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Diagnostic study of bovine herpes virus -1 Infection in cattle by antigen sandwich ELISA in Mosul city, Iraq

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Abstract---Infectious bovine rhinotracheitis (IBR) is worldwide disease affecting both domesticated and wild ruminants. However, it has a significant economic impact on animal industry. Bovine herpes virus 1 (BoHV-1) can infect different organs of an animal. The current work aims to investigate the prevalence of BoHV-1 in cattle of Mosul city, Iraq. In this study, 184 animals 6 months – 2 years old, were sampled between October 2020 and March 2022. Plasma and nasal swabs were tested using of Sandwich ELISA test for the detection of BoHV-1 antigens. Results indicated that the infection rate of BoHV-1 in cows was 12/184 (6.5%). Results show that, there was no significant difference indicated among prevalence of the diseases concerning BoHV-1 in the respiratory, ocular, and reproductive forms, the sample type, whether plasma and nasal swabs, between native and imported breed ($P \leq 0.05$). Furthermore, a significant difference in the prevalence of BoHV-1 was detected in males more than in females 12/144 (8.3%), ($P \leq 0.05$). In addition, there was a significant difference in the prevalence of BoHV-1 10/100 (10%) at 6-8 months of age ($P \leq 0.05$). It has been concluded that BoHV-1 virus still circulated in cows of Mosul city, Iraq with relatively high infection rate. However, many other factors could increase these infection rare particularly animals age.

Keywords---BoHV_1, Mosul, Cattle, prevalence, Antigen Sandwich ELISA.

Introduction

Bovine herpesvirus-1 (BoHV -1) spreads in different parts of the world and because of its importance from a veterinary medical point of view, it is classified under the list B of the World Organization for Animal Health, and many countries of the world have adopted various eradication regimens to get rid of it (1). the causative virus infects domestic cows, as well as other cloven foot species such as sheep, goats and buffaloes (2) .Alpha herpes virus 1 causes many diseases in cows, the most important of which are bovine rhinotrachitis infectious (IBR) and infectious Pustular vulvovaginitis (IPV), which are characterized by several clinical signs in cows (3,4) It also affects the digestive and nervous system and the appearance of chronic skin lesions (5).

It also causes miscarriage, which usually occurs in the last trimester of pregnancy. Further, it was responsible for infertility and short estrus period in non-pregnant cows. It also causes necrotic endometritis, ovarian inflammation and severe lesions of the corpus luteum (6,7). The incubation period for the disease is (2-4) days, followed by nasal and lacrimal mucous secretions, with drooling of saliva, However, after several days the nasal and lacrimal secretions become mucopurulent (8) .virus can be diagnosed by detecting the specific antibodies to bovine herpes virus type 1, which can be detected within 7-10 days from the onset of infection as well as during the latent phase of the virus. Investigation and detection of antibodies to this virus (9). The disease has many infectious properties that cause heavy economic losses, However, one of the most important epidemiological characteristics of this virus is its ability to cause latent infection in the nerve endings of Terminal Ganglia after the initial infection (10), as the animals in which a latent infection occurs remains throughout Her life is a carrier of the virus Due to the lack of a Serological Study in Nineveh Governorate that relies on modern laboratory methods in diagnosing the disease, this study was designed to investigate the Infection rate of infectious bovine rhinotracheitis in cattle in Mosul city, Iraq.

Material and Methods

Study Animals and Samples Collection

The Current study was conducted to examine 184 cattle with age six months to two years old from various farms in Mosul, Iraq, between October 2021 and March 2022. Information Concerning age, gender, origin was collected.. For each animal, Blood was collected (with anticoagulants) from each animal and the blood was separated to obtain plasma and stored at - 20°C for subsequent tests. (11,12,13). In addition, nasal swab samples were taken from animals showed respiratory signs. Sandwich enzyme-linked immunosorbent assay (sandwich-ELISA) was performed for both plasma and nasal swabs (14,15).

Sandwich-ELISA Procedure

In this study, a commercial sandwich ELISA kit (Abbexa BoHV-1 ELISA kit, USA) was conducted according to the manufacturer's instructions. In brief, the absorbance was set at 450 nm using BioTek EL-800 micro plate reader. The

negative and positive samples were determined according to the optical density (OD) values as the following: cut off value = the mean of negative Control values + 0.15, the negative sample was OD < cut off value, the positive sample was OD $\geq$ cut off value.

Statistical analysis

Statistical analysis was conducted using Chi-squared test. The differences were considered statistically significant if $P \leq 0.05$. For this purpose, SPSS 18 was used.

Results

The results revealed that the infection rate of BoHV-1 in cows in Mosul city was 6.5% (Figure 1). There was no significant difference in BoHV -1 prevalence between the respiratory and ocular form compared to respiratory and genital form, no significant difference between plasma and nasal swap sample, no significant difference between imported and native breed animals ($P \leq 0.05$; Table 1). On the other hand, this study Indicate a significant difference in BoHV -1 prevalence between sex of animals and between age groups of the animals ($P \leq 0.05$; Table 1).

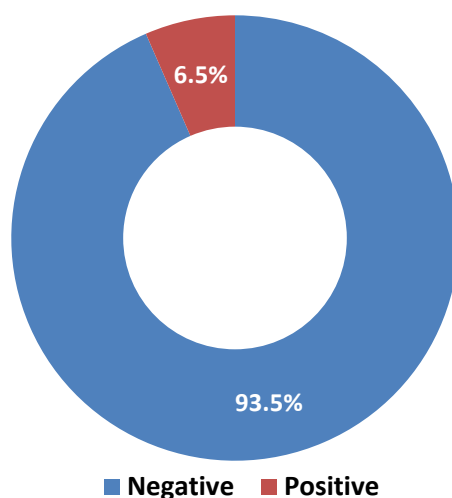


Figure 1. Infection rate of BoHV -1 in cattle in Mosul city

Table (1): Number and percentage of cattle in Mosul city positive to BoHV-1 according to different study variables

Studied Variables	No. of animals examined	No. of infected animals	% percentage of infected animals
Form of the disease			
Respiratory and ocular	100	8	8a
Respiratory and genital	84	4	4.7a
Type of the Sample			

Plasma	110	10	9a
Nasal swap	74	2	2.7a
Breed of the animal			
Native breed	50	2	4a
Imported breed	134	10	7.6a
Sex of the animal			
Male	144	12	8.3a
Female	40	0	0b
Age of the animal			
6-8 month	100	10	10a
9 month- 2 years	84	2	2.38b

Different letters in each variable means statistically significant difference at $P \leq 0.05$.

Discussion

Bovine herpes virus-1 infects cattle and is spreads worldwide, causing a variety of respiratory and reproductive problems, as well as weight loss and substantial economic losses (16). This is a innovative Prevalence research of BOHV-1 in Mosul city, Using Antigen Sandwich ELISA in plasma and nasal swap, it was determined that the disease has an overall Prevalence rate of 6.5% in Mosul city. In earlier BOHV1 studies abroad, a lower and/or roughly identical Prevalence was found, The Prevalence was 11.1% in cattle employing Antigen Sandwich ELISA in India (17). The prevalence of BOHV-1 varies by country and even within a country due to factors such as sample diversity, climate changes, management strategies, control efficiency, population size, biosecurity, and uncontrolled animal migration. (18). There was no a significant difference in BOHV1 Prevalence for Disease form, Respiratory and ocular form was 8%, and Respiratory and genital form was 4.7 % in the current study which agreed with Nandi et al.; Benoit et al. (19,20). There was no substantial different in BoHV -1 prevalence for type of sample plasma sample in this investigation. 9%, and Nasal Swap Sample 2.7% (17,21) This disparity in prevalence could be attributed to the virus's low titer in the nasal swab as a result of the disease's latent period.

The current work found that males had a greater prevalence of BOHV-1. This may be due to the fact that most of the samples in this study were taken from fields of calves bred for fattening. The fact that there is no significant difference in BoHV-1 Prevalence between imported and native animals was also noted in this study, and the reason for this could be attributed to the lack of vaccination programs for this disease, especially since the majority of the animals used in this study are young animals prepared for fattening purposes. The current Study, indicated that a significant variation in BOHV-1 prevalence in age, with a greater prevalence rate in calves aged 6-8 months, which was agree with the findings of Johannes et al., (22) and may be due to fact that Older animals develop an immune response due to repeated exposure to the virus throughout their lives, which may reduce the appearance of disease symptoms in them(20). This indicator is in the high rate of Prevalence of the disease at young ages. May be young ages are sensitive to infection from old ages (14).

Conclusion

This study of BoHV-1 by Antigen Detection by Sandwich-ELISA (The Nasal swap and Plasma Samples) in Mosul city cattle, has revealed a relatively high prevalence of the disease, and several factors associated with the disease's prevalence, such as gender, age, and origins, have been discussed. As a result, these factors should be evaluated in Mosul and throughout the country for disease strategic control.

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Conflict of interest

The authors declare no conflicts of interest.

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