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Community knowledge, attitude and practice towards cutaneous leishmaniasis endemic area Ochello, Gamo Gofa Zone, South Ethiopia

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ABSTRACT

Objective: To assess the knowledge, attitude and practice of the community related to cutaneous leishmaniasis (CL) in an endemic area Ochello, Gamo Gofa Zone, South Ethiopia.**Methods:** We conducted community based cross-sectional survey among residents in Ochello from November to December 2014. The study area was purposely selected based on previous reports on endemicity of CL. Using simple random sampling technique, a total of 392 household participants were selected in the study area Ochello. Structured questionnaire was used to collect the data. Regarding the responses given to knowledge, attitude and practice, a score of 1 was given for each right response and 0 for unsure responses. Data were double entered and analysis was conducted using SPSS version 20 statistical software. Descriptive statistics that include frequency and percentage were used to analyze the results.**Results:** In total, 392 individuals were participated in our study where 225 (57.4%) of the participants were males and 167 (42.6%) were females. Of all the total participants, 265 (67.6%) had heard of the disease, and 127 (32.4%) responded that they did not know CL. Based on the scoring results, 265 (67.6%) participants were knowledgeable about CL. Out of 265 participants who heard about CL, most of them [215 (54.8%)] had the attitude that CL was a problem in their area and had no positive attitude towards the treatment of CL. Approximately, 215 (54.8%) replied that CL was preventable. Majority of the respondents did not sleep outdoors and did not practice sleeping near vegetation with or without bed net.**Conclusions:** The current finding indicated that the inhabitants of Ochello developed good awareness and encouraging attitude regarding CL. However, their prevention and control practice was very low. Hence, the result of this study calls for organized community awareness creation through various means.

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The study protocol was performed according to the Helsinki declaration and approved by Institutional Review Board of the College of Health Sciences of the Addis Ababa University and National Research Ethics Review Committee. Informed written consent was obtained from the participants.

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1. Introduction

Leishmaniasis is epidemiologically diverse disease caused by haemoflagellate protozoan parasites of the genus *Leishmania* (family Trypanosomatidae) transmitted by the bite of the female *Phlebotomus* sandflies [1,2]. The disease is prevalent in 98 countries [2,3]. It is manifested in different clinical forms including self-curing cutaneous to the deadly visceral form of the disease [4].

Leishmaniasis, one of the neglected tropical diseases, is among the most important public health problems worldwide. It

causes disability nearly in 98 endemic countries and 3 territories where 350 million individuals are living at risk of infection [2,5]. According to Alvar *et al.* [5], 0.7 to 1.2 million new cases of cutaneous leishmaniasis (CL) are estimated per year. With increasing deforestation, human movement, urbanization, and HIV/AIDS, leishmaniasis is a growing public health concern in many countries [6]. Leishmaniasis excessively impinges on the poor, mostly individuals with defenseless homes as well as ecological settings. Low daily earnings together with poor health systems aggravate the productivity of underprivileged communities [4].

During CL, vector-borne protozoan diseases, cutaneous lesion appears at the site of sandfly bites. The cutaneous lesions vary in clinical manifestations, severity as well as time of healing. In most of the CL patients, lesions might become chronic resulting in disfiguring of the affected part of body or may be leishmaniasis recidivans. CL is not fatal, however, could have considerable social impact due to stigmatization of patients when the lesions/scars appear on the face or visible extremities. According to reports in different parts of the world, CL is associated with sex [7], age [8], living with animals [8] and presence of patients in the family and CL in many endemic foci is zoonotic [9].

In Ethiopia, CL is reported in highland areas in the country [10–12]. Based on a recent report by Alvar *et al.* [5], CL cases of between 20000 and 50000 are reported per year. Health education and facilities, equipment for screening and identification of CL patients in the country are not enough as well as very few trained personnel are available in the field in Ethiopia. Hence, up to date information regarding leishmaniasis is not available on time or not reported at all. CL is deforming and leads to social stigma.

Despite the increased prevalence of CL due to various reasons, there are few studies conducted regarding knowledge, attitude and practice (KAP) of the community in CL endemic areas in Ethiopia. Knowing the impact of leishmaniasis and human behavior surrounding CL is very important to improve its control and treatment. In the present study, we investigated KAP of communities in an endemic area Ochello, Gamo Gofa Zone, South Ethiopia.

2. Materials and methods

2.1. Study area and population

A community-based cross-sectional study was conducted in Ochello between November and December 2014 to investigate the KAP of the community regarding CL. Ochello is located at about 20 km in the north of the town Arba Minch at an elevation of 2016 m above sea level. Arba Minch town is located approximately 500 km in the south of the capital Addis Ababa while 275 km south of Hawassa (capital of the region). Arba Minch is the main town of the Gamo Gofa Zone in Southern Nations, Nationalities, and Peoples Regional State (Figure 1). Farming is the main occupation of the residents where cultivation of avocado, mango, banana and rearing livestock is the main activities of the community. This survey was carried out with the support and cooperation from local community leaders, health and agricultural extension workers in Ochello. Based on the 2013 population projection of

Ethiopia conducted by the Central Statistical Authority, Arba Minch Zuria woreda had a population of 185302 people of whom 92680 were male and 92622 were female, with Ochello having a population of 32000 people [13].

2.2. Sampling of the study participants

Considering 50% of the study participants had knowledge, constructive attitude or good practice towards CL [confidence interval (CI) = 95%, degree of accuracy 5%], 385 subjects were sampled for the study. In order to increase the precision of the estimates, 392 participants at the age of 18 or above were included for this study. Prior to sampling, the chairman of the village was contacted and discussion was made on the objectives of the study. After the discussion, their willingness was requested and permission was obtained from community leaders. The sampling frame which is the list of household heads was obtained in the office of the community leader and selection of study participants were conducted at random. Hence, the selected household heads were communicated to come to the central place for interview.

2.3. Data collection

Questionnaire consisting of structured questions were designed in such a way to obtain information on sociodemographic characteristics, knowledge on CL, attitude scale towards CL, and practice related to CL in English language. The following were the questions used in the survey.

Knowledge was assessed using 6-item questionnaire including 1. Have you ever heard of CL? 2. Do you believe that CL is a health problem? 3. What do you think the cause of CL? 4. What are the symptoms of CL? 5. Location of lesions/scars, and 6. Where often you/family go to get treatment for CL? Attitude was assessed based on 6-point questionnaire including 1. Is CL a problem in your area? 2. Is CL treatable? 3. What do you think the outcome of CL if not treated? 4. How is CL transmitted? 5. Where do sandflies breed? 6. Have you ever participated in CL control activities? Practice had 5 items including 1. Is CL a preventable disease? 2. What methods do you know to prevent CL? 3. Sleeping outdoors, 4. Sleeping condition, and 5. Work time preference.

The questionnaire was then translated into Amharic language authorized and pre-tested on 20 household heads prior to the actual data collection for consistency. The sampled household head or the next oldest member of the family in the absence of the household head was interviewed. Data collectors were selected from Ochello for this purpose. The interview was conducted in a suitable place one by one. Local name for CL was documented during the pilot study and hence, the local name for CL was “Bolba”.

2.4. Scoring

Scores for knowledge ranged from 0 to 6 where scores ≤ 3 assumed poor knowledge and gave a score value of 0 whereas scores > 3 were considered as positive and gave a score value of 1. The attitude to CL was assessed using 6 questions where attitude scores ranging between 0 and 3 were considered as poor attitude whereas attitude scores > 3 were considered as

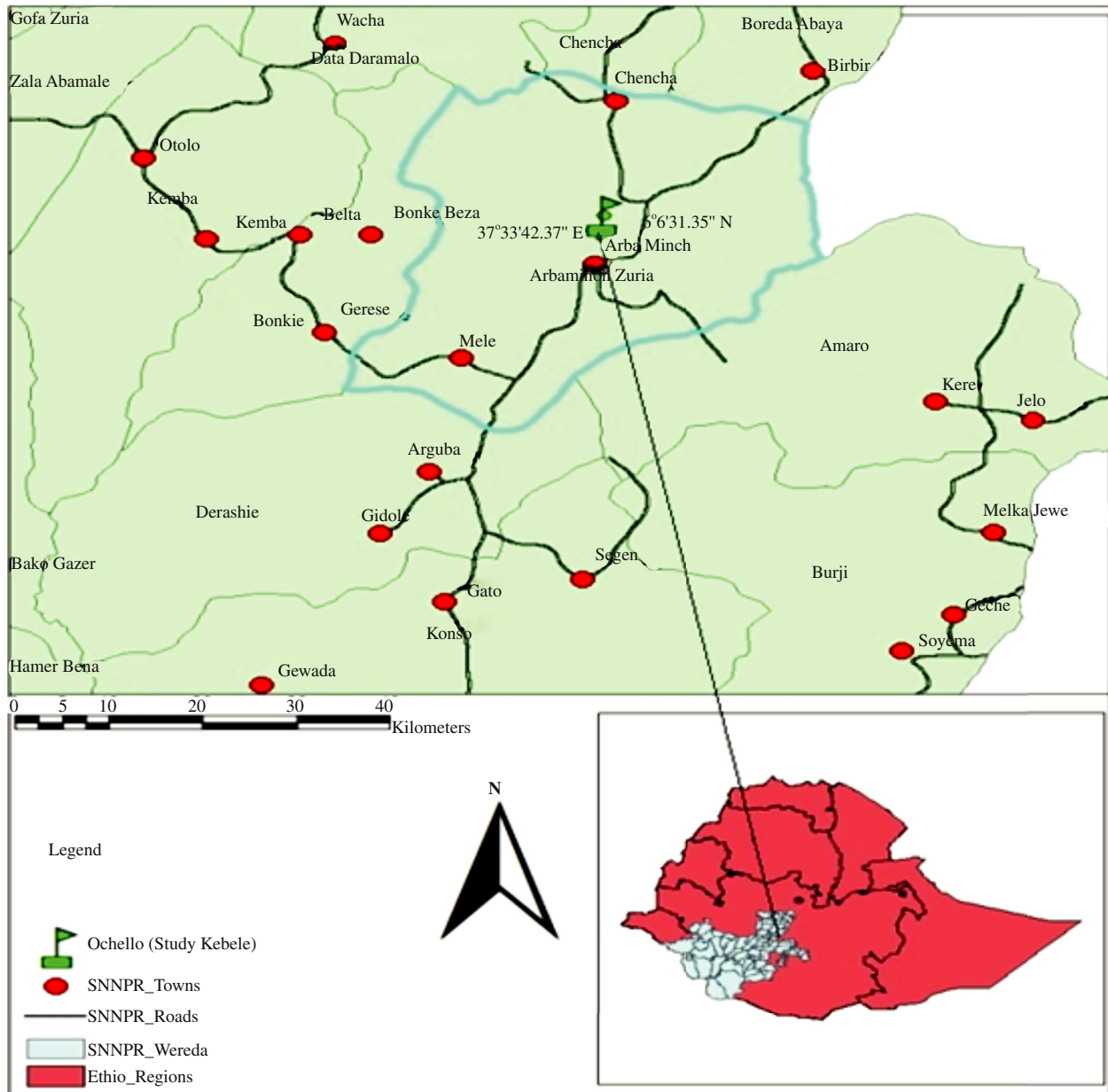


Figure 1. Location of the study area, Ochello of Gamo Gofa Zone in Southern Nations, Nationalities, and Peoples Regional State, South Ethiopia.

constructive attitude. Practice to CL was evaluated using 5 questions where scores ≥ 3 were regarded as good quality practice to manage CL.

2.5. Ethics

Institutional Review Board of the College of Health Sciences of the Addis Ababa University and National Research Ethics Review Committee approved the procedures of this study. As most of the study populations were illiterate, Institutional Review Board recommended getting oral consent of the participants. Thus, verbal consent was taken immediately after the objectives of the study were explained. Those infected with CL were informed to go to Arba Minch Hospital for leishmaniasis treatment. After the interview source of infection, clinical signs and protection techniques of CL were explained to the study participants. Confidentiality of the information was maintained.

2.6. Data analysis

Information collected was entered into SPSS version 20 and analyzed. Descriptive statistics such as percentage was used to express the level of community member's KAP.

3. Results

3.1. Sociodemographic characteristics

A total of 392 individuals were involved in this study; 225 (57.4%) of the respondents were males and 167 (42.6%) were females. The age of participants varied between 19 and 60 years where the medium age was 35 years. Participant's major occupation was farming [285 (72.7%)]. Majority of the participants [332 (84.7%)] were married, 388 (99.0%) owned farmland and Orthodox Christianity was the dominant religion [271 (69.1%)] in Ochello. Of the study participants, 225

(57.4%) were able to read and write while 91 (23.2%) of the participants neither read nor wrote. All of the study participants were Gamo by ethnicity. Regarding their residency, all of the study participants resided in the area for more than three years and none of them traveled out of their area within 6 months during the study period. The general sociodemographic characteristics of the study participants were presented in Table 1.

Table 1

Sociodemographic characteristics of study participants in Ochello, Gamo Gofa Zone, South Ethiopia.

Item		Frequency	Percent
Sex	Male	225	57.4
	Female	167	42.6
Age	18–20	6	1.6
	21–30	145	0.5
	31–40	134	1.0
	41–50	76	0.8
	51–60	30	1.0
	> 60	1	0.3
Religion	Orthodox Christianity	271	69.1
	Protestant	121	30.9
Relation to household head	Head	319	81.4
	Spouse	73	18.6
Permanent residence	Rural	336	85.7
	Urban	56	14.3
Family size (number)	2	27	6.9
	3–5	89	22.7
	> 5	276	70.4
Major occupation	Employed	7	1.8
	Trade	42	10.7
	Farmer	285	72.7
	Housewife	23	5.9
	No job	1	0.3
	Other	34	8.7
Educational status	Illiterate	91	23.2
	Read and write	225	57.4
	Grade 1–6	65	16.6
	Grade 7–8	4	1.0
	Grade 9–12	5	1.3
	Diploma and above	2	0.5
Marital status	Married	332	84.7
	Divorced	60	15.3
Do you own a farmland?	Yes	388	99.0
	No	4	1.0
If yes, location of the farmland	< 100 m	295	75.2
	100–1 000 m	23	5.9
	> 1 km	74	18.9
How long have you lived in the current location?	< 3 years	0	0.0
	> 3 years	392	100.0
Have you ever traveled out of your area in the last 6 months?	Yes	0	0.0
	No	392	100.0

3.2. Participants' knowledge on CL

From the total study participants, 265 (67.6%) knew CL, and 127 (32.4%) responded that they did not hear of CL. Most of them (77.2%) responded that CL was transmitted by mosquitoes. Nearly 20% of the study participants had no

knowledge about CL transmission. About 59.6% of the participants responded that the main clinical symptom of CL was swollen legs, while 11% acknowledged that they did not know any symptom. The majority of the participants [234 (59.7%)] responded that lesion (kuselet) occurring on the face was the main symptom of CL and 215 (54.8%) believed that CL was one of the health problems in the area. In this finding, 265 (67.6%) of the participants indicated that most of CL patients went to traditional healers for treatment. Among the 225 male study participants who heard about CL, 153 (68%) were knowledgeable; whereas from 167 female participants who heard about CL, 112 (67.1%) were well-informed. Hence, based on the scoring results, 265 (67.6%) study participants were knowledgeable (Table 2).

Table 2

Knowledge on CL among study participants in Ochello, Gamo Gofa Zone, South Ethiopia.

Item		Frequency	Percent
Have you ever heard of leishmaniasis?	Yes	265	67.6
	No	127	32.4
Do you believe that leishmaniasis is a health problem?	Yes	215	54.8
	No	177	45.2
What do you think the cause of leishmaniasis?	Total	392	100.0
	Sandfly bite	192	49.0
What are the symptoms of leishmaniasis?	Flies	184	46.9
	Poor hygiene	16	4.1
Location of lesions/scar	Pruritus	21	5.4
	Lesion	244	62.2
Where often you/family go to get treatment for CL?	Emaciation	16	4.1
	Forehead	20	5.1
	Face	234	59.7
	Nostril	5	1.3
	Arm	6	1.5
	Leg	4	1.0
Overall knowledge	Ear	3	0.8
	Mixed	25	6.4
Where often you/family go to get treatment for CL?	I don't know	127	32.4
	Health center	110	28.1
Overall knowledge	Clinic/health post	17	4.3
	Traditional healers	265	67.6
Overall knowledge	Good	265	67.6
	Poor	127	32.4

3.3. Attitude related to CL in Ochello

Out of the 392 contestants who heard about CL, most of them [215 (54.8%)] had the attitude that CL was a problem in their area and had no positive attitude towards the treatment of CL whereas 137 (34.9%) had no any attitude whether CL was treatable. Regarding their treatment preference, the majority [235 (59.9%)] had the attitude that treatment from traditional healers was effective. Of the respondents, 225 (57.4%) had the attitude that CL had disfiguring outcome on the body where it occurred. Of the respondents, 192 (49.0%) indicated that sandfly bite was the main way of transmission while 63 (16.1%) responded that transmission was by flies and 77.3% indicated that it bred in the vegetation. Of the participants, 375 (95.7%) did not participate in the CL control activities (Table 3).

Table 3

Attitude towards CL among study participants in Ochello, Gammo Goffa Zone, South Ethiopia.

Item		Frequency	Percent
Is CL a problem in your area?	Yes	215	54.8
	No	40	10.2
	I don't know	137	34.9
Is CL treatable?	Yes	40	10.2
	No	215	54.8
	I don't know	137	34.9
What do you think the outcome of CL if not treated early?	Death	10	2.6
	Disability	225	57.4
	Self cure	20	5.1
	Others	137	34.9
How is leishmaniasis transmitted?	Through sandfly bite	192	49.0
	Bodily contact with patients	17	4.3
	By flies	63	16.1
	Others	120	30.6
	Vegetation	303	77.3
Where do sandflies breed?	Houses	72	18.4
	Others	17	4.3
	Vegetation	303	77.3
Have you ever participated in CL control activities?	Yes	0	0.0
	No	375	95.7
	I don't know	17	4.3
Overall attitude	Positive	162	41.3
	Negative	230	58.7

3.4. The practice of study participants towards CL prevention and control in Ochello

Among the total respondents, 215 (54.8%) replied that CL was preventable. Regarding methods of prevention, they used bed net (21.7%) and DDT (19.4%). Majority of the respondents did not sleep outdoors and did not practice sleeping near vegetation with or without bed net. Concerning their work time preference, majority of them performed their farm activities during day time [375 (95.7%)] (Table 4).

Table 4

Practice of respondents towards CL prevention and control in Ochello, Gamo Gofa Zone, South Ethiopia.

Item		Frequency	Percent
Is CL a preventable disease?	Yes	–	–
	No	215	54.8
	I don't know	177	45.2
What methods do you know to prevent CL?	Bed net	85	21.7
	DDT	76	19.4
	No prevention methods	231	58.9
Sleeping outdoors	Yes	160	40.8
	No	232	59.2
Sleeping condition	Sleeping near vegetation under bed net	84	21.4
	Sleeping near vegetation without bed net	76	19.4
	Never sleep near vegetation	232	59.2
	Day time	375	95.7
Work time preference when temperature is high	Night	0	0.0
	Both	17	4.3
Overall practice	Good	147	37.5
	Poor	245	62.5

4. Discussion

CL is known to occur in undetermined magnitude in different areas in Ethiopia. This finding provides detailed analysis of KAP on CL by the communities in Ochello, one of CL endemic sites in Southern Nations, Nationalities and Peoples Regional State, South Ethiopia. The data collection was focused mainly in Ochello. However, the results and analyses can be extrapolated to the other parts of the country having similar socioeconomic characteristics. This study in Ochello was conducted to assess the KAP of endemic communities with a considerable number of community samples. In addition, experienced individuals were used for data collection especially in administering the questionnaire. These individuals are indigenes to Ochello, speak the local language of the study participants and interact directly with the target population, which could facilitate compliance and cooperation of the participants to give honest information required [14]. Furthermore, all the survey activities were supervised by the researchers.

According to the recommendations of World Health Organization, the implementation of KAP surveys is basic for health promotion campaigns, as the surveys help programs adjust health education messages to build public knowledge and awareness [15]. KAP study in relation to CL infection varies among regions and is heavily influenced by socio-cultural settings. Very little information is available how individual communities integrate knowledge of the origins and impacts of CL into local knowledge systems. This KAP study on indigenous adults of Ochello who lived 3 or more years in the area was the first to be performed.

This study noted that although the study area is categorized as CL endemic area, the 127 (32.4%) of the participants were not aware of that status and 177 (45.2%) did not know that CL was a health problem, revealing that information about CL was not efficiently communicated to the community. Hence, there were people who had poor or no understanding of CL. The majority of the respondents [192 (49.0%)] indicated that CL was caused by sandflies whereas 184 (46.9%) indicated that housefly was the cause of CL and 16 (4.1%) indicated that poor hygiene caused CL. The implication of this discrepancy of information is that families may not take suitable actions to protect their family members.

In this study, most of the participants [244 (62.2%)] knew that the most common signs of CL include lesions on the face (59.7%), forehead (5.1%), arms (1.5%), legs (1%) and ears (0.8%). Thirty-two point four percent of the participants had no information on the signs and symptoms of CL. About 6.4% of the participants knew one or more signs and symptoms of CL.

This survey indicated that most of the participants (67.6%) preferred traditional remedies during illness, indicating that the consciousness on the usage of modern treatment centers such as health centers/hospitals is low. However, approximately 28.1% and 4.1% of the participants still consider health centers and health posts for CL treatment, respectively. Although, some of the participants preferred health center treatment, their knowledge of the drugs used in the treatment of CL was poor, showing awareness on CL in the population is low.

The attitudes of the participants related to CL showed that most of them, 54.8%, of the participants view CL to be problematic disease. In addition, the participants of the study had varied views regarding the significance of CL as a health problem, with participants viewing CL as a medical, social or an

economic problem. The fact that slightly more than half of the participants indicated that they view CL to be a problem shows that awareness and knowledge of CL is lacking among the residents of this endemic community, Ochello. Thus, there is a need to increase efforts to improve education of the residents to ensure efficient control of CL.

The majority (54.8%) of the participants assumed that CL is not treatable, 34.9% did not know whether CL is treatable and only 10.2% believed that it could be treated and cured completely. This showed that the community attitude towards the treatment of CL is low. In our study, a considerable proportion of the population sought treatment from local traditional healers. This might increase disease duration and in turn, increase the chance of transmission of CL. This might be due to different reasons like poor community awareness creation activities. This finding is similar with the study conducted in Iran by Sarkari *et al.* [16].

Nearly half of the respondents (49%) said that leishmaniasis is transmitted through sandfly bite, 30% indicated it is transmitted through other means, 16.1% said it is transmitted by flies and 4.3% indicated bodily contact with CL patient could transmit leishmaniasis. Majority of the respondents (77.3%) indicated that sandflies bred in vegetation whereas 18.4% replied that sandflies bred in houses. Approximately 95% of the respondents did not believe that CL could be controlled through community participation, and 4.3% of the respondents have no idea. More than half (57.4%) of the participants indicated the disability is the outcome of CL if not treated, only 5.1% indicated self cure and 2.6% replied death is the outcome of CL if not treated. When the overall attitude of the study participants are considered, they have favorable attitude towards CL that is a health problem but attitude to its treatment and transmission is poor. Similar study conducted by Nandha *et al.* [17] indicated poor attitude of the community favored the increase in the occurrence of CL.

About 34.8% of the study participants indicated that preventability of CL is unthinkable; none of them mentioned that CL is preventable and the others (45.2%) did not know whether it could be preventable. People's knowledge about the preventability of the disease is very low. Similarly, low prevention practice was reported by Saberi *et al.* [18]. In order to prevent sandfly bites, 21.7% of the participants used only bed nets, 19.4% used only DDT, while 58.9% of the participants did not use any prevention methods against sandfly bites. This might be due to poor awareness of the community in Ochello. Of the participants, 40.8% slept outdoors in farm land and 21.4% used bed nets when sleeping outdoors. About 95.7% of the respondents used to work during the day and very few of the respondents (4.3%) preferred to work at night. This might be due to socioeconomic status of the population, absence of electric light supply, and the people's tradition to work at day time.

In conclusion, our study indicated that the inhabitants of Ochello were conscious and had constructive attitude on CL, however, the practice they had for the control and prevention of CL was found to be very low. Hence, this finding suggested persistent activities towards behavioral change and social mobilization.

Conflict of interest statement

We declare that we have no conflict of interest.

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References

- [1] Bañuls AL, Hide M, Prugnolle F. *Leishmania* and the leishmaniasis: a parasite genetic update and advances in taxonomy, epidemiology and pathogenicity in humans. *Adv Parasitol* 2007; **64**: 1-109.
- [2] World Health Organization. Control of the leishmaniasis. Geneva: World Health Organization; 2010. [Online] Available from: http://apps.who.int/iris/bitstream/10665/44412/1/WHO_TRS_949_eng.pdf [Accessed on 20th September, 2015]
- [3] Desjeux P. Leishmaniasis current situation and new perspectives. *Comp Immunol Microbiol Infect Dis* 2004; **27**(5): 305-18.
- [4] Alvar J, Croft S, Olliaro P. Chemotherapy in the treatment and control of leishmaniasis. *Adv Parasitol* 2006; **61**: 223-74.
- [5] Alvar J, Vélez ID, Bern C, Herrero M, Desjeux P, Cano J, et al. Leishmaniasis worldwide and global estimates of its incidence. *PLoS One* 2012; **7**(5): e35671.
- [6] Desjeux P. The increase in risk factors for leishmaniasis worldwide. *Trans R Soc Trop Med Hyg* 2001; **95**(3): 239-43.
- [7] Reithinger R, Dujardin JC, Louzir H, Pirmez C, Alexander B, Brooker S. Cutaneous leishmaniasis. *Lancet Infect Dis* 2007; **7**(9): 581-96.
- [8] Kolaczinski JH, Reithinger R, Worku DT, Ocheng A, Kasimiro J, Kabatereine N, et al. Risk factors of visceral leishmaniasis in East Africa: a case-control study in Pokot territory of Kenya and Uganda. *Int J Epidemiol* 2008; **37**(2): 344-52.
- [9] Reithinger R, Mohsen M, Leslie T. Risk factors for anthroponotic cutaneous leishmaniasis at the household level in Kabul, Afghanistan. *PLoS Negl Trop Dis* 2010; **4**(3): e639.
- [10] Ashford RW, Bray MA, Hutchinson MP, Bray RS. The epidemiology of cutaneous leishmaniasis in Ethiopia. *Trans R Soc Trop Med Hyg* 1973; **67**(4): 568-601.
- [11] Negera E, Gadisa E, Yamuah L, Engers H, Hussein J, Kuru T, et al. Outbreak of cutaneous leishmaniasis in Silti woreda, Ethiopia: risk factor assessment and causative agent identification. *Trans R Soc Trop Med Hyg* 2008; **102**(9): 883-90.
- [12] Lemma W, Erenso G, Gadisa E, Balkew M, Gebre-Michael T, Hailu A. A zoonotic focus of cutaneous leishmaniasis in Addis Ababa, Ethiopia. *Parasit Vectors* 2009; **2**(1): 60.
- [13] Central Statistical Authority. Population projection of Ethiopia for all regions at wereda level from 2014–2017. Addis Ababa: Central Statistical Authority; 2013. [Online] Available from: http://www.csa.gov.et/images/general/news/pop_pro_wer_2014-2017_final [Accessed on 20th September, 2015]
- [14] Bauer L. Knowledge and behavior of tourists to Manu National Park, Peru, in relation to leishmaniasis. *J Travel Med* 2002; **9**(4): 173-9.
- [15] Moreira Rda C, Rebelo JM, Gama ME, Costa JM. [Knowledge level about of American tegumentary leishmaniasis (ATL) and use of alternative therapies in an endemic area in the Amazon Region in the State of Maranhão, Brazil]. *Cad Saude Publica* 2002; **18**(1): 187-95. Portuguese.
- [16] Sarkari B, Qasem A, Shafaf MR. Knowledge, attitude, and practices related to cutaneous leishmaniasis in an endemic focus of cutaneous leishmaniasis, Southern Iran. *Asian Pac J Trop Biomed* 2014; **4**(7): 566-9.
- [17] Nandha B, Srinivasan R, Jambulingam P. Cutaneous leishmaniasis: knowledge, attitude and practices of the inhabitants of the Kani forest tribal settlements of Tiruvananthapuram district, Kerala, India. *Health Educ Res* 2014; **29**(6): 1049-57.
- [18] Saberi S, Zamani A, Motamedi A, Nilforoush-zadeh MA, Jaffary F, Rahimi E, et al. The knowledge, attitude, and prevention practices of students regarding cutaneous leishmaniasis in the hyperendemic region of the Shahid Babaie Airbase. *Vector Borne Zoonotic Dis* 2012; **12**(4): 306-9.