Research in
AGRICULTURE, LIVESTOCK and FISHERIES
ISSN : P-2409-0603, E-2409-9325
An Open Access Peer-Reviewed International Journal

Article Code: 0387/2022/RALF
Article Type: Research Article

Res. Agric. Livest. Fish.
Vol. 9, No. 3, December 2022: 307-312.

MILK PRODUCERS' AWARENESS OF MILK-BORNE ZOONOSES IN BAGHABARIGHAT MILK SHED AREAS OF BANGLADESH

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ARTICLE INFO

Received
25 November, 2022

Revised
26 December, 2022

Accepted
28 December, 2022

Online
January, 2023

Key words:
Milk-borne zoonoses
Dairy farmers
Awareness
Milk hygiene
Bangladesh

ABSTRACT

The present study was undertaken to assess the farmers' knowledge and awareness of milk-borne zoonoses in Bhaghabarighat Milk Shed Areas of Bangladesh. A cross-sectional study was carried out in randomly selected 270 dairy farmers in Pabna and Sirajgonj district. A pretested structured questionnaire was used to collect information from respondents regarding different aspects of milk-borne zoonosis. Data were collected from farmers, with inclusion criteria of having at least 2 cows with farming experience of more than 6 months. The study showed that almost 80% of the farmers were unable to name any milk-borne zoonotic disease, whereas rest of the farmers had a little bit knowledge about milk-borne zoonoses those were relatively educated and experienced farmers. About 23% of the farmers had no knowledge of the fact that raw milk can be a potential source of disease transmission. The majority of the respondents (99%) did not receive any formal training about zoonotic diseases. Among the respondents' awareness levels of milk-borne zoonoses were 4.5%, 9.2%, 17.4%, 54.84% and 82.1% for brucellosis, anthrax, tuberculosis, mastitis and diarrhea, respectively. The behavioral practices of dairy farmers observed to increase the risk of milk-borne zoonoses transmission were: consumption of raw milk (13%), lack of cooling system (100%), no milk routine testing, and none farmers' did medical check-up. 87% of the respondents preferred to use boiled milk. The farmers' overall knowledge about milk-borne zoonoses was inadequate. In conclusion, awareness and training programs about milking hygiene and handling can improve disease control and reduce the public health risk of milk-borne zoonoses.

To cite this article: Shanta S. A., M. Aktaruzzaman, M. S. Ahmed, M. R. Hasan and M. A. Islam, 2022. Milk producers' awareness of milk-borne zoonoses in Baghabarighat milk shed areas of Bangladesh. Res. Agric. Livest. Fish. 9 (3): 307-312.

INTRODUCTION

Infections that are naturally transmissible from vertebrate animals to humans and vice versa are classified as zoonoses (WHO, 2009). Zoonotic pathogens can be bacterial, viral or parasitic, and can spread to humans by direct contact with domestic, agricultural or wild animals, or through food and water. It has been estimated that about 61% of human infections are zoonotic (Taylor et al., 2000). In the livestock sector, different farm animals naturally carry a wide range of zoonotic pathogens. In the dairy sector, zoonotic pathogens are normally present in dairy animals, raw milk, milk products, meat and the farm environment but are often difficult to diagnose. These zoonoses can be transmitted to humans in several ways that include consumption of infected raw milk and coming in contact with infected dairy animals, animal products and infected farm environments (Zinsstag et al., 2007). However, most milk-borne zoonoses are mostly acquired through consumption of infected milk.

Milk-borne zoonoses are of both public health and economic importance. In addition to causing serious economic losses in dairy cattle production, they pose a major barrier for trade of animals and animal products, and this could seriously impair socio-economic progress especially in developing. These countries often have inadequate infrastructure and limited financial resources to control animal diseases. Furthermore, the level of awareness among farmers of the economic and public health importance of zoonotic diseases in most of these countries is low, and this further stifles efforts to control these diseases (Ekuttan, 2005; Munyeme et al., 2010).

In Bangladesh, there is no documentation of milk producer's awareness of milk-borne zoonoses except the recent report of Islam et al. (2020) in the same study areas. Lack of awareness of milk-borne zoonoses can put the lives of milk producers, farm workers and their family members at risk of infection. Now a day, food safety is very important issue over the world including developing country like Bangladesh. The objective of this study was to assess milk producers' awareness of milk-borne zoonoses in selected smallholder dairy farms.

MATERIAL AND METHODS

Study setting and study population

This study was conducted in Baghabarighat Milk Shed Areas (BMSA) of Bangladsh. Shahjadpur and Ullapara upazilas of Sirajganj district and Bera and Sathia upazilas of Pabna district were selected for this study. A total number of 270 dairy farmers were selected randomly from four upazillas for questionnaire survey. Two villages from each upazilla having high density dairy farmers were selected for this study. The farmers having at least two lactating cows had included for the study. Data on dairy farmer's socio demographic characteristics, milking practices and farmer's awareness on cattle milk borne zoonoses.

Data collection

A cross-sectional study was conducted among the personnel involved in the milk chain system in Baghabarighat milk shed areas.

Data was collected using pretested questionnaire and checklist for observation in the dairy farms. The questionnaires encompassed questions to assess awareness of milk borne disease and practicing behavior of dairy farmers in Bangladesh Milk Producer' Cooperative Union Ltd. The checklist included observations related to barns and collection centre.

Data analysis

All data were entered in Microsoft Excel spread sheet, coded and transferred to Epi info for analysis. Descriptive statistics such as frequencies, distribution and percentages were used to summarize the data.

Ethical consideration

No ethical approval was required for this study as it is a survey based study. However, the data were collected after obtaining consent from all of the farmers involved in the study.

RESULTS

Socio demographic characteristics of the respondents

A total of 270 smallholder dairy farmers were interviewed in this cross sectional study in 4 Upazilas of Sirajganj and Pabna district. Male comprised 94.07% of the respondents while the remaining 5.93% were females of different age and educational levels. Most of the respondents, 60.11% (n=162) belong to the age group of 36-50 years, this indicates that majority of the respondents were in potential productive age. Regarding the educational level, 50.37% (n=136) were illiterate, 31.11% (n=84) attended primary education, 15.56% (n=42) attended secondary education and only 2.96% had college or university courses (Table 1).

Table 1. Socio demographic characteristics of the respondents

Parameter	Category	Frequency	Percentage
Sex	Female	16	5.93
	Male	254	94.07
Age	Young (<35 yrs)	36	13.22
	Medium (35-50 yrs)	162	60.11
	Old (>50 yrs)	72	26.67
Occupation	Only dairy	12	4.44
	Dairy + Agriculture	198	73.33
	Dairy + Agriculture+ Service	15	5.56
	Dairy + Business	15	5.56
	Dairy + Labour	30	11.11
Education	Illiterate	136	50.37
	Primary education	84	31.11
	Secondary education	42	15.56
	College and above	08	2.96

Milk producers' awareness of zoonotic diseases

When asked generally on their awareness of cattle zoonoses, about 48 % of dairy farmers were aware about it (Table 2). Dairy farmers were generally aware of brucellosis (21.2%), tuberculosis (16.1%) and anthrax (16.1%). When asked specifically on their awareness of milkborne zoonoses, only 41.2% were aware. Of those who were aware, 20% were able to name at least one relevant milk-borne zoonotic disease such as brucellosis (4.5%), tuberculosis (17.4%) and Anthrax (9.2%) (Table 2). Dairy farmers responded that mastitis, and diarrhoea were milk-borne zoonoses.

Table 2. Dairy farmers' awareness of milk-borne zoonoses

Parameter	No. of Farmers	Percentage (%)
Aware about Cattle zoonoses	129	48.1
Aware about Milk borne zoonoses	110	41.2
Named at least one who were aware	22	20
Name of the zoonoses		
Brucellosis	1	4.5
Anthrax	2	9.2
Tuberculosis	4	17.4
mastitis	12	54.84
Diarrhea	18	82.1

Transmission modes of milk-borne zoonoses

Most dairy farmers (87.2%) indicated that the most important route of contracting milk-borne zoonoses is through ingestion of infected raw milk (Table 3). Low percentages of dairy farmers indicated that they could be infected with zoonoses through ingestion of infected milk, contact with infected animals and from contaminated environment. Most of the dairy farmers (81.6%) indicated that animal health workers are important in raising the awareness on milk-borne zoonoses with human doctors, the media and schools also cited as important.

Table 3. Transmission modes of milk-borne zoonoses

Parameter	No. of farmer	Percentage (%)
Ingestion of infected raw milk	208	77.03
Ingestion of infected meat	94	35.1
Contact with infected animals	89	33.01
Contaminated environment	35	13.5
Occupational hazard	67	25.2

Behavioral practices of dairy producers which could expose them and the public to milk-borne zoonoses

All farmers (100%) indicated that part of the milk they produce is used for household consumption; sell to public and high percentage of milk is used to sell to Milk Vita (Table 4). There was no cooling facility for storage raw milk among the studied farms. About 13% farmers indicated that they consume raw milk. No dairy farmers indicated that they routinely test for milk-borne zoonoses in milk and routinely go for medical check-ups. However, most farmers (85.19%) indicated that they dispose of milk from sick cows (Table 4).

Table 4. Behavioral practices of dairy producers

Variable	No. of farmers	Percentage (%)
Uses of milk (Household+ sale to public + sale to Milk Vita)	270	100
Dispose of milk from sick animal	230	85.19
Selling of sour milk	31	11.48
No use of milking machine	270	100
Absence of cooling facilities	270	100
Consumption of raw milk	36	13.33
No Routine test for milk borne zoonoses	270	100

DISCUSSION

This study was seated to assess milk awareness producers on milk-borne diseases. Microbial analysis was out of scope of this study, but it was assured that the milk produced was inclined to microbial contamination during pre and post-harvesting milk handling practices, prolonged storage duration and transportation to the collection center. It is indorsed that the dairy farmers before milking should clean barn, wash and dry the udder with clean towels regularly on the daily basis.

Milk-borne zoonoses awareness was low in both sectors, though some dairy farmers were aware, they failed to name them. Similar observations were noted in Kenya (Ekuttan, 2005) where dairy farmers were generally aware of zoonoses but insufficient knowledge on specific milk-borne zoonoses. However, smallholder dairy farmers in the survey area were particularly little bit aware of brucellosis, tuberculosis, anthrax compare to mastitis and diarrhea. In Tanzania, brucellosis, anthrax, tuberculosis and rabies were also reported to be the top four zoonoses known by smallholder dairy farmers (John et al., 2008). Awareness on brucellosis, particularly with regard to commercial dairy farmers, could be attributed to its importance as a cause of production losses in terms of calf losses and decreased milk production by aborting cows.

In addition, as a result of the gradual increase of the national prevalence of brucellosis, compulsory calf-hood vaccination using *Brucella abortus* S19 vaccine and stamping out policy have been enforced to control the disease in commercial dairy herds (Madsen, 1989). This is likely to have increased the awareness of brucellosis in that sector. Ingestion of infected raw unpasteurized milk was cited as the most possible way of contracting milk-borne zoonoses, and this agrees with earlier observations (Chahota et al., 2003). However, as reported earlier (Ameni and Erkihun, 2007), the awareness of other possible ways of contracting milk-borne zoonoses such as ingestion of infected meat and regular contact with infected animals and afterbirths was low. Despite being aware of the most possible way of contracting milk-borne zoonoses, dairy farmers consume raw milk at household level and sell raw milk to the local public, and this concurs with a previous report (Khan and Usmani, 2005).

In spite of selling raw milk to the local public, smallholder dairy farmers lacked cooling facilities, and similar observations have been reported elsewhere (Grimaud et al., 2007; Millogo et al., 2008). Cooling milk after milking reduces the risk for the growth of both pathogenic and spoilage bacteria (Quinn et al., 2002). Where milk is produced under poor hygienic conditions and is not cooled, the main contaminants such as lactic acid producers cause rapid souring. Lactic acid has an inhibitory effect on pathogenic bacteria; however, this cannot be relied upon to provide a safe milk product (Nangamso, 2006).Alarming matter is that the farmers themselves do not commonly test for milk-borne zoonoses. Similar observations have been reported in Nigeria where routine testing of zoonoses is not regularly done, thus exposing their prisoners who herd animals to serious public health implications (Junaidu et al., 2008). Due to lack of efficient zoonosis surveillance and food safety, the risk for zoonoses transmission is increasing, particularly in resource-limited countries (Acha and Szyfres, 2003; Zinsstag et al., 2007; Marcotty et al., 2009). Furthermore, as observed by Junaidu et al. (2008), routine medical check-up for zoonoses by dairy farmers, farm workers and their families is not a common practice, and when they fall sick, zoonotic diseases are unlikely to be considered among the differential diagnoses.

Milk production practices such as lack of appropriate milking places and milking techniques influence the level of milk contamination at farm level (Grimaud et al., 2007). As observed in other studies (Hidayet and Mehmet, 2004; Millogo et al., 2008), all smallholder dairy farmers studied practiced hand milking with a relatively higher percentage of them milking cows in open kraals, which constitutes one of the direct methods of milk contamination. Higher microorganisms have been reported in milk from hand-milked compared to machine-milked cows (Filipoviet and Kokaj, 2009). Some of these microorganisms contaminating milk may include those that are potentially zoonotic such as Salmonella spp. Thus, the milking practices used in smallholder dairies constitute an important risk factor for exposure to zoonotic pathogens.

Without information on milk-borne zoonoses, dairy farmers are neither informed nor motivated to take the simple precautions necessary to protect themselves, their families, workers and the public. In addition, proper disposal of infected milk or dairy products, aborted materials and use of hygienic procedures during milking and milk storage are extremely important steps in successful control of zoonotic pathogens (Al-Majali et al., 2009). These general hygienic practices and zoonotic disease control programs need to be integrated in the milk production process particularly at the smallholder level in order to prevent transmission from animals and animal products since most are maintained in the animal reservoirs (Zinsstag et al., 2007). While successful control of the milk-borne zoonoses rests with multi-stakeholder involvement (Brook and McLachlan, 2006), farmers play a critical role in the implementation phase whose success hinges on farmers' level of awareness of the importance of such diseases.

CONCLUSIONS

This study established that the level of awareness to milk-borne zoonoses in smallholder dairy farmers. Smallholder farmers are mostly not aware of the risk of contracting zoonotic pathogens from consuming raw milk. Thus, educating these farmers on the methods to control milk-borne zoonoses in animals and to minimize human exposure from animals and animal products will reduce their incidence in smallholder dairy farms. Therefore, results of this study appear to imply that by improving the level of awareness for zoonoses, teaching and training of dairy farmers, especially from smallholder sectors in Bangladesh could bring about improved animal health, productivity and food safety.

ACKNOWLEDGEMENTS

The authors are grateful to the dairy farmers for agreeing to participate in this study. We also appreciate the animal health assistant of MilkVita, Baghabarighat, Sirajgonj for selection of the dairy farmers in the study area.

COMPETING INTEREST

The authors declare that they have no competing interests.

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