



Schmallenberg Virus Investigation Among Dairy Cattle in Iraq

HUSSEIN ALI NAJI¹, SAAD HASHIM AL-HUSSEINY², ZAINAB ABDUL HUSSEIN SAUD³ AND WESSAM MONTHER MOHAMMED SALEH^{1*}

¹Department of Internal and Preventive Medicine, College of Veterinary Medicine, University of Basrah, Iraq; ²Department of Veterinary Internal Medicine, College of Veterinary Medicine, University of Al-Qadisiyah, Iraq; ³Department of Public Health, College of Veterinary Medicine, University of Basrah, Basrah, Iraq.

Abstract | Schmallenberg virus (SBV) is disease-affecting cattle, sheep and goats, which are more susceptible than other animals, and has spread all the Europe countries since 2011. In the current study was aimed to investigate the seroprevalence of Schmallenberg virus antibodies in cattle in Basra and Al-Qadisiyah Provinces in south Iraq from September 2019 to August 2021. In a total 78 serum samples of cattle aged from 2-5 years were analyzed with competitive enzyme-linked immunosorbent assay for Schmallenberg virus. All the suspected animals suffered from many recurrent non-specific clinical signs such as dropping of milk production 78 (100%), loss of appetite 70 (89.74%), still birth 46 (58.97%), abortion 28 (35.89%) and malformation 4 (5.12%). The results of competitive ELISA technique indicated that 66 (84.6%) of 78 samples were positive for antibodies Schmallenberg virus, the incidence was 87.09% in Basrah while 82.97% in Al-Qadisiyah. The seropositive ELISA results according to the clinical signs were 66 (84.61%), 39 (50%), 24 (30.67%), and 3 (3.84%) for decreased milk production, still birth, abortion and malformation respectively. In conclusion this is the first study of detection of SBV Antibodies in cattle from south Iraq. The SBV caused high economic losses due to the decrease in cattle milk production, abortion and still birth also threatened the health of cattle therefore veterinarians should find control and prevention programs to reduce the morbidity caused by Schmallenberg virus.

Keywords | Dairy cattle, Abortion, ELISA, Schmallenberg Virus, Sero-prevalence

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***Correspondence** | Wessam Monther Mohammed Saleh, Department of Internal and Preventive Medicine, College of Veterinary Medicine, University of Basrah, Iraq; **Email:** Wessam.Mohammed@uobasrah.edu.iq, wessamgm@gmail.com

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INTRODUCTION

Schmallenberg virus (SBV) is Orthobunyavirus family Bunyaviridae which was first acute SBV infections were recorded in August 2011 within Germany, but the first still-birth and malformed animals detected in December 2011

in the Netherlands, then recognized in Germany by the "Friedrich Löffler Institute" in October 2011 by examining blood samples of cows which were giving non-specific clinical signs (Hoffmann *et al.*, 2012; Wernike *et al.*, 2015)., the veterinarian and researcher recognized unknown outbreak caused many clinical signs including decrease milk

production with slightly increase in body temperature and diarrhea, the blood sample was collected from an infected animals in Schmallenberg in Germany, then analyzed in the lab by use meta – genomic and next – generation sequencing and reported a new virus called Schmallenberg virus according the Schmallenberg city. (Van den Brom *et al.*, 2012; Van der Poel *et al.*, 2014).

The SBV affected main species of cattle, sheep and goats, though SBV has been identified in other animals as camels and deer (Authority, 2012; Conraths *et al.*, 2013). This virus is appearing a vector-borne disease and predominately transmitted by Culicoides midges or mosquitoes and most of authors explored the SBV through a Culicoides invasion in the summer season of 2012 in Ireland, although many of animals was seronegative until autumn in Europe (Barrett *et al.*, 2015; Stokes *et al.*, 2016; Wernike *et al.*, 2013).

In adult ruminants the infection by this virus is generally asymptomatic, however infections of a naïve pregnant females resembles with the vulnerable period of pregnancy, transmission a cross the placenta can cause abortion, stillbirth and fetal malformations (Beer *et al.*, 2013; Hubálek *et al.*, 2014). Hence the outbreaks of fever, diarrhea and dropped milk yield had also been noticed in the European as Netherland (Wernike *et al.*, 2013). Usually, infections that, occur in the end of summer and early autumn followed by a cases of abortion, dystocia and mastitis in 2011, while in sheep and goats, only abortion and dystocia were recorded (Tarlington *et al.*, 2012; Wernike *et al.*, 2013). Iraq's cattle industry especially in south region, is heavily impacted by numerous challenging and debilitating conditions (Naji *et al.*, 2021) or diseases (Naji *et al.*, 2019; Saleh *et al.*, 2019). In the south of Iraq, however, little information is available about Schmallenberg virus characteristics and epidemiology. In this study, aimed to determine SBV antibodies via competitive ELISA test in cattle in Basrah and Al- Qadisiyah provinces and reported the common clinical signs of Schmallenberg virus infection.

MATERIALS AND METHODS

ETHICAL APPROVAL

The present study was conducted accordance with the rule and guidelines issued by collage of veterinary medicine- University of Al-Qadisiyah. The experiments procedures were approved by the Committee of

Animal Ethics in the College of Veterinary Medicine, University of Al-Qadisiyah, Iraq.

STUDY DESIGN

The present study was conducted on 78 cows (31 serum samples of cows from Basra province and 47 serum samples of cows from Al-Qadisiyah province) aged from 2-5 years, All the (78) cows were suffered from different clinical signs included abortion, still-birth, decrease milk production and congenital anomalies were obtained from ranchers, the study extended between Sep 2019 to August 2021 in the stations of dairy cattle in Basrah and Al-Qadisiyah Provinces in Iraq.

CLINICAL EXAMINATION

The dairy cows suffering from history of abortion, stillbirth, decreased milk production and other important clinical signs were examined clinically and scores of vital signs were properly recorded and documented.

SERUM SAMPLES

Blood samples were collected from the jugular vein, using a vacutainer tube without anti-coagulant. Subsequently, these samples centrifuged for ten minutes at 1500 rpm to produce the serum, then the serum was kept in the cryotubes in deep freezer at -45 and it stored at -45 °C until analysis.

ELISA TANIQUE

In this ELISA kit we were followed the manufacturers' protocols (Svanova ELISA is an indirect ELISA the added conjugate forms complex with the antibodies) as described in our previous research (Naji *et al.*, 2021). The indirect ELISA tested the antibodies with conjugate to form the complex, Double sample tested performed. Every sample was added in two different wells, first sample coated with control antigen while the second sample was coated with SBV antigen. All the coated microplate was read at optical density OD 450 nm, value of optical density was adjusted through subtracts both wells value of every single sample, then the positive percentage (PP) value was correlated with positive control value.

$$PP = \frac{OD_{\text{Corr}} (\text{Sample or NC})}{OD_{\text{Corr}} (\text{PC})} \times 100$$

PP < 10 was considered as negative and PP > 10 as positive.

All the data in the present study analyzed with Chi square test and Microsoft excel software, for evaluating the seropositive status and the percentage the clinical signs of Schmallerberg virus infection in cattle in south Iraq.

RESULTS

The clinical signs in the present study of suspected animals show dropped milk production 78 (100%), 70 (89.74%), 46 (58.97%), 28 (35.89%) and 4 (4.59%) for loss of appetite, stillbirth, abortion and malformation respectively as in the (Figure 1).

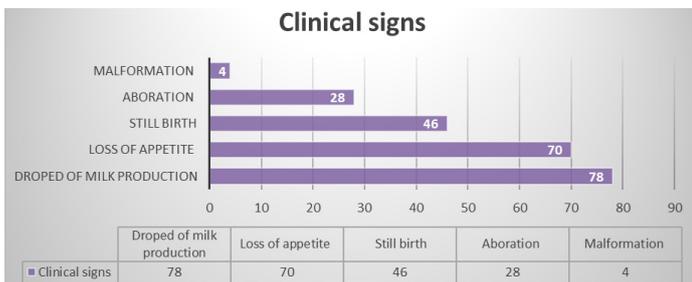


Figure 1. The clinical signs appear in suspected animals.

The results of Elisa test in the present study show 66 (84.6%) samples from 78 samples were seropositive percentage for the antibodies SBV both Basrah and Al-Qadisiyah Provinces, The ELISA Analysis test appear percentage the seropositive samples were 27 (87.06%) of 31 samples in Basrah province while 39 (82.97%) from 47 sample were positive for SBV in Al-Qadisiyah province (Figure 2).

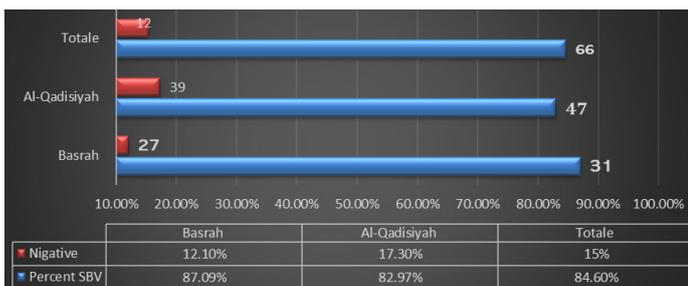


Figure 2. The percent of positive samples in both Basrah and Al-Qadisiyah Province.

Overall, the samples were positive for SBV according the clinical signs 66 (84.61%), 39 (50%), 24 (30.67%), and 3 (3.84%) for decreased milk production, still birth, abortion and malformation (Figure 3 and 4) respectively as in (Figure 5).

The results of Elisa according each of every clinical signs show 66 (100%) out 66 sample were positive for SBV test decrease milk production followed by 39 (84.78%) out from 46, 24 (85.71%) out (28) and 3 (75%) out 4 were positive to

SBV for still birth, abortion and malformation respectively Figure 6.



Figure 3. An SBV-positive cow's twin mummified fetuses.



Figure 4. An SBV-positive cow's aborted fetus.

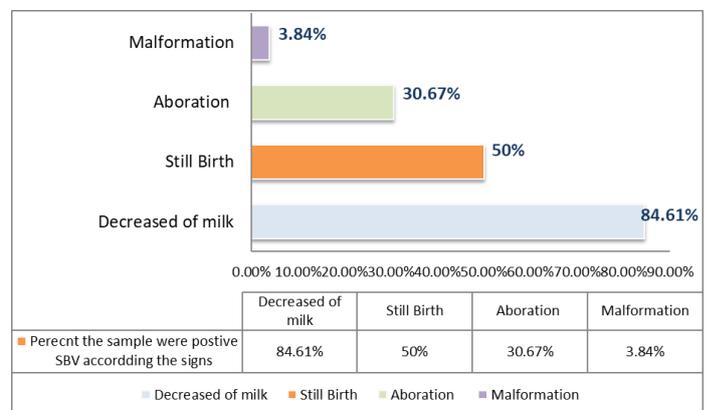


Figure 5. Percent the samples were positive for SBV to the total samples according the clinical signs.

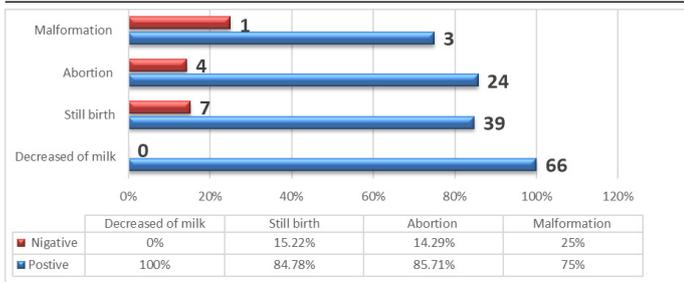


Figure 6. Percent and Number of the samples were positive for each the clinical signs.

DISCUSSION

Schmallenberg virus infection is an infectious disease and producing high economic losses to animals production, particularly in sheep and goats (Pawaiya and Gupta, 2013), and during the height of SBV outbreak in Europe, the disease is spreading rapidly between flocks (Veldhuis *et al.*, 2017), whereas in cattle (Collins *et al.*, 2016), revealed in his survey that sero-prevalence was 62.5% in pregnant cows and 0.6% in heifer. In our study, the first suspicious clinical signs were recorded as soon as from September 2019 to August 2021 in dairy cattle (Holstein) which were imported from some of European countries into Iraq, especially in Al-Qadisiyah and Basrah Provinces, the source of cattle explanation the high percentage of seropositive antibodies of SBV in the present study .

In the current study we were investigate the SBV by using the commercial Elisa kit and the specificity was reported to be 87.09% and 82.97% in Basrah and Al-Qadisiyah Provinces respectively. We found it unlikely those antibodies against SBV in these dairy cows which were imported into Iraq between 2014 and 2018 . As noted in our previous investigation (Naji *et al.*, 2021), buffalo show lower seroprevalence rates, possibly due to their increased resistance to infection or their clinical abnormalities being caused by other ailments, in addition to the SBV has ability to transported through artificial insemination which common uses in cattle while don't used in buffalo in Iraq. The current study similar study has been done in Netherlands and Belgium in 2012 including the prevalence of this virus infection in dairy cows is high at farm level of 95% and 99.76% respectively (Méroc *et al.*, 2013; Veldhuis *et al.*, 2017). Moreover, the herd prevalence was 86.5 % in the Dutch study (Afonso *et al.*, 2014), the results of our study suggesting that dairy herds were most likely exposed previously to SBV during European outbreak before imported to Iraq.

CONCLUSIONS

The current study provides important data about the presence of the Schmallenberg virus (SBV) in Iraq, and consider the first study in middle and south Iraq. The SBV caused

high economic losses du to the decrease cattle milk production, abortion and still birth also threatens the health of cattle therefor the veterinarian should find control and prevention program to reduce the morbidity caused by Schmallenberg virus.

NOVELTY STATEMENT

Several conditions, such as abortion, stillbirth, and decreased milk production, affect the cattle industry in Iraq, but no satisfactory diagnosis has been provided. Due to the fact that SBV is the first suspect among the above conditions, this study provides the first seroepidemiological evidence of SBV antibodies in cattle in southern Iraq, which is helpful for the control of this disease in this area.

AUTHORS' CONTRIBUTIONS

SHA, ZAHS and HAN have supposed and designed the work. WMMS and HAN carried out the laboratory tests. They did the survey and collected the references about the subject. All authors have done the reading and approving of this manuscript.

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CONFLICT OF INTERESTS

All the authors affirm that they have no competing interests between them.

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