Knowledge, attitude, and practices regarding rabies among residents of Mekdella district, South Wollo, Ethiopia

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Abstract

Rabies, a highly fatal neglected tropical disease that affects warm-blooded animals, was the subject of a cross-sectional study conducted from January 2021 to April 2021. The study aimed to assess the level of knowledge, attitudes, and practices (KAPs) regarding rabies and associated risk factors among the communities of Mekdella district. A semi-structured questionnaire was administered to a total of 384 households randomly selected from six kebeles. Factors associated with KAP were evaluated using the logistic regression model. The findings revealed that about 60% and 57% of respondents have good knowledge and implement preventive practices, respectively. However, the majority of respondents were unaware of the causative agent of rabies (55.7%) and rabies post-exposure prophylaxis (65.9%). Although 88.3% of the respondents knew about vaccination as a means of rabies prevention, only 20.1% of the respondents had their dogs vaccinated. About 53.9% of respondents would wash the wound with water and soap if bitten by rabid animals. Educated respondents were eight times (AOR = 7.7; 95% CI: 2.5-23.7) and three times (AOR = 3.1; 95% CI: 1.2-8.0) more likely to have good knowledge and practice preventive measures against rabies, respectively, compared to illiterate participants. Respondents who were trained about rabies were nine times (AOR = 9.7; 95% CI: 1.4-66.4) and five times (AOR = 4.5; 95% CI: 1.2-16.3) more likely to have good knowledge and implement preventive practices, respectively, than the non-trained ones. Being previously exposed to rabies made respondents four times (AOR = 3.9; 95% CI: 1.8-8.3) and two times (AOR = 2.3; 95% CI: 1.2 - 4.3) more likely to have good knowledge and implement preventive practices regarding

rabies. This study revealed the vast gaps in the communities' knowledge on rabies and poor practices in the prevention and control of rabies and post-exposure prophylaxis. It underscores the importance of community involvement in improving rabies prevention and control, fostering a sense of responsibility and empowerment.

Keywords: Ethiopia; Knowledge and practice; Mekdella; Prevention and control; Rabies.

Introduction

Rabies is characterized by an acute encephalitis illness caused by the rabies virus of the genus *Lyssavirus* in the family of *Rhabdoviridae*. It affects all mammals and is present in all continents except Antarctica. Following the onset of clinical symptoms, rabies is almost always fatal (WHO, 2017; Aklilu *et al.*, 2021). People are usually infected following a deep bite or scratch from an animal with rabies, and transmission to humans by rabid dogs accounts for 99% of the cases. Africa and Asia have the highest rabies burden in humans and account for 95% of rabies deaths worldwide.

Studies conducted in different parts of Ethiopia reported an overall good knowledge, attitude, and practices (KAP) score among the communities about rabies ranging from 49.0% to 85.7% (Alie *et al.*, 2015; Abdela *et al.*, 2017; Abdela and Teshome, 2017; Gebremeskel *et al.*, 2019; Bihon *et al.*, 2020). A study in the Amhara region for example reported that 61%, 72%, and 45% of the respondents had adequate knowledge, desirable attitude, and good practice scores, respectively (Bahiru *et al.*, 2022), while 56.1%, 56.2%, and 61.3% of the study participants of Mekele city had a good level of knowledge, attitude, and practice on the prevention and control of rabies, respectively (Hagos *et al.*, 2020).

Domestic dogs are considered to be the primary sources of human rabies in Africa. Retrospective studies of rabies using data collected from 1990 - 2000 and 2015 - 2019 indicated that dogs were responsible for maintaining and disseminating rabies in Ethiopia and that they were the primary culprits of human rabies cases (Yimer *et al.*, 2002; Aklilu *et al.*, 2021). Furthermore, a separate study found that of the 655 animal bite cases recorded in the Bishoftu, Lemuna-bilbilo, and Yabelo districts, 96.5% were caused by dogs (Beyene *et al.*, 2018).

Rabies is a severe problem in Ethiopia, with thousands of people infected each year according to the Centers for Disease Control and Prevention (CDC, 2017). Several studies documented a significant number of human rabies exposure cases in different regions of Ethiopia over several years (Yibrah and Damtie, 2015; Teklu *et al.*, 2017; Yizengaw *et al.*, 2018; Gebru *et al.*, 2019). The estimated death toll is around 2,700 annually, which is one of the highest in the world (CDC, 2017). However, the true number of rabies deaths is likely even higher because many cases go unreported and Ethiopia lacks sufficient diagnostic laboratories to confirm all cases (CDC, 2017; Bihon *et al.*, 2020). According to the reports of Jemberu *et al.* (2013), an annual estimated rabies incidence in the North Gondar zone was 2.33 cases per 100,000 in humans, 412.83 cases per 100,000 in dogs, 19.89 cases per 100,000 in cattle, 67.68 cases per 100,000 in equines, and 14.45 cases per 100,000 in goats.

Rabies can be controlled and prevented with vaccination, however few places in Ethiopia offer life-saving human rabies post-exposure prophylaxis, and most people don't have the means to make it to a major hospital to get treated (CDC, 2017). Moreover, people's awareness about what to do if bitten by dogs is low, and they may contact local traditional healers for treatment instead, losing precious time, and increasing the danger of infection and death (CDC, 2017; WHO, 2017).

The World Health Organization, the World Organisation for Animal Health, the Food and Agriculture Organization, and the Global Alliance for Rabies Control have set a global target to eliminate human rabies deaths entirely by 2030 (WHO, 2017; Broban *et al.*, 2018). To achieve this ambitious goal, several strategies are being considered, including strict quarantine measures, elimination of stray dogs, control of rabies in wildlife, dog registration programs and raising awareness about rabies in communities.

While Mekdella district began eliminating stray dogs and offering prophylactic rabies vaccinations in October 2015, there is a need for more quantitative data on rabies in the area both in humans and in animals. Furthermore, there is a need to more understanding of how much the community knows about rabies and the importance of preventive measures. No prior studies have been conducted in this district, despite records of death of humans and animals due to rabies in the area. Therefore, this study aims to assess the community's knowledge, attitudes, and practices regarding rabies and to identify associated risk factors in Mekdela district of South Wollo zone.

Materials and methods

Study area

The study was conducted in the Mekdella district of the Amhara regional state of Ethiopia (Figure 1). The district has a latitude of 11.55°N, a longitude of 38.28°E, and an elevation ranging from 700 to 3600 meters above sea level. The area receives an annual rainfall of 891.23 mm and an average temperature of 16.5 °C. According to the Mekdella district administration development and statistical planning report, the total human population of the district is estimated to be 142,654. The district has an estimated 131,090 bovines, 24,872 equines, 126,406 ovine, 97,651 caprines, 145,643 poultry, and 16,500 pet population (Mekdella District Statistical Planning Office).

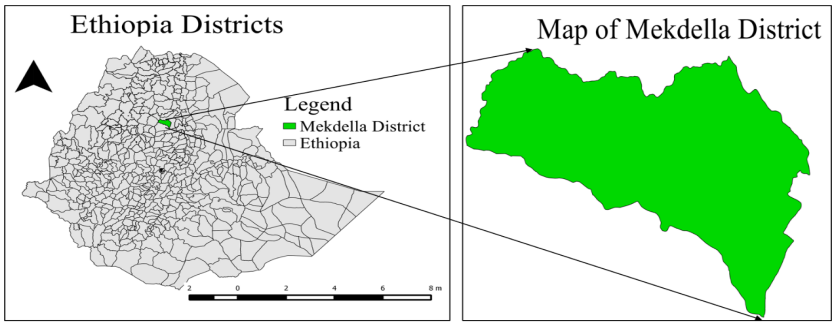

Figure 1. Map showing the study area.

Study design and population

A cross-sectional study design was employed from January 2021 to April 2021. The study population was household heads who had lived as permanent residents in randomly selected kebeles of the Mekdella district (Genatit, Deferge, Kibitiya, Gonderochi, Kebele 01 and 02). A systematic random sampling method was used to select study participants from households that had lived for more than six months in a Kebele.

Sample size determination and sampling techniques

The required sample size for this study was estimated by considering 50% of the population knowing about rabies since there were no studies on KAPs related to rabies in the study area. Thus, the sample size was calculated ac-

cording to Thrusfield (2018) using a 95% confidence interval and 0.05 absolute precision; 422 respondents were selected as study subjects, with a 10% non-response rate.

A simple random sampling procedure was employed to select kebeles. Of the 32 kebeles in the district, six were randomly selected using the lottery method. Then, 70 households were further selected from each kebele using the systematic random sampling method. In the absence of an eligible respondent in a given household, the next household was substituted.

Questionnaire survey methods

A semi-structured questionnaire survey was used to capture details of the household characteristics that were used to assess the socio-demographic factors (sex, age, religion, education status, occupation, and family size) and social and environmental factors (dog ownership, source of information, and awareness), and disease-related factors (training, awareness, and family exposure). Additional questions include knowledge of rabies, especially on the disease, mode of transmission, species affected, and means of prevention and control, as well as practices about rabies prevention strategies, including willingness to vaccination.

The questions were pre-tested to ensure the questionnaire's applicability and revised accordingly. One adult person from each household (more than 18 years old and who lived more than 6 months as a permanent resident in the study area) was interviewed face-to-face. The questionnaire was first developed in English and then translated into Amharic (local language) for appropriateness and ease of approach to the study participants.

Data management and analysis

The data were checked for completeness, clarity, consistency, and accuracy. Then the data were cleaned, coded, and entered into a Microsoft Excel spreadsheet 2016 and analyzed using SPSS version 25. Descriptive statistics were used to present results in tables and figures. Binary logistic regression was used to show the association between independent variables with dependent variables. The knowledge and preventive practice of the respondents were determined by computing knowledge and practice-related questions, respectively. KAP questions were given scores and dichotomized into good and poor KAP levels using a cut-off of 50% of the highest score possible (Bahiru *et al.*, 2022).

Binary knowledge and practice questions received a score of 1 for a correct response and 0 for an incorrect response. Attitude questions were given 0 for I don't know the response, 1 for an incorrect response to the question, and 2 for the correct answer to the question. Respondents who had a score of 50% or more were thought to have adequate knowledge, good practice, and a desirable attitude. In comparison, those who received a score of less than 50% were thought to have inadequate information, poor practice, and an undesirable attitude (Hagos *et al.*, 2020; Bahiru *et al.*, 2022). Variables having *p*-value< 0.2 in the univariable logistic regression were fitted into the multiple logistic regression models. Adjusted odds ratio (AOR) with a 95% Confidence Interval (C.I) was computed to assess the presence and strength of associations. Variables having a *p*-value less than 0.05 in multiple logistic regressions were considered as significantly associated with the dependent variables.

Data quality assurance

Before the study began, a pre-test was performed on 20 veterinary and paraveterinary professionals in the district to validate the questionnaires. Each questionnaire was checked for incompleteness, missed values, and unlikely responses and then manually cleaned upon such indications. The data were cross-checked for consistency and accuracy.

Results

Socio-demographic characteristics

Out of the 422 heads of household interviewed, 38 individuals (9%) were discovered to have incomplete data, and as a result, they were excluded from the analysis. The majority of the respondents, 307 (79.9%) were male. Among the respondents, nearly half, specifically 186 individuals (48.5%), fell within the age range of 18 to 35. A slight majority of the participants, comprising 207 individuals (53.9%), identified themselves as Muslim, while the second largest religious group was Orthodox, with 177 individuals (46.1%). Concerning educational status, 150 (39.1%) of the participants were illiterate, followed by 140 (36.5%) primary school, 48 (12.5%) secondary school, and 46 (11.9%) higher education. Among interviewed households, 64.3% (247), 16.9% (65), and 11.9% (46) were farmers, unemployed, and government employees, respectively (Table 1).

Table 1. Socio-demographic information of the study participants.

Variables		No. of respondents (%)	Knowledge		Practice	
			Good	Poor	Good	Poor
Sex	Male	307 (79.9)	191	116	182	125
	Female	77 (20.1)	38	39	37	40
Religion	Muslim	207 (53.9)	127	80	113	94
	Orthodox	177 (46.1)	102	75	106	71
Educational status	Illiterate	150 (39.1)	65	85	66	84
	Primary school	140 (36.5)	90	50	80	60
	Secondary school	48 (12.5)	35	13	35	13
	Higher education	46 (11.9)	39	7	38	8
Occupation	Jobless	65 (16.9)	33	32	33	32
	Farmer	247 (64.3)	138	109	135	112
	Merchant	26 (6.8)	20	6	16	10
	Employed	46 (11.9)	38	8	35	11
Age	18-35 years	186 (48.5)	115	71	101	85
	36-55 years	161 (41.9)	91	70	90	71
	> 55 years	37 (9.6)	23	14	28	9
Family size	≤3	271(70.6)	160	111	156	115
	4-6	101 (26.3)	61	40	55	46
	>6	12 (3.1)	8	4	8	4

Knowledge of respondents related to rabies

Figure 2 illustrates that the community of Mekdella district exhibited a favorable level of knowledge regarding rabies, with 60% of the population demonstrating good knowledge on the subject. The majority of respondents (59.1%) had no awareness of rabies, and 55.7% of respondents didn't know the causative agent. However, the majority of the respondents knew the means of transmission of rabies (83.6%), and the disease could not easily be treatable once clinical signs were manifested (89.6%). Besides, the majority of the respondents (65.9%) were unaware of post-exposure prophylaxis for rabies. In

contrast, 88.3% of the respondents were aware of dog vaccination as a means of rabies prevention, as shown in Table 2.

Table 2. Knowledge of the community of Mekdella district related to rabies.

Questions	Yes (%)	No (%)
Do you know the causative agents of rabies?	170 (44.3)	214 (55.7)
Do you know the means of transmission of rabies?	321(83.6)	63 (16.4)
Is rabies easily treatable after the onset of clinical signs?	40 (10.4)	344 (89.6)
Do you know about post-exposure prophylaxis?	131 (34.1)	253 (65.9)
Can we prevent rabies by vaccination of dogs?	339 (88.3)	45 (11.7)
Do you know the vaccination interval for dogs?	110 (28.6)	274 (71.4)
Does castration decrease the incidence of rabies?	294 (76.6)	90 (23.4)

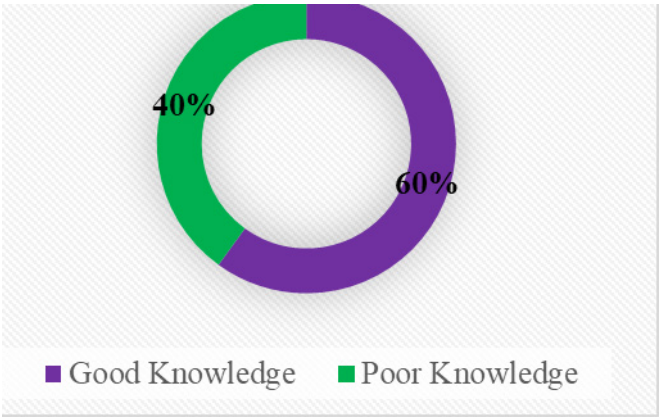

Figure 2. Overall knowledge status of respondents after computing knowledge-related questions.

The majority of respondents (71.6%) believed that almost all animals are affected by rabies and almost half of the respondents (49%) also believed that all animals could transmit rabies to humans. In addition, more than half of the respondents (59.4%) responded that both bite and contact with saliva were the means of rabies transmission (Table 3).

Table 3. Respondent's knowledge of rabies-affected species, causes, and its transmission to humans.

Questions	Response	Number (%)
Which species are affected by rabies?	Dog only	29 (7.6)
	Wild animals	16 (4.2)
	Dog and humans	21 (5.5)
	Human and domestic animals	43 (11.2)
	All animals	275 (71.6)
Which animals transmit rabies to humans?	All animals	188 (49)
	Dog and domestic animals	26 (6.8)
	Dog and cat	67 9 (17.4)
	Dog only	103 (26.8)
Means of transmission of rabies?	Infected meat	10 (2.6)
	Contact with saliva	74 (19.3)
	Bite	72 (18.8)
	Bite and contact with saliva	228 (59.4)
Clinical signs of rabies?	Behavioural change	148 (38.5)
	Salivation	184 (47.9)
	Hydrophobia	52 (13.5)

Community attitudes toward rabies

Fewer numbers of respondents (7%) believed the consumption of rabid animal meat could be a medicine for rabies. However, 52.6% disagreed with this idea. Nearly seven percent of respondents believed that burning and smoking rabid animals could be a medicine for rabies. However, 51.8% disagreed with this idea. The majority of respondents believed that traditional healers were a solution for rabies (73.9%), whereas about 91.6% of respondents also would seek health professional support if rabid animals bite them (Table 4).

Table 4. Attitudes of the community toward rabies.

Attitude Related Variables	Agree (%)	Disagree (%)	Don't know (%)
Rabid animal meat consumption as a medicine for rabies	27 (7)	202 (52.6)	155 (40.4)
Burning of rabid animals and inhalation of the smoke as a medicine for rabies	26 (6.8)	199 (51.8)	159 (41.4)
Traditional healers could be a solution for rabies	284 (73.9)	85 (22.2)	15 (3.9)
Seeking advice from a health professional during a dog bite	352 (91.6)	26 (6.8)	6 (1.6)

Preventive practices of the participants toward rabies

Overall, the preventive practices of respondents towards rabies indicated that 57% had good practices (Figure 3). Out of 384 respondents, 23.9% had dogs, and most of the dogs (76.1%) were kept free-ranging. The majority of the respondents from the community do not practice vaccination of dogs against rabies (79.9%). The majority of respondents take immediate action (killed/tied) on rabid animals (94.8%), seek medical help when humans are bitten by rabid animals (67.2%), and practice washing the wound with soap and water after a dog bite (53.9%) (Table 5).

Table 5. Preventive practices of the respondents toward rabies.

Practice related variables	Yes (%)	No (%)
Do you have dogs?	92 (23.9)	292 (76.1)
Do you manage your dog indoors?	113 (29.4)	271 (70.6)
Would you take immediate action on the rabid animals (killed/tied)?	364 (94.8)	20 (5.2)
Do you wash wounds with water and soap after a bite by a rabid dog?	207 (53.9)	177 (46.1)
Do you take persons to the health centers immediately after first aid?	258 (67.2)	126 (32.8)
Have you had your dog vaccinated for rabies?	77 (20.1)	307 (79.9)

Figure 3. Overall preventive practices status of respondents after computing practice related questions.

About one-third of the respondents, 115 (29.9%), visited traditional healers, 11 (2.9%) used holy water, while the majority, 258 (67.2%), preferred health centers for rabies treatment. About half of the respondents, 206 (53.6%), know about stray dog control to prevent rabies, and 143 (37.2%) killed stray dogs to prevent and control rabies (Figure 4).

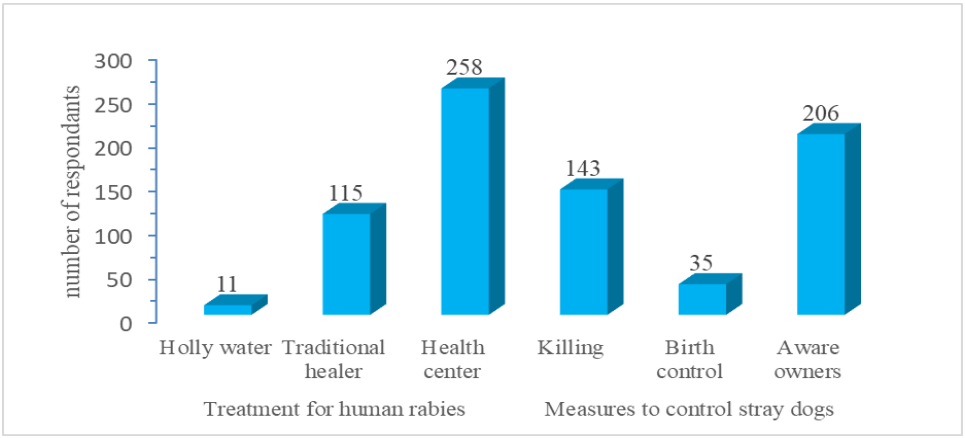

Figure 4. Measures for control of stray dogs and practices after a dog bite.

Univariable and multivariable logistic regression results of knowledge of rabies

After controlling the other variables, logistic regression was carried out to evaluate the association between independent variables and knowledge (Table 6). Respondents having a higher level of education were eight times (AOR = 7.7; 95% CI: 2.5-23.7) more likely to have good knowledge than that of illiterates. Respondents who had awareness were twelve times (AOR = 12.4; 95% CI: 6.4-24.2) more likely to have good knowledge than those who didn't have awareness of the disease. Respondents who gained health-related training were ten times (AOR = 9.7; 95% CI: 1.4-66.4) more likely to have good knowledge than those who didn't gain health-based training. Participants who had family exposure to rabies were four times (AOR = 3.9; 95% CI: 1.8-8.3) more likely to have good knowledge than those who didn't have family exposure. Other factors, suchas sex, age, religion, marital status, family size, and occupation, were not significantly associated with the knowledge of this disease (Table 6).

Table 6. Factors associated with the knowledge of respondents.

	Factors	Knowledge		COR (95%CI)	AOR (95% CI)
		Good	Poor		
Sex	Male	191	116	Ref.	Ref.
	Female	38	39	0.59 (0.4-0.9)	0.79 (0.4-1.7)
Educational	Illiterate	114	116	Ref.	Ref.
	Primary school	40	20	2.35 (1.5-3.8)	3.15 (1.7-5.9)
	Secondary school	30	18	3.52 (1.72-7.2)	4.69 (1.8-12.4)
	Higher education	45	1	7.29 (3.1-17.3)	7.68 (2.5-23.7)
Occupation	Jobless	29	36	Ref.	Ref.
	Farmer	142	105	1.23 (0.7-2.1)	1.69 (0.8-3.9)
	Merchant	17	10	3.23 (1.2-9.1)	2.24 (0.6-8.6)
	Employed	41	4	4.61 (1.9-11.4)	2.86 (0.8-9.8)
Awareness	No	90	137	Ref.	Ref.
	Yes	139	18	11.76 (6.4-20.6)	12.39 (6.4-24.2)
Dog ownership	No	166	126	Ref.	Ref.
	Yes	63	29	1.65 (1.0-2.7)	0.43 (0.2-0.9)
Training	No	198	153	Ref.	Ref.
	Yes	31	2	11.98 (2.8-50.8)	9.65 (1.4 -66.4)
Family-exposure	No	152	133	Ref.	Ref.
	Yes	77	22	4.53 (2.6-8.1)	3.91 (1.8-8.3)

Univariable and multivariable logistic regression results of practice toward rabies

Univariable and multivariable logistic regression was made by controlling other factors to identify the associations between independent factors and preventive practices toward rabies. Respondents with higher levels of education were three times (AOR = 3.1; 95% CI: 1.2-8.0) more likely to have good preventive practices for rabies disease than illiterates. Dog owners were four times (AOR = 4.4; 95% CI: 2.2-16.3) more likely to exercise good preventive practice compared to those who didn't have dogs. Respondents who gained health-related training were five times (AOR = 4.5; 95% CI: 1.2-16.3) more likely to have good preventive practice than those who didn't gain health-based training. Participants who had family exposure to rabies were two times (AOR = 2.3; 95% CI: 1.2-4.3) more likely to have good preventive practices than those who didn't have family exposure. Other factors, like sex, age, occupation, and awareness, were not significantly associated (P>0.05) with the preventive practice of respondents (Table 7).

Table 7. Factors associated with the preventive practice of respondents.

Factors		Practice		COR (95%CI)	AOR (95%CI)
		Good	Poor		
Sex	Male	182	125	Ref.	Ref.
	Female	37	40	0.64 (0.4-1.1)	0.69 (0.4-1.3)
Education	Illiterate	66	84	Ref.	Ref.
	Primary school	80	60	1.97 (1.1-2.7)	1.75 (1.2-2.9)
	Secondary school	35	13	3.43 (1.7-6.9)	2.599 (1.1-5.9)
	Higher education	38	8	6.04 (2.6-13.8)	3.11(1.2-8.0)
Age	18-35 years	101	85	Ref.	Ref.
	36-55 years	90	71	1.07 (0.7-1.6)	0.6-1.7)
	> 55 years	28	9	2.62 (1.2-5.9)	2.15 (0.9-5.4)
Occupation	Jobless	33	32	Ref.	Ref.
	Farmer	135	112	1.17 (0.7-2.0)	0.91 (0.4-1.9)
	Merchant	16	10	1.6 (0.6-3.9)	0.89 (0.3-2.8)
	Employed	35	11	3.09 (1.3-7.1)	2.11 (0.8-5.7)
Awareness	No	117	110	Ref.	Ref.
	Yes	102	55	1.74 (1.15-2.7)	1.0 (0.6-1.8)
Dogs	No	140	152	Ref.	Ref.
	Yes	79	13	6.59 (3.5-12.4)	4.44 (2.23-16.3)
Training	No	189	162	Ref.	Ref.
	Yes	30	3	8.57 (2.6-28.7)	4.48 (1.2-16.3)
Family exposure	No	140	145	Ref.	Ref.
	Yes	79	20	4.09 (2.4-7.0)	2.27 (1.2-4.3)

Discussion

In this study, more than half of the respondents (60%) had good knowledge regarding rabies, which was in line with those reported by residents of the Amhara region (61.3%) (Bahiru *et al.*, 2022). Slightly lower results (56.1% and 51.9%) were reported from Mekelle city and Dedo district of the Jimma zone (Abdela *et al.*, 2017; Hagos *et al.*, 2020), and higher results (64.1% and 85.7%) were reported at Bahir Dar city and Kombolcha town (Guadu *et al.*, 2014; Gebremeskel *et al.*, 2019). More than half of the respondents (55.7%) didn't know the causative agents of rabies, and this report disagrees with lower findings of 22%, 32.4%, 39.3%, 32.4%, and 21.6% in Munisa district, Dedo district, Gondar

city, Dessie city, and Debretabor city, respectively (Serebe *et al.*, 2014; Alie *et al.*, 2015; Gebeyaw and Teshome, 2016; Abdela *et al.*, 2017; Abdela and Teshome, 2017). Almost 59.4% of respondents in the current study replied that both bite and saliva contacts were the means of transmission of rabies; however, a lower finding of 9.8% was reported in the Dedo district and Gondar city (Serebe *et al.*, 2014; Abdela *et al.*, 2017). The variation in the knowledge status of the current study compared to other studies might be due to the variation in educational status, low community awareness, and limited disease training status.

About two-thirds of respondents (71.6%) replied that all animals are affected by rabies. This is in line with other findings reported in Addis Ababa (71.9) (Ali *et al.*, 2014) and Kombolcha town (72.9%) (Ali *et al.*, 2014; Gebremeskel *et al.*, 2019). In this study, only 34.1% of respondents were aware of post-exposure prophylaxis. However, higher results of 39.6% and 65.5% were reported in and around South Gondar and Dedo districts, respectively (Abdela *et al.*, 2017; Bihon *et al.*, 2020). Most of the respondents (73.9%) in this study believed in traditional healers. This is in agreement with reports from South Gondar (81.5%) (Bihon *et al.*, 2020) and North Gondar (84%) (Jemberu *et al.*, 2013; Bihon *et al.*, 2020). Studies conducted in Addis Ababa, Dessie city, and Araba Minch reported lower (58.3%, 46%, and 42.45%) beliefs in traditional healers, respectively (Ali *et al.*, 2014; Gebeyaw and Teshome, 2016; Tamirat *et al.*, 2016). The preference for traditional practices might arise from many factors, including easy access to medicinal plants, limited health centers, and low treatment costs in the study area.

In this study, the respondents believed that eating rabid animals' meat (7%) could be a medicine for rabies. This belief was also reported in Kombolcha (48.2%) (Bihon *et al.*, 2020) and South Gondar (10.6%) (Gebremeskel *et al.*, 2019). This indicates the perception gap between functional treatments and traditional beliefs. This belief revealed that the community in the study areas has limited knowledge of rabies post-exposure treatment and requires intensive awareness training.

The current finding revealed that more than half of the respondents (57%) had good preventive practices against rabies. A similar finding was reported by Hagos *et al.* (2020) in Mekelle City (61.3%), but a higher finding in Kombolcha town (79.9%) (Gebremeskel *et al.*, 2019). Almost half of the respondents (53.9%) would wash the wound with water and soap if bitten by rabid ani-

mals. A higher number of respondents practiced washing wound with water and soap (92.4%) in Kombolcha town (Gebremeskel *et al.*, 2019), than in South Gondar (8.9%) (Bihon *et al.*, 2020). Poor preventive and control practices in the current study might be associated with the characteristics of the respondents, including the fact that most lived in rural areas, their educational status, and low community awareness.

In the present study, although more than 80% of the respondents knew that rabies could be prevented by vaccinating dogs, only 20.1% of them had their dogs vaccinated. This indicated that dog vaccination practice is very poor in the area. Poor and non-existent dog vaccination practices were reported in the Dabat district, and good practices were reported in Gondar town (Jemberu *et al.*, 2013), and Dessie city (36%) (Gebeyaw and Teshome, 2016). Lower coverage of rabies vaccines in the current study area might be due to a lack of access and low awareness of rabies vaccination. Thus, raising awareness about dog vaccination and improving access and affordability of the vaccine need to be done to control the disease.

In this study, 41.9% of informants obtained information related to rabies from informal sources. This indicated the need for extensive public education about rabies to increase dog-associated rabies awareness. Many scholars have mentioned raising the community awareness level as an essential tool to control rabies (Yimer *et al.*, 2002; Jemberu *et al.*, 2013; Rine *et al.*, 2017; Broban *et al.*, 2018).

Conclusion

This study showed considerable gaps in the community's knowledge of the cause, mode of transmission, and host range of rabies and poor practice in prevention and control methods for dog rabies and post-exposure prophylaxis. Therefore, veterinarians and health professionals should pay due attention to the periodic education of the community on rabies and improve the accessibility and affordability of the rabies vaccine for dogs and post-exposure prophylaxis for humans.

Acknowledgments

The authors would like to acknowledge the Ministry of Agriculture of Ethiopia, the Food and Agriculture Organization of the United Nations, the Mekdella

Woreda Livestock and Fishery office, the Mekdella Woreda veterinary clinic staff members, and all the study participants.

Ethical consideration

The study protocol was reviewed and approved by the Ministry of Agriculture, Ethiopia, in collaboration with the Food and Agriculture Organization of the United Nations (FAO). Before conducting the research, the participants were informed of the study's objectives and benefits. Oral informed consent was obtained from each participant after informing them about the objectives, the benefits of the study, and the rights of the study participants. Only voluntary participants were enrolled in the study. They gave verbal consent for inclusion in the study because they were unable to write and read. These consents were taken in the presence of a third independent party.

Funding

This study was supported by the Ministry of Agriculture, Ethiopia, in collaboration with the Food and Agriculture Organization of the United Nations (FAO). The funder had no role in the conception, design, data collection, analysis, and interpretation of the data reported in this manuscript.

Declaration

The authors declare that they have no conflict of interest in this work.

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