Knowledge, attitude and prevention measures of students towards cutaneous leishmaniasis in Delanta district, Northeast Ethiopia

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ABSTRACT

Background and aims: Leishmaniasis is a neglected tropical disease which causes significant morbidity and mortality, particularly in developing countries. Cutaneous leishmaniasis (CL) is the main form of leishmaniasis that affects the skin. Knowledge and perception of people about leishmaniasis has a great impact to prevent the disease in endemic areas. Hence, the aim of this study was to assess the knowledge, attitude and preventive measures of Wegeltena secondary school students towards CL in Delanta district, one of the endemic areas in Northeast Ethiopia.
Methods: A facility-based cross-sectional study was conducted from January 4 to 20, 2021 at Wegeltena secondary school in Delanta district, Northeast Ethiopia. A pre-tested, interviewer administered structured questionnaire was used to collect the data. Multivariable logistic regression analysis was utilized to measure the degree of association between outcome and independent variables. Statistically significant association with the outcome variables was declared at a *p*-value of <0.05.
Results: A total of 388 students were participated in the study. In overall, 27.6% and 34.5% of participants had good knowledge and favorable attitude towards CL, respectively. Being grade 12 (AOR = 2.56; 95% CI: 1.23–5.29) and dwelling in urban areas (AOR = 1.78; 95% CI: 1.09–2.89) were determinants of good knowledge. However, female sex (AOR = 1.96; 95% CI: 1.21–3.18) and had good knowledge about CL (AOR = 3.75; 95% CI: 2.26–6.21) were significantly associated with favorable attitude of respondents towards the disease.
Conclusion: In this study, nearly three-fourth of participants had poor knowledge about CL and two-third of them had unfavorable attitude towards the disease. Level of education and residence were determinants of respondents' knowledge about CL. Moreover, sex and level of knowledge about CL were determinants of respondents' attitude towards the disease. Therefore, an intensified health education program shall be implemented in schools that are found in endemic areas.

1. Introduction

Leishmaniasis is a neglected tropical disease transmitted by the bite of sand flies. It causes significant morbidity and mortality, particularly in developing countries (Leishmaniasis [Internet], 2020). Globally, about 700,000 to 1 million new cases of leishmaniasis have been reported annually (Leishmaniasis Key facts [Internet], 2020). There are three main types of leishmaniasis. These are visceral, cutaneous and muco-cutaneous leishmaniasis (Leishmaniasis [Internet], 2020). Over 95% of the global burden of cutaneous

leishmaniasis (CL) has been reported from Central Asia, Mediterranean basin, Middle East and America (Leishmaniasis Key facts [Internet], 2020). Major ecological changes like urbanization, deforestation and other environmental activities are contributed to the global distribution of leishmaniasis (Leishmaniasis Key facts [Internet], 2020; Rachel Tidman et al., 2021; Caldart et al., 2021). In Ethiopia, the prevalence of leishmaniasis was estimated to be 9.13% (Haftom et al., 2020) and in 2019, about 1665 cases of CL were reported to World Health Organization (WHO) (*Leishmaniasis: status of endemicity of Cutaneous leishmaniasis* 2019 [Internet], 2019).

Cutaneous leishmaniasis is the main form of leishmaniasis that cause skin lesion on exposed parts of the body (Eshetu and Bassa, 2016; McGwire and Satoskar, 2013). It is mainly observed on the face (Bugssa et al., 2014a; Bekele et al., 2014a; Amin et al., 2013). *Leishmania (L) major, L. tropica, L. aethiopica,* L. *amazonensis* and *L. braziliensis* are the most common *Leishmania* species causing CL (Sabzevari et al., 2021; Veasey et al., 2020; Steverding, 2017). Rarely, it can also be caused by *leishmania donovani* and L. *infantum (*Salam et al., *2014;* Khatri et al., *2016)*. In Ethiopia, settings which are found with an altitude of 810–3563 m above the mean sea level and environmental temperature of 10.6 °C to 23.8 °C are the main leishmaniasis risk areas. Cutaneous leishmaniasis is highly prevalent in the central, northern and the southern highlands of Ethiopia (Seid et al., 2014). Though the exact burden was unknown, CL is suspected to be endemic in over 170 districts of Ethiopia (Ethiopian Federal Minstry of Health, 2013). In addition, new outbreaks of CL have been observed and reported in settings which were not known previously (Amisalu, 2014). Sleeping outside of the house and engaging in outdoor activities are the main behavioral risk factors to the acquisition of infection in highland areas of Ethiopia (Custodio et al., 2012).

A study conducted in Ethiopia at ALERT (All African Leprosy Rehabilitation and Training center) hospital revealed that CL was the third most common cause of skin disease and it was the leading among all the infectious causes of skin diseases (Gimbel and Legesse, 2013). A community-based cross-sectional study conducted in Eastern Tigray showed that the prevalence of CL was about 6.7% and adolescents aged 10–19 years were highly affected (Bsrat et al., 2015). Another study reported from Southwest Ethiopia among primary school students revealed that about 64.8% of participants had CL (Bugssa et al., 2014b). Moreover, CL has a significant psychological impact and social stigma, particularly in young individuals and children (Bennis et al., 2017). There is no approved vaccine to prevent infection of leishmaniasis (Leishmaniasis [Internet], 2020). However, it can be prevented by environmental management, personal protection and elimination of sand flies (Leishmaniasis Key facts [Internet], 2020). Awareness and perception of people towards leishmaniasis have a great impact to prevent the disease in endemic areas. In Ethiopia, few community-based studies regarding the awareness and perception of people towards leishmaniasis have been conducted. As a result, a considerable proportion of individuals have lack of awareness about leishmaniasis and they primarily use herbal medications to treat the disease (Kebede et al., 2016; Tamiru et al., 2019). However, institutional based studies are limited in Ethiopia. Hence, the aim of this study was to assess the knowledge, attitude and preventive measures of Wegeltena secondary school students towards CL in Delanta district, one of the endemic areas in Northeast Ethiopia.

2. Method and materials

2.1. Study design and period

A facility-based cross-sectional study was conducted in Delanta district among Wegeltena secondary school students from January 4–20, 2021.
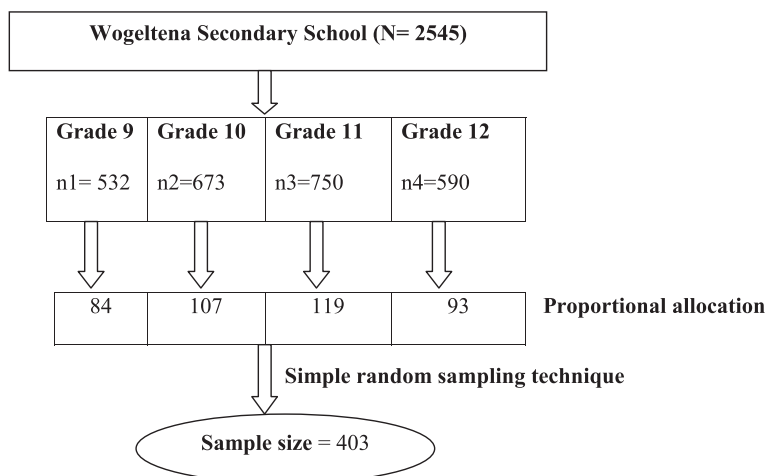

Fig 1.

2.2. Study settings

The study was conducted at Wegeltena secondary school in Delanta district, Northeast Ethiopia. The district is found in South Wollo zone of Amhara region and it has an altitude ranging from 1500 to 3819 m above sea level. The major town is Wegeltena and it is found 494 km far from Addis Ababa (the capital city of Ethiopia), 312 km from Bahir Dar (the capital of Amhara regional state) and 98 km Northwest of Dessie town. Cutaneous leishmaniasis is known to be endemic in the district and it is named as "Qunchirr" in the local language. Wegeltena secondary school is the only secondary school in the town and a total of 2545 students were enrolled during the study period.

2.3. Source and study population

All students who were enrolled in Wegeltena secondary school were the source population. However, those students who were enrolled in Wegeltena secondary school and available during data collection period were the study population.

2.4. Sample size and sampling technique

single population proportion formula [$n = (Z a/2)^2 P (1-P)/d^2$] was used to estimate the required sample size. A proportion of 50%, confidence level of 95% ($Z = 1.96$), 5% margin of error and 5% non-response rate were considered to estimate the sample size. With these assumptions, the sample size was 403. Proportional allocation was made based on the educational level of students and simple random sampling technique was used to select the study participants. (See Fig 1.)

2.5. Data collection tool and procedures

Data were collected using a pre-tested, interviewer-administered structured questionnaire. Age, sex, level of education, residence, ethnicity and family size were among the socio-demographic variables included in the questionnaire. However, questions to assess the level of knowledge and attitude of participants towards CL were adopted from previous studies (Kebede et al., 2016; Tamiru et al., 2019). 17 questions were used to measure the knowledge of study participants. The questions were focused on the mode of disease transmission, symptoms, risk groups, commonly affected body parts, prevention methods and treatment options. The attitude of respondents towards CL was assessed using five questions. In addition, prevention measure of participants towards CL was identified.

2.6. Data quality control

The following measures were taken to preserve the data quality. The questionnaire was translated from English to Amharic (local language of the study area) and then back to English to check its consistency. Data collectors and supervisors were trained for two days regarding the objective of the study, ethical issues and how to collect the data. They were also trained how to apply personal protective equipment. Glove and face mask were provided for both data collectors and supervisors to prevent the risk of coronavirus infection. In addition, the tool was pre-tested on 21 students from Mehonegna secondary school to evaluate face validity, clarity of language and to ensure that the questionnaire was understandable.

2.7. Operational definitions

Overall knowledge was categorized as good if the total score was ≥60% of knowledge assessing questions
Good knowledge: Overall knowledge was categorized as good if the total score was ≥ 60% of knowledge assessing questions.
Poor knowledge: Overall knowledge was categorized as poor if the total score was <60% of knowledge assessing questions.
Favorable attitude: Overall attitude was categorized as favorable if the total score was ≥60% of the attitude assessing questions.
Unfavorable attitude: Overall attitude was categorized as unfavorable if the total score was <60% of the attitude assessing questions.

2.8. Data processing and analysis

Data was entered into EpiData version 4.6 and exported to IBM SPSS version 25 for further statistical analyses. The mean value and standard deviations were used to describe continuous variables and categorical variables were presented in tables using frequency and percentages. All variables were entered in multivariable logistic regression analysis model and Hosmer- Lemeshow statistic was used to test the goodness fit of the model. In multivariable analysis, variables were declared significantly associated with the outcome variables at a *p*-value of <0.05.

3. Results

3.1. Socio-demographic characteristics of study participants

A total of 388 students were participated in the study with a response rate of 96.3%. The mean age of participants was 18.4 years

(SD $\pm$ 1.24 years) and 82.7% were under 20. Of the study participants, 51.8% of them were rural residents and 95.4% were Amhara in ethnicity. Moreover, 54.4% of respondents were females and 24.8% of participants had more than five family members (Table 1).

3.2. Knowledge of the study participants about CL and sand flies

Of the study participants, 76.8% were heard about CL and community was the main source of information for 52% of respondents. About 89% of participants had observed individuals affected with CL in their vicinity and 40% of them were able to identify symptoms of CL as painful disfiguring lesion. Of all participants, about 55.7% of them didn't know how the disease is transmitted and 19.5% were believed that CL is transmitted by the urine of Bats. Similarly, 47.3% of respondents didn't know any prevention measures of CL and 75.5% were never heard about sand flies. About 28.4% of participants knew that unhygienic places were the main breeding sites for sand flies. Moreover, 33.7% of participants didn't know the peak season for CL transmission and 20% of them had no information about the preferred time of sand fly bite.

In overall, 27.6% (95% CI; 23.2–32.5) of the study participants had good knowledge about CL and sand flies (Supplementary material 1).

3.3. Attitude of the study participants towards CL

In our study, 61.1% of the study participants were believed that CL is one of the common health problems in their locality and 22.4% of respondents were believed that the disease is a serious health problem. Moreover, about 42% and 55.5% of participants were believed that CL is a preventable and treatable disease, respectively. However, majority of study participants didn't know whether or not CL is a serious and preventable disease. In overall, 34.5% (95% CI; 29.9–39.2) of the study participants had favorable attitude towards CL (Supplementary material 2).

3.4. Prevention measures of respondents towards CL

In this study, participants were asked which CL prevention methods they were utilized to prevent the disease. Thus, 54.1% of participants were not applying any known prevention measures and 23.2% of respondents didn't know whether they were applying prevention measures or not. However, 12.1% and 6.4% of participants were preventing the disease by closing house doors and by avoiding sleeping outdoors, respectively (Supplementary material 3).

3.5. Factors associated with the knowledge of participants towards CL

Bivariable analysis was not utilized due to the limited number of independent variables. Thus, all variables were included in multivariable logistic regression analysis model. In multivariable analysis, being grade 12 and urban residency were significantly associated with good knowledge of participants about CL. The odds of having good knowledge about CL in grade 12 students were 2.4 times (AOR = 2.42; 95% CI: 1.18–4.95; *P*-value: 0.015) higher than those who were grade nine. Similarly, the odds of having good

Table 1
Socio-demographic characteristics of the study participants in Wegeltena secondary school, Delanta district, Northeast Ethiopia, 2021 ($n = 388$).

Variables	Frequency	Percentage
Gender		
Male	177	45.6
Female	211	54.4
Age (in years)		
<20	321	82.7
≥20	67	17.3
Grade level		
Nine	81	20.9
Ten	103	26.5
Eleven	114	29.4
Twelve	90	23.2
Residence		
Urban	187	48.2
Rural	201	51.8
Household family size (in numbers)		
<3	83	21.4
3–5	209	53.8
>5	96	24.8
Ethnicity		
Amhara	370	95.4
Others*	18	4.6

*Oromo, Tigre

knowledge of CL in urban residents were 1.9 times (AOR = 1.90; 95% CI: 1.18–3.06; *P*-value: 0.008) higher than rural residents (Table 2).

3.6. Factors associated with the attitude of participants towards CL

All the socio-demographic variables and the overall knowledge status of participants were included in the multivariable analysis model. Thus, after adjusting for confounding variables; being female and those who had good knowledge about CL were significantly associated with favorable attitude of participants towards the disease. The odds of having favorable attitude towards CL in females were 1.9 times (AOR = 1.96; 95% CI: 1.21–3.18; P-value: 0.006) higher than males. In addition, the odds of having favorable attitude in those who had good knowledge about the disease were 3.7 times (AOR = 3.73; 95% CI: 2.26–6.14; *P*-value: < 0.001) higher than those who had poor knowledge (Table 3).

4. Discussion

Leishmaniasis is one of the major neglected tropical diseases primarily affecting peoples who are found in low socio-economical status (World health Organization, 2021). Cutaneous leishmaniasis is a common health problem and it is highly prevalent in the northern and southern highland areas of Ethiopia (Seid et al., 2014; Bisetegn et al., 2020). Peoples' awareness and perception towards leishmaniasis have its own impact to prevent the disease in endemic areas (Alidosti et al., 2021). In this study, about 27.6% of the study participants in overall had good knowledge about CL and sand flies. This finding was lower than studies conducted among adults aged between 19 and 60 years in Gamo Gofa zone, Southern Ethiopia (Kebede et al., 2016) and in Ghana among age group of 10 to 76 years (Doe et al., 2019). This discrepancy could be due to the difference in the study period, study population and data collection tools employed; unlike our study, the study of Gamo Gofa zone was community based and the overall knowledge was assessed using six questions. In addition, the study of Ghana was community based and they used small sample size.

Additionally, we have tried to compare data of the specific knowledge assessing questions beyond the overall knowledge. Thus, in this study, 76.8% of participants were heard about CL which was higher than a study conducted in Southern Ethiopia (Kebede et al., 2016). This discrepancy could be due to the difference in the study populations; the study of Southern Ethiopia was community based. About 37.2% of our study participants knew that males are highly affected by CL. This was nearly similar to a study conducted in Northwest Ethiopia among adults aged between 18 and 85 years (Tamiru et al., 2019). Studies conducted in Ethiopia, Saudi Arabia and Pakistan has shown that CL is affecting males more likely than females (Amin et al., 2013; Akram et al., 2015; Eshetu and Mamo, 2020). This could be due to the high engagement of males in outdoor activities. In our study, 25.2% of participants didn't knew any symptom of CL which was similar with a study conducted in Northwest Ethiopia (Tamiru et al., 2019). However, in Pakistan, about 56% of participants didn't knew any symptoms of the disease where majority of the study participants were founded with the age group of 16–28 years (Akram et al., 2015). Moreover, 69.8% of our study participants were identified that face is the main part of the body affected by CL. Studies reported in endemic area of Ethiopia and Saudi Arabia indicated as CL is mainly observed in the face (Amisalu, 2014; Bugssa et al., 2014b; Bekele et al., 2014b; Alanazi et al., 2016).

Table 2
Factors associated with the knowledge of Wegeltena secondary school students about CL and sand flies in Delanta district, Northeast Ethiopia, 2021 (*n* = 388).

Variables	Participants' knowledge about CL and sand flies		AOR (95% CI)	P-value
	Good	Poor		
Gender				
Male	50(28.2)	127(71.8)	1.40(0.86–2.29)	0.173
Female	57(27.0)	154(73.0)	1	
Age (in years)				
<20	95(29.3)	229(70.7)	1	
≥20	12(18.8)	52(81.2)	0.52(0.25–1.07)	0.077
Grade level				
Nine	17(21.0)	64(79.0)	1	
Ten	35(34.0)	68(66.0)	1.31(0.12–4.75)	0.220
Eleven	23(20.2)	91(79.8)	0.95(0.46–1.99)	0.912
Twelve	32(35.6)	58(64.4)	2.42(1.18–4.95)	0.015
Residence				
Urban	61(32.6)	126(67.4)	1.90(1.18–3.06)	0.008
Rural	46(22.9)	155(77.1)	1	
Household family size (in numbers)				
<3	23(27.7)	60(72.3)	1	
3–5	63(30.1)	146(69.9)	1.21(0.66–2.24)	0.531
>5	21(21.9)	75(78.1)	0.64(0.31–1.35)	0.249
Ethnicity				
Amhara	99(26.8)	271(37.2)	0.45(0.16–1.28)	0.136
Others	8(44.4)	10(55.6)	1	

Notes: AOR, Adjusted odds ratio [1]references.

Table 3

Factors associated with the attitude of Wegeltena secondary school students towards CL in Delanta district, Northeast Ethiopia, 2021 (n = 388).

Variables	Attitude of participants towards CL		AOR (95% CI)	P-value
	Favorable	Unfavorable		
Gender				
Male	48(27.1)	129(72.9)	1	
Female	86(40.8)	125(59.2)	1.96 (1.21–3.18)	0.006
Age (in Year)				
<20	115(35.5)	209(64.5)	1	
≥20	19(29.7)	45(70.3)	1.22 (0.64–2.33)	0.544
Grade level				
Nine	24(29.6)	57(70.4)	1	
Ten	49(47.6)	54(52.4)	1.90 (0.96–3.77)	0.063
Eleven	29(25.4)	85(74.6)	0.89 (0.45–1.78)	0.753
Twelve	32(35.6)	58(64.4)	1.04 (0.52–2.10)	0.892
Residence				
Urban	66(35.3)	121(64.7)	0.96 (0.60–1.53)	0.874
Rural	68(33.8)	133(66.2)	1	
Household family size (in numbers)				
<3	21(25.3)	62(74.7)	1	
3–5	78(37.3)	131(62.7)	1.60 (0.85–3.00)	0.138
>5	35(36.5)	61(63.5)	1.61 (0.78–3.35)	0.195
Ethnicity				
Amhara	126(34.1)	244(65.9)	0.53 (0.18–1.56)	0.253
Others	8(44.4)	10(55.6)	1	
Knowledge about CL				
Poor	73(26.0)	208(74.0)	1	
Good	61(57.0)	46(43.0)	3.73 (2.26–6.14)	< 0.001

Notes: AOR, Adjusted odds ratio [1]references.

Leishmaniasis is a vector borne disease transmitted by the bite of sand flies. However, 75.5% of our study participants were never heard of sand flies and about 19.5% of participants were believed that CL is transmitted by Bat's urine. Similarly, in Ghana, about 80% and 39.6% of study participants had no ideas how the disease is transmitted and prevented, respectively (Doe et al., 2019). Sand flies become more active to bite from the time of dusk to dawn and in drier than rainy seasons (Leishmaniasis [Internet], 2020; Karmaoui, 2020). Thus, avoiding outdoor activities from dusk to dawn and in dry seasons is important to reduce risk of infection. In general, majority of our study participants had lack of awareness about the transmission and prevention methods of leishmaniasis.

In our study, grade 12 students were more likely to have good knowledge about CL and sand flies compared to their juniors. This may be because of the extra information they obtained from media including internet. In this study, urban dwellers were more likely to have good knowledge about the disease compared to rural residents. This could be related to the abundant source of information about the disease in urban settings. They may also get information from health professionals. However, it contradicts with a study reported from Northwest Ethiopia that rural residents were more knowledgeable than urban inhabitants (Tamiru et al., 2019). This discrepancy might be due to the fact that the study of Northwest Ethiopia was community based and conducted in rural setting.

Moreover, in our study, 34.5% of the study participants had favorable attitude towards CL. This finding was lower a study conducted in Southern Ethiopia (Kebede et al., 2016). This discrepancy could be related to the variation in socio-demographic characteristics of the study participants and the study periods. When we see specifically beyond the overall attitude, about 61.1% of our study participants were believed as CL is a common health problem in their locality which was in line with a study reported in Southern Ethiopia (Kebede et al., 2016), but higher than a study reported from Tunisia (Maaoui et al., 2019). In our study, majority of the study participants didn't know whether or not CL is a serious and preventable disease. However, a study in Northwest Ethiopia showed that about 82% of participants were perceived as CL is a serious disease (Tamiru et al., 2019). Furthermore, about 50.5% of the study participants in our study preferred traditional medicine as a good treatment option which was comparable with other studies conducted in Ethiopia (Kebede et al., 2016; Tamiru et al., 2019) and India, among adults aged above 18 years (Nandha et al., 2014). With the above evidence, we can conclude that people living in endemic areas of Ethiopia have awareness gap about the modern treatment options of CL.

Multivariable analysis revealed that females were more likely to have a favorable attitude towards CL than males. In addition, individuals who had good knowledge about CL were more likely to have favorable attitude towards the disease.

Generally, in this study, lack of awareness regarding disease transmission, manifestation, treatment, risk factor and controlling methods were observed among study participants. In addition, majority of the study participants had unfavorable attitude towards the disease and a considerable proportion of study participants didn't implement disease prevention measures.

This study has the following limitations. The first limitation could be related to the nature of cross-sectional design used and method of data collection, which may predispose respondents for social desirability and recall bias. Second, this study was done in a single school that the finding may not be generalized to the overall population of the district. In addition, we tried to compare our finding with community-based studies due to availability of limited researches.

5. Conclusion and recommendations

In this study, nearly three-fourth of the study participants had poor knowledge about CL and sand flies. However, two-third of the study participants had unfavorable attitude towards the disease. More than half of respondents didn't apply any known prevention measures and a significant proportion of respondents didn't know whether or not they were applying prevention measures.

Level of education and residence were determinants of respondents' knowledge about CL. Moreover, sex and level of knowledge about CL were determinants of respondents' attitude towards the disease. Therefore, an intensified health education and awareness creation programs shall be implemented in schools which are found in endemic areas.

Health institutions and other governmental organizations shall prepare, distribute and post leaflets in schools to enhance the awareness of school community about CL and prevention methods. We also recommend schools to establish anti-leishmaniasis clubs.

Data sharing statement

The used data set and analyzed during this study are available from the corresponding author on reasonable request.

Ethical issue

Ethical approval was obtained from the ethical review committee of College of Medicine and Health Sciences, Wollo University. Communications with school director was held through a formal letter. Study participants were informed that participation was on a voluntary basis and they can leave the study at any time if they are not comfortable about the questionnaire. We got informed consent from each participant and it was approved by the ethical review committee of College of Medicine and Heath Sciences. This study was conducted in accordance with the declaration of Helsinki and confidentiality was preserved for all data collected.

Consent for publication

Not applicable.

Author contributions

All authors made substantial contributions to the conception and design, acquisition of data, or analyses and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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Declaration of Competing Interest

None

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.parepi.2022.e00241.

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