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Study on rabies control and prevention using knowledge attitude and practice in Jabalpur central India

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Abstract

Rabies is endemic in India and kills 20000-30000 people every year. Vaccination and awareness are the two major tools to develop rabies control strategies that transcend sectoral boundaries. However, the status of protective antibody titre post vaccination is seldom checked thereby indicating a gap of awareness among the stakeholders. Therefore, the present study was carried out to evaluate the awareness of rabies among general public. The statistical analysis of knowledge, attitude and practice was done by Bivariate χ^2 and multivariate general linear model. The awareness study showed significant gaps. Multivariate general linear model of the demographic characters of respondents viz. genders, educational and occupancy and persons in the household also showed significant difference statistically. The study revealed that along with vaccination, evaluation of antibody titre should be made compulsory. The pet owners should be made aware of the good dog management practices. The questionnaire-based study on knowledge, attitude and practice increases dog owners and non dog owners interest about rabies, vaccination and prevention. Such study will be helpful in enhancing awareness and also in reduction of risk factors.

Keywords: Rabies control, knowledge attitude, Vaccination and awareness, *Lyssavirus*

Introduction

Rabies is caused by neurotropic virus of the genus *Lyssavirus* in the family of Rhabdoviridae. It is an acute, viral encephalomyelitis which affects all warm-blooded animals with mortality rate being close to 100% once the clinical signs develop (Vegad and Katiyar, 2008) [23]. It is responsible for an estimated 59,000 human mortalities annually worldwide (Gold *et al.*, 2020) [8]. Most of the cases are mainly reported from the developing world, especially in Asia (56.0%) and Africa (44.0%). About 40% of people are bitten by suspected rabid animals are children under 15 years of age (WHO, 2020) [26]. Over 99 percent of human exposures to rabies results from the bite of domestic dog (*Canis familiaris*) due to higher dog population and prevailing poor dog ownership practices (Dzikwi *et al.*, 2011) [5]. The annual cost of rabies in Africa and Asia was estimated at US\$ 583.5 million, most of which is due to the cost of post exposure prophylaxis (Knobel *et al.*, 2005) [11].

India is numero-uno worldwide with death toll of 20000-30000 humans due to rabies. The higher chances of rabies may be due to close proximity between animals and humans, lack of awareness about vaccination, lack of managemental practices of bite wound etc (Rimal *et al.*, 2020) [17]. In India, the incidences of animal bites are 17.4 per 1000 and mostly are by dogs (60% stray, 40% pet dogs). A person is bitten every 2 seconds and someone dies from rabies every 30 seconds in India (Sudarshan, 2004) [19]. Majority of people who die of rabies are from poor or low socio-economic status (Ghosh, 2006) [7]. India spends about 15 billion rupees for rabies vaccines alone, exerting a sizeable economic burden on the government (Meslin, 2009) [14]. The rabies virus is readily transmitted through contact with infectious saliva, transplantation of organs particularly cornea and aerosol transmission in laboratories and bat caves, wherein viable viruses are in unusually high density. Rabies viruses have been transmitted by ingestion in experimentally infected animals (OIE, 2009) [27].

Rabies is maintained in two epidemiological cycles, urban and sylvatic. In the urban cycle, dogs are the main reservoir host and the cycle predominates in areas of Africa, Asia and Central and South America. The sylvatic cycle is the predominant in Europe and North America.

WHO recommends that about 70% of dogs need to be vaccinated to control rabies in a community (WHO, 1989; Knobel *et al.*, 2007) [24, 12] but most of the dog population is not vaccinated against preventable disease (Ahmed *et al.*, 2000) [2].

The knowledge, attitude and practice (KAP) study helps in assessing the status of awareness among the dog and non-dog owners about rabies, its mode of transmission, associated risk, preventive measures etc (Altman *et al.*, 2008) [3]. Scattered studies of KAP on rabies have been carried out in different parts of India (Prakash *et al.*, 2012) [16]. There are no studies of evaluation of antibody titre post rabies vaccination and of KAP based study among the general public population in Central India. Considering the above facts the present investigation was aimed to evaluate immune response to rabies vaccination and awareness study to understand the knowledge gap.

Ethical approval

Ethical approval was taken by institutional animal ethical committee for conducting research [No.09/IAEC/Vety.2019; Dated: 16/9/2019].

Evaluation of Knowledge, Attitudes and Practices regarding rabies among the public

A total of 428 respondents were interviewed from Jabalpur, Madhya Pradesh in a random manner. The respondents include dog owners (176) and non-dog owners (252), urban (263) and rural (165) and students (308). The participation was voluntary and data collection was kept confidential to meet the ethical considerations. The questionnaire-based interview was conducted in order to assess the knowledge, attitude and practice of rabies and was designed partly from similar such studies conducted elsewhere (Matibag *et al.*,

2009; Tandon *et al.*, 2017) [13, 20]. The questionnaire consisted of both closed and open questions. The designed questionnaire for collection of information was comprised of 4 parts: questions pertaining to the respondent's socio-demographic information (age, sex, education level, occupation, religion, ethnicity, number of people in the household, dog ownership status, location); questions related to the knowledge and perception of rabies; questions on pet care practices. The sampling includes visitors who came to the various clinics, students of Bachelor of Veterinary Science (1st and 3rd year), Veterinary Diploma (1st and 2nd year) and a school student (11 and 12th class). The volunteers included in the study were in the age group of 16 to 67 years. Answers were recorded in English and the local Hindi language.

Data analysis was carried using SPSS software version.16 and Microsoft Excel 2007. Descriptive statistics were calculated for each variable of interest. General Linear Model (MANOVA) and Bivariate χ^2 test analysis was applied to compare the responses of the questions related to socio-demographic characters of respondents with respects to the respondent's knowledge, attitude and practice of rabies and difference between respondents from dog and non-dog owners as well as urban and rural areas. A p-value <0.05 was considered statistically significant (Snedecor and Cochran, 1994) [18].

Results

The knowledge, attitude and practice study to canine rabies showed that people had good information about rabies but variation in information and its application were observed between different groups about rabies, vaccination, treatment and control programme. Statistically, (Bivariate χ^2 and Multivariate) gaps in awareness among different groups were observed (Table 4, 5 and Table S2, S3, S4).

Table 1: Response of people to questions related to the Knowledge, Attitude and Practice of rabies from Jabalpur

S. No.	Variables	Response (%)	
		Yes	No
1	Have you heard of rabies?	96.45	3.55
2	Believe rabies is fatal?	93.03	6.07
3	Believe rabies is transmitted by dogs?	94.31	5.68
4	Believe that dog should receive rabies vaccine (dog owners)?	76.46	23.54
5	Believe that bite wound is washed with soap and water?	64.68	35.31
6	Believe that rabies can be prevented by vaccination of dogs?	95.39	4.61
7	Believe that rabies can be diagnosed in laboratory?	83.96	16.04
8	Believe that there are no locally available methods of treatment for dog bite and rabies?	64.85	35.15
9	Would report to hospital for treatment if bitten by a stray dog?	93.08	6.91
10	Would report to hospital for treatment if bitten by owned dog?	92.35	7.64
11	Would report to authorities if there is suspected outbreak of rabies in the community?	89.08	10.92
12	Would kill stray dog if rabies is suspected?	56.40	43.59
13	Is stray dog a problem in your community?	74.705	25.295
14	Believe it is important to control dog population in Jabalpur?	87.51	12.49
15	Do you support rabies control campaign?	97.4	2.6
16	Believe it is good to vaccinate your dog?	98.8	1.2
17	Dog handlers should wear protective clothing?	74.055	26.945
18	It is good to wash dog bite wounds with soap?	76.645	24.715
19	Whether dog handlers should take human anti-rabies vaccine?	73.36	26.64
20	Have you provided shelter to your pet?	73.75	26.25
21	Do you deworm your pet dog?	92.025	7.975

Table 2: Multivariate General Linear Model results of the demographic characters of respondents with respect to Knowledge, Attitude and Practice of rabies.

Variable	Number (%)	Knowledge (p-value)	Attitude (p-value)	Practice (p-value)
Gender				
Male	249 (58.17)	0.023*	0.467	0.282
Female	179 (41.83)			
Age				
16-29	350 (81.77)	0.183	0.106	0.989
30-41	40 (9.35)			
≥42	38 (8.88)			
Educational level				
Graduate	49 (11.45)	0.021*	0.044*	0.022*
Diploma	46 (10.75)			
Higher Secondary	179 (41.82)			
High school	127 (29.67)			
Middle	23 (5.37)			
Primary	04 (0.93)			
Occupation				
Student	308 (71.96)	0.164	0.019*	0.07
Farmer	05 (1.17)			
Employee	47 (10.98)			
Business	30 (7.01)			
Dependent/housewives	15 (3.50)			
Unemployed	23 (5.37)			
Dog ownership status				
Yes	115 (26.87)	0.003*	0.955	0.000*
No	313 (73.13)			
Persons in household				
≤5	308 (71.96)	0.000*	0.002*	0.000*
>5	120 (2.80)			

P-value below 0.05* was considered to be statistically significant

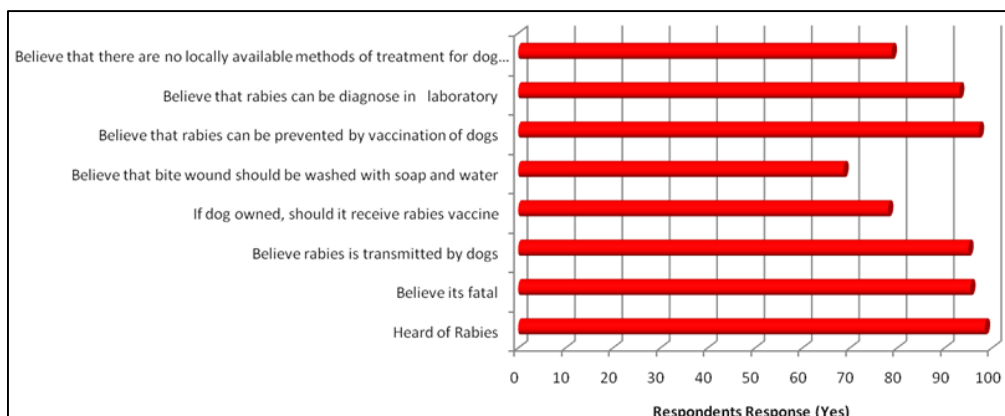


Fig 1: Bar diagram showing the response to the questions related to knowledge of rabies

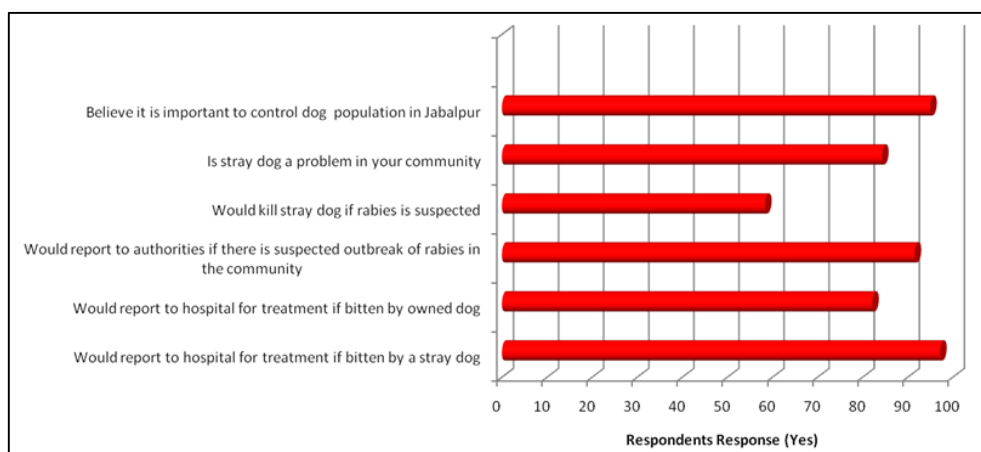


Fig 2: Bar diagram showing the response to the questions related to attitude of rabies

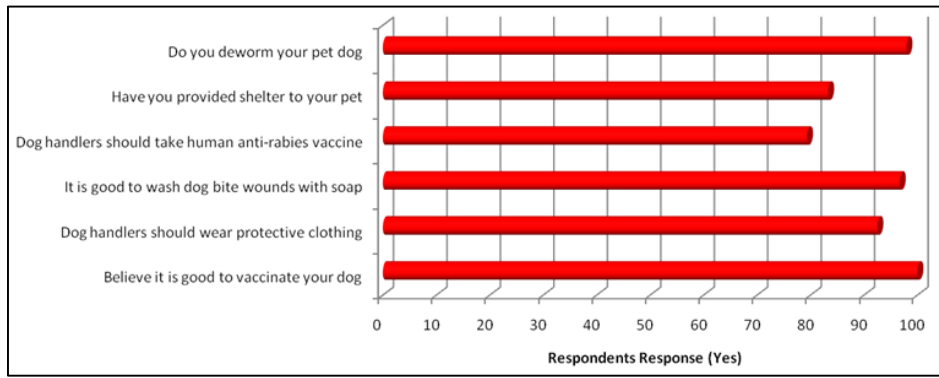


Fig 3: Bar diagram showing the response to the questions related to practice of rabies

Discussion

Incidence of rabies is a preventable by intensive vaccination and neglected tropical disease that can infect all mammals. Over 99 % of all human deaths from rabies are caused by the bite of domestic dogs (WHO, 2013) [25]. Globally, rabies kills more than 59,000 humans annually with more than 60.0% cases are concentrated Asia and Africa (Hampson, 2015) of which 30 to 50 % was below 15 years of age. The disease is endemic in India and kills 20,000 peoples annually.

Like our investigation, various KAP study have already been conducted and such study showed high knowledge regarding reservoir status, transmission, vaccination and had a positive attitude towards the prevention and control of rabies (Tenzin *et al.*, 2021; Fenelon *et al.*, 2017; Beyene *et al.*, 2018) [21, 6, 4]. Beyene *et al.* (2018) [4] also observed negative correlation between distance and vaccination. Some workers advocated our findings that dog owners had high knowledge of rabies and also about its prevention and control (Ntampaka *et al.*, 2019 and Hagos *et al.*, 2020) [15, 9]. Hagos *et al.* (2020) [9] reported that training increases the knowledge on rabies. Like our observation, a study carried out on urban (32.7%), peri-urban (30.0%) and rural (37.3%) and observed that almost all (99.3%) participants had heard about rabies and 88.7% of them knew its zoonotic significance (Abdela *et al.*, 2017) [1]. Tiwari *et al.* (2019) [22] observed that the attitudes and practices of the respondents towards rabies control was positive in households with a high/middle socio-economic status but poor in older (>35 years) participants.

In the present study, the higher knowledge in urban people, dog owners, males and smaller families may be due to ownership of dogs, higher education and awareness regarding various diseases of dogs including rabies from various sources like doctors, extension workers, media, books etc. Some of the observations showed that non-dog owners had good knowledge than dog owners and it may be due to higher number of students (significant number from veterinary fraternity).

Variation in KAP based study in different study may be attributed to demography *viz.* urban-rural people, dog owners and non-dog owners, interest of people, awareness schemes run by government and non-government organization. KAP based study helps in assessing the risk factor, enhancing knowledge and information regarding rabies and people.

The present study suggests that there should be regular monitoring of anti-rabies antibody titre so that in cases of

vaccine failure the animal may be vaccinated again. This will also help in knowing the failure causes and its removal, revising/ rescheduling vaccination. KAP study will help in assessing the risk and enhancing the level of awareness among the people. Such study among the students or children below 15 years age and countries like India is useful in reducing the incidences from huge population of stray dogs particularly in childrens, who are more vulnerable. Therefore, it is suggested that to prevent and control the rabies, vaccination, their effectiveness and awareness among the general public is of outmost importance.

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Conflict of interest: The authors declare that they have no issue regarding conflict of interest.

Supporting Information

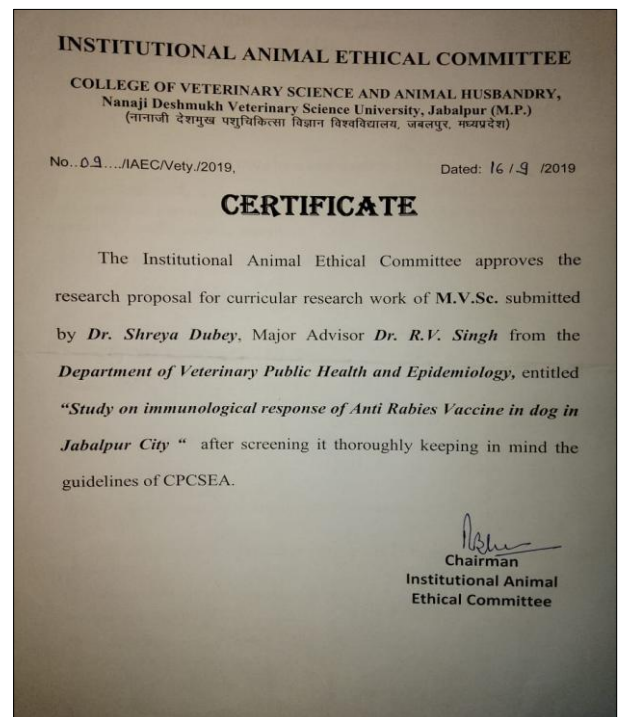


Table S1: Response of people to questions related to the Knowledge of rabies

Variables /Questions	Urban (Yes, %)	Rural (Yes, %)	χ^2	P-value	O.R (95% CI)	Dog owner (Yes, %)	Non -dog owner (Yes, %)	χ^2	P-value	O.R (95% CI)	Male	Female	χ^2	P-value	O.R (95% CI)
1. Have you heard of rabies?	96.84	96.06	0.148	0.7004	1.347	97.38	99.65	1.0204	0.3124	0.3266	95.6245	97.49	0.1718	0.678	0.4898
2. Believe rabies is fatal?	91.25	94.8	1.2289	0.2676	0.8168	95.17	95.7	0.1163	0.73303	0.7917	92.622	93.46	0.0823	0.774	0.8480
3. Believe that rabies is transmitted by dogs?	93.46	95.17	0.3546	0.5515	0.6992	93.97	96.1	0.4211	0.5164	0.6528	95.39	93.12	0.0887	0.7658	1.4301
4. Believe that dog should receive anti-rabies vaccine?	80.47	72.45	1.7544	0.1853	1.5556	86.80	69.38	9.4406	0.0021*	3.0067	81.4	70.261	3.270	0.7052	1.827
5. Believe that dog bite wound is washed with soap and water?	75.20	54.17	9.6299	0.0019*	2.556	66.05	71.32	0.5793	0.44658	0.7929	71.74	56.558	4.853	0.0275	1.923
6. Believe that rabies can be prevented by vaccination of dogs?	97.64	93.14	1.684	0.194	2.4337	96.3	98.2	0.6873	0.407	0.4898	96.87	93.79	1.682	0.194	2.433
7. Believe that rabies can be diagnosed in laboratory?	80.27	87.65	2.381	0.1228	0.5455	88.87	97.29	5.8378	0.0156*	0.2268	80.7	87.34	1.339	0.2471	0.637
8. Believe that there are no local methods available for treatment of dog bite and rabies?	62.45	67.25	0.5459	0.45993	0.8036	81.3	76.4	0.7406	0.38959	1.34	64.73	64.85	0.021	0.8825	0.957

Table S2: Response of people to questions related to the Attitude toward rabies

Variables/ Questions	Urban (Yes, %)	Rural (Yes, %)	χ^2	p-value	O.R (95%CI)	Dog owner (Yes, %)	Non dog owner (Yes, %)	χ^2	p-value	O.R (95%CI)	Male	Female	χ^2	p-value	O.R (95%CI)
1. Would report to hospital for treatment if bitten by a stray dog?	95.82	90.35	2.765	0.09634	2.6667	94.50	99.9	2.791	0.0973	0.1919	88.15	98.06	7.680	0.0055	0.149
2. Would report to hospital for treatment if bitten by owned dog?	94.85	89.86	1.8018	0.1795	2.111	87.58	76.7	4.195	0.0406*	2.19	92.66	92.26	0.072	0.788	0.115
3. Would report to authorities if there is suspected outbreak of rabies in the community?	91.71	86.45	1.228	0.2677	1.646	86.9	96.2	5.207	0.0224*	0.2788	92.13	85.66	2.4073	0.120	2.029
4. Would kill stray dog if rabies is suspected?	63.20	49.61	3.4381	0.0637	1.7027	62.82	53.9	1.668	0.1965	1.4505	57.40	55.309	0.0812	0.7757	1.084
5. Is stray dog a problem in your community?	67.71	81.70	5.2267	0.02224*	0.4665	88.68	79.95	1.778	0.1823	1.6731	70.76	78.1	1.663	0.197	0.658
6. Believe it is important to control dog population in Jabalpur?	81.48	93.54	7.7527	0.005444*	0.2721	95.09	94.9	00	1.0	1.0	86.34	88.73	0.178	0.674	0.8377
7. Do you support rabies control campaign?	95.66	99.14	2.7079	0.09985	0.1939	97.33	94.9	0.5208	0.47048	1.7018	100	94.642	-	-	-

Table S3: Response of people to questions related to the Practice of rabies

Variables/ Questions	Urban (Yes, %)	Rural (Yes, %)	χ^2	p-value	O.R (95%CI)	Dog owner (Yes, %)	Non dog owner (Yes, %)	χ^2	p-value	O.R (95%CI)	Male	Female	χ^2	p-value	O.R (95%CI)
1. Believe that it is good to vaccinate dog?	99.3	98.3	-	-	-	100.0	100.0	-	-	-	99.10	98.605	0.338	0.560	0.4949
2. Should dog handlers wear protective clothing?	86.07	62.04	18.7139	0.000015*	4.4615	85.9	99.1	12.18	0.0005*	0.0620	85.997	79.961	1.134	0.286	1.535
3. Is it good to wash dog bite wounds?	88.86	64.42	17.38	0.00003*	4.551	97.9	95.5	0.6873	0.4071	2.0417	88.43	89.877	0.049	0.824	0.906
4. Should dog handlers take	82.3	64.4	8.219	0.004145*	2.5625	90.8	67.89	19.456	0.00001*	5.3529	81.01	78.358	0.276	0.599	1.202

human anti-rabies vaccine?															
5. Would you like to provide shelter to pet dog?	88.13	59.27	19.4527	0.00001*	4.7486	89.3	77.3	5.1028	0.02389*	2.4168	80.14	78.981	0.120	0.728	1.128
6. Do you deworm pet dog?	97.8	86.25	-	-	-	96.8	99.1	-	-	-	97.61	96.34	0.148	0.7004	1.347

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