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Epidemiological Study on Relationship Between Some of Demographic Characteristics and the Prevalence of Hydatid Cysts Disease in the Holy City of Karbala

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Abstract Hydatid cyst or hydatidosis is one of the common diseases between humans and animals (zoonotic disease) and has a global spread. Due to the importance of the disease, we chose this topic to find out the epidemiological extent of the spread of the disease and its relationship to some demographic characteristics. Where statistical data was collected and analyzed for those with hydatid cysts who were treated with surgical intervention at Al-Hussein Teaching Hospital in the Holy Governorate of Karbala. The statistics included (the number of infected people - age - gender - months of infection - residential areas - multiplicity of infections - affected body parts). The total number of infected people was (40) for both sexes for the year (2022). There were (27) infected cases (67.5%) in females and (13) infected cases (32.5%) in males. Thus, the infection rate in females is higher than in males. The infection rate according to age was highest in the youth group (21-30) and the lowest in the very young and very old ages. The highest infection rate during the year was during June and September, while the lowest was in the cold months of December and January, in which no infection was recorded. The infection rate in rural areas (Al-Hindiyya and Al-Husseiniyah sectors) was higher than in city areas. As for multiple infections, the highest percentage is a single infection, and the most affected organ is the liver, then the abdominal cavity, while the least affected organ is the lung.

Key Words Hydatid cyst, Zoonotic disease, Epidemiology, Surgical intervention, Demographic characteristics

1. Introduction

Hydatid cyst or hydatidosis: It is a parasitic disease that affects humans as well as herbivorous animals such as sheep, goats, cows, and camels, and all of them are considered intermediate hosts for this parasite [1], [2]. The disease has been known in humans since ancient times. It was described by Hippocrates (379 BC); that it is a liver filled with water [3]. The disease is called by several names, including granulomatous echinococcosis, cystic echinococcosis, hydatidosis, and unilateral gap hydatidosis [4], [5]. The disease is considered one of the common zoonotic diseases between humans and animals [6].

The disease represents a major dilemma for humans, both medically and economically, in almost all parts of the world [7]. These cysts spread throughout all parts of the body, and almost no place on the body is spared from them except the hair and nails [8]. The cause of the disease in humans and all intermediate hosts (camels, buffalo, cows, sheep, horses, and other animals) is a parasitic larva that belongs to the phylum of flatworms, Platy helminthes, Class Taenia, Cestoda, Order Cyclophyllida, Family Teaniidae, Genus Echinococcus, which includes many species, the most important of which is medically the granular type E. granulosus and the vesicular type E. multilocularis, and this stage can attack any organ in the host's intermediate body [9].

Iraq is considered one of the most endemic areas for the disease. Hydatid cyst disease is one of the endemic diseases in Iraq that affects the health, social and economic levels, which has led to the investigation of multiple methods of treatment. Surgical intervention is considered one of the most important treatment methods despite the serious problems that the patient is exposed to during surgery, which It is difficult or impossible to perform in some cases [10], [11]. For several reasons, the patient is not surgically qualified as a result of (age, anesthesia, suffering from other serious diseases, or the cyst being located in places that are difficult for the surgeon to deal with, such as the brain, heart, or spine. Hence the importance of using materials or extracts of a different chemical nature that may help in treating patients [12]. The importance of chemotherapy has emerged as an

alternative to surgical treatment in cases of early or surgically impossible infection, as it has given curative results in many cases [13].

The cause of the disease is due to two important factors: The first is the impossibility of knowing the infection in the early stages of the disease, as it does not show symptoms until the size of the cyst increases, which leads to pressure on the tissues surrounding it [6]. The second factor is the loss of easy treatment methods for this. The disease is very similar in severity to metastasis stage cancerous tumors [14]. Recent information has indicated the spread of the disease in areas that were previously completely free of it, such as North America and Canada [15]. It has been noted that the infection rate is affected by the relationship between humans and dogs, in countries with pastures it reaches (20-50%). The infection increases during childhood as a result of playing with dogs [16]. Studies in Nouakchott (Mauritania) have shown that dogs remain one of the most suitable hosts for these worms. In the country, although wild dogs, especially jackals, can sometimes live where humans are present [17], the disease results from the growth of large virgin cysts in various organs of the human body and domesticated and feral animals after ingestion of Echinococcus eggs. The hydatid cyst is the larval stage that grows from the larva of the hexa-spine embryo of the tapeworm of the genus Echinococcus, the adult worms of which parasitize in the small intestine of dogs and other definitive hosts of the canine family [18]. The disease often begins without symptoms and may last for years [19].

The symptoms and signs that occur depend on the location and size of the cyst [19]. Alveolar echinococcosis usually begins in the liver, but can spread to other parts of the body such as the lungs or brain. When the liver is affected, the patient may suffer from abdominal pain, weight loss, and yellow skin discoloration due to jaundice. Lung disease may cause chest pain, shortness of breath, and cough. The infection is spread to humans when they eat food or drink water that contains parasite eggs or through close contact with an infected animal. The eggs are released in the feces of animals that eat meat infected with the parasite. Commonly affected animals include dogs, foxes, and wolves [20]. The disease causes many complications and risks, including pressure on nearby organs, for example the gallbladder duct, which causes an increase in bile in the body (bilirubin) and inflammation of the bile ducts due to their blockage - pressure on nearby blood vessels - cyst bursting, this leads to It causes the small larvae inside the cyst to spread to the rest of the organs. If it explodes into the abdominal cavity, the larvae will settle on the peritoneum and each larva will form a new cyst - the explosion of the cyst can lead to anaphylactic shock, which leads to fainting and severe low blood pressure, and may also lead to death. Inflammation may also occur in the cyst it turns into an abscess in the liver or lung [19]. Diagnosis is usually made by ultrasound through the use of computed tomography (CT) or magnetic resonance imaging (MRI). Blood tests to look for antibodies to the parasites may also be useful, as well as a biopsy [19].

Group Number	Age Group / Year	Number of infection	Percentage%
1	1≥ 10	2	5
2	44136	5	12.5
3	21 - 30	13	32.5
4	31 - 40	10	25
5	41 - 50	9	22.5
6	51 - 70	1	2.5
	Total	40	100%

Table 1: The incidence of Hydatidosis disease by age

Preventing cystic disease is by treating dogs that may carry the disease and vaccinating sheep. Treatment is often difficult. Cystic disease may be drained through the skin and then administered with medication [19]. Sometimes this type of disease is only monitored [20], [21]. The alveolar form often requires surgical intervention followed by drug treatment [19], [21]. The drug used is albendazole and may humans have used it for years [19], [20]. Alveolar echinococcosis may lead to death [19]. The disease occurs in most regions of the world and currently affects about one million people [19]. In some regions of South America, Africa, and Asia, up to 10% of the population is infected [19]. In 2015, the cystic form caused about 1,200 deaths compared to 2,000 deaths in 1990 [6], [22]. In view of all the seriousness and complications mentioned about the disease, we chose the topic of our research to find out what the relationship of some demographic characteristics is to the epidemiology and spread of the disease.

2. The Method of the Work

Statistical data was collected from the Ministry of Health / Al-Hussein Teaching Hospital in the Holy Governorate of Karbala by opening records related to the disease and collecting information about the disease for the year (2022). The study included the number of cases of total hydatid cyst disease according to (age - sex - residential sectors - monthly incidence - multiplicity of infection, and locations of infection). The infected cases were divided into six groups according to age group and for both sexes, as shown in Table 1. Working with data in Excel 2019; The data was then statistically analyzed in Excel 2019 and represented as graphs and charts.

3. Results

The results obtained were the number of cases infected with the disease (40) for the year (2022), including 13 male cases, at a rate of (32.5%), and 27 female cases, at a rate of (67.5%). Thus, the incidence of females is higher than that of males. As shown in Figure 1.

Table 1 shows the numbers and ages of people infected with hydatid cysts, the total number and percentage of infection, and how the number of infected people is divided into six groups according to age group, from the youngest age group (1 $\geq$ 10) years to the oldest age group (51 - 70) years. The table also shows the number, percentage, and infection rate for each group, the lowest and highest number, and the percentage of infection in any group.

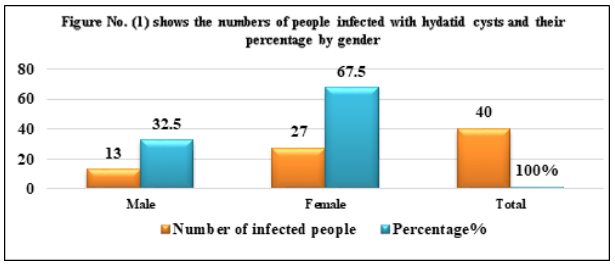

Figure 1: The numbers of people infected with hydatid cysts and their percentage by gender

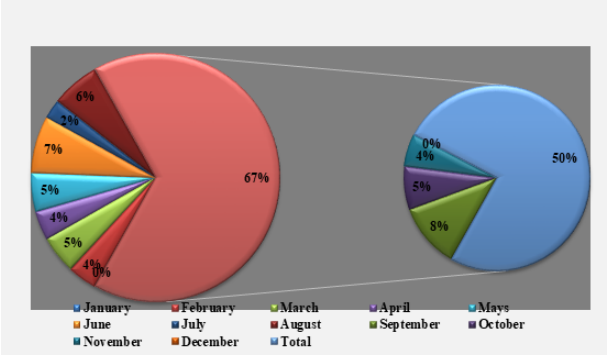

Figure 2: The incidence of hydatid cysts by month of the year

Figure 1 explains the number and percentage of cases of hydatid cysts by gender. It shows that the number and percentage of infections in females was higher than in males, as it was (27) (67.5%) in females, while it was (13) (32.5%) in males.

Figure 2 explains the percentage of infection with the disease during the months of the year, showing that the lowest percentage of infection was during July by (2%), while no infection rate was recorded during December and January, the highest rate of infection was during June and September by (7% and 8%), respectively.

Figure 3 explains the number and percentage of infection with the disease according to residential sectors in Karbala Governorate, showing that the highest infection rate was in the Hindiyya sector, while the lowest infection rate was in the Center sector.

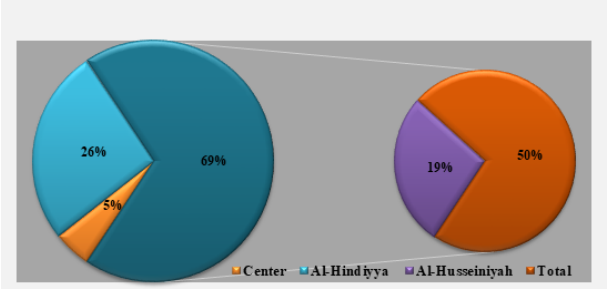

Figure 3: The incidence of hydatid cysts according to residential sectors in Karbala Governorate

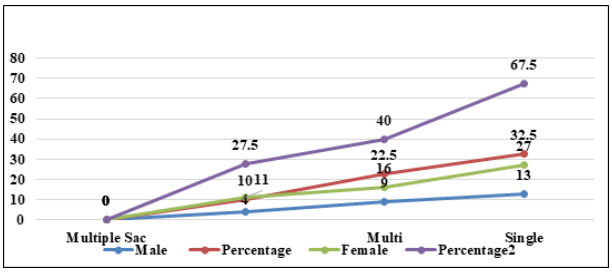

Figure 4: The multiple occurrence of hydatid cysts in males and females

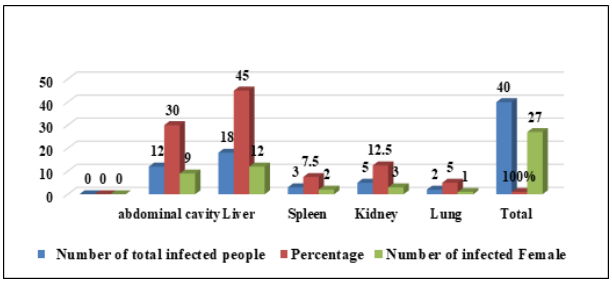

Figure 5: The location and percentage of hydatid cysts for each organ of the human body in Females

Figure 4 explains multiple infections for both sexes, showing that the rate of single infections is higher than the rate of multiple infections, as the percentage of single infections in females was (40%), in males it was (22.5%), while the percentage of multiple infections in females was (27.5%) and in males (%4).

Figure 5 explains the locations of infection with hydatid cysts in the body's various organs in females. It shows the total number of people affected, the number and percentage of infected females, and the percentage of infection for each organ of the body of infected females. It shows that the highest percentage of infection was in the liver, secondly in the abdominal cavity, and the lowest percentage of infection was in the lungs, Then the spleen and kidneys.

Figure 6 explains the locations of infection with hydatid cysts in the body's various organs in males. It shows the total number of infected people, the number and percentage of infected males, and the percentage of infection for each

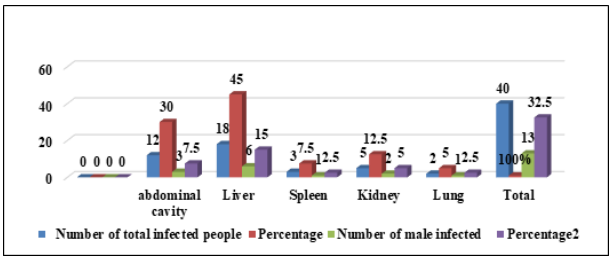

Figure 6: The location and percentage of hydatid cysts for each organ of the human body in males

organ of the body of infected males. It shows that the highest infection rate was in the liver, secondly in the abdominal cavity, then the kidneys, and the lowest infection rate was in the lung and spleen.

4. Discussion

The results obtained were the number of cases infected with the disease (40) cases for the year (2022), including (13) males at (32.5%) and (27) females at (67.5%). Thus, the incidence of females is higher than that of males. As shown in Figure 1. This percentage agrees to a large extent with the percentage of study [23], where the infection rate was recorded in females (68.75%), while in males (31.25%), and is less than the percentage of study [24] in Canada, where it was recorded (77%) in males. (23%) in females, and the results were contrary to the study [25], as it recorded a percentage opposite to our current study, which recorded (53.7%) in males and (46.3%) in females.

The infection results are shown according to age group in Table 1, which shows that the highest infection rate was among (21-30) years old, with several (13), by (32.5%), the second rate of infection was among (31-40) years old, with several (10) by (25%), while the lowest number and percentage, respectively, is (1) by (2.5%) in the age group (51 - 70) years. Also, the percentage was small in the age group ($1 \geq 10$) years with several (2) by (5%). Suppose we notice that the infection rate was high in the youth age group, as this group is characterized by its love and intense desire for fast food prepared in restaurants outside the home. This type of food is characterized by its lack of complete health and hygiene conditions. In that case, these results are consistent with study [26] but disagree with study [16], which reported that the infection rate in children is higher due to children's familiarity and intense love for playing with animals, dogs in particular.

The infection rate results according to the year's months are shown in Figure 2, which shows that the highest infection rate was in both the months of June and September in number (6) by (15%), while the lowest infection rate was (2) by (5%) in July. No infection was recorded in either December or the second, among the cold months in Iraq. The infection rate is directly proportional to the temperature, so we notice an increase in the infection rate in the hot months in Iraq, consistent with [27].

As for infection according to residential areas, we noticed, as shown in Figure 3, a higher infection rate in rural areas (Husseiniyah and Hindiyya) than the infection rate in urban areas (the center), despite the high population density in the cities. This may be attributed to the nature of the life of people in rural areas and their interaction with animals because they raise animals (cattle for milk and meat products and dogs to use them for guarding and when grazing animals). In addition to that, they slaughter animals outside slaughterhouses and throw away their waste, which many stray dogs feed. In rural areas, in addition to their lack of knowledge of the correct way to wash vegetables, this is consistent with a study [16], [17].

As for multiple infections for both sexes, it is shown in Figure 4. We note that the percentage of single infections for both sexes is higher than the percentage of multiple infections, in number (25) by (62.5%); the number of females is (16) by (40%), and the number of males is (9) by (22.5%); thus the infection rate in females is higher than it is in males. As for multiple infections registered number (15), by (37.5%) for both sexes, it was shown in females, (11), by (27.5%), while it was in males (4) by (10%); This is consistent with [27], [28], which mentions the high rates of single infections recorded during surgical operations, as it states that whenever the disease is discovered early, it is treated and controlled. However, if it is left, it becomes multiple, develops, is difficult to control, and may lead to death.

The results of the spread of hydatid cysts in the human body's organs are shown in Figures 5 and 6 for females and males, respectively. We noticed that the affected organs were (abdominal cavity - liver - spleen - kidneys and lungs); The highest percentage of infections for both sexes was liver injury (18) by (45%), and in second place was injury to the abdominal cavity, with several (12) by (30%), and the lowest percentage of injury for both genders was in the lungs (2) by (5%); This result is consistent with [26]. The reason for this result is the high rate of liver infection may be because treating these cases requires surgical operations that cost the patient, the family, and the state. In some cases, as a result of the multiple cysts and their spread in the liver, it is difficult to remove the liver, which leads to a deterioration of the condition and then the death of the patient. Thus, we need to conduct awareness campaigns to spread the culture of preventing and avoiding contracting communicable diseases in general and diseases shared between humans and animals in particular.

5. Recommendations

1) Health education for all members of society about the cause and carrier of the disease, methods of transmission of the disease, and the intermediate and final host through audio and video media.
2) Wash vegetables well before eating them to eliminate worm eggs.
3) Providing inspection teams for careful health control over slaughterhouses, butcher shops, and meat sales.
4) Preventing the slaughter of animals on roads and residential areas.
5) Disposing of slaughter waste by burning it in slaughterhouse incinerators, which is the safest way to prevent it from being eaten by stray dogs or buried in very deep holes.
6) Extensive campaigns are being carried out to eliminate animals that transmit the disease (stray dogs).

Conflict of interest

The authors declare no conflict of interests. All authors read and approved final version of the paper.

Authors Contribution

All authors contributed equally in this paper.

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