than that, respondents who had spent more than five years in the community were likely to know the local name of TPU (X2=6.438, p=0.04). The results also showed no association between demographic factor and the belief that TPU could be transmitted.

Respondents expressed different answers about the aetiology of TPU (Fig. 2). The majority of respondents who believed that they knew the cause of TPU attributed it to bacterial infections (37%), whereas 38% attributed it to poor hygiene. A 7% believed that insect bites cause TPU and 8% attributed it to Mut mut fly. Meanwhile, 5% of them attributed TPU to insect bites and the remaining

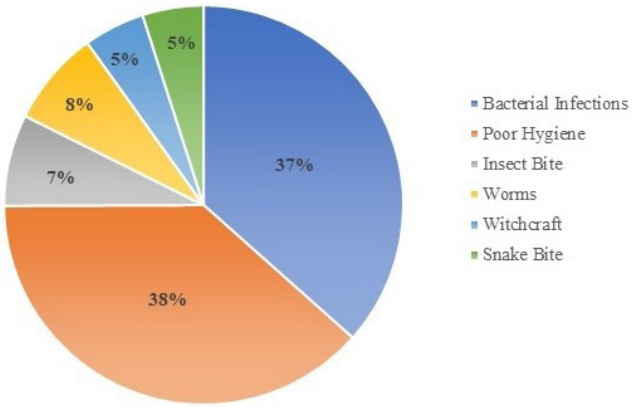

Figure 2: Traditional beliefs attributed to TPU

5% believed it was due to witchcraft.

Community members' practice and attitude towards Tropical Phagedenic Ulcer patients

Approximately 22.1% respondents had encountered TPU patients, while 56.3% of them regarded TPU patients as normal people in the society. 27.6% would allow their children or family members to freely interact with TPU patients. Meanwhile, 21.9% of respondents stated that certain traditional beliefs are attributable to TPU and nearly half of the respondents (54.4%) agreed that patients should not be restricted from going to school or public places (Table II). Socio-demographic factors were found to have an influence on the community's attitude and practice towards TPU patients. Male respondents (χ^2=4.672, P=0.031), those aged 41-60 (χ^2=24.134, P=0.000) and widowers (χ^2=17.143, P=0.000) were more likely to have encountered TPU patients. Respondents who had resided in the community for more than five years regarded them as healthy people. Those aged above 60 years were more likely to agree to allow their family and relatives to interact with TPU patients. Concerning race, respondents of the Chinese ethnicity had a higher tendency to believe that no traditional beliefs are associated with TPU.

DISCUSSION

Tropical phagedenic ulcer remains as, one of the neglected tropical infections and it causes a significant economic burden to the country. This infection is often well-known in non-developing countries, and cases in Malaysia have not been given much attention possibly due to misdiagnoses of the infection (14). Misconceptions about TPU that are widely held within the society may affect people's attitude and practices towards the infection (15). Our study shows a high level (84.4%) of overall knowledge concerning TPU in the area of study, with locals referring to the disease with names such as 'Tokak' to describe the infection. Our findings are contradictory to those reported by Akoachere et al., (2016) in which a high level of knowledge was observed concerning skin and subcutaneous tissue ulcers known as Buruli ulcers, caused by *Mycobacterium ulcerans* in the Southwest region of Cameron. In their study, more farmers were included compared to other occupations, and this might explain their high level of knowledge of Buruli ulcer. Our study focuses mainly on the subject of tropical phagedenic ulcer in Shah Alam, Malaysia. The study revealed that the disease is not familiar to residents living in the areas where the prevalence of the disease is not high. This might be the reason for the poor knowledge about TPU. However, socio-demographic factors such as age and marital status significantly influenced community members' level of understanding about the disease (Table I). Respondents expressed different answers to the question on the aetiology of TPU (Fig. 2). Among those who believed they knew the cause, 62% attributed tropical phagedenic ulcer to bacterial infection, 59.1% attributed it to poor hygiene, 12.8% attributed it to insects, and 12% attributed the infection to worm bites. The remaining, attributed it to Mut mut fly (8.9%), witchcraft (3.4%) and snake bite (3.2%). In the literature, some of these aspects have been reported as BU risk factors, as stated by Akoachere et al., 2016. In our study, the majority (62%) chose bacterial infections as the cause. These results are in contrast with another similar study (16), in which it was reported that 16% of the respondents attributed the ulcers to drinking non-portable water, 5.5% perceived it to be caused by wading in ponds/rivers or swimming, 8.1% stated it as being a result of poor hygiene, and 5.2% attributed it to witchcraft. Nevertheless, findings from our study area showed that witchcraft was still a cause that was believed to be associated with the disease. Although TPU is not a well-known disease, the study participants appeared to understand the aetiology of the disease as well as its mode of transmission. About 29.7% of them believed that the disease is transmittable between individuals. This clearly is a false perception, as no cases of the disease being transmitted from human to human have been reported.

There was a high acceptance level towards TPU patients; these patients are regarded as normal individuals by 56.3% of the respondents. Despite this, only 27.6% of the respondents are open to the idea of letting their family members and the patients to interact with each other, which in fact shows an average attitude towards the patients. Only 54.4% held the opinion that TPU patients should be permitted in public places, and traditional beliefs were attributed to TPU by 21.9% of the respondents. Our data showed (Table II) that age significantly influenced whether or not the respondents would allow their relatives to interact with TPU patients. According to a study conducted by Stienstra et al. (2002), the stigma regarding the disease is huge and is strongly associated with the lack of understanding about the ulcer and the mysterious nature of the condition. Social isolation is highly prevalent, and this was admitted by respondents in the study (17). The stigma worsened when they thought that the disease could be transmitted through witchcraft (17).

Table II: Attitude and practice of community members towards TPU patients

Demographic Characteristics	N (%)	Have seen someone with TPU (%)		Regards TPU patients as normal people in the society (%)		Will allow children or family members to interact freely with TPU patients (%)		Agrees that there are traditional beliefs attributed to TPU (%)		Believes that TPU patients should be allowed to go to school or public places (%)	
Total	384 (100)	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
		77.9	22.1	43.8	56.3	72.4	27.6	78.1	21.9	45.6	54.4
Sex		χ^2=4.672, P=0.031		χ^2=0.457, P=0.499		χ^2=0.741, P=0.389		χ^2=0.048, P=0.827		χ^2=0.023, P=0.878	
Female	220(57.2)	81.8	18.2	42.3	57.7	74.1	25.9	77.7	22.3	45.9	54.1
Male	164(42.7))	72.6	27.4	45.7	54.3	70.1	29.9	78.7	21.3	45.1	54.9
Age		χ^2=24.134, P=0.000		χ^2=0.363, P=0.948		χ^2=10.412, P=0.015		χ^2=5.431, P=0.143		χ^2=2.039, P=0.564	
<20	39(10.1)	84.6	15.4	46.2	53.8	74.4	25.6	66.7	33.3	46.2	53.8
21-40	228(59.3)	84.6	15.4	43.0	57.0	77.2	22.8	78.5	21.5	48.2	51.8
41-60	97(25.2)	63.9	36.1	45.4	54.6	64.9	35.1	83.5	16.5	40.2	59.8
61+	20(5.2)	55.0	45.0	40.0	60.0	50.0	50.0	70.0	30.0	40.0	60.0
Race		χ^2=8.069, P=0.089		χ^2=0.646, P=0.958		χ^2=1.436, P=0.838		χ^2=12.946, P=0.012		χ^2=19.028, P=0.01	
Malay	286(74.4)	80.8	19.2	44.4	55.6	73.1	26.9	77.3	22.7	51.4	48.6
Chinese	28(7.2)	71.4	28.6	42.9	57.1	75.0	25.0	92.9	7.1	21.4	78.6
Indian	51(13.2)	72.5	27.5	39.2	60.8	66.7	33.3	80.4	19.6	31.4	68.6
Bumiputra	10(2.6)	50.0	50.0	50.0	50.0	80.0	20.0	40.0	60.0	50.0	50.0
Others	9(2.3)	66.7	33.3	44.4	55.6	66.7	33.3	88.9	11.1	11.1	88.9
Education Level		χ^2=4.951, P=0.175		χ^2=3.244, P=0.355		χ^2=2.922, P=0.404		χ^2=3.324, P=0.344		χ^2=1.298, P=0.730	
No Education	2(0.5)	100.0	0.00	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Primary School	6(1.5)	83.3	16.7	16.7	83.3	50.0	50.0	100.0	0.0	33.3	66.7
Secondary School	126(32.8)	71.4	28.6	48.4	51.6	69.8	30.2	75.4	24.6	49.2	50.8
University	250(65.1)	80.8	19.2	42.0	58.0	74.4	25.6	79.2	20.8	44.0	56.0
Marital Status		χ^2=17.143, P=0.001		χ^2=2.242, P=0.524		χ^2=1.535, P=0.674		χ^2=0.797, P=0.850		χ^2=2.549, P=0.467	
Married	181(47.1)	69.1	30.9	47.5	52.5	69.6	30.4	79.6	20.4	43.1	56.9
Single	193(50.2)	86.0	14.0	40.4	59.6	75.1	24.9	77.2	22.8	47.7	52.3
Widowed	6(1.5)	66.7	33.3	33.3	66.7	66.7	33.3	66.7	33.3	66.7	33.3
Divorced	4(1)	100.0	0.00	50.0	50.0	75.0	25.0	75.0	25.0	25.0	75.0
Occupation		χ^2=3.454, P=0.327		χ^2=2.756, P=0.431		χ^2=6.339, P=0.096		χ^2=2.533, P=0.469		χ^2=4.318, P=0.229	
Private Sector	164(42.7)	78.0	22.0	44.5	55.5	76.2	23.8	79.9	20.1	51.2	48.8
Government Sector	36(10.1)	77.8	22.2	55.6	44.4	83.3	16.7	83.3	16.7	47.2	52.8
Self-employed	63(16.4)	69.8	30.2	41.3	58.7	65.1	34.9	71.4	28.6	41.3	58.7
Others	121(31.5)	81.9	18.2	40.5	59.5	67.8	32.2	77.7	22.3	39.7	60.3
Time spent in Community		χ^2=1.824, P=0.402		χ^2=8.163, P=0.017		χ^2=3.061, P=0.216		χ^2=2.367, P=0.306		χ^2=1.845, P=0.398	
< One year	45(11.7)	84.4	15.6	24.4	75.6	62.2	37.8	86.7	13.3	40.0	60.0
Between one and five years	85(22.1)	74.1	25.9	49.4	50.6	76.5	23.5	75.3	24.7	41.2	58.8
> Five years	254(66.1)	78.0	22.0	45.3	54.7	72.8	27.2	77.6	22.4	48.0	52.0

Moreover, based on our findings, 3% of the respondents agreed that ulcer patients should not carry any form of social responsibility and should not be received in social and community-related events, and 4.4% believed that individuals suffering from TPU should be prevented from attending schools. This shows that public understanding of the disease tremendously affects patients' social life. In light of this, people's perception about the existence of tropical phagedenic ulcer can be changed by improving education to drive social change, as the results in our study revealed an average attitude and practice towards ulcer patients (Table II). The study found that education level does not primarily affect the receptiveness of the community towards patients with TPU.

CONCLUSION

Overall, the knowledge on tropical phagedenic ulcer among community members was low since only 32.8% knew about it. This indicates the lack of awareness about tropical phagedenic ulcer among the public. Moreover, the attitude and practice regarding tropical ulcer patients were at an average level since 21.9% of the respondents believed that the infection is associated with traditional beliefs. This has a significant influence on social stigma, as was observed in other studies. Apart from that, fewer people agreed to allow social interaction with TPU patients, indicating negative attitude and practice. Merely half of the respondents perceived TPU patients as

healthy individuals, and half of them have no objection towards allowing the patients in public places. Instilling proper education is imperative in order to combat misconceptions that exist within the community as well as to improve the awareness about TPU in the study sites to eradicate tropical phagedenic ulcer.

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