

## Hydatidosis and Hepatic Trematodosis in Water Buffaloes in Khuzestan Province, Southwestern Iran, Based on Abattoir Data During 1998-2008

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**Abstract:** Meat inspection records in the “Complex abattoir” located in Ahwaz, a city in southwest Iran and the capital of Khuzestan province, during a 10- year period (1998-2008) were used to determine the prevalence and long-term trend of cystic echinococcosis and hepatic trematodosis in water buffaloes (*Bubalus bubalis*) in the region. A total of 57,555 water buffaloes were slaughtered in the 10-year period and overall 13,619 (23.66%) livers and 20105 (34.93%) lungs were condemned in this ruminant. Studied zoonotic helminthosis were responsible for 78.04% of total liver condemnations of which 55.32%, 0.74% and 21.98 were due to fasciolosis, dicrocoeliosis and hydatidosis, respectively. Pulmonary hydatidosis infection rate was significantly higher than hepatic hydatidosis in slaughtered buffaloes. The overall trend showed a considerable decline in the prevalence of the mentioned zoonotic helminthosis over the study period which was more remarkable in the first several years. Hence, the prevalence of fasciolosis, dicrocoeliosis and hydatidosis from 24.09, 0.23 and 32.51% in 1998-1999 decreased to 10.12, 0.02 and 10.95% in 2007-2008 for water buffaloes, respectively. There were no significant variations due to prevalence of these infections during seasonal patterns probably due to chronicity of the diseases. The study has established that fasciolosis and hydatidosis are prevalent in this animal slaughtered at Ahwaz abattoir and cause higher condemnation rates of edible offals. The findings merit for more extensive epidemiological investigations of the zoonotic infections in water buffaloes to determine the prevalence, economic impact and public health importance for the diseases in the region better.

**Key words:** Prevalence Fasciolosis • Dicrocoeliosis • Hydatidosis • Meat inspection • Water buffalo • Iran

### INTRODUCTION

Water buffaloes (*Bubalus bubalis*) are mainly distributed in tropical and sub-tropical regions, such as Asia, North Africa, Australia and Central America [1]. They are raised and kept as economically important animals because they provide milk, meat and hides of good quality and also their dung is good as fertilizer.

The population of water buffaloes in Iran was more than 521,000 in 2007 and they distributed in different provinces of the country. Khuzestan province is one of the most water buffalo raising area in the country. There are approximately 25.7% (134 thousand) out of a total of this ruminant in this area.

Although abattoir surveys have limitations, they are an economical way of gathering information on livestock disease. It is suggested that an efficient meat inspection

service should function as an important monitor of animal disease, being particularly valuable in the field of chronic and ill-defined conditions which are not apparent to either the stock owner or his veterinary surgeon but which must be of considerable economic and animal health significance [2, 3]. Also, a feedback from the slaughterhouse to the individual farm is of great value in the field of preventive medicine.

Parasitic infections of water buffaloes have caused considerable economic losses globally to the buffalo industries and farming communities as a consequence of death of infected animals, reduced weight gains and the condemnation of affected organs after slaughter [3, 4]. Some parasites of buffaloes are zoonoses, such as hydatid cyst, *Fasciola* sp. and *Dicrocoelium dendriticum* and the parasites present in a number of countries including Iran [1, 3, 5-7].

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Although, Iran is one of the endemic areas of cystic echinococcosis and liver fluke infections and south-west Iran is one of the biggest territories for rearing domesticated animals, including water buffaloes, there are a few studies on these zoonotic parasite infections in water buffaloes in some other provinces of Iran in recent years [7-10]. Epidemiological surveys of cystic echinococcosis and liver fluke diseases in this ruminant are not present in the region. Therefore, this study was undertaken to estimate the prevalence and possible trends of hydatidosis and hepatic trematodosis using abattoir data in the water buffaloes of Khuzestan province, southwest of Iran.

## MATERIALS AND METHODS

**Area Description:** Khuzestan Province is located, southwest of Iran, between latitude 29°58' N to 33°4' N and longitude 47°41' E to 50°39' E and average annual precipitation is about 266 mm. The mean average temperature of Khuzestan province about is 31.2°C in the warmer period (May-October) and during the cooler period (December-March) the mean average temperature drops to 15.1°C. Its vast and fertile land and pasture resources provide the foundation for the development of animal husbandry and supports population of livestock, including water buffaloes.

**Survey of Slaughtered Water Buffaloes and Statistical Analysis:** The study was a retrospective abattoir survey, undertaken for a period of 10-years from 21 January 1998 to 20 January 2008 which included slaughtered water buffaloes in the largest abattoir in Khuzestan province, southwest of Iran. Animals were brought from different parts of the province to this abattoir for being slaughtered. As a part of an ongoing surveillance system, each slaughtered animal was inspected individually by a

veterinarian in the course of their routine duties. The reasons for condemnation of organs including cystic echinococcosis and hepatic trematodosis were recorded daily on prepared data sheets. Diagnosis of the parasites was done macroscopically either by visual inspection or palpation and where necessary one or more incisions were made in order to detect small hydatid cysts and liver trematoda located inside bilious canals. The prevalence was collected on a monthly basis. This time interval was chosen as being likely to indicate any seasonal trends. Analysis of data was done using SPSS Version 16. Percentages (%) to measure prevalence and to measure the value of differences were the statistical tools applied. In all the analyses, values of  $P < 0.05$  were accepted as significant.

## RESULTS

A total of 57,555 water buffaloes were slaughtered from 21 January 1998 and 20 January 2008. Of these livestock, overall 13,619 (23.66%) livers and 20105 (34.93%) lungs were condemned. The annual rate of liver and lung condemnations due to hydatidosis and hepatic trematodosis in the study period is presented in Table 1. The annual prevalence rates for the zoonotic plathyhelminth infections and trends of infections in water buffaloes in the 10-year period are shown in Figure 1. Among liver fluke infections, a highly significant fasciolosis rate (13.09%) was recorded than dicrocoeliosis rate (0.17%) in this ruminant ( $P < 0.0001$ ). The overall trend was a considerable decline in the prevalence of mentioned zoonotic helminthosis over the study period which was more remarkable in the first several years ( $P < 0.05$ ). The seasonal variation of cystic echinococcosis and liver fluke infections from water buffaloes slaughtered could be seen in Table 2. Season has no effect on the prevalence of the diseases.

Table 1: The total number of liver and lung condemned and the organs condemnations due to hydatidosis, fasciolosis and dicrocoeliosis in water buffaloes slaughtered in Ahwaz, Iran, (1998-2008)

Years	Liver condemnations			Lung condemnations		
	Total	Due to fasciolosis	Due to dicrocoeliosis	Due to hydatidosis	Total	Due to hydatidosis
1998-1999	1677	1041 (62.07)	10 (0.6)	547 (32.62)	2484	858 (34.54)
1999-2000	2240	1247 (55.67)	54 (2.41)	404 (18.04)	2860	937 (32.76)
2000-2001	1612	799 (49.57)	20 (1.24)	461 (28.60)	2320	826 (35.60)
2001-2002	1109	652 (58.79)	6 (0.54)	146 (13.17)	1876	771 (41.10)
2002-2003	1019	495 (48.58)	1 (0.10)	184 (18.05)	1814	542 (29.88)
2003-2004	1072	535 (49.91)	3 (0.28)	96 (8.96)	1598	252 (15.77)
2004-2005	989	502 (50.76)	1 (0.10)	90 (9.10)	1480	232 (15.67)
2005-2006	977	633 (64.79)	2 (0.20)	248 (25.38)	1450	518 (35.72)
2006-2007	1915	1104 (57.65)	3 (0.16)	565 (13.84)	2840	1147 (40.39)
2007-2008	1009	527 (52.23)	1 (0.10)	252 (24.97)	1383	318 (22.99)
Overall	13619	7535 (55.32)	101 (0.74)	2993 (21.98)	20105	6401 (31.84)

The data in parentheses represent percentage

Table 2: Seasonal prevalence rate (%) of hydatidosis, fasciolosis and dicrocoeliosis in water buffaloes slaughtered during January 1998 to January 2008

Seasons	Number Slaughtered	Fasciolosis (%)	Dicrocoeliosis (%)	Hepatic hydatidosis (%)	Pulmonary hydatidosis (%)
Spring	13113	1687 (12.86)	29 (0.22)	591 (4.51)	1545 (11.78)
Summer	14430	2049 (14.20)	26 (0.18)	637 (4.41)	1947 (13.49)
Fall	14553	1774 (12.19)	19 (0.13)	775 (5.32)	1349 (9.27)
Winter	15459	2025 (13.10)	27 (0.17)	990 (6.39)	1560 (10.10)
Total	57555	7535 (13.09)	101 (0.17)	2993 (5.20)	6401 (11.12)

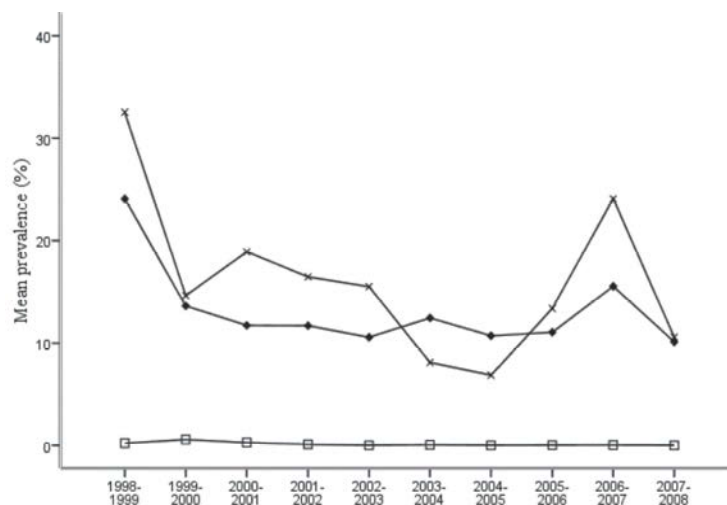


Fig. 1: Changes in the annual prevalences of hydatidosis (x), fasciolosis (♦) and dicrocoeliosis (□) in water buffaloes slaughtered in Ahwaz, southwest of Iran from January 1998 to January 2008

## DISCUSSION

The buffaloes may harbor a variety of parasites [1,4,8,10]. These parasites, especially zoonotic helminthes, are some of the major health problems severely limiting the productivity of animals including buffaloes and also they are potential dangers for the human population. Information on the epidemiological patterns of the parasitic diseases in the different agro-climatic zones of the country including Khuzestan province would provide a basis for evolving strategic and tactical control of these infections.

During the study period, hydatidosis and hepatic trematodosis were responsible for 78.04% of the total liver condemnations (Table 1). Cystic echinococcosis was responsible for 21.98 and 31.84% of the total liver and lung condemnations in the region respectively, whereas the values were 28.7 and 15.4% of the total liver and lung condemnations in animals slaughtered in Shiraz [11]. Liver condemnations caused by fasciolosis with 55.32% were by far more than observed in dicrocoeliosis with 0.74% in the total liver condemnations in water buffaloes slaughtered in the region. In a study performed in slaughterhouse of Shiraz (Fars province), fasciolosis and dicrocoeliosis were responsible for 54 and 21% of the total liver condemnations in animals slaughtered, respectively [12].

Our findings indicated that the annual prevalence for fasciolosis and hydatidosis in water buffaloes was considerable, but the prevalence of dicrocoeliosis was low (Fig. 1). The mean prevalence of buffalo fasciolosis found in this study (13.09%) was noteworthy and was much lower numbers for infected buffaloes than previous report from Dezful city (in Khuzestan province) by Sahba *et al.* [13], with 91.4%. This result was consistent with reports of buffalo fasciolosis in Mazandaran province, northern Iran, with 15% [14] and in Ardabil, northwestern Iran, with 11.4% [9], but this prevalence was less than in Gilan province from northern Iran [7] and in Hunan Province from China [1].

Dicrocoeliosis is common in grazing ruminants in many countries including in Iran [3, 9, 12, 15]. Dicrocoeliosis occasionally affects humans [5, 15] and in human faeces has already been established in Iran by Farid [5]. In the present study, the overall prevalence of buffalo dicrocoeliosis in the region (Fig. 1) was considerably lower than reports from other studies in Iran [9] and of some other Asian countries such as China [1] and India [4]. It is apparent that slaughter prevalence or abattoir data is not equal to prevalence in the population particularly for dicrocoeliosis; however, it could be acceptable as a surrogate marker for the population occurrence.

Cystic echinococcosis is one of the major parasitic problems in human and livestock in Iran [6, 8, 16-18]. In the present study, the prevalence of buffalo hydatidosis was some deal similar to result of Dalimi *et al.* [8] in western Iran, but it showed more than Shiraz in south of Iran [19]. In this study, the pulmonary hydatidosis in water buffalo had higher infection rate (11.12%) than hepatic hydatidosis (5.2%), so that lung to liver hydatidosis ratio being 2.14. Mehrabani *et al.* [19] in a study in Shiraz (south of Iran) reported that 8% of lungs and 4% of livers of buffaloes (Lungs/livers ratio = 2) were infected by hydatid cysts, which was in large agreement with the data obtained in our study.

A decrease in the prevalence of cystic echinococcosis and hepatic trematodosis in the study area was noticed over a period of 10 years which was more remarkable in the first several years (Fig. 1). Hence, the prevalence of fasciolosis, dicrocoeliosis, pulmonary hydatidosis and hepatic hydatidosis decreased from 24.09, 0.23, 19.85 and 12.66% in 1998-1999 to 10.12, 0.02, 6.11 and 4.84% in 2007-2008 for water buffaloes respectively ( $P < 0.05$ ).

Our results are plausible, considering the relative drought conditions and the effect that would have on the snail intermediate host. Therefore, climatic conditions could be responsible for this improvement, especially for liver fluke infections. The extreme drought that prevailed during years 1998-2000 all over the country led to slaughtering many animals due to scarcity of food. This is apparent from the total number of slaughtered animals which had remarkable increase in years 1999-2000 (Table 1). It could be hypothesized that disappearance of large number of infected animals accompanied with very hot and dry environmental condition at that time caused dramatic declines in infection prevalence in subsequent years. Also it may be attributed partly to the greater awareness among farmers of the losses caused by the infections that caused more effective use of available treatments. Another explanation for the decline in cases of hydatidosis is the implementation of a national program which undertook during the last several years of the 1990s in order to control rabies; during this action, many stray dogs were eliminated in the region.

Although the prevalence rates of fasciolosis, dicrocoeliosis and hydatidosis recovered from the water buffalo varied in different seasons (Table 2), there was no statistical difference between various seasons. The epidemiologic implication of these findings might be attributed to chronicity of the diseases. Once the animal is infected, these infections and/or the lesions of the diseases usually remain for some years and/or for the

whole life of the animal. This may be the reason for non-seasonal patterns of the diseases. As in the present study, Daryani *et al.* also reported that the seasonal differences for hydatidosis [10] and hepatic trematodosis [9] in buffaloes there were no statistically significant.

In conclusion, we found cystic echinococcosis and liver fluke infections are considerable or rather prevalent and also great reduction of the diseases occurred in water buffaloes slaughtered at Ahwaz abattoir during the first several years. This survey has helped to illustrate the usefulness of meat inspection records in monitoring disease situations and demonstrating possible secular trends and also provides a preliminary baseline data for the future monitoring of these potentially important parasitic diseases. Since water buffalo plays an important role in the agro-economy of Iran and many other Asian countries, the impact of hydatidosis and liver fluke infections in this animal species and its role in the transmission of the zoonotic platyhelminth infections in the region need further attention.

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