

PROGRESS REPORT**Progress report towards preventing cow rabies in Mallard, Iran: policies and monitoring measures**

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Abstract

Rabies is one of the most common viral and fetal diseases between humans and animals known as a zoonotic disease. Approximately 99% human rabies deaths occur in developing countries. Health care and follow up programs conducted for all the rabies cases are one of the important priorities for health care system in Iran to prevent the rabies incidence. The purpose of this study is to describe the cow rabies status and the health care programs conducted to the successful elimination of this deadly disease in one of the largest cowsheds in Mallard city in Iran during 2014.

After founding the rabies incidence in one of the largest cowsheds in Mallard city in Iran, the crisis committee was held immediately and control measures including isolation, complete quarantine, vaccination of residents, and other sanitation measures were achieved in cooperation with the responsible organizations. During this incidence, 23 calves, cows and heifers were died.

By conducting an integrated program and method, the numerous stakeholders contributed to the successful elimination of this fatal disease. In order to control the rabies, it is essential to educate the public on the prevention of the disease, especially in areas where the disease is more prevalence. Therefore, cooperation between the institutions involved in the disease control and planning for

emergency disease eradication are essential to prevent the rabies infection among pets, especially livestock.

Keywords: Rabies; Incidence; Mallard; Cow; Cowshed

Introduction

Rabies is one of the common viral diseases between humans and animals known as a zoonotic disease that is highly fatal and generally affects on the warm-blooded animals (1-3). Although human rabies is considered as a serious health problem in the developed countries, 55000 human deaths is reported annually in the developing countries (4). Rabies is a vaccine-preventable viral disease which occurs in more than 150 countries and regions (5). The disease is currently found in all continents except Antarctica, but more than 95% of rabies human deaths occur in Asia and Africa. The disease causes tens of thousands of human deaths and the disability of millions people (DALYs) worldwide that its annual cost is approximately up to US \$8.6 billion. The main source of human rabies is dogs and control of the rabid dogs is possible by vaccination (6-9).

The cause of rabies is the neurophysiological virus named lyssaviruses (10). Rabies infection manifests in two forms including furious rabies and paralytic (dumb) rabies. Diagnosing furious rabies type based on the disease symptoms is easier. Due to lack of its aggressive symptoms, dumb type may be undiagnosed and make the disease more dangerous (3). Rabies is usually transmitted by saliva, Licking, clawing and scratching from the rabid dogs and also Inhalation of aerosolized rabies virus and receipting organ transplant infected with this virus (11-13). Rabies transmission through the gastrointestinal tract appears to be impossible, but carnivorous animals may rarely be infected by rabid animal carcasses. Because of isolating rabies virus from the fetus, uterus, and ovaries of a female animal, the rabies transmission by the placenta isn't impossible (10). After personal exposure to the rabies virus, immediate anti-rabies treatment leads to patient survival. While, due to the lack of awareness about the side effects of disease or neglect of them, delay in diagnosis of an exposed person to rabies until symptoms appear leads to his/her death (14, 15). Based on the rabies incidence severity, Iran country

is classified in the high-risk group (16). Due to the high mortality rate (100%) among rabies human, the control of this disease is one of the most public health priorities in Iran (2) and the follow up all affected animals is seriously for the rabies prevention Therefore, in spite of increasing the number of rabid animals, the incidence of rabies diseases among human has been decreased. In Iran, the annual trend of animal bites is increasing and the number of bites has increased from 35 cases in 1986 to 198 cases per 100,000 persons in 2015. Of the 1,600,000 reported bites, 81% were due to the dog attack (89% conducted by domestic dog). It was found that date, weasel and hybrid mice are the causes for transmitting human rabies in Iran (16).

The major organizations involved in the rabies control program in Iran are the National Veterinary Organization, the Ministry of Health, the Ministry of Education, the Ministry of Economic Affairs and Finance, the Ministry of Interior, the Municipality, the Faculty of Veterinary Medicine, and the Pasteur Institute, etc. which according to the adopted regulation contribute to the control, prevention, diagnosis and treatment of rabies. Based on this planning, all mentioned organizations play an important role in the rabies control. The purpose of this study is to describe a rabies incidence occurred in one of the largest cowsheds of Mallard in 2014. This paper describes the control methods and the actions taken by various organizations and institutions to prevent the disease progress and control the rabies incidence.

Materials and Methods

Founding the rabies cow

On May 28, 2014, a report was received from a heifer death, and after sending the sample to the Pasteur Institute, the rabies disease was confirmed. Based on the definition and the measurable scales, the rabies disease is confirmed by neurological symptoms, dyspnea, and other symptoms in animals, and also, results obtained from the reference laboratory. After death, the heads of three cows suspected to rabies were separated from

their carcasses and sent to the Pasteur Institute laboratory which their results were positive. Almost in one month, 23 calves, cows and heifers died.

Coordinated measures and monitoring system

Because of confirming the rabies occurred in one of the largest cowsheds in Mallard city in Iran, and death of the numerous cattle (120 cattle), the need to cross-sectoral cooperation for disease control was very important. The city governorate was immediately notified by the health and veterinary networks. Therefore, the Crisis Committee was immediately held at the Mallard governorate office with the presence of the governor, health network, veterinary, agricultural jihad, prefectures, municipalities, law enforcement, environmental protection, etc.

All organizations involved in the control rabies program had an active participation in this phenomenon. Municipality provide equipment such as machine for burying rabies cow's carcasses, Environmental Protection Agency investigated the transmission possibility of disease to the wildlife in the area, Veterinary Office had an active presentation for protection of other livestock against rabies and follow-up the laboratory test results. This intergroup coordination could improve the outcomes of the monitoring assessments

After announcing the rabies incidence, the possible routs of transmission were evaluated by dispatching an inspection team including the experts from the Veterinary Office and the Health Network. Due to passing the water outlet channel of Karaj Dam through this cowshed, it is possible that the invading animals have been entered the stable by the channel. Therefore, inlet and outlet channels were immediately blocked by lace. With respect to founding several fox nest in the surrounding of the cowshed, the inspection team was suspected to transmit the rabies by the fox. Therefore, all fox nests were immediately destroyed. Unfortunately, any fox was not found for animal's brain biopsy and sending it to the Pasteur Institute. After confirming the positive brain biopsy of the first infected cow, all residents were immediately vaccinated against rabies at the five times, and it was emphasized on

mandatory wearing gloves and musk by people who had the direct contact with animals also, individual protection kits were provided for the livestock workers in Mallard. In the first, the died cow carcasses were burned by the veterinarian, but due to increasing air pollution, based on the health network order the died cow carcasses were buried at a depth of 5 meter and lime water was poured on them. With beginning the first symptoms of rabies, the diseased cows were immediately separated from healthy cows. Rabies occurrence was announced to the surrounding farmers, alert status was declared and complete quarantine was conducted by the Veterinary Office also, without the veterinary license, people transportation and using the animal products were impossible.

According to the Governance Crisis Committee, it was decided to install the fence around the cowshed also, water inlet and outlet channels were sanitized. The elimination of stray dogs was conducted until Up to 10 km radius from the infected cowshed. By successful performance of programs, rabies incidence was controlled in the mentioned cowshed therefore, rabies transmission to the other surrounding people and cowsheds was impossible.

Table 1. Conducted measures during the rabies incidence in a Mallard cowshed

Obtained results	Date
Receiving a report of the rabies illness in a heifer, with nerve symptoms, screaming, banging his head, advising the farmer to separate the patient's livestock from the rest of the animals	Sunday May 18, 2014
Losing a heifer, the health experts referring to the cowshed and monitoring the carcass burial	Monday May 19, 2014
Losing a calf, sending samples to the Pasteur Institute, referring the experts of the Health Care Network to the cowshed and monitoring on carcass burial	Tuesday May 20, 2014
Loss of one calf and appearance of the rabies symptoms between two calves and one heifer Receive a positive results a sample sent to the Pasteur Institute	Wednesday May 21, 2014
Receiving the report of two cattle being died	Saturday May 24, 2014
Receiving a report of a cow's death	Sunday May 25, 2014
Receiving a report of a cow's death	Wednesday May 28, 2014
Receiving the report of three cattle being died	Thursday May 29, 2014
Receiving a report of a cow's death	Friday May 30, 2014
Losing a heifer	Sunday June 1, 2014
Receiving report of two cattle being died	Tuesday June 3, 2014
Losing a heifer	Friday June 5, 2014
Losing a heifer	Friday June 6, 2014
Five heifers lost	Saturday June 7, 2014
Observing a suspicious cow	Sunday June 8, 2014
Observing a cow lost and a suspected case	Wednesday June 18, 2014
Receiving a report of a cow's death	Friday June 20, 2014

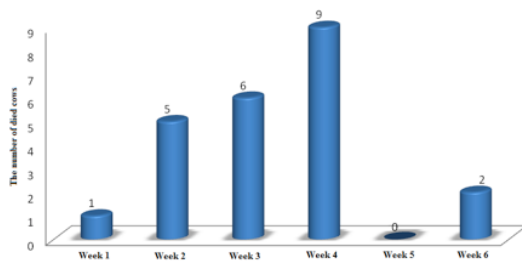


Figure 1. The epidemic diagram of the rabies incidence in the affected cowshed

Discussion

This study investigates the rabies incidence in the affected cowshed in the Mallard city, in Iran and different actions were done by various responsible organizations for control of the rabies incidence.

After receiving an incidence report and receiving a positive result from a sample sent to the Pasteur Institute, a crisis committee was held to make effective interdepartmental measures in order to control the rabies incidence by preventive measures such as vaccination for all residents in the area.

Based on the results of previous studies conducted in Iran, domestic animals are the main source of rabies (16, 17). For example, in a study conducted in Tehran, more than 81% of bites were caused by dogs and 0.3% by foxes. Epidemiological studies of animal bites in Ferdows city also showed that large and small stables located in the residential and marginal areas of many cities, as well as unattended several dogs breeding by farmers increase the chance of human and other animals being bitten by dogs (18). In this study, due to the presence of several fox nests in the surrounding of the cowshed, it seems that the disease has been transmitted by the fox. A rabies incidence in Malopolska, Poland in 2010 showed that rabies has been found more in the foxes than other wild animals as well as rabid cattle has occurred due to the rabies incidence among fox population (16). The results of a 10-year epidemiological study on rabies disease in the northern provinces of the country show the highest incidence of rabies in cows (21). Due to occurring two rabies incidence and rabies transmission from dogs to domestic livestock in China in 2015, it was emphasized on forced vaccination of dogs and public training to eradicate the rabies transmission (23). In another study in Canada, the rabies incidence among raccoons was led

to the presence of responsible local, provincial, and federal agencies to control this incidence by updating the policies, improving monitoring system, holding the public education course, and providing the huge vaccinations for domestic and wild animals. In this situation A cross-sectoral coordination method was effective in the control of rabies raccoon (24). The rural part of Mallard has many fruit orchards and the main residual occupations are agriculture and animal husbandry therefore, dog breeding for the protection of their livestock and orchards is necessary. Dogs contact with the wild animals especially wolves and other wild animals is the most reason for rabies transmission. So that, vaccination, restricting of domestic dogs and livestock and dealing with stray dogs are necessary (19, 20). Totally, for eradication of rabies, it is suggested to be active the disease care system, eliminate the stray animals, immunize pets, and raise public awareness about this disease (21). Because of the economic costs of livestock loss and emphasizing on the importance of the role of dogs in rabies transmission and its incidence among livestock, dogs control as well as their vaccination, especially in the rural areas is recommended to prevent the rabies epidemics among dogs, pets, and human populations (22). The support of rabies monitoring system and cooperation with other organizations are very importance for the incidence control. This incidence had the useful lessons for the authorities to respect the role of Inter-organizational collaborations. Therefore, increasing the scientific and practical capacity of health care employees and supporting the rabies care system and co-operation with other organizations seems to be necessary (18). A health approach is critical to consider the medical challenges about successful elimination of the zoonotic diseases. Due to rabies incidence experience in Malaysia, a team from veterinarians, doctors, and environmental health experts was formed to prevent that the rabies incidence become a national strategy. The strategy of raising public awareness by using trained health workers leads to preventive efforts against rabies. The promotion of public awareness during the Malaysian rabies incidence was led to the effective control of this incidence during two months after its onset (25). With respect

to importance of rabies between human and livestock as well as high mortality in humans, fortunately, effective steps have been taken to prevent human disease and raise public awareness about the rabies disease and timely refer to the health-care systems for getting vaccination. However, this mentioned incidence was led to severe impact on livestock and had considerable economic damages. According to the obtained results from this study, rabies

reduction or its eradication are possible by training and intervention programs for livestock owners, emphasizing on vaccination of guard dogs, stables sanitation and fence installation around stables.

Conflict of interest

The authors have no conflict of interest to declare.

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