



Correct Identification of Animal Host Species Is Important in the Diagnosis of Zoonotic Diseases

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1. Introduction

Zoonoses or *zoonotic* diseases are referred to the diseases that can be transmitted from both wild and domesticated animals to humans. The presence of zoonoses depends on many factors including: being of an agent, rate of exposure, transferring mechanisms and host susceptibility. Each of those factors has important roles in the epidemiology of infectious diseases as zoonotic diseases in humans (1, 2). Infectious diseases are caused by different microorganism such as bacteria, viruses, *Rickettsia*, *Borrelia*, *Mycoplasma* and fungi which live in both humans and non-human hosts. These hosts are called reservoirs of infectious diseases. Reservoirs of zoonoses are different animals including vertebrates and invertebrates which are ecological sources of the pathogen in the nature.

Bats, dogs, cats, horses, cattle, pigs, sheep, rodents, rabbits, and birds are common examples of vertebrate in carrying of rabies, anthrax, tapeworms, European tick-borne encephalitis, *Salmonella* infections, influenza, viral

diseases, leptospirosis and plague, Q fever and *Campylobacteriosis*, respectively between animals and humans. However, others such as elephants are not well known in the development and spread of tuberculosis to human. Argasid ticks and sandflies are of invertebrates that are known as reservoirs of endemic relapsing fever and papataxi fever, respectively, however the term of zoonoses referred to vertebrate hosts (3, 4).

Zoonotic diseases may be spread in different ways such as oral blood sucking vectors and direct contact. In oral way ova of parasites like tapeworms is ingested via consuming uncooked or semi cooked foods by humans. Some others can be transmitted by blood sucking arthropoda and direct contact, here the sandflies in zoonotic cutaneous leishmaniasis (ZCL) and anthrax, respectively (1, 2, 4). The climatological conditions are other points which run the pathogen microbes to be changed to new strain and serotypes over long periods (3, 5).

Another aspect regarding zoonoses is the diversity in

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The presence of zoonoses depends on many factors which have important roles in the epidemiology of infectious diseases as zoonotic diseases in humans. According to above facts it is concluded that the diagnosis of the zoonoses are not possible without correct identifying of their animal hosts and reservoirs.

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their hosts. They harbor different hosts in their life stages during their life cycles. Broad tapeworms such as *Diphyllobothrium latum* and *D. nihonkaiense* are exotic parasites that grow as long as 12 meters in the small intestine. Both tapeworms exploit freshwater copepods as their first intermediate host. However, both of them exploit many species of different fish as second intermediate hosts (6). Another example is regarded to leptospirosis which is spread among different Small mammal species especially of rodents (7). Finally, this editorial paper is aimed to emphasize this point that making a correct identification of hosts of microbial diseases will lead the scientific communities to better understanding the epidemiology of diseases and making plans to eradicate those.

2. Discussion

According to the above facts, zoonotic diseases are exposed to different ecological and epidemiology conditions in the nature. These effects on the biology and ecology of different infecting disease agents including their pathogenicities and it are a problematic choice and make their identifying very hard and complicated. Because such microorganisms in the duration of passaging among different hosts are acquired different pathogenicity and changed to new strains compared to their original as zoonoses (8). It means that new emerging infections have been established. There are many examples of those infections which have been previously defined as unrecognized diseases such as HIV/AIDS, severe acute respiratory syndrome (SARS), Ebola hemorrhagic fever, and Nipah virus encephalitis. They are described as infections with rapidly increasing in incidence or geographic range (9).

Two examples of emerging infections in Iran are Crimean-Congo hemorrhagic fever (CCHF) and West Nile Fever (WNF) in the terms of emerging infections. It has been demonstrated that CCHF has spread in 24 provinces of 30 provinces in Iran from 2000 till October 2008 with Sistan-va-Balouchistan, Isfahan, Fars and Khozestan as the most infected provinces of Iran. CCHF is a *Hyalomma* tick borne viral disease (Nairovirus group) and its reservoirs besides the ticks are different species of small and large vertebrates. The disease is transmitted by immature and mature *Hyalomma* ticks to the humans such as vets, butchers and the people whom are involved with livestock and domestic ruminant animal jobs (10).

WNF is a mosquito borne flavivirus disease which is endemic in the Middle East including Iran with a vast distribution and with high rates in Kermanshah and Khuzestan as endemic areas of WNF. Its natural reservoirs are different birds (11, 12). Leptospirosis is a bacterial disease which has been reported vastly from different parts of Iran. Rodents including rats and mice are the most important of mammals as reservoirs and carriers for most serovars of *Leptospira*; however serovars *pomona*, and *hardjo* are adapted to agricultural animals as carrier hosts (7).

According to above facts it is concluded that the diagnosis of the zoonoses are not possible without correct identifying of their animal hosts and reservoirs. As revealed in the current discussion different hosts including vertebrate and invertebrate animals act as a part of epidemiology of the zoonoses. If we do not correct identify the reservoir species we will miss a part of epidemiology the zoonoses and we are not able to do the predict the outbreaks of the zoonoses and the emergence of a new variety of pathogenic microbes. Therefore we are driven to false or missing diagnosis the disease. We can point to two articles which have been reviewed recently in the editorial board of the Jundishapur Journal of Microbiology (JJM) regarding rats as reservoir or intermediated hosts of toxoplasmosis (12) and leptospirosis in Ahvaz (under consideration). In the result sections of both articles have been referred to 127 and 120 trapped *Rattus rattus* (black rat) from different parts of Ahvaz during 3 years, respectively. Unfortunately there was not any information regarding how the authors have identified the rodent species or which Iranian Rodent key the authors have used to identify the trapped rodents.

The second point in the terms of two presented manuscripts is that in the other studies including Kia *et al* (13), Rahdar *et al* (14) and Tavalaei *et al* (is being running in the department of Parasitology, Ahvaz Jundishapur University of Medical Sciences [AJUMS]), which have been done or is being done in Ahvaz, *R. norvegicus* has been reported as the most frequent rodent species in urban areas. This species has been reported as a dominant rodent in the urban area in Bandar Abbas, south of Iran (15) and Baghdad urban areas (16). In contrast to the above articles, there are two papers with *R. rattus* as dominant species in Sarpole-Zahab of Kermanshah and Sari of Mazandaran (17, 18). In Sarpole-Zahab study just has explained that different criteria of the morphology of rodents were used to identify the species without telling which morphology or key points, however in Sari study just has said external characters were used as the identifier criteria and all the *Rattus* have been identified as *R. rattus* with 32% of all the collected rodents. This point is vital to explain a rodent identification regarding a microbial disease in the level species is more important than regarding an ectoparasites (other than lice and mites) of the rodents.

Finally, it is suggested to do more correct identifying of the animal hosts we must use the newest classic local morphological identifying keys and techniques. However neither of all the above studies have used that and only the external characters have been noted as the basis of identification. In order to remove this paradox, for example regarding identifying the rodents, their skull structures should be described as the most reliable method (19-21). The wrong identification of hosts of microbial disease will lead us to wrong disease epidemiology and diagnosis.

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