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RESEARCH ARTICLE

A STUDY ON THE AWARENESS AND KNOWLEDGE OF ZOONOTIC DISEASES AMONG THE PUBLIC IN AND AROUND PRODDATUR, YSR KADAPA DISTRICT, ANDHRA PRADESH, INDIA

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ABSTRACT

A cross sectional questionnaire based study was conducted to assess the awareness of zoonotic diseases in farmers, agricultural workers, butchers, students and in employees of state government and private organizations. The questionnaire was designed to obtain information on awareness about zoonotic diseases, source of infection, modes of transmission and hygienic practices followed by the respondents. A total of 1985 respondents were selected from Proddatur and 8 surrounding villages of Proddutur, YSR Kadapa district of Andhra Pradesh, India. All the respondents participated in this study can read and write in their local language i.e. Telugu. Among the respondents only 28.06% were having some awareness about zoonotic diseases. All the participants of this study were known about the dangerous zoonotic diseases i.e. rabies (100%) and this was followed by bird flu (25.89%) and swine flu (18.58%). The employees from veterinary and medical and health departments of state government have knowledge about bovine tuberculosis (4.93%) which can be transmitted from infected cattle and exclusively the employees of veterinary and animal husbandry department were aware about the diseases brucellosis (94.04%) that may be transmitted from cattle, sheep and goats. Among the respondents the transmission of zoonotic diseases through consumption of milk (14.10%) and meat (18.58%) was also low. Hygienic practices followed by the farmers during cleaning of udder while milking and during cleaning of sheds were also considered to be negligible. 8.46% of the respondents were owned the dogs and among them 58.33% of them feed their dogs with raw offal and 66.67% of them allow their dogs freely in their premises. This low percentage of awareness about zoonotic diseases and lack of awareness about the hygienic practices to be followed to protect themselves make the respondents of this study as a vulnerable group to expose to the zoonotic diseases. Bringing awareness among the public about the threat to them through zoonotic diseases, their modes of transmission, prevention and control measures should be considered as most important to protect them which should be done by the veterinary and human health care professionals.

INTRODUCTION

Veterinary medical practice is unique among the health professions. Its objectives are to enhance the health care, productivity and wellbeing of animals as well as to guarantee the safety of animal products used by people (Hendrix *et al,* 2005). The ultimate objective of veterinary medicine is to promote the well being and the quality of human life. Moreover, Veterinary Public Health is a discipline which deals with the contribution and responsibility of veterinary medicine for the public health (Cosivi O *et al,* 1999). Approximately 60 percent of all described agents of infections of human beings are shared in nature with other vertebrate animals (Daszak *et al,* 2000). Many animal related problems which negatively affect human health and economy exist in all countries of the world including zoonoses, food borne diseases and pollution of the environment from animal sources. Most of the agents associated with the current food borne disease out breaks such as salmonellosis, *E.coli*, Campylobacteriosis and Listeriosis are of concern especially in the developing countries. In addition zoonoses like Rabies, Brucellosis, Bovine tuberculosis, Cysticercosis, Hydatidosis, Taeniasis, and Toxoplasmosis are yet to be considered as uncontrolled diseases (WHO, 2002) which need the attention of veterinary public health services.

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Generally in most cases these cannot be controlled without a full, multidisciplinary approach which includes public health education and community involvement as well. Hence, Veterinary Public Health has become a much more active field of enquiry and is involved with human health that it was before. Furthermore veterinary public health activities involve a diverse range of functions within the public, which reflects the broad community interest between veterinary and human medicine (Christensen, 1996; King and Khabbaz, 2010). So far there is no uniform documented evidence of awareness on zoonotic diseases among the public.

A number of animal diseases like Anthrax, Brucellosis, Rabies, Bovine tuberculosis and Cysticercosis are considered to be important diseases with their significant zoonotic potential. Along with these diseases a number of other diseases are there which may be transmitted to human beings through contamination during production, processing and handling of food products of animal origin. Further human activities like working with animals and in their sheds, improper disposal of waste from animal sheds, skinning of infected animals, slaughtering of diseased animals, disposal of infective material from the diseased animals and poor personal hygiene practices have been reported to be important risk factors contributing to frequent outbreaks of zoonotic diseases in humans.

Lack of awareness about the zoonotic diseases is one of the most important reasons for the outbreak of zoonotic diseases in people. When it comes to the reality people who are living in villages are often exposed to zoonotic diseases than the people who are residing in towns or cities. As agriculture and Animal Husbandry are the two important occupations of people in villages, which make them to expose to a number of dangerous zoonotic diseases.

In developing countries zoonotic diseases have become an important threat to human health (Wastling *et al*, 1999). As the zoonotic diseases have a direct effect on animal health and production, which may influence the economy of the country. Due to the zoonotic diseases of livestock the economy will be impaired through barriers to trade, increased cost of marketing the product to ensure it is safe for human consumption and the loss of market because of decreased consumer confidence (Mc Dermott and Arimi, 2002; Perry *et al*, 2002)

Even though the zoonotic diseases are having greatest importance as per as human health is concerned, most of them are undiagnosed, causing enormous suffering and death of thousands of children and adults annually (WHO, 2006). As zoonotic diseases are present since a long time, a number of factors are responsible for their existence. These include increase contact between animals and humans and this factor continues to play a major role in their persistence and emergence. Environmental changes due to natural and manmade calamities, customs and traditions followed by different people in various countries, increase in human population, migration of people from one place to another place especially from rural to urban areas and increased movement of animals towards human habitations due to deforestation are some of the factors for spreading of the zoonotic diseases. In most of the under developed and developing countries farming practices, low education level, culture and eating habits, presence of reservoir population, inadequate disease control programmes and lack of information about disease burden have been reported to be associated with persistence of zoonotic diseases (John *et al*, 2007 ; Asbjer, 2009)

Even though the government is practicing most disease control schemes including vaccination, organization of animal health camps, compensation to livestock owners for infected animals that are culled are not very feasible in most developing countries, mainly because of limited resources. Improving awareness among the livestock owners and proper disease diagnostic techniques could be helpful in prevention and control of zoonotic diseases. Hence an understanding about public awareness and practices of farmers have received much attention now a days could be a useful tool in developing and improving existing control measures (Swai *et al*, 2010; Mosalagae *et al*, 2011).

METHODOLOGY

Study area and population

This study was conducted in Proddatur (YSR Kadapa District, Andhra Pradesh) and its surrounding villages (Lingapuram, Khadarbadar, Kothapalli, Pallavolu, Chaapaadu, Seetharampuram, Alladapalli and Ponnapalli) from July 2014 to April 2015. The target population consisting of farmers of different education levels, agricultural workers, butchers, students, human and animal care workers who are working at village level and non health professionals like teachers, lecturers, engineers, bank and postal employees and revenue department employees of State government.

Objective and design of the study

The major objective of this survey was to assess awareness about the zoonotic diseases in the targeted population. A questionnaire based cross sectional study design was employed to look on the perception of the public on zoonotic diseases.

Sampling method

A simple random sampling method was employed to select the respondents. Evaluation method including a well designed interview and questionnaire. Respondents were selected based on education level and profession during questionnaire administration in different areas of Proddatur and in its surrounding villages. During the administration of questionnaire any member of the households who was willing to participate in the survey was taken as a sampling unit. Accordingly semi structured questionnaire supplemented with interview was administered to 1985 people, among whom 556 farmers, 343 agricultural workers, 131 butchers, 351 students, 173 teachers, 78 lecturers, 41 engineers, 83 revenue department people, 55 bank employees, 28 postal and telegraph employees, 62 employees of medical and health department and 84 employees from department of Veterinary & Animal Husbandry of State government.

A semi structured questionnaire which covered demographic characteristics, awareness and preventive measures against zoonotic diseases used to collect data. The purpose of the study as well as methodology was explained to the farmers and the other respondents and their oral consent was obtained before enrolment of their name in the study. Local language Telugu was used for the interview and on an average 10 to 15 minutes were spend with each respondents. The first section of the questionnaire covered demographic information including respondent's location, gender, age and education level. The second section consisting of questions that can evaluate the perception of the respondents about zoonotic diseases, their importance, transmission cycles and major clinical signs in humans and animals. In addition the respondents were also asked questions regarding the use of traditional medicines for the treatment of zoonotic diseases in their area. They were also asked if they had encountered anyone infected and / or had died of zoonotic diseases.

Data collection and analysis

Data was collected by using questionnaire and interviews to evaluate the percentage of awareness about the zoonotic diseases among the respondents.

RESULTS AND DISCUSSION

The link among humans, animal populations and the surrounding environment is very close in many developing countries, where animals provide transportation, draught power, fuel, clothing and source of protein in the form of milk, meat and eggs. In the absence of proper care, this linkage can lead to a serious risk to public health with huge economic consequences (WHO, 2010). Studying the perception of the community on the risk factors, routes of transmission and life cycle of zoonotic diseases is a crucial step towards the development and implementation of appropriate disease prevention and control strategies.

So far there is no documented evidence on the awareness of zoonoses among the rural and urban communities. Hence this study was taken up to assess the awareness on zoonotic diseases among the public.

In the present study people from different background were selected as respondents. Education qualifications of the respondents are given in table 1. A total; of 1985 respondents were selected during this study and all of them were educated in different levels starting from elementary education to post graduation. Everybody who involved in this study were in a position to read and write in their mother tongue i.e. Telugu. As per the study carried out about the awareness of zoonotic diseases among the rural and urban communities, it came to know that the knowledge regarding the zoonotic diseases (table 2) was very low (28.06%).During the interview part of this study, it came to know that most of the respondents were unaware about the fact of transmission of diseases between vertebrate animals and human beings. When they were explained about the zoonotic diseases, their transmission and symptoms, some of them especially butchers were recollected the incidence of fever for them after slaughtering of some of the animals. A number of zoonotic diseases anthrax, brucellosis, leptospirosis and bovine tuberculosis are prevalent in the livestock of this state. None of the respondents were aware about these diseases, their route of transmission and symptoms in humans. This study indicated a relatively lower level of awareness of the respondents in the study area when compared to the report of Grima *et al* (2012), who indicated that all the respondents in Addis Ababa, were mentioned about the zoonotic diseases like anthrax, taeniasis, bovine tuberculosis and brucellosis. The difference in overall awareness between these two study sites for the common zoonotic diseases could be due to variation in the provision of information about these diseases and food habits etc. In Addis Ababa, meat is a regular item in their food, where as in the area of present investigation people will consume meat but it is not a regular item in their diet.

Table.1 Educational qualifications of the respondents

Respondents category	Elementary education	High school education	Intermediate	Graduation	Postgraduation
Farmers	23 (04.13%)	418 (75.17%)	41 (07.37%)	72 (12.94%)	02 (00.35%)
Agricultural workers	148 (43.14%)	141 (41.10%)	54 (15.74%)	---	---
Butchers	42 (32.06%)	68 (51.90%)	21 (16.03%)	---	---
Students (who are studying now)	---	42 (11.96%)	174 (49.57%)	92 (26.21%)	43 (12.25%)
Teachers	---	---	---	68 (39.30%)	105 (60.69%)
Lecturers	---	---	---	---	78 (100.0%)
Engineers	---	---	---	28 (68.09%)	13 (31.70%)
Bank employees	---	---	---	01 (1.81%)	54 (98.18%)
Employees of posts & telegraphs	---	---	03 (10.71%)	21 (75.00%)	04 (14.28%)
Employees of medical & health department	11 (17.74%)	14 (22.58%)	08 (12.90%)	29 (46.77%)	---
Employees of veterinary & animal husbandry department	28 (33.33)	12 (14.28%)	28 (33.35%)	16 (19.04%)	---
Employees of revenue department	---	---	---	71 (85.54%)	12 (14.45%)
TOTAL	**252 (12.69%)**	**695 (35.01%)**	**329 (16.57%)**	**398 (20.05%)**	**311 (15.66%)**

Table 2 Awareness about the zoonotic diseases and hygienic measures followed by the respondents

Respondents category	Awareness about zoonotic diseases	Hygienic measures followed by the respondents (Farmers and agricultural workers only)			
		Washing of udder with disinfectant	Washing of udder without disinfectant	Cleaning of shed with disinfectant	Cleaning of shed without disinfectant
Farmers	112 (20.14%)	---	556 (100.0%)	---	556 (100.0%)
Agricultural workers	34 (09.91%)	---	343 (100.0%)	---	343 (100.0%)
Butchers	82 (62.59%)	---	---	---	---
Students (who are studying now)	43 (12.25%)	---	---	---	---
Teachers	64 (36.99%)	---	---	---	---
Lecturers	33 (42.30%)	---	---	---	---
Engineers	18 (43.90%)	---	---	---	---
Bank employees	26 (47.27%)	---	---	---	---
Employees of posts & telegraphs	12 (42.85%)	---	---	---	---
Employees of medical & health department	32 (51.61%)	---	---	---	---
Employees of veterinary & animal husbandry department	84 (100.0%)	---	---	---	---
Employees of revenue department	17 (20.48%)	---	---	---	---
TOTAL	**557 (28.06%)**	---	---	---	---

Table 3 Awareness about transmission of zoonotic diseases

Respondents category	Awareness about transmission of zoonoses from different species of animals					Awareness about transmission of zoonoses by consumption of	
	Dogs	Cattle	Sheep& Goats	Poultry	Pigs	Milk	Meat
Farmers	556 (100.0%)	---	---	24 (04.31%)	18 (03.23%)	---	76 (13.66%)
Agricultural workers	343 (100.0%)	---	---	10 (02.91%)	---	---	---
Butchers	131 (100.0%)	---	---	58 (44.27%)	46 (35.11%)	---	84 (64.12%)
Students (who are studying now)	351 (100.0%)	---	---	106 (30.19%)	79 (22.50%)	14 (03.98%)	101 (28.77%)
Teachers	173 (100.0%)	---	---	64 (36.99%)	43 (24.85%)	86 (49.71%)	24 (13.87%)
Lecturers	78 (100.0%)	---	---	53 (67.94%)	34 (43.58%)	48 (61.53%)	16 (20.51%)
Engineers	41 (100.0%)	---	---	28 (68.29%)	21 (51.21%)	12 (29.26%)	12 (29.26%)
Bank employees	55 (100.0%)	---	---	38 (69.09%)	29 (52.72%)	05 (09.09%)	02 (03.63%)
Employees of posts & telegraphs	28 (100.0%)	---	---	12 (42.85%)	08 (28.57%)	06 (21.42%)	05 (17.85%)
Employees of medical & health department	62 (100.0%)	14 (22.58%)	---	12 (19.35%)	06 (09.67%)	31 (50.00%)	48 (77.41%)
Employees of veterinary & animal husbandry department	84 (100.0%)	84 (100.0%)	79 (94.04%)	68 (80.95%)	52 (61.90%)	72 (85.71%)	64 (76.19%)
Employees of revenue department	83 (100.0%)	---	---	41 (49.39%)	33 (39.75%)	06 (07.22%)	14 (16.86%)
TOTAL	**1985 (100.0%)**	**98 (04.93%)**	**79 (03.97%)**	**514 (25.89%)**	**369 (18.58%)**	**280 (14.10%)**	**446 (22.46%)**

Most of the people eat meat only once in a week and occasionally twice. Because of increased meat consumption in Addis Ababa, the veterinary and human health care authorities might have supplied the information to the public about the potential threat to the health of human beings through the consumption of meat from infected animals and about the diseases that may be transmitted to humans through the infected animals.

The farmers and agricultural workers were asked about the zoonotic diseases that they know after explaining about the zoonotic diseases and their significant effect on human health (Table 3). The results revealed that very little percentage (16.24%) of the farmers and agricultural workers were aware about the diseases that are transmitted between animals and human beings.

A number of zoonotic diseases like anthrax, brucellosis, leptospirosis, and salmonellosis are prevalent in different areas of Andhra Pradesh, but all (100%) the respondents revealed that rabies was the disease known to them and most of the respondents were unaware about other zoonotic diseases. Similar type of observation was found with agricultural workers also. Increased awareness about the disease rabies among the respondents was due to the information provided by the news papers, due to the extension activities conducted by the employees of the departments of Veterinary and Animal Husbandry and Medical and Health services of the state government in the form of pamphlets and posters, through the elders in the family and further they also informed that the disease was present in their area because of that they came to know much about rabies. This study has shown patchy

awareness and poor knowledge of zoonotic diseases by the livestock keepers and others.

rabies (100%) followed by bird flu (25.89%) and swine flu (18.58%).

Table.4 Awareness about dog management

Respondents category	Number of dog owners	Feeding of offal		Movement of the animals	
		Raw	Cooked	Restricted	Freely allowed to move
Farmers	38 (06.83%)	38 (06.38%)	---	---	38 (06.83%)
Agricultural workers	18 (05.24%)	18 (05.24%)	---	---	18 (05.24%)
Butchers	---	---	---	---	---
Students (who are studying now)	---	---	---	---	---
Teachers	12 (06.93%)	08 (04.62%)	04 (02.31%)	11 (06.35%)	01 (00.57%)
Lecturers	23 (29.48%)	06 (07.69%)	17 (21.79%)	23 (29.48%)	---
Engineers	32 (78.04%)	08 (19.51%)	24 (58.53%)	32 (78.04%)	---
Bank employees	24 (43.63%)	11 (20.00%)	13 (23.63%)	24 (43.63%)	---
Employees of posts & telegraphs	11 (39.28%)	09 (32.14%)	02 (07.14%)	11 (39.28%)	---
Employees of medical & health department	05 (08.06%)	---	05 (08.06%)	05 (08.06%)	---
Employees of veterinary & animal husbandry department	03 (0357%)	---	03 (03.57%)	03 (03.57%)	---
Employees of revenue department	02 (02.40%)	---	02 (02.40%)	02 (02.40%)	---
TOTAL	**168 (08.46%)**	**98 (58.33%)**	**70 (41.66%)**	**111 (66.07%)**	**57 (33.92%)**

This low level of awareness is likely to expose them to an increased risk of contracting zoonotic diseases. This risk is more for farmers and agricultural workers as they are unlikely to take proper precautions or use protective clothing when dealing with abortions or calves with diarrhoea and during the farm activities like milking, cleaning the animal shed or during the slaughtering of animals in case of butchers. The study further revealed that not only the farmers and agricultural workers but also the field staff of departments of Veterinary and Animal Husbandry and Medical and Health Services of state government has a very poor knowledge about the other zoonotic diseases except rabies, anthrax and tuberculosis. This shows that the emergency preparedness for an outbreak of zoonotic diseases is low. Further diagnosis of zoonotic diseases is not a part of routine differential diagnosis in animal health diagnostic centres. Similarly zoonotic diseases like brucellosis and leptospirosis are not a party of differential diagnosis and testing protocols in human hospitals and consequently the diseases may be under reported and proper treatment may not be given (John *et al*, 2008). Limited knowledge at these levels is due to the general lack of data on zoonotic diseases and inadequate communication between veterinary and human health care professionals (Cripps, 2000). With regarding the limited knowledge and awareness about zoonotic diseases in the field staff of veterinary and medical and health departments, much can be done by education and training, to increase the knowledge and skills of the health professionals and for raising awareness by facilitating communication and inter disciplinary collaboration in sharing information between veterinary, public health, agricultural personnel and policy makers (Coulibaly & Yameogo, 2000) and the same can be used to guide the development of a co-ordinated, efficient and effective " One Health" approach to the diagnosis, treatment and prevention of zoonotic diseases.

All the respondents in this study were asked, whether they were aware of any diseases that can been transmitted from animals to human beings (Table 3). The results of the study revealed that very little percentage (28.06%) of respondents were known about very few zoonotic diseases. The most frequently known zoonotic disease among the respondents in the study area were

When the respondents were asked about the diseases transmitted to humans through different species of animals like dog, cattle, sheep, goat, pigs and poultry, all the respondents revealed that rabies was the disease transmitted from dogs and it was followed by bird flu from poultry and swine flu from pigs. Whereas employees from medical and health department (22.58%) and all (100%) the respondents from the department of veterinary and animal husbandry services revealed that tuberculosis was the disease transmitted to humans from cattle through consumption of not properly boiled milk. All the respondents from the department of veterinary and animal husbandry services revealed that brucellosis was another disease that may be transmitted through aborted cattle. Of the total respondents only4.93 percent of them know about tuberculosis, which can be transmitted from cattle to humans. This is in conjunction with the work of Amenu *et al* (2010) who reported that a high number of respondents had no detailed and accurate knowledge about zoonotic tuberculosis. There was a difference in the level of awareness with regard to zoonotic tuberculosis in the study groups where employees of animal and human health care departments have the highest awareness and the traditional livestock keepers and other categories of people have considerably less awareness. This might put them as the most vulnerable group as far as zoonotic tuberculosis is concerned. Ashford *et al* (2001) stated that in countries where bovine tuberculosis is common and pasteurization of milk has not been practiced widely, an estimated 10-15 percent of human tuberculosis cases are caused by *Mycobacterium bovis.* Among all the respondents veterinary health care workers were known about the disease brucellosis. This is in contrast to the report of Mihiret-ab (2012) who reported that 5.6 percent of the respondents were aware about the zoonotic significance of brucellosis in and around Dire-Dawa of Ethiopia an under developed country when compared to India. The absence of awareness about brucellosis in the present study area might be due to poor or absent awareness creation activities that should have been created by the medical and veterinary health care professionals. The relatively high percentage of awareness about zoonotic tuberculosis and brucellosis among the medical and veterinary health care personnel respectively might be due to the information provided by their respective departments.

In the present investigation the respondents were asked about the diseases that may be transmitted by consumption of milk and milk products (Table 3). Among the total respondents only 14.05 percent people were known about the disease tuberculosis which may be transmitted to humans through consumption of unpasteurized milk. The awareness about milk borne tuberculosis was more in the employees of medical (50.0%) and Veterinary (85.41%) health care personnel when compared to other categories of respondents. Among the others lecturers (61.53%) and teachers (49.7%) were well aware about the zoonotic potential of tuberculosis. The farmers and agricultural workers participated in this study were not having any knowledge regarding the zoonotic tuberculosis but they were well aware that food poisoning may occur if spoiled milk or milk products are consumed. The milk production practices that are followed by these people such as lack of appropriate milking areas and milking technique will influence the level of contamination of milk at farm level (Grimaud *et al*, 2007). As observed in other studies (Hidayet and Mehmet, 2004, Millogo *et al*, 2008) all the dairy farmers practiced hand milking with a relatively higher percentage of them milking cows in open areas, may be considered as one of the direct methods of milk contamination. Some of these organisms contaminating milk may include those organisms that are potentially zoonotic such as *Mycobacterium bovis*, *Salmonella* etc. Thus the milking practices used by the livestock owners in rural areas constitute an important risk factor for exposure to zoonotic pathogens.

The respondents in this study were asked with regarding the zoonotic diseases that may be transmitted by consumption of meat and meat products (Table 3). The results revealed that 18.23 percent of the people stated that food poisoning might be occurred if they consume spoiled or contaminated meat, but none of them were specific about the diseases transmitted through meat consumption. Except the employees of animal health care (88.8%), who reported that anthrax is an important zoonotic disease that may be transmitted by consumption of meat from infected animals. Although no out breaks of food poisoning associated with consumption of contaminated meat and meat products have been recorded in and around Proddatur, respondents in this study area were having little knowledge about food poisoning but relatively low awareness was observed with regarding the meat borne zoonotic diseases as compared to a study conducted by Amenu *et al* (2010) who indicated that 96.3% of the respondents knew that contaminated meat and raw meat were vehicles for disease transmission to humans. The difference could be due to lack of information about the meat borne zoonotic diseases in the current study area. To safe guard the public health an intensive awareness creation programmes should be undertaken in the area regarding the danger associated with consumption of contaminated and infected meat which predisposes to anthrax, taeniasis and also to other serious food borne pathogens.

The farmers and agricultural workers who owned dairy animals were asked about the hygienic measures that they follow during milking of the animals (Table 2). All the respondents (100%) informed that they will wash the udder of the animals before milking with the water that is available with them without addition of any disinfectant. Further all the respondents (100%) were also informed that the shed of the animal will be cleaned with ordinary water. During this study it was observed that most of the animals were kept outside without any shelter under the tree and very few of the farmers and agricultural workers are having sheds without proper flooring for their animals. These conditions may be responsible to expose the animals to pathogenic microbes. During the investigation it came to know that most of the livestock owners were not aware that improper maintenance of animal sheds is the major cause of mastitis which is a common infection among the milch animals. These dairy farmers were neither informed nor motivated to take the simple precautions necessary to protect themselves, their families, workers and consumers. From this study 80 percent of the livestock owners indicated that animal health workers are important in raising awareness on milk borne zoonoses. Similarly the butchers who involved in this study were asked about the zoonotic diseases that may be transmitted during slaughtering of the animals and while handling of the carcasses. The results revealed that they were unaware of the diseases which may be transmitted through their occupation. This lack of awareness may be due to lack of information about the threat to them through the zoonotic diseases. Hence veterinarians are a crucial link in keeping dairy farmers and butchers fully informed about the ways to reduce the risk of transmission of zoonotic diseases. In addition proper disposal of infected milk or dairy products, contaminated or infected meat, aborted material and use of hygienic procedures during milking, slaughtering of animals and while handling of meat are extremely important steps in successful control of zoonotic diseases (Al-Majali *et al*, 2009). These general hygienic practices and zoonotic disease control programmes need to be integrated in the milk and milk meat production process particularly at the small holders level in order to prevent transmission from animals and animal products since most of the zoonotic pathogens are maintained in animal reservoirs (Zinsstag *et al*, 2007)

In this study 8.46 percent of the participants owned dogs and 35.11 percent of them informed that they allow their dogs to freely move outside the premises of their houses (Table 4). The presence of large number of non restricted dogs plays a crucial role not only in transmission of rabies but also in contaminating the environment with tapeworm eggs which could subsequently infect humans. Among the dog owners 71.3 percent of them reported that they feed their dogs with offal's collected from the slaughter houses and retail meat shops without proper cooking. Feeding of viscera of the infected animals to dogs was reported to facilitate the transmission of *Echinococcus granulosus* and this may increase the risk of transmission of the same infection to humans (Moro and Schantz, 2009) This was supported by the results of the investigation carried out by Carmena *et al* (1996), who reported that the type of feed given to dogs was found to affect the prevalence of cystic echinococcosis in humans. In order to eliminate the infection risk to humans living in close association with the infected dogs, either euthanasia of such dogs or chemotherapy under strict supervision of veterinarians has been recommended (Ekerte and Peter, 2004).

CONCLUSION

Among the different zoonotic diseases that are existed in the nature only rabies was known to all the respondents of this study. The absence of awareness about other zoonotic diseases in the present investigation area might be due to poor or absent of awareness creation activities that should have been done by medical and veterinary health care professionals of the state government. The level of awareness about rabies in this study was good but improvement is very much essential in the management and proper handling of dogs. Conclusively the public awareness about some common zoonotic diseases like bovine tuberculosis, echinococcosis, taeniasis, brucellosis and anthrax and their means of transmission was very low. Awareness should be created among the public regarding the routes of transmission of zoonotic diseases. The public health authorities of Ministry of Health should give due emphasis for public health education and creating awareness among them on various preventive and control measures against the zoonotic diseases that are already existed in the area. In many developed countries zoonotic diseases have been virtually eliminated because of effective control measures including human and animal vaccination, veterinary supervision of animal slaughter and quality control of animal products and also with awareness campaigns for the public.

Continued education and awareness bringing programmes and collaboration between veterinary and human health care professionals were considered to be important to bring awareness among the public about zoonotic diseases and to combat those diseases. Therefore efforts by both veterinary and human health care professionals should focus on effective ways of improving public knowledge of zoonotic diseases and their transmission, the development of improved herd disease management plans and the establishment of food safety systems.

In conclusion to deal with zoonotic diseases like brucellosis, anthrax, bovine tuberculosis, taeniasis, echinococcosis and various other food borne zoonotic diseases, knowledge of risk factors is very important in prevention and control of these diseases. Thus an extension education campaign particularly in the rural areas could be helpful in decreasing the incidence of zoonotic diseases. In addition surveillance studies of the disease must be included in to prevention and control programmes at local and national levels.

In the present investigation the overall percentage of awareness and practices with respect to zoonotic diseases was not satisfactorily but differed significantly between respondents' educational level and experience. Though farmers and agricultural workers with primary level of education and above that and the other categories of respondents with different levels of education, no difference was observed among them with regarding the awareness about zoonotic diseases. This observation reflects the source of information about zoonotic diseases where non formal education through extension workers and information through news papers and television were mentioned as important source of information on zoonoses.

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