Assessment of community knowledge, attitude, and practice towards rabies and its determinants in Kersa District, East Hararghe Zone, Oromia Region, Ethiopia

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Abstract

Despite the prevention and control efforts against rabies, it remains a health problem for humans and animals in Ethiopia. A cross-sectional study design was employed from February to July 2022 to assess community knowledge, attitudes, and practices towards rabies and associated factors in the Keresa district of Oromia regional state, Ethiopia. Face-to-face interviews were used to collect data from 384 households, and logistic regression was employed in the data analysis. Fifty-three percent (95% CI= 47.9-58.1%), 62% (95% CI= 57.3-66.9%), and 50% (95% CI= 45.1-54.9%) had adequate knowledge, a desirable attitude and good preventative practices towards rabies, respectively. 92.7% (95% CI= 90.1-95.3%) of participants had heard of rabies before, and 52.9% (95% CI= 47.9-58.1) of their primary source of information was the community. Nearly all respondents, 95% (95%CI= 93.8-97.7%), admitted to eating rabid animal flesh, and 56.3% (95%CI= 51-61.5%) believed that eating rabid animal meat may transmit the disease. One-fourth, 25.5% (95%CI=21.1-29.9%) of study participants believed that rabies is related to spirits, and 27.9% (95%CI= 23.4-32.6) claimed that holy water might treat rabies. Sex, level of education, occupation, and training status affect the knowledge of study participants. Age, family size, occupation type, and source of information were all linked to preventive practice, but sex and age were the only variables associated with attitude. Respondents having good knowledge and desirable attitudes had better preventive practices against rabies. Therefore, further awareness and disease-

related training are needed for the district population and beyond to improve their knowledge of rabies prevention and control.

Keywords: Attitude**;** Kersa District**;** Knowledge; Practice; Rabies.

Introduction

Rabies is a neurotropic disease caused by Lyssavirus rabies, which belongs to the genus *Lyssavirus* in the family Rhabdoviridae of the order Mononegavirales and is transmissible to all mammals. It is one of the 20 neglected tropical diseases identified by the WHO, nearly 100% lethal in humans and animals and killing 59,000 people annually (WHO *et al.*, 2018). It also causes a severe and long-term societal and financial burden on patients in poverty-stricken countries (WOAH, 2019). The cost of post-exposure prophylaxis for humans, the loss of livestock, and other rabies-related expenses made an estimated 8.6 billion USD annually in global economic burden (WHO, 2023). In Africa, rabies is an endemic disease in which 99% of human cases are caused by dog bites (WOAH, 2022).

WHO and WOAH are pushing for the elimination of human deaths caused by dog-mediated rabies by the year 2030. Dog rabies vaccines can effectively eradicate the disease at its animal source and are 100% preventive (WOAH, 2022; WHO, 2023). However, without consistent efforts to bridge the gaps in access to dog vaccination and post-exposure treatment for afflicted people and animals, the threat of rabies is anticipated to grow in Africa (WOAH, 2022). Community collaboration involving veterinarians and public health officials is necessary to prevent human rabies. Baseline data on the coverage rates of practices (dog vaccination, dog restraint, correct care of bite wounds, seeking Post-Exposure Prophylaxis, and rabid dog management) are crucial for control and prevention (WOAH, 2017). Mass dog vaccination is the preferred method of eradicating rabies, and vaccination coverage in rabies-endemic areas should be at least 70% to prevent outbreaks (WHO, 2013). On the other hand, veterinary services should take the lead in controlling the dog population to prevent the spread of the rabies virus, coordinating their efforts with other relevant public institutions (WOAH, 2019).

Among African countries, Ethiopia was estimated to have the second-largest number of rabies deaths in the year 2018 (WHO *et al.*, 2018). According to the Centers for Disease Control and Prevention (CDC) report, thousands of people

are infected in Ethiopia, and an estimated 2,700 people die each year due to rabies (CDC, 2017). The high incidence of canine rabies in Ethiopia is due to the presence of a large number of dogs and their poor management (Wario *et al.*, 2018). As reported by Jemberu *et al*. (2013), the estimated yearly incidence of rabies was 2.33 cases per 100,000 people, 412.83 cases per 100,000 dogs, 19.89 cases per 100,000 cattle, 67.68 cases per 100,000 horses, and 14.45 cases per 100,000 goats (Jemberu *et al.*, 2013). A total of 2667 dog brain samples were investigated between 1990 and 2000, and 1951 (73.2%) samples tested positive for rabies (Yimer *et al.*, 2002). Between 2001 and 2009, the Ethiopian Health and Nutrition Research Institute recorded 386 fatal human cases, with an annual range of 35 to 58. During that time, 75% of the 3,460 animal brains tested in the lab were found to be rabies-positive (Deressa *et al.*, 2010). On the other hand, 87 cases of human rabies were clinically identified at the Ethiopian Public Health Institute between 2015 and 2019, with a death rate of 100% (Aklilu *et al.*, 2021). According to Akililu (2021), dogs were responsible for 95.4% (83/87) of human deaths, compared to 1.1% (1/87) for cats and 3.4 (3/87) for wild animals (Aklilu *et al.*, 2021).

Even though vaccines are available for humans and dogs in Ethiopia, Kidane *et al*. (2016) found that just 3.9% of dogs in Addis Ababa, the capital of Ethiopia, had gotten their vaccinations (Kidane *et al.*, 2016). The challenges related to the prevention and control of rabies include the extensive use of traditional medications and religious approaches to treat rabies cases. The majority of rabies victims, particularly those from rural regions, visit health institutions when they give up using traditional treatments or when a family member is lost (Deressa *et al.*, 2010). Therefore, assessing the community's knowledge, attitude, and practice towards rabies at all levels would be nice. To the best of the authors' knowledge, we were unable to track down any previously published studies on community KAP towards rabies in the Kersa district. Therefore, this study aimed to assess the community's KAP towards rabies and associated factors in Kersa district, East Hararghae zone of Oromia region, Ethiopia.

Materials and methods

Study area

Kersa is one of the districts of the Eastern Hararghe zone of the Oromia regional state and is bordered by Bedeno to the south, Meta to the west, Dire Dawa to the north, Haro Maya to the northeast, and Kurfa Chele to the south-

east (Figure 1). It is 465 kilometers east of Addis Abeba, at a latitude of 9°15'0" N and a longitude of 41°40'0" E. Its height above sea level varies from 1400 to 3200 meters. The district receives between 550 and 1300 mm of rainfall each year, and the average yearly temperature is between 15 and 20 °C (Wikipedia, 2023). According to statistics released by the Central Statistical Agency in 2007, an estimated 225,510 people are living in this area, with 113,024 males and 112,486 women (ESPS, 2022).

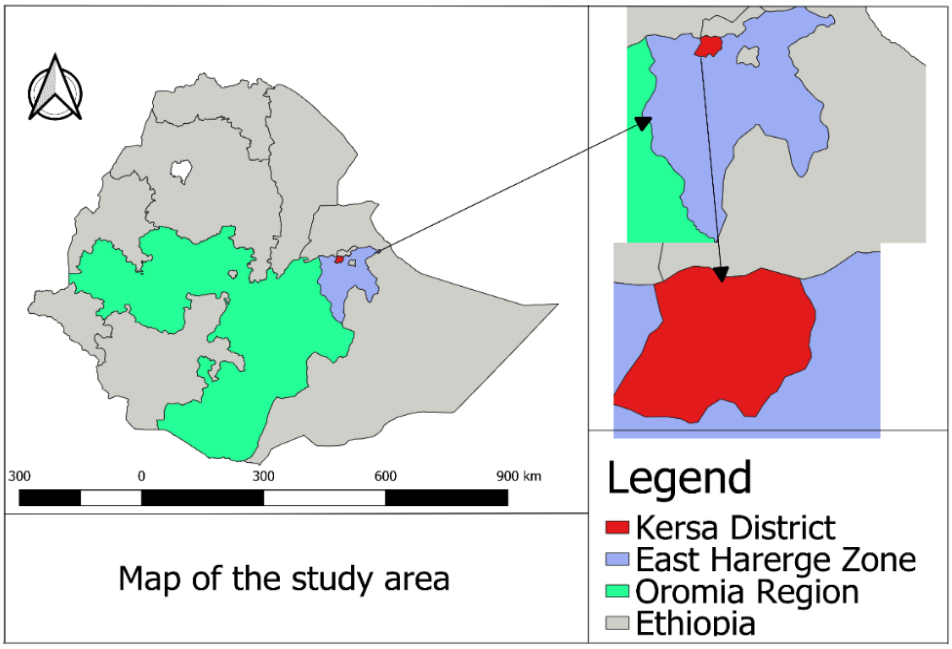

Figure 1. Map of Ethiopia showing the study area

Study population

The study participants include individuals aged ≥ 15 years who have been permanent residents for at least six months in the Kersa district, including urban, peri-urban, and rural residents, who were recruited for the research.

Study design, sample size determination, and sampling technique

The study was carried out using a cross-sectional design from February to June 2022. According to assessments provided by Abdela and Teshome (2017), 57.3% of Munesa district's residents in the Arsi Zone had good KAP for rabies, which was used to determine the required sample size for this study. The Thrusfield (2018) formula was employed to calculate the sample size, assuming a large population proportion (Thrusfield, 2018). Hence, Where n= required sample size; Pexp = population have good expected KAP to rabies (57.3%); d^2= Desired absolute precision (5%); Z- value for 95% confidence interval (1.96). Therefore, = 376, by adding 10% non-response rate, the sample size was 414.

Multi-stage sampling techniques were used for the selection of sampling units. First, areas were selected based on the population's lifestyle to represent urban, peri-urban, and rural areas. Urban and peri-urban areas were represented by one for each, while the rural area was divided into highland, midland, and lowland areas based on agroecology. The five areas, Mada Oda, Weter, Langey, Kersa, and Balina, were purposefully selected based on the above criteria. Each area had an equal number of samples. The households in the selected areas were then further selected via a technique known as systematic random sampling. Finally, one interviewee was chosen at random from each of the selected households.

Data collection tools

For this investigation, a standardized closed-ended questionnaire was used. The questionnaire included questions about knowledge, attitude, practice, and information about the resident's age, sex, education, and religion. It was initially written in English and then translated into Afaan Oromo for the study participants.

Data entry and statistical analysis

Data were entered and coded into Microsoft Excel and transferred to Statistical Packages for Social Science (SPSS) version 23.0 statistical packages. Frequency and percentage were used to present descriptive statistics data. 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, practice, and attitude questions received a score of 1 for a correct response and 0 for an incorrect response. 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). Univariable and multivariable logistic regression analyses were performed to figure out the association between the KAP scores and any socio-demographic variables. In the univariable logistic regression, variables with p-values less than 0.2 were fitted into the multiple logistic regression models. Association among KAP of respondents was tested using a Chi-square test. The dependent variables were considered to be significantly associated with variables in multiple logistic regressions when the p-value was less than 0.05.

Ethical considerations

An ethical approval letter was obtained from the University of Gondar, College of Veterinary Medicine and Animal Sciences Institutional Ethical Review Committee with reference number CVMAS.sc-05/2022. Before the interview began, they were briefed about the purpose of the study and asked for their consent, and only volunteer participants were recruited for the study. The responses of study participants were kept completely confidential, and their identities did not appear in the research report.

Results

Socio-demographic characteristics

Of the total 414 study participants approached for an interview, only 384 completed the interview; hence, the response rate was 92.8%. More than half of the respondents, 53.6% (95% CI= 48.7-58.6%), were males. The majority of study participants, 46.4% (95% CI= 41.2-51.3%), were in the age group between 30-45 years old. Nearly half of the study participants, 47.1% (95% CI= 42.4-52.3%), had no formal education, and only 12.2% (95% CI= 8.9-15.9%) of the participants had completed college and above. Half of the respondents, 50% (95% CI= 45.1-55.2%), were farmers, and 11.2% (95% CI= 8.3-14.6%) were government employees. About 62.2% (95% CI= 57.6-67.2%) respondents have gotten- married, and 43.5 % (95% CI= 38.8-48.7%) respondents have a family size of three to six (Table 1).

One-third of respondents, 31.3% (95% CI= 26.3-36.2%), kept dogs in their house, but only 17.5% (21/120) dogs were vaccinated. The 8.6% (95% CI= 6-11.5%) of respondents had health-related training, and 44% (95% CI= 39.1-49.5%) had experience with rabid animals. The majority of participants 92.7% (95%CI= 90.1-95.3%) had heard of rabies previously, and more than half of them 52.9% (95% CI= 47.9-58.1%), and one-fifth of them 21.6% (95% CI= 17.4-25.8) had the source of information from the community and mass media, respectively (Figure 2).

Table 1. Socio-demographic and KAP information of the study participants in the Kersa district (N= 384)

Variables		N (%) Good (%)	Knowledge	Attitude	Practices
			Good (%)	Good (%)	
Sex	Male	206(53.6)	133(64.6)	143(69.4)	110(53.4)
	Female	178(46.4)	71(39.9)	96(53.9)	82(46.1)
Age (in years)	15-29	151(39.3)	90(59.6)	113(74.8)	93(61.6)
	30-45	178(46.4)	87(48.9)	103(57.9)	83(46.6)
	≥46	55(14.3)	27(49.1)	23(41.8)	16(29.1)
Educational status	Illiterate	181(47.1)	70(38.7)	86(47.5)	71(39.2)
	Primary school	78(20.3)	24(30.8)	51(65.4)	47(60.3)
	Secondary school	78(20.3)	66(84.6)	55(70.5)	46(60)
	Collage and above	47(12.2)	44(93.6)	47(100)	28(59.6)
Religion	Orthodox	146(38)	73(50)	86(58.9)	77(52.7)
	Muslim	238(62)	131(55)	153(64.3)	115(48.3)
Occupation	Unemployed	29(7.6)	27(91.1)	24(82.8)	23(79.3)
	Farmer	192(50)	75(39.1)	95(49.5)	78(40.6)
	Trader	76(19.8)	44(57.9)	52(68.4)	48(63.2)
	Employed	43(11.2)	37(86)	40(93)	22(51.2)
	Student	44(11.5)	21(47.7)	28(63.6)	21(47.7)
Family member	1-3	77(20.1)	51(66.2)	52(67.5)	38(49.4)
	4-6	167(43.5)	116(69.5)	106(63.5)	101(60.5)
	>6	140(36.5)	75(53.6)	81(57.9)	53(37.9)
Marital status	Single	127(33.1)	75(59.1)	94(74)	74(58.3)
	Married	239(62.2)	115(48.1)	131(54.8)	107(44.8)
	Divorced	13(3.4)	11(84.6)	11(84.6)	11(84.6)
	Widowed	5(1.3)	3(60)	3(60)	0

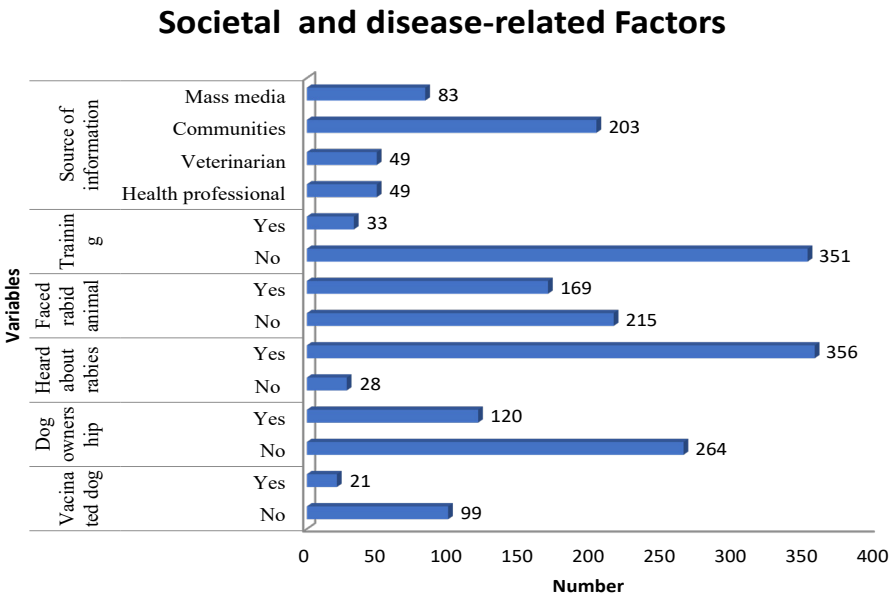

Figure 2. Societal and disease-related factors towards rabies in Kersa district

Knowledge of study participants towards rabies

More than half of the respondents, 53% (95% CI= 47.9-58.1%), had adequate knowledge about rabies in the Kersa district (Figure 3). Almost two-thirds, 65.1% (95% CI=60.4-69.8%) of respondents knew about zoonotic disease, and 69.8% (95%CI= 65.4-74%) think rabies is zoonotic. Slightly higher than one-fourth, 26.8% (95% CI= 22.4-31.3%) of respondents knew the cause of rabies is a virus, and 82% (95% CI= 77.9-85.7%) and 74.7% (95% CI= 70.3-79.1%), knew the clinical sign of rabid animals and the way of transmission from an infected animal to healthy, respectively. About half of the respondents, 51% (95% CI= 46.4-56.3%) and 51.6% (95% CI= 46.6-56.8%), knew dogs as the reservoir of rabies and the time of vaccination for humans after being bitten by a rabid dog, respectively (Table 2).

Table 2. Knowledge of respondents about rabies in the Kersa district

Questions	No (%)	Yes (%)
Do you know about zoonotic diseases?	133(34.6)	250(65.1)
Do you think rabies is zoonotic?	116(30.2)	268(69.8)
Do you know the indications/signs of a rabid animal?	69(18)	315(82)
Do you know how rabies transmits from an infected animal to another animal or human?	97(25.3)	287(74.7)
Do you know the main reservoir of rabies?	188(49)	196(51)
Do you think stray dogs contribute to rabies outbreaks?	202(52.6)	182(47.4)
Do you know the cause of rabies?	281(73.2)	103(26.8)
Do you know when a human be vaccinated against rabies after being exposed?	186(48.4)	198(51.6)

The attitude of respondents towards rabies

The overall attitude of the community of Kersa district revealed that 62.2% (95% CI= 57.3-66.9%) had a desirable attitude of rabies disease (Figure 3). Out of the total participants, 61.7% (95% CI= 57-67.4%) considered rabies as fatal, and 45.1% (95% CI= 40.1-50%) assumed that rabies is treatable after the onset of the clinical sign. Most study participants, 58.9% (95%CI= 54.4-63.8%) and 63% (95% CI= 57.8-68), respond rabies can be prevented by vaccination and educating the community, respectively. One-fourth of respondents, 25.5% (95% CI=21.1-29.9), thought that rabies is related to spirit, and 27.9% (95% CI= 23.4-32.6) believed it is treatable by holly water. More than half of respondents, 56.3 % (95% CI= 51-61.5%), assumed that eating rabid animal meat could transmit the disease, and 21.1% (95% CI= 16.9-25.5%) think that eating rabid animal meat might be used as a vaccine (Table 3).

Table 3. Community attitudes regarding rabies.

Variables	No (%)	Yes (%)
Do you think rabies is a fatal disease	146(38)	238(62)
Rabies is easily treatable after the onset of clinical signs	211(54.9)	173(45.1)
Do you think rabies can be prevented by vaccination?	158(41.1)	226(58.9)
Do you think rabies can be prevented by educating people	142(37)	242(63)
Do you think holly water can treat rabies disease	277(72.1)	107(27.9)
Rabies is related to the spirit	286(74.5)	98(25.5)
Do you think eating rabid animal meat can transmit rabies?	168(43.8)	216(56.3)
Do you think eating rabid animal meat can be used as a vaccine?	303(78.9)	81(21.1)

Community preventive practice toward rabies

Results of this study revealed that half of the respondents, 50% (95% CI= 45.1-54.9%), had good preventive practices towards rabies disease (Figure 3). Three-fourth of respondents, 75% (95% CI= 70.3-79.2%), responded that they visited the health center after being bitten by a rabid animal, and only 31.3% (95% CI= 26.8-36.2%) participants practiced washing the wound with water and soap as an immediate action (first aid) for the victim. The majority of respondents, 82.3% (95% CI= 78.4-86.2%), took immediate action (kill/tie) on the rabid animal, and 56% (95% CI= 50.8-61.2%) reported it to responsible authorities. About 95% (95% CI= 93.8-97.7) of respondents answered that they would eat meat from a rabid animal (Table 4).

Table 4. Community practice toward rabies

Variables	No (%)	Yes (%)
Do you take action (kill/tie) on the rabid dog/animals?	68 (17.7)	316 (82.3)
Have you ever eaten rabid animal meat?	16 (4.2)	368 (95.8)
Would you notify authorities if you came across a rabid dog?	169 (44.0)	215 (56.0)
If a dog bites you, would you visit health centers?	96 (25.0)	288 (75.0)
If a dog bites you, would you wash the wound with water and soap first?	264 (68.8)	120 (31.2)
Have you gone through any disease-related training?	351 (91.4)	33 (8.6)

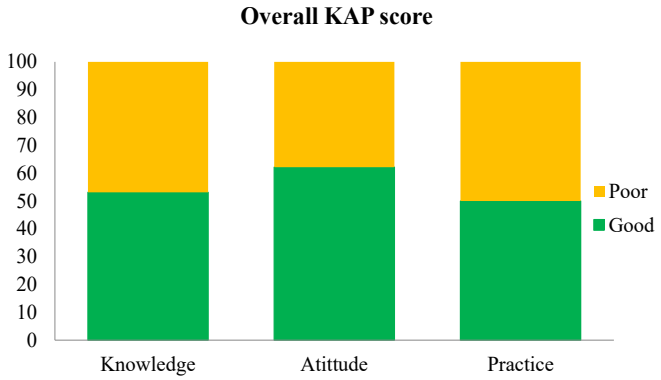

Figure 3. Overall KAP score of the community of Kersa district

Factors associated with community knowledge, attitude, and preventive practice toward rabies

Sex, educational level, occupation, and training had statistically significant associations with knowledge scores. Fifty percent of females were less likely (adjusted odds ratio [AOR]=0.5, CI= 0.3-0.8) to have adequate knowledge about rabies than males. Respondents having secondary school education, college, and above education level had six and more times (AOR=6.7, CI= 2.4-18.8) and thirteen and more times (AOR=13.4, CI= 2.5-71.0) more likely to have adequate knowledge than illiterates, respectively. Farmers and students had 80% (AOR=0.2, CI= 0.03-0.99) and 90% (AOR=0.1, CI= 0.01-0.6) less likely to have adequate knowledge than unemployed respondents. Respondents who took training had seventeen times (AOR=17.0, CI= 2.0-141.1) more likely adequate knowledge than those who didn't take training (Table 5).

Sex and age had a statistically significant association with the attitude score. Females had 40% (AOR=0.6, CI= (0.4-0.96) less likely to have a desirable attitude than males. Respondents having the age group 30-45 years and >=46 years had 50% (AOR=0.5, CI= 0.2-0.9) and 60 % (AOR=0.4, CI= 0.2-0.9) less likely to have a desirable attitude than respondents having age group 15-29 years old (Table 6).

Age, family size, occupation, and source of information had a statistically significant association with outcome variable practice. Respondents having age group 30-45 years and >=46 years had 60% (AOR=0.4, CI= (0.2-0.8) and 70 % (AOR=0.3, CI= 0.1-0.8) less likely to have good preventive practices than respondents having age group 15-29 years old. Respondents with family sizes of 4-6 members had two or more times (AOR=2.1, CI=1.1-4.2) more likely to have good preventive practice than respondents who have 1-3 family members. Farmers, workers, and students had 70% (AOR=0.3, CI=0.1-0.98) and 90% (AOR=0.1, CI=0.04-0.5) less likely to have good preventive practices for rabies than unemployed, respectively. Respondents having sources of information about rabies from veterinarians, communities, and mass media have five and more times (AOR=5.2, CI=2.0-11.8), two and more times (AOR=2.4, CI= 1.1-5.5) and one and more times (AOR= 1.5, CI=1.4-8.1), respectively more likely preventive practices than who have the source of information from health professionals (Table 7).

Table 5. Factors associated with community knowledge of rabies

Variables	Good	Poor	COR (95%CI)	AOR (95%CI)
Sex				
Male	133	73	Reference	Reference
Female	71	107	0.4(0.24-0.6)	0.5(0.3-0.8) **
Age (in years)				
15-29	90	61	Reference	Reference
30-45	87	91	0.7(0.4-1.0)	1.4(0.7-2.8)
>=46	27	28	0.7(0.4-1.2)	2.4(0.9-6.0)
Educational status				
Illiterate	70	111	Reference	Reference
Primary school	24	54	0.7(0.4-1.2)	0.6(0.3-1.3)
Secondary school	66	12	8.7(4.4-17.3)	6.7(2.4-18.8) **
College and above	44	3	23.3(7.0-77.8)	13.4(2.5-71.0) **
Occupation				
Unemployed	27	2	Reference	Reference
Farmer	75	117	0.1(0.01-0.2)	0.2(0.03-0.99) *
Trader	44	32	0.1(0.02-0.5)	0.2(0.03-1.3)
Employed	37	6	0.5(0.1-2.4)	0.1(0.01-1.1)
Student	21	23	0.1(0.01-0.3)	0.1(0.01-0.6) *
Family member				
1-3	51	26	Reference	Reference
4-6	116	51	0.7(0.4-1.1)	0.4(0.2-0.9) *
>6	75	65	0.5(0.3-0.9)	0.5(0.2-1.2)
Source of rabies information				
Health professionals	37	12	Reference	Reference
Veterinarians	41	8	1.7(0.6-4.5)	1.3(0.4-4.5)
Community	73	130	0.2(0.1-0.4)	0.4(0.2-1.98)
Mass media	53	30	0.6(0.3-1.3)	1.1(0.4-3.1)
Faced rabid animal				
No	107	108	Reference	Reference
Yes	97	72	1.4(0.9-2.0)	1.7(0.98-2.9)
Training				
No	172	179	Reference	Reference
Yes	32	1	33.3(4.5-246.4)	17.0(2.0-141.1) **

*p-value <0.05, ** p-value <0.01

Table 6. Factors associated with community attitude towards rabies

Variables	Good	Poor	COR (95%CI)	AOR (95%CI)
Sex				
Male	143	63	Reference	Reference
Female	96	82	0.5(0.3-0.9)	0.6(0.4-0.96) *
Age (in years)				
15-29	113	38	Reference	Reference
30-45	103	75	0.5(0.3-0.9)	0.5(0.2-0.9) *
>=46	23	32	0.2(0.1-0.6)	0.4(0.2-0.9) *
Educational status				
Illiterate	86	95	Reference	Reference
Primary school	51	27	2.1(1.204-3.617))	1.8(0.9-3.6)
Secondary school	55	23	2.6(1.5-4.7)	1.5(0.6-3.4)
College and above	47	0	-	-
Occupation				
Employed	24	5	Reference	Reference
Farmer	95	97	0.2(0.1-0.6)	0.6(0.2-2.3)
Trader	52	24	0.5(0.2-1.3)	0.7(0.2-2.6)
Unemployed	40	3	2.8(0.6-12.7)	2.1(0.4-12.4)
Students	28	16	0.4(0.1-1.1)	0.3(0.1-1.2)
Family member				
1-3	52	25	Reference	2.007
4-6	106	61	0.8(0.5-1.5)	1.3(0.7-2.6)
>=7	81	59	0.7(0.4-1.2)	1.5(0.7-3.3)
Source of rabies information	36	13	Reference	Reference
Health professionals	38	11	1.3(0.5-3.1)	0.7(0.2-2.3)
Veterinarian	105	98	0.4(0.2-0.8)	0.9(0.4-2.1)
Community	60	23	0.9(0.4-2.1)	1.2(0.5-3.2)
Mass media				
Faced rabid animal				
No	144	71	Reference	Reference
Yes	95	74	0.633(0.418-0.960)	0.8(0.5-1.3)

*p-value <0.05

Table 7. Factors associated with community preventive practices towards rabies

Variables	Good	Poor	COR	AOR (95%CI)
Sex				
Male	110	96	Reference	Reference
Female	82	96	0.8(0.5-1.1)	0.8(0.5-1.3)
Age				
15-30	93	58	Reference	Reference
31-45	83	95	0.6(0.4-0.9)	0.4(0.2-0.8) *
>=46	16	39	0.3(0.1-0.5)	0.3(0.1-0.8) *
Educational status				
Illiterate	71	110	Reference	Reference
Primary school	47	31	2.4(1.4-4.04)	1.6(0.8-3.2)
Secondary school	46	32	2.2(1.3-3.8)	1.3(0.6-3.0)
College and above	28	19	2.3(1.2-4.4)	1.0(0.3-3.0)
Family size				
1-3	38	39	Reference	Reference
4-6	101	66	1.6(0.9-2.7)	2.1(1.1-4.2) *
>=7	53	87	0.6(0.4-1.1)	1.2(0.6-2.4)
Occupation				
Unemployed	23	6	Reference	Reference
Farmer	78	114	0.2(0.1-0.5)	0.3(0.1-0.98) *
Trader	48	28	0.5(0.2-1.2)	0.4(0.1-1.4))
Employed	22	21	0.3(0.1-0.8)	0.4(0.1-1.3)
Student	21	23	0.2(0.1-0.7)	0.1(0.04-0.5) **
Source of rabies information				
Health professionals	16	33	Reference	Reference
Veterinarians	35	14	5.2(2.2-12.2)	5.2(2.0-11.8) **
Community	87	116	1.6(0.8-2.99)	2.4(1.1-5.5) *
Mass media	54	29	3.8(1.8-8.1)	1.5(1.4-8.1) **

*p-value <0.05, ** p-value <0.01

Association of preventive practices of rabies with knowledge and attitude

Pearson's chi-square test revealed that both knowledge and attitude had significant effects on preventive practices of rabies (Table 8). There was a strong association between preventive practice and knowledge of respondents ($\chi 2=6.0$, $p=0.014$). Respondents with good knowledge (55.9%) had better preventive practices than respondents with poor knowledge (43.3%). Attitude also had a strong association with good preventive practice ($\chi 2=28.8$, $p\leq 0.001$). Respondents with desirable attitudes (60.7%) had better preventive practices than respondents with undesirable attitudes (43%).

Table 8. Chi-square test showing association of KAP

Variables		Preventive practice		Chi-square	P-value
		Good (%)	Poor (%)		
Knowledge	Good	114 (55.9)	90 (44.1)	6.0	0.014
	Poor	78 (43.3)	102 (56.7)		
Attitude	Desirable	145 (60.7)	94 (39.3)	28.8	≤ 0.001
	Undesirable	74 (43)	98 (57)		

Discussion

The finding of the present study revealed that 53% of the study subjects from the Kersa district had adequate knowledge, and the result was in line with the reports for the Dedo district of the Jima zone (Nejash *et al.*, 2017). The current study and the Dedo district are similar since the majority of the study participants were from rural areas and because both have a similar culture and language. On the other hand, higher results of 56.1, 61.3, 64.1, and 85.7% were reported from households of Mekelle City, residents of Amhara region, and communities of Bahir Dar City and Kombolcha town, respectively (Guadu *et al.*, 2014; Addis *et al.*, 2019; Hagos *et al.*, 2020; Bahiru *et al.*, 2022). The fact that the majority of the study's participants in the current study area resided in rural areas, where information sources and levels of education were lower, might be the cause of the study's lower scores.

The majority of study participants (92.7%) heard about rabies, which indicates respondents are aware of the presence of rabies in their area, and this helps with the control strategy of the disease. This result was in line with the findings of several scholars from different areas of Ethiopia (Digafe *et al.*, 2015; Gebeyaw and Teshome, 2016; Bihon *et al.*, 2020). Over 90% of the respondents of Awash- Basin, Eastern Ethiopia, claimed to know about rabies, but 79.2% did not know how dogs acquire the disease (Tschopp *et al.*, 2016). This may be the consequence of the disease being a highly fatal disease with prominent symptoms to which everyone has been exposed.

More than half of the respondents (52.9%) in this study obtained information from the community; this is because discussion about the disease is good among communities, and influential persons in the community should get awareness of the disease, and they can create awareness in their community. The result was in line with respondents from Addis Ababa City (Ali *et al.*, 2014). Slightly

higher than one-fourth (26.8%) of the study participants knew that the cause of rabies was a virus; this is due to the fact that most respondents are uneducated and have no access to differentiate the causative agents as viruses, bacteria, and other agent. Different studies in and nearby Gondar City, Dedo district of Jima zone, and around Dessie City, Munisa district of Arisi zone and Debre Tabor City reported a higher rate of 60.7, 67.6, 67.6, 78 and 78.4 % of the respondents knew about the causative agents of rabies, respectively (Serebe *et al.*, 2014; Alie *et al.*, 2015; Gebeyaw and Teshome, 2016; Nejash *et al.*, 2017; Nejash and Endale, 2017). The fact that respondents from urban areas tend to have better information sources and educational levels may be attributable to study area variation.

The majority of respondents (74.7%) knew the way of transmission was through the bite of a rabid animal and saliva contact. This suggests that respondents are aware of the transmission of the disease and controlling the disease might be easy as the means of transmission were known; it was higher than the report from Debre Tabor (57.8%) (Alie *et al.*, 2015) and Bahir Dar City (21.4%) (Guadu *et al.*, 2014). Nearly one-fifth of the respondents (18%) did not know the indications and signs of rabid animals, which is lower than 37.3% and 23% of urban and pastoralists of the Awash basin did not know the symptoms of rabies in dogs, respectively (Tschopp *et al.*, 2016).

The result of the current study has also revealed that the majority (62%) of the respondents had a desirable attitude toward rabies disease. A lower result was reported by Wolelaw *et al*. (2022) in the Bure Zuria district, North West Ethiopia, with 51.2% of participants having a good attitude towards rabies (Wolelaw *et al.*, 2022). The majority of study participants, 58.9 and 63%, had positive perceptions about vaccination and educating the community could control rabies disease, respectively; slightly higher results, 65.9%, were reported by Bihon *et al.* (2020) in and Around South Gondar. More than half of respondents (56.3%) assumed rabid animal meat could be used as medicine. This is not a good perception since it might not be used as a medicine, and this may affect the use of modern treatment and increase the mortality rate. The current finding is slightly higher than 48.2% of the community of south Gondar (Bihon *et al.*, 2020).

In the current study, preventive practices towards rabies in Kersa district revealed that 50% of the respondents had good preventive practices, and a lower finding of 45.46% in the residents of Amhara region was reported by Bahiru

et al. (2022). Among the interviewed participants, nearly one-third (31.2%) reported a practice of washing the wound using soap and water. This result agreed with results reported from the Gondar Zuria district (30.7%) of Ethiopia (Digafe *et al.*, 2015). It was higher in a study conducted in Kombolcha town, which reported 92.4% (Addis *et al.*, 2019). The difference can be attributed to the difference in the awareness status of the community and the lack of training in the current study area. The WHO also recommends wound washing and vaccination immediately after contact with a suspected rabid animal, which can prevent almost 100% of rabies deaths (WHO, 2013).

Regarding the preferred action taken for bitten humans, 75% of participants responded to visiting hospitals for post-exposure vaccine, and the rest preferred traditional treatment and religious places. Even though most respondents prefer hospitals, awareness should be mandatory for the rest as traditional treatment and religious places are not guaranteed for the treatment of the disease. This result is higher when compared to a study conducted in Debre Tabor, which was 37.5% preference (Alie *et al.*, 2015).

This study revealed that around 95.8% of respondents consumed meat from rabid animals. It was a poor practice even though the disease is not transmitted through eating meat. There might be accidents during the slaughtering process, and this leads to contact of the virus with the damaged part of the human body, as well as affecting the control and prevention of the disease. This result is high when compared with that of Debark (64.9%) of respondents and reported in the Gondar Zuria district (Digafe *et al.*, 2015), which revealed consumption of cooked or boiled meat from rabid animals was considered safe by 67.0% of the respondents. Cooked meat does not transmit rabies; however, it is not advisable to consume meat from an infected animal (WHO, 2013).

In this study, sex, educational level, occupation, and training were determinant factors for knowledge. Males had more knowledge than females, and this might be because males are more educated than females. On the other hand, as the education level increased, the knowledge about rabies disease also increased, and this might be due to educated people having more chances to know about the disease through different means; this was in agreement with the study conducted in the Arsi zone Munesa district (Nejash and Endale, 2017). The possible explanation might be that an educated person has better access to information and can easily understand the disease.

This finding revealed that a good practice score was significantly associated with age, family size, occupation, and source of information. The age group from 15-29 years old has better practice than the rest of the age groups, and this is because most respondents from 15-29 years old were students, and they have better knowledge and understanding than the other age group. As the family size increased, the good preventive practices also increased, and this might be due to different demographic characteristics of the family members, which increased the chance of good practice. Regarding occupation, farmers and students have poor preventive practices as compared to unemployed respondents; this might be due to farmers having very close contact with dogs as dogs are used as guards for them; on the other hand, students have poor practices as they have youngsters and interact with dogs. Wolelaw *et al.* (2022) reported similar results, namely that the source of information and age had a statistically significant association with practices. An individual whose age group was 18–29 years was 2.7 times more likely to have good prevention practices towards rabies than those in an age group more significant than 45 years (Wolelaw *et al.*, 2022).

Preventive practice is significantly associated with the knowledge and attitude of respondents. As the knowledge increased, the preventive practice also increased, and as the attitude increased, the preventive practice also increased. This suggests that working on the knowledge and attitude of respondents will increase the preventive practice of the disease.

Conclusions

As this study indicates, more than half of the participants in the Kersa district had good KAP. However, there was an information gap regarding the cause of the disease, the first action taken after being bitten by a suspected dog, and the existence of undesirable perception with regard to relating rabies to the spirit as a means of transmission and belief in holy water as a means of treatment. The presence of low vaccination coverage and high practice of traditional medicine was another bottleneck. Educational status, training, and occupational background were the most critical factors that have a significant role in the community's KAP score. Respondents with good knowledge and desirable attitudes had good preventive practices against rabies disease; hence, awareness and disease-related training should be given to increase the knowledge and attitude of society, which will help the preventive practice of the disease.

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