

Seasonal prevalence of hydatidosis in buffaloes –A retrospective study

Aarif M. Khan, Mohsin Gazi and Suhani Bashir

Faculty of Veterinary Sciences and Animal Husbandry
Sher-e-Kashmir University of Agricultural Science and Technology, Kashmir, India
Corresponding author: Arif Khan, email: ariffkhan99@gmail.com
SB: Suhani247@gmail.com, MG: mohsingazi9975@gmail.com

Received: 08-12-2012, Revised: 23-03-2013, Accepted: 24-03-2013, Published online: 04-07-2013

How to cite this article:

Khan AM, Gazi M and Bashir S (2013) Seasonal prevalence of hydatidosis in buffaloes –A retrospective study, *Vet World* 6(9): 647-650, doi: 10.14202/vetworld.2013.647-650

Abstract

Aim: To identify the prevalence of Hydatidosis in buffalo-calves, heifers and adults slaughtered in slaughter house of Mirha Exports Pvt. Ltd. between March 2010 to Feb. 2011.

Materials and Methods: 2,09,615 buffaloes slaughtered were included in this study and were categorized into three groups (A, B and C) based on their age at the time of ante-mortem examination. Group A consisted of calves (>1 year), accounting for 5100 out of the total number of animals. Group B consisted of heifers (2-3 years) accounting for 7840. Group C consisted of adult buffaloes (3-7 years) accounting for 1,96,675.

Results: Our study revealed an overall prevalence of hydatidosis as 50.96%. Furthermore, the group wise analysis showed the prevalence as 3.52%, 5.58% and 54% in calves, heifers and adult buffaloes, respectively.

Conclusion: Based on the factors considered, we conclude that the higher prevalence of infections in buffaloes slaughtered in the Mirha Exports is likely due to an overpopulation of stray dogs in the areas from which the plant gets its supply of animals.

Keywords: buffalo, hydatid cyst, prevalence, retrospective study, slaughter

Introduction

Hydatidosis is a zoonotic disease of great public health importance. Hydatidosis is caused by the tape worm *Echinococcus granulosus* which is found in the small intestine of carnivores, particularly in dogs and the metacestode (hydatid cyst) is found in a wide variety of ungulates and humans [1]. The pathogenicity of the cyst depends on the severity of the infection and the organ in which it is situated. In hydatidosis there is a development of the hydatid cysts in organs such as lungs, liver, brain, spleen and heart. In domestic animals clinical signs are often not observed despite heavy infections. Diagnosis of hydatidosis in domestic animals is rarely made at antemortem [2]. However, immuno-diagnosis of hydatid disease was carried out by different workers in sheep [3], camel [4] and cattle [5].

Consumption of beef in India was around 2 million tons in 2012, as per the report of GAIN (Global Agricultural Information Network). Beef production and consumption has doubled in three years between 2008 and 2011 and is set to scale further heights [6].

The estimation of the economic importance of hydatidosis varies greatly amongst countries and regions. There are differences in the reports of hydatidosis in buffaloes slaughtered in different regions of India [7]. The prevalence rate in North India was reported as 48% for water buffalo [8]. Because of

an extensive distribution throughout the world, it gets such a significant attention that prevention of this disease is one of the dynamic programmes of the World Health Organisation [9]. The Indian subcontinent provides ideal conditions for the establishment, propagation and dissemination of hydatidosis both in humans [10] and livestock [11].

Owing to its zoonotic and economic importance in India, our goal was to determine the prevalence of hydatid cysts in buffaloes slaughtered in Mirha Exports Private Ltd, Mohali, between March 2010 to Feb 2011.

Materials and Methods

The study was conducted at Mirha Exports Private Ltd, SAS- Nagar near Chandigarh, Mohali, India, a government approved slaughter house having a capacity to slaughter ~700 buffaloes per day catering to the needs of the areas from different parts of Punjab viz- Batala, Rajpura, Ludhiana, Amritsar and Sultanpur. The slaughter practice adopted at the abattoir is *Halal*.

A total of 2,09,615 Buffaloes were slaughtered during March 2010 to Feb. 2011 (Table-1) and were categorized into three groups (A, B and C) based on their age at the ante-mortem examination.

Group A consisted of calves (1-2 years), accounting for 5100 out of the total number of animals slaughtered (Males=4131 females=969). Group B consisted of Heifers (2-3 years) accounting for 7840 (Males=5644 females=2196). Group C consisted of adult buffaloes (3-7 years) accounting for 1,96,675 (Males=8260 females=1,88,415).

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Table-1. Number of buffaloes slaughtered at Mirha Exports Private Ltd, Punjab

Seasons	Months	Calves (>1 year)		Heifers (2-3 years)		Adult (3-7years)		
		Males	Females	Males	Females	Males	Females	
Spring	March	644	64	471	181	720	14,810	
	April	464	71	482	190	545	14,506	
	May	185	94	467	154	453	12,846	
Summer	June	154	64	411	121	308	11,766	
	July	222	43	436	98	427	9767	
	August	131	37	489	76	486	8658	
Autumn	September	265	49	497	167	451	9845	
	October	345	89	412	189	476	12,735	
	November	436	77	489	204	779	14,634	
Winter	December	581	78	538	290	785	13,795	
	January	358	91	454	277	864	14,164	
	February	346	212	498	249	1966	50889	
Total		4131	5100	5644	7840	2196	8260	1,96675

Table-2. Age-wise prevalence of hydatidosis in the respective groups.

Groups	Total	Positive	Male	Female
Calves (>1 year)	5100	180 (3.52%)	115 (63.88%)	65 (36.11%)
Heifers (2-3 years)	7840	438 (5.58%)	78 (17.80%)	360 (82.19%)
Adult buffaloes (3-7 years)	1,96,675	106208 (54%)	16993(15.99%)	89215 (84%)

The organs that were carefully examined and palpated were lungs, liver, spleen and heart. The cysts collected were examined in laboratory to ascertain whether they are fertile or sterile, based on the presence of protoscolices [12]. In the event some lesions on visceral organs could not be diagnosed differentially, a photograph of same was mailed to the Head, Teaching Veterinary Clinical Complex for differential diagnosis from the various photographs/plates available on various websites and the confirmed reports were received immediately via telephone. The organ wise fertility rate of the cyst was recorded.

Statistical analysis: Percent prevalence was the basis for analysis of data.

Results and Discussion

2,09,615 buffaloes were slaughtered during March 2010 to Feb. 2011, as shown in Table-1, which were categorized into three groups (A, B and C) based on the age detected at the ante-mortem examination. Our study revealed an overall prevalence of hydatidosis as 50.96% in buffaloes. Earlier, [7,8,12,13] reported an overall prevalence of 48%, 34.5%, 23.53% and 40.5%, respectively in slaughtered water buffaloes in different parts of India. Kumar et al. [14] reported a prevalence of 6.52% in buffaloes in the north east of India. Pednekar et al. [15] showed a prevalence of 3.81% in buffaloes as against 5.10% in cattle of Maharashtra region of India. In our studies the high prevalence of hydatidosis could be due to the fact that various regions from which buffaloes were brought may have unhygienic conditions and are overpopulated with stray dogs. Significant variations in the prevalence of hydatidosis have been observed in various parts of India by [16,17].

The group wise study showed the prevalence as 3.52%, 5.58% and 54% in calves, heifers and adult buffaloes, respectively (Table-2). Our prevalence rate in calves is less than what others have reported. Terefe

et al. [13] reported a prevalence of 9.3% in calves. It was found that there is a positive correlation between the age of the buffaloes and the infection rate ($p < 0.05$). Lahmer et al. [18] have shown higher prevalence in males (44.8%) than in females (25.2%). Higher prevalence of cysts in adults than in calves was also documented by Lahme et al. [18]. The main reason for a higher prevalence in advanced age may be due to the various ailments associated with ageing and also the chronic nature of the disease.

Females outnumbered the prevalence in heifers and adult buffaloes with 82.19% and 84% prevalence as against the calves, where the males showed a higher incidence 63.88%. These results are in agreement with the findings of [7] and [19] who also reported a higher incidence of hydatidosis in slaughtered female buffaloes. The higher prevalence in male calves could be due to the apathy of the owners who are often reluctant to provide better management to the male calves owing to their negligible utility.

Table-3 shows that the cysts have a higher occurrence in all the groups in winter (54.28%), followed by spring (28.14%), summer (21.92%) and autumn (20.92%). These findings are in contrary to the findings of [20] who reported maximum number of infections in spring (30%) and the minimum number of infection in winter (24.51%). However, our findings are parallel to those of Mohamadin et al. [21], who also documented a higher prevalence in winter. The increased incidence of the disease in winter may be due to the survival of the cyst in the organs for several days under colder temperatures as compared to hot summers. One of the reasons for a higher number of infections recorded during winter can be attributed to the fact that there was also a higher inflow of buffaloes for slaughter in winter as compared to other seasons. Jithendran et al. [22] also reported a high occurrence of hydatidosis in sheep and goat as 28.3% and 19.45%, respectively in winter.

Table-3. Seasonal prevalence of Hydatidosis

Seasons	Calves (>1 year)		Heifer (2-3years)		Adult buffaloes (3-7years)	
	N	Positive	N	Positive	N	Positive
Spring	1522	456	1945	583	43880	12288
% prevalence(Group)	29.96%		29.97%		28.0%	
% prevalence(season)	28.14%					
Summer	651	136	1631	342	31412	6911
% prevalence(Group)	20.89%		20.96%		22.0%	
% prevalence(season)	21.92%					
Autumn	1261	252	1958	391	38920	8173
% prevalence(Group)	19.98%		19.96%		20.99%	
% prevalence(season)	20.92%					
Winter	1666	643	2306	922	82463	45355
% prevalence(Group)	38.59%		39.98%		55%	
% prevalence(season)	54.28%					

Table-4(a) In situ involvement of visceral organs and number of cysts recovered with their fertility rate in calves.

Organs	Calves (>1year)			
	Total	Positive	Fertile	Sterile
Lungs (males)	4131	71	5	66
Lungs (females)	696	34	1	33
Liver (males)	4131	42	13	29
Liver (females)	696	31	17	14
Spleen (males)	4131	02	0	02
Spleen (females)	6960	0	0	
Heart (males)	41310	0	0	
Heart (females)	6960	0	0	

Table-4(b) In situ involvement of visceral organs and number of cysts recovered with their fertility rate in heifers.

Organs	Heifers (2-3 year)			
	Total	Positive	Fertile	Sterile
Lungs (males)	5644	67	43	24
Lungs (females)	2196	78	21	57
Liver (males)	5644	45	11	34
Liver (females)	2196	58	19	39
Spleen (males)	5644	05	2	03
Spleen (females)	2196	12	5	7
Heart (males)	5644	01	0	01
Heart (females)	2196	0	0	0

Table-4 (b) In situ involvement of visceral organs and number of cysts recovered with their fertility rate in Adult buffaloes.

Organs	Adult buffaloes (3-7years)			
	Total	Positive	Fertile	Sterile
Lungs (males)	8260	612	540	72
Lungs (females)	1,188415	178454	789	177665
Liver (males)	8260	409	289	120
Liver (females)	1,188415	113919	1345	112574
Spleen (males)	8260	41	12	29
Spleen (females)	1,188415	89	62	27
Heart (males)	8260	09	04	05
Heart (females)	1,188415	130	47	83

Distribution of the hydatid cysts in organs showed that lungs accounted for the highest prevalence (2.17%) followed by liver (1.51%) and spleen (0.04%) in calves (Table-4a). However, no cysts were observed in the heart. The organ wise fertility showed that 7.04% of male cysts were fertile in lungs as compared to 2.94% fertility of female cysts. In liver, 54.83% and 0.95% female cysts and male cyst were fertile respectively. In heifers (Table-4b) the lungs showed 1.84% prevalence (29.92% fertile in females and 64.17% in male calves) as compared to liver, 1.31% (24.44% fertile in males and 32.75% in females), spleen 0.21% (40% in males and 41.66% females) and heart 0.01%. The adult buffaloes (Table-4c) revealed that lungs constitute 14.96% (0.44% fertile in females and 88.23% in males) of hydatid cysts, liver 9.55% (1.18% fertile in females and 70.66% in males), spleen 0.01% (69.66% fertile in females and 29.26% in males) and heart 0.01% (36.15% fertile in females and 44.44% in

males). Our findings are in correlation with Pour et al. [19] and Nadery et al. [23], who also reported higher prevalence in lungs as compared to liver. Nadery et al. [23] reported presence of the cyst as 60% in lungs, 32% liver, 4% spleen, 2% kidney, 0.9% heart and 0.1% brain. Verma et al. [24] reported higher infections of cysts in lungs as 43.09%, liver 24.39%, spleen 2.76%, heart 1.65%.

Our findings are in contrast with Rinaldi et al. [25] who reported only sterile and calcified cysts in the lungs and liver of slaughtered buffaloes. Verma et al. [26] reported higher number of sterile cysts in buffaloes. However, Arbabi et al. [27] found the fertile cyst in lungs of the slaughtered animals. The prevalence of highly fertile cysts as encountered in our study is of great public health hazard not only to butchers and meat handlers, but also to the meat consumers.

Conclusion

The higher prevalence of hydatidosis in buffaloes slaughtered in the Mirha Exports is likely due to the overpopulation of stray dogs in the areas where the plant gets its supply. Hydatid disease is caused by small tapeworms (*Echinococcus granulosus*) that live in the intestine of dogs and continuously voids through faces and thus act as regular carriers of the disease. The unhygienic and lack of appropriate disposal of affected organs at the plant adds to the incidence. The unhygienic conditions and lack of appropriate disposal of affected organs at the plant adds to the incidence. Thus, there is an immediate need for mass deworming programme in stray dogs and buffaloes in and around the mandi areas. Proper disposal of the affected organs, increasing the awareness regarding the disease among the butchers and implementing effective serosurveillance of the disease is the need.

Authors' contributions

AK: surgery and dissection, SB: Antemortam examination of animals, identification of cyst and collection of the cysts, MAG: Compilation of a survey in the form of report, recording of data, drafted and revised the manuscript. All authors read and approved the final manuscript.

Acknowledgements

The authors are thankful to the Managing Director of the Mirha Exports Pvt. Ltd. for providing necessary facilities to carry out this study. Thanks are also due to the slaughter house butchers who helped us immensely during the investigation.

Competing interests

The authors declare that they have no competing interests.

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