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### Introduction:

Echinococcosis is a parasitic disease in humans and animals. It is also known as Hydatidosis due to its most common clinical presentation as hydatid cysts. Keeping in view of its endemic status and poor consideration in human and animal health as well as in community, it is considered an emerging but neglected zoonotic, parasitic disease<sup>1</sup>. It is caused by *Echinococcus* spp. tapeworm, a parasite. Larval stage of the tapeworm is highly pathogenic. It is ingested in the form of eggs but development of larvae in intestine causes severe disease in humans as well as in animals. Disease appear usually in the form of cysts in liver which is the first check point of blood coming from intestine or lung but can appear in any viscera<sup>2</sup>. Echinococcosis is endemic worldwide, but it is a major public health issue in developing countries. It is mainly associated with common public health issues of low and middle-income countries such as illiteracy, home slaughtering of

animals as well as close contact with the house hold animals<sup>3</sup>. Disease is associated with major economic loss in the form of livestock fatality, quality of meat and long-term morbidity and mortality in humans<sup>4</sup>.

### Epidemiology:

Many species of *Echinococcus* has been discovered so far. Echinococcosis is primarily caused by the *Echinococcus* species; *E. granulosus* and *E. multilocularis*. Both species are responsible for animal and human disease. Three main types of Echinococcosis have been identified based on the appearance of the disease namely; cystic which is caused by *E. granulosus*, alveolar form caused by *E. multilocularis* and multicystic form caused either by *E. vogelii* or *E. oligarthrus*<sup>2</sup>. The cystic form of the disease is associated with high morbidity while the alveolar form is reportedly associated with high mortality rate<sup>5</sup>. Definitive

hosts are fox, dogs and other carnivores. The highly pathogenic metacestodes form harbors in the intestines of canids and disease transmission occurs when eggs of the tapeworm are excreted by these animals into the environment. The infected feces are the source of contamination and are ingested by humans and grazing animals<sup>6</sup>. Though prevalence in livestock and humans is not explored sufficiently, morbidity and substantial economic loss in resource poor settings are particularly evident. Improper disposal of animal wastes at slaughter houses, exposure to stray dogs and close proximity to cattle are some of the top reasons for disease transmission from infected animals to humans<sup>7</sup>. In low and middle-income countries like Pakistan, there are certain social issues, such as health services accessibility and affordability which lead to late detection, complications and continuous circulation of disease in the community<sup>8</sup>. Similar risk factors are prevalent in livestock that hinder early detection, treatment and management of outbreaks of livestock disease<sup>9</sup>.

#### **Transmission:**

Disease is transmitted by direct contact with the feces of an infected dog or the intermediate host; the farm animals such as sheep, goat and camels. Grazing animals eat tapeworm eggs from the infected dog's feces and get infected with the disease. These animals are intermediate hosts and can shed immature eggs for years. These eggs are resistant to environment and can survive up to two years<sup>10</sup>. Vegetables and fruits are contaminated where these animals live. Through bad hygiene practices, eating raw or poorly cooked meat and unwashed vegetables and fruits, eggs are transmitted to humans. Incubation period is variable and ranges from 12 to 24 months<sup>3</sup>. In Pakistan, rural lifestyle supports disease transmission as it is common practice to see humans living in close proximity to animals under the same roof. Children and young females are particularly at risk due to self-neglect and increased exposure. In rural culture of Pakistan, women are supposed to cook for family, provide fodder to household animals and work in the field as well. Children are usually staying with mother and play in dusty contaminated environment<sup>11</sup>.

#### **Treatment and prevention:**

Patients usually present at the tertiary care hospital with complain of mass in liver or lungs or may be associated with complications of the primary lesion. Treatment is based on the WHO classification of cysts<sup>12</sup>. Decision of percutaneous aspiration or surgical resection is based on the type and location of the lesion. PAIR approach (puncture, aspiration, injection and re-aspiration) is a minimally invasive technique where protoscolicide is used along with percutaneous aspiration and results in less complications<sup>13</sup>. Alveolar type is associated with lower chances of success. Praziquantel, albendazole and mebendazole are the recommended drugs for chemotherapy alone or with surgery<sup>14</sup>.

Hand hygiene, washing vegetables and fruits thoroughly and awareness about the potential risk of the disease are the key

areas to address in low and middle-income countries in order to reduce the prevalence<sup>3</sup>. Exposure of dogs to animal's carcasses and infected viscera can be avoided by proper disposal and/or burial of infected viscera.

Dog owners should be advised to treat dogs with praziquantel, and stray dogs should be managed accordingly. Deworming campaigns have shown promising results in countries where elimination is the target<sup>15</sup>. All workers in slaughter houses, laboratories and town municipal administration should be educated to observe necessary precautions<sup>7</sup>.

#### **Surveillance and Response in Pakistan:**

In Pakistan, after devolution in 2011, health is the responsibility of every province<sup>16</sup>. Every province has its own surveillance system that work in silos and there is minimal data sharing with other provinces. Many vertical programs are catering to infectious diseases, namely Tuberculosis, Malaria and HIV but there is no common platform for surveillance and response to zoonotic disease particularly hydatidosis. Least political commitment as well as ignorance towards uniform reforms in public health sectors are the key identified issues<sup>17</sup>. On human side data is available on individual cases from tertiary care hospitals and same is the case for animal sector<sup>18</sup>. Integrated Disease Surveillance and Response (IDSR) is the greatest initiative ever taken to make a single national repository of data for human diseases for analysis and response activities.

#### **Conclusion:**

Neglected zoonotic diseases are considered neglected due to illiteracy and poor access to clean water, poor hygiene practices and lack of access to health services at community level. Many disease incidences had been reported from different regions of Pakistan. But the lack of research, poor resource allocation and the ignorance towards poverty relate diseases resulted in scarce literature available for reforms<sup>19</sup>. Health authorities are working in silos and there is a severe lack of communication at all levels. As far as evidence-based decision making is concerned at the provincial and national level, non-availability and poor quality of available data is the biggest issue. Enough literature is not available on morbidity and mortality in humans and animals; neither do we know the prevalence of disease. Laboratory data is not enough to make a conclusion for disease prioritization.

#### **One Health Approach:**

One health is a relatively new idea for Pakistan<sup>20</sup> In August 2017, with the help of US Department of Agriculture (USDA) and Centers for Disease Control (CDC), Pakistan started its journey towards One Health Zoonotic Disease Prioritization (OHZDP). One Health System Mapping and Resource Toolkit (OH-SMART) was used and diseases with high morbidity, mortality and economic burden were chosen by consensus of all stake holder. Hydatidosis was not able to secure a place in the list priority diseases despite high morbidity and economic burden associated with the disease<sup>21</sup>.

**Mitigates:** Based on the circumstances in Pakistan discussed in the paper, the best solution is the awareness of all health care

providers about and the mandatory reporting of zoonotic diseases.

At provincial level, there is an urgent need for a close linkage between tertiary and secondary care hospitals, public health practitioners and policy makers. Linkage between the Department of Environment, Department of Agriculture and Department of Veterinary Medicine is suggested and response activities to zoonotic diseases should be concerted through Ministry of Health at provincial and national level<sup>22</sup>.

Pakistan is moving towards the development of a strategic frame work for zoonotic diseases under the umbrella of the One Health concept. The integrated disease surveillance seems the best way around to get credible data at national level. There is no shortage of public health staff, but their utilization is the issue. Rapid Response Teams (RRTs) at all levels (national, provincial and districts) can be trained to respond to disease outbreaks. Provincial Disease Surveillance and Response Units (DSRUs), already working Directorate General Health Services (DGHS) in all provinces can be declared a focal point for integrated activities.

Young scholars at universities should be encouraged to explore new dimensions of diseases and provided with conducive environment for research<sup>23</sup>. Zoonotic diseases and one health concept should be incorporated in medical curricula and there should be more slots for internship and training in this critical area of public health<sup>24</sup>. Laws and policies should be devised and implemented for proper disposal of abattoir wastes and stray dogs' management as well as vaccination and deworming by responsible dog ownership programs.

Awareness at community level can be enhanced by using already working community health workers in different community level programs such as Lady Health Worker Program, Mother, Neonatal and Child Health Program and TB Control Program. Additional training of the volunteers from community will be an added benefit<sup>25</sup>. For that purpose, schools and social gatherings like Jumma prayer and Eid meetings can be utilized as an opportunity to raise awareness about hydatidosis and hygienic practices.

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