Haryana Vet. (March, 2024) **63(SI),** 5-9

Research Article

EVALUATION OF AWARENESS, RISK FACTORS AND PRACTICES FOLLOWED BY PET PARENTS AND VETERINARIANS ABOUT PET ZOONOSES

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Received: 31.01.2023; Accepted: 23.04.2023

ABSTRACT

Pet ownership is gaining popularity in India. Dogs and cats are the most important and common companions of humans. However, they harbor over 50-70 zoonotic pathogens and the risk of their transmission cannot be neglected. The current study aimed to explore the knowledge levels, risk factors, and practices associated with pet zoonoses among pet parents and veterinarians. A cross-sectional study was conducted on 200 pet parents and 100 veterinarians *via* a questionnaire that contained both open and close-ended questions about zoonoses, their risks and practices. These responses were analyzed based on their frequencies and percentages. The chi-square test and Fisher's exact test were applied in order to assess the significant difference between selected variables. During this study, 136 pet parents and 68 veterinarians responded, and most pet parents (91.17%) and veterinarians (77.9%) were from an urban background. Dogs (70.58%) were more commonly owned compared to cats. The majority of pet parents (57.35%) didn't know the exact meaning of zoonosis. A total of 58.82% of pet parents did not have any authentic sources of availing information regarding zoonotic diseases of pets. The results of this study concluded that there is an immediate need to increase awareness among pet owners about household risks and preventive practices associated with pet zoonoses.

Keywords: Pets, Pet hygiene, Pet owners, Veterinarians, Zoonoses

How to cite: Tekchandani, C., Kolhe, R., Waskar, V., Kolhe, S., Budhe, M., Shende, T. and Mote, C. (2024). Evaluation of awareness, risk factors and practices followed by pet parents and veterinarians about pet zoonoses. *Haryana Vet.* **63(SI)**: 5-9.

There are 1415 species of infectious agents pathogenic to humans and 61% of pathogens can be transmitted between animals and humans (Taylor *et al.*, 2001). An increasing number of pet animals in urban areas introduces a higher risk of zoonoses. Very few diseases like rabies, toxoplasmosis, and leptospirosis associated with dogs and cats are well-known. In actuality, pet animals are known to harbor around 70 zoonotic pathogens. Hence, risk factors associated with them need to be evaluated. Around 14-62% of pet owners allow pet animals in their bedrooms which can increase the chances of zoonoses. Keeping exotic animals as pets also increases the risk of acquiring zoonoses (Rahman *et al.*, 2020). Some diseases that can be associated with companion animals are brucellosis, chlamydiosis, leptospirosis, cat scratch disease, ehrlichiosis, Lyme disease, hantavirus, influenza, Q-fever, and rabies. Gastrointestinal protozoal infectious agents are also commonly found in pet animals (Day, 2016). Sharing our environment and time with pets gives psychological comfort but it enhances the risks of contracting zoonotic diseases. Some modes through which zoonotic diseases can be transmitted are skin, mucus membranes, bite injuries, scratches, ingestion of fecal matter, aerosols, droplets, vector bites, etc. Infants, children, geriatric people, and immunocompromised people are at a higher risk of contracting zoonotic diseases (Stull *et al.*, 2013). People all over the world are fond of keeping birds, reptiles, and exotic animals apart from dogs and cats. In the context of one health, the role of veterinarians is pivotal in the surveillance, monitoring, and prevention of zoonoses associated with pet animals. A present cross-sectional study was conducted to assess the awareness of cat and dog zoonoses among pet parents and veterinarians.

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MATERIALS AND METHODS

This study was conducted on pet parents and veterinarians from different states of India. There were no fixed criteria for the inclusion of the number of respondents per state. The pretested questionnaires were distributed via Google forms to 200 pet owners and 100 veterinarians randomly. Their responses were divided into rural and urban categories. A cross-sectional study was conducted from July to September 2021 to assess the knowledge, risk factors, and practices related to zoonotic diseases of cats and dogs by pet owners and veterinarians. Two different questionnaires were originally prepared in English and were evaluated by experts from Veterinary Public Health, Veterinary Microbiology, and Veterinary Clinical Practices. These questionnaires contained both open and close-ended questions which were divided into various sections like demography, knowledge, risk factors,

and practices. The data were entered in Microsoft Excel 19 for frequency and percentage analysis. The statistical analysis was done using SPSS software version 26. Pearson's chi-square test and Fisher's exact test were used to determine the significance between selected variables. A p-value <0.05 was considered to be statistically significant.

RESULTS AND DISCUSSION

Respondent characteristics: Out of 200 pet parents, 136 responded, 78 (57.35%) respondents were females and 58 (42.63%) were males. The mean age of respondents was 32-54 years. The majority of respondents (91.7%) were from an urban background. A total of 54.41% of respondents were graduates and 38.97% were postgraduates. The majority of the respondents owned dogs (70.58%), and only 15.44% owned cats. The remaining respondents owned animals like squirrels, fish, birds, etc. Globally, dogs and cats are highly preferred companion animals and in the USA, the total population of owned dogs and cats is over 78.2 million and 86.4 million (Sandhu and Singh, 2014). Hence, it is necessary that pet parents and other people should be made aware of the risks of zoonotic diseases associated with dogs and cats. In the present study, a significant statistical association was not observed between the type of pets owned and the age or gender of the respondents (P >0.05). Also, no significant difference was found between the type of pet owned in relation to educational qualification, settlement, or gender. Out of 100 veterinarians, 68 responded and their mean age was 28.5 years. Most of them were also from an urban background (77.94%). Around 60.29% of veterinarians were postgraduates and 39.7% were graduates. About 48.52% of veterinarians were small animal practitioners and 30.88% of veterinarians practiced both with small and large animals. A significant difference was found between the gender and type of practice of veterinarians (P 0.001). There was also a significant difference between the settlement and type of practice (P = 0.032).

Knowledge levels of zoonoses: The knowledge levels of 136 pet parents are represented in Table 1. It was revealed that there was no statistically significant difference in the responses of respondents on the basis of the type of pets they owned. However, it was observed that 57.35% of respondents were unaware of the fact that diseases transmitted from animals are called zoonotic diseases. Over 64.70% of respondents had never heard of the word zoonosis. Awareness about rabies as a zoonotic disease was found to be fairly good. About 107 (78.67%) respondents knew about the zoonotic impacts of rabies and 77.20% of respondents could not name any other zoonotic diseases except rabies. Brookes *et al.* (2019) surveyed farmers in Punjab following a rabies outbreak regarding their sources of information. It was concluded that primary sources of rabies information were either friends or neighbors, or were not available. Altogether, 71.32% of respondents of the current study acknowledged that their veterinarian did not discuss with them about risks of zoonotic diseases associated with pets. In the study of Stull and colleagues (2013), 18.25% of respondents said that they receive their information from the internet which is close to 19.85% of respondents of our data. It is thus clear that veterinarians' involvement in spreading awareness about zoonotic diseases of pets is limited and a proactive approach from veterinarians is expected. The knowledge level of veterinarians in terms of zoonoses was adequate.

Awareness of risk factors associated with pet zoonoses: The awareness of risk factors associated with pet zoonoses of pet parents and veterinarians was analyzed on the basis of frequency and percentage as well as on the basis of the chi-square test and fisher's exact test. The results for the same are demonstrated in tables 2 and 3. Around 5.88% of respondents disagreed with the fact that diseases could be transferred through bites and scratches of animals. Further, 27.94% of respondents accepted that they were unaware of the above fact. About 8.82% of respondents disagreed that children and immunocompromised people are at a higher risk of getting contracted zoonotic diseases and 44.11% of respondents answered that they are unaware. About 38.97% of respondents disagreed that kissing pets can pose any danger and 23.52% of respondents were unaware. When these percentages are combined together, it can be realized that 62.49% of respondents are lacking information about the zoonotic disease risk factors. After a detailed analysis of the risk factors, it was established that there were no significant statistical differences observed in the awareness of pet parents based on the type of pet that they owned. However, it was observed that many pet parents were unaware of the risks that could entail with pet ownership. A study from Sydney, Australia observed that over 64.5% of people were not worried about contracting any diseases from their pet animals (Steele and Mor, 2015). The present findings are important in the context of risk factors that aggravate the chances of acquiring infections from household pets as inadequate knowledge of risk factors was observed in pet parents. In a study performed among medical practitioners in Tanzania, it was concluded that the knowledge of zoonotic diseases of medical practitioners was also inadequate (John *et al.*, 2008). The majority of the veterinarians (86.76%) agreed that contact with animal saliva, urine, other body fluids, and inhalation of infectious aerosols or droplets can be very risky. Only 63.23% of veterinarians agreed that a lack

Table 1. Knowledge level of pet parents (N=136)

Sr. No.	Statement	Response		
		Yes (%)	No (%)	Unaware (%)
1.	Diseases from animals can be transmitted to humans or vice-versa.	102 (75%)	34 (25%)	-
2.	Diseases acquired from animals are called zoonotic diseases.	55 (40.44%)	3 (2.20%)	78 (57.35%)
3.	Have you ever heard of the word zoonosis?	48 (35.29%)	88 (64.70%)	-
4.	About 60% human diseases are transmitted from animals.	28 (20.58%)	19 (13.97%)	89 (65.44%)
5.	Dogs and cats can transmit their pathogens to humans directly.	59 (43.38%)	19 (13.97%)	58 (42.64%)
6.	Indirect transmission of pathogens from pets to humans through parasites is possible.	72 (52.94%)	9 (6.61%)	55 (40.44%)
7.	Rabies is a zoonotic disease transmitted from dogs and cats.	107(78.67%)	3(2.20%)	26 (19.11%)
8.	Do you know of any zoonotic diseases other than rabies?	31 (22.79%)	105 (77.20%)	-
9.	A veterinarian is consulted for the treatment of zoonotic diseases.	108 (79.41%)	7 (5.14%)	21 (15.44%)*
10.	Your pet is dewormed regularly against ecto-and endo-parasites.	118 (86.76%)	18 (13.23%)	-
11.	Ticks, mites, fleas and lice may be present on the skin of your pets.	88 (64.70%)	48 (35.29%)	-
12.	Some bacteria present in the nails of your pets can be zoonotic.	40 (29.41%)	6 (4.41%)	90 (66.17%)
13.	Feaces of dogs and cats can harbour various parasites potentially harmful to humans.	83 (61.02%)	8 (5.88%)	45 (33.08%)
14.	Have you or any of your family members been a victim of animal bite and scratches?	90 (66.17%)	46 (33.82%)	-
15.	My veterinarian has informed me about the zoonotic diseases of pets.	39 (28.67%)	97 (71.32%)	-
16.	Do you agree that knowledge of zoonoses is important and pet owners should be made aware of it?	130 (95.58%)	6 (4.41%)	-

* The response option was sometimes instead of unaware

Table 2. Awareness about risk factors associated with pet zoonoses in pet parents (N=136)

Sr. No.	Statement	Response		
		Agree (%)	Disagree (%)	Unaware (%)
1.	Pet associated zoonotic diseases are mostly transferred through bite and scratches.	90 (66.17%)	8 (5.88%)	38 (27.94%)
2.	People may acquire pet associated zoonotic infections through direct contact of the skin or mucus membranes with animals.	70 (51.47%)	16 (11.76%)	50 (36.76%)
3.	Presence of parasites on pets can be potentially dangerous to them and humans.	113 (83.08%)	3 (2.20%)	20 (14.70%)
4.	Immunocompromised people and people who have undergone recent surgery should avoid contact with pets for certain period.	78 (57.35%)	16 (11.76%)	42 (30.88%)
5.	Aged people, children and immunocompromised people are at increased risk of zoonoses.	64 (47.05%)	12 (8.82%)	60 (44.11%)
6.	Lack of knowledge may pose a risk of acquiring zoonoses.	114 (83.82%)	5 (3.67%)	17 (12.5%)
7.	Sharing of same environment by human and pets may increase the risk of zoonotic diseases.	46 (33.82%)	45 (33.08%)	45 (33.08%)
8.	Licking, kissing and sleeping with pets may be potentially risky.	51 (37.5%)	53 (38.97%)	32 (23.52%)
9.	There is no need of regular vaccination and deworming of pets.	6 (4.41%)	124 (91.17%)	6 (4.41%)
10.	Contact with other animals like stray dogs/ cats can increase the risk of catching diseases including zoonoses.	101 (74.26%)	10 (7.35%)	25 (18.38%)
11.	Pet hygiene is very important.	131 (96.32%)	1 (0.73%)	4 (2.94%)
12.	One must prohibit pet access to kitchen and foods intended for human consumption.	103 (75.73%)	30 (22.05%)	3 (2.20%)
13.	One must keep dogs and cats indoors and prevent them from hunting, garbage eating, etc.	90 (66.17%)	32 (23.52%)	14 (10.29%)

of dental hygiene of pets can lead to human diseases. There were no significant differences found between the responses of veterinarians based on the type of their practice.

Practices associated with pet zoonoses: It was observed that only 63.97% of pet parents agreed to always follow veterinary advice. Over 112 (82.35%) respondents always vaccinated their pets regularly. When the respondents were asked about their discussions on zoonotic diseases with veterinarians, it was revealed that 53.67% of people never had any discussion with veterinarians about zoonotic diseases. There was no significant difference between the practices followed and the type of pet owned. A significant difference was only observed in practices related to routine hand washing and cleaning of utensils (p value= 0.039, 0.038, respectively). Almost 73.52% veterinarians said that clients only follow the veterinary advice sometimes. More than 76.47% of vets claimed that they give out information about zoonotic diseases. About 33.82% of respondents accepted that no separate isolation area for infectious diseases is available at their place of practice. A majority of veterinary practitioners (89.70%) feel that there is a need for veterinarians to be trained on zoonotic diseases (Table 4). There were no statistically significant differences found between veterinarians who had different types of practices. Effective infection prevention and control practices (IPCs) are essential in human and veterinary medicine to reduce the risk of occupational diseases including occupational zoonoses. In our study,

Table 3. Awareness of risk factors of veterinarians (N=68)

Sr. No.	Statement	Response		
		Agree (%)	Disagree (%)	Unaware (%)
1.	People may acquire pet associated zoonotic infections through direct contact of the skin or mucus membranes with animals.	63 (92.64%)	1 (1.47%)	4 (5.88%)
2.	Contact with animal saliva or urine and other body fluids or secretions, ingestion of animal fecal material inhalation of infectious aerosols or droplets in not risky.	7 (10.29%)	59 (86.76%)	2 (2.94%)
3.	Presence of parasites on pets is risky and they can bite humans.	62 (91.17%)	3 (4.41%)	3 (4.41%)
4.	Bacteria from dogs' and cats' nails can be transferred to humans via scratching.	57 (83.82%)	9 (13.23%)	2 (2.94%)
5.	Scabies is contagious and spreads quickly through physical contact in families, schools, nursing homes, etc.	60 (88.23%)	4 (5.88%)	4 (5.88%)
6.	Lack of proper dental hygiene in animals may lead to diseases in both animals and humans.	43 (63.23%)	16 (23.52%)	9 (13.23%)
7.	Children, elderly people and immunocompromised people are at a decreased risk of zoonoses.	17 (25%)	49 (72.05%)	2 (2.94%)
8.	A pediatrician treating a child who has a puppy will not suspect a zoonotic disease to start off with.	32 (47.05%)	23 (33.82%)	13 (19.11%)
9.	Sharing of same environment by humans and pets may increase risk of zoonotic diseases.	54 (79.41%)	12 (17.64%)	2 (2.94%)
10.	Precautions should not be taken while handling fecal and urine samples.	28 (41.17%)	39 (57.35%)	1 (1.47%)
11.	Regular deworming of humans should be done, especially the ones with pets.	65 (95.58%)	1 (1.47%)	2 (2.94%)

some of the statements were also used in the survey which will give an idea about practices followed by veterinarians in order to prevent the risk of occupational zoonoses. Zoonotic disease risk perception of British veterinarians was analyzed and it was observed that the majority of the respondents (57.5%) were not concerned about the risk of zoonoses. It was further demonstrated that IPCs are not always followed by veterinarians (Robin *et al.*, 2017).

CONCLUSION

Pet animals are treated as members of the family. Unfortunately, pets are known to harbor at least 70 different zoonotic pathogens. Irrespective of gender, age, and education, knowledge levels of pet parents on pet-associated zoonoses is low. Veterinarians are mostly aware of the risk of zoonotic diseases but their infection control practices are insufficient. To prevent household risks of pet-associated zoonoses, pet owners should be made aware of the risk of zoonoses and preventive practices.

Table 4. Practices of veterinarians (N=68)

Sr. No.	Statement	Response		
		Always or Yes (%)	Sometimes (%)	Never or No (%)
1.	Pet owners follow veterinary advice diligently.	11 (16.17%)	50 (73.52%)	7 (10.29%)
2	Vaccination and deworming is regularly done.	27 (39.70%)	37 (54.41%)	4 (5.88%)
3	Washing and cleaning of contact surfaces due to pet faces and urine is done in clinics.	56 (82.35%)	10 (14.70%)	2 (2.94%)
4	I give out information about zoonotic diseases to my clients.	52 (76.47%)	12 (17.64%)	4 (5.88%)
5	I have treated animals with notifiable diseases and informed the higher authorities.*	24 (35.29%)	-	44 (64.70%)
6	I change gloves after treating every patient.	42 (61.76%)	21 (30.88%)	5 (7.35%)
7	The treatment table is sanitized after every patient.	55 (80.88%)	8 (11.76%)	5 (7.35%)
8	A separate isolation area for treatment of infectious diseases is available at my place of work.*	45 (66.17%)	-	23 (33.82%)
9	A separate dining area is present at my place of work.*	49 (72.05%)	-	19 (27.94%)
10	Training sessions are held for the work team explaining them about the prevention of zoonotic diseases.	20 (29.41%)	24 (35.29%)	24 (35.29%)
11	Knowledge and skills are upgraded and updated by attending trainings, webinars, seminars, etc on a regular basis.	42 (61.76%)	21 (30.88%)	5 (7.35%)
12	Clients sometimes miss their vaccination doses.	6 (8.82%)	59 (86.76%)	3 (4.41%)
13	Sterilisation of instruments is done before using them.	57 (83.82%)	8 (11.76%)	3 (4.41%)
14	Snap tests for various zoonotic diseases like rabies, leptospirosis, etc is available at my veterinary clinic.*	35 (51.47%)	-	33 (48.52%)
15	There is a provision of diagnostic facilities for infectious diseases at my place of work.*	30 (44.11%)	-	38 (55.88%)
16	Infectious abortion outbreaks should be reported.	54 (79.41%)	11 (16.17%)	3 (4.41%)
17	Any contact of aborted materials with bare hands is avoided.	63 (92.64%)	0	5 (7.35%)
18	Acaricides and other chemicals are sprayed on the body of pets using face masks and goggles.	35 (51.47%)	20 (29.41%)	13 (19.11%)
19	Pet owners are counseled regarding zoonotic diseases regularly.	38 (55.88%)	25 (36.76%)	5 (7.35%)
20	I advise pet owners regularly about how to keep their animals clean and diseases-free.	56 (82.35%)	7 (10.29%)	5 (7.35%)
21	Being a veterinarian, do you feel that there is a need for you to be trained on zoonotic diseases? **	61 (89.70%)	6 (8.82%)	1 (1.47%)

* The statement options are Yes and No.
**The statement options are Yes, Maybe, and No.

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