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# The current situation of Bluetongue virus Disease in some Egyptian governorates during 2018-2019

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**Abstract**

Bluetongue (BTV) is a notifiable multiple species non-contagious vector born viral disease of domesticated and wild ruminants. An active surveillance study was conducted to understand the current situation of BTV in some Egyptian governorates in period between 2018-2019, the present seroprevalence in sample population of 5219 animals comprising 2366 cattle, 2683 sheep and 170 goat covering line agro-climatic zone (Delta, East, West, Central and Upper Egypt). The antibody prevalence was highest in goat (49.4%) followed by sheep (48.4%) and cattle (41.5%). The Upper Egypt district had the highest prevalence of BTV (65.5%) while Delta district had the lowest prevalence (37.3%) respectively. Also, the highest percentage of positivity for BTV antibodies was (56.9%) observed in autumn and (35.3%) in winter. Our results showed that attention and quarantine measures should be established to investigate clinical suspected cases to obtain real information about the situation of possible circulating BTV disease in Egypt by periodical diagnosis using suitable diagnostic techniques which act as a safeguard for our livestock.

***Keywords**: Current situation, Bluetongue, Egypt 2018-2019*

## Introduction

Bluetongue (BT) is an infectious, vector-borne viral disease that affects wild and domestic ruminants. The disease is caused by bluetongue virus (BTV), a member of the genus *Orbivirus* within the family *Reoviridae*. Up to now, 27 serotypes of BTV are officially recognized (**Maan *et al*. 2011a, b; Zientara *et al*. 2014).** The virus Horizontal transmission has been demonstrated for BTV serotypes 26 and 27 (**Batten *et al*. 2014; Bréard *et al*. 2017**).

BTV can exert major effects on animal health especially ruminant populations, restricting international trade in Livestock. It is listed as a notifiable disease by the office international des Epizooties (OIE) (**Gibbs and Greiner, 1994**).

In warmer African climates BT outbreaks can occur throughout the year. In cooler climates like in the southern parts of South Africa the clinical disease usually becomes apparent in late summer and autumn and disappears with the first winter frosts (**Coetzee *et al,* 2012).**

BTV can infect ruminants and camelids, but clinical disease is more pronounced in sheep **(De Koeijer and Elbers, 2007).**

The major economic impact of BT is that it is a reportable disease by almost all regulatory authorities along with at least 14 other diseases that are considered to have major adverse economic and societal ramification **(Mc Vey *et al.*, 2013).**
BTV is classified into 27 serotypes based on the genetic and antigenic feature of the neutralizing protein $VP_2$. $VP_7$ protein is a major determinant of serogroup specificity and most serological assays to detect BTV are based on detection of anti $VP_7$ antibodies **(Mertens *et al.*, 2005).**

Laboratory diagnosis depends on the isolation and identification of the causative virus as well as demonstration of rising antibody titer in serum samples collected during acute and convalescent stages of the disease **(Thomas, 1980)**.

**In Egypt:** the first documented outbreak of (BTV) infection occurred in imported Marino sheep (**Hafez and Ozawa, 1973).** The reported (BTV) serotypes in subsequent outbreak were 1, 2, 10, 12 and 16 **(Ismail *et al.*,1987).**

The BTV initially has been considered as an endemic disease in Africa and Cyprus, but recently, it was identified in many regions of the world such as Australia, the USA, Israel, and European countries **(Kyriakis *et al.* 2015**).

The present study was carried out to clarify the disease status in some Egyptian governorates in different districts during 2018, 2019.

## Materials and Methods

During 2018–2019 samples were collected during the vector breeding season in Autumn and winter seasons, a total of 5219 serum samples were collected of 2366 cattle, 2683 sheep and 170 goats from different provinces distributed on (Delta, East, West, Central and Upper Egypt) at least two governorates from each district, the collected blood from livestock was conducted solely for the purposes of this study and it was performed aseptically by veterinarian who was one of the investigators **(OIE, 2011).**

### 1-Samples:

### Preparation of blood samples

A total of 5219 blood samples were collected from cattle, sheep and goats from different Egyptian governorates. Ten ml of blood from each animal were collected in clean sterile tubes.
The clean serum was obtained using sterile Pasteur pipettes from the blood samples were left in tightly closed tubes overnight at 4°C and then centrifuged at 3000r pm for 10 min to separate the sera.
The collected samples from animals may contain live virus and appropriate inactivation steps should be put in place. Heat inactivation has been described (**Van Vuren & Paweska, 2010).**

### 2-Serological detection of BTV antibodies using competitive ELISA

Serum samples were stored at −20°C till the serological tests were performed by commercial ID Vet, (France) BTV competitive ELISA kit was used for detection of BTV specific antibodies against $VP_7$ protein in sera samples according to manufacturer instruction. **(Tittarelli, 2014).**

-The wells were coated with the $VP_7$ protein.
The samples to be tested and the controls were added to the microwells. The anti-$VP_7$ antibodies, if present form an antibody-antigen complex which masks the $VP_7$ epitopes.
-An anti $VP_7$ peroxidase (HRP) conjugate is added to the microwells. It fixes to the remaining free $VP_7$ epitopes forming an antigen-conjugate-HRP complex.
-After washing to eliminate the excess conjugate, the substrate solution (TMB) is added.
-The resulting coloration depends on the quantity of specific antibodies present in the sample to be tested.
-In the absence of antibodies, a blue solution appears which becomes yellow after the addition of the stop solution.
-In the presence of antibodies, no colouration appears.
-The Microplate was read at 450 nm.

## Results

In the present study, the serological survey for BTV in different Egyptian governorates re-

vealed that the virus was distributed in different localities in Egypt the overall seroprevalence of BTV in cattle and small ruminants was 2365 out of 5219 serum samples in percentage 45.3 % were positive for BTV antibodies and the Upper Egypt district showed higher percentage of positivity than other districts and seasonal variation have important role in viral infection where the highest percentage of positive samples was 56.9% in autumn as in tables (1 and 2)

**Table (1).** Results of ELISA test for detection Bluetongue antibodies in different Districts

| District | No. of sample | Positive +ve | Percentage % |
|---|---|---|---|
| **Delta** | **2445** | **912** | **37.3%** |
| **East** | **791** | **286** | **36.2%** |
| **West** | **1056** | **624** | **59.1%** |
| **Central** | **672** | **376** | **56.0%** |
| **Upper Egypt** | **255** | **167** | **65.5%** |
| **Total** | **5219** | **2365** | **45.3%** |

**Table (2).** Result of ELISA Test for Detection of Bluetongue BTV antibodies in Autumn and Winter seasons:

| Season | No. of sample | Positive +ve | Percentage % |
|---|---|---|---|
| **Autumn** | **2406** | **1370** | **56.9%** |
| **Winter** | **2813** | **995** | **35.3%** |

In cattle 983 out of 2366 in percentage, 41.5% were positive for BTV antibodies detecting ELISA and The higher percentage was in Upper Egypt (Luxor – Aswan– Sohag and Qena) as provided in **Table (3).**

**Table (3).** Result of ELISA Test for BTV antibodies in cattle serum samples in different Egyptian governorates:

| District | No. of sample | Positive +ve | Percentage % |
|---|---|---|---|
| **Delta** | 1328 | 459 | 34.6% |
| **East** | 460 | 166 | 36.1% |
| **West** | 90 | 44 | 48.9% |
| **Central** | 352 | 208 | 59.1% |
| **Upper Egypt** | 136 | 106 | 77.9% |
| **Total** | **2366** | **983** | **41.5%** |

In sheep 1298 samples out of 2683 in percentage 48.4% were positive for BTV antibodies detection. The west district (Marsa Matrouh and El -Wadi El -Gadid) was found to be the highest positive area which constituted 60.6% **(as shown in Table 4)**.

**Table (4)** Result of ELISA Test for BTV antibodies in sheep serum in different Egyptian governorates

| District | No. of sample | Positive +ve | Percentage % |
|---|---|---|---|
| **Delta** | 1065 | 426 | 40% |
| **East** | 310 | 115 | 37.1% |
| **West** | 881 | 534 | 60.6% |
| **Central** | 320 | 168 | 52.5% |
| **Upper Egypt** | 107 | 55 | 51.4% |
| **Total** | **2683** | **1298** | **48.4%** |

Concerning goat, our results showed that 84 out of 170 in percentage 49.4% where the West is the highest district **(**(Marsa Matruh and El-Wadi El- Gadid) (**table 5)**

**Table (5)** Result of ELISA Test for BTV antibodies in goat serum in different Egyptian governorates

| District | No. of sample | Positive +ve | Percentage % |
|---|---|---|---|
| **Delta** | 52 | 27 | 51.9% |
| **East** | 21 | 5 | 23.8% |
| **West** | 85 | 46 | 54.1% |
| **Central** | - | - | - |
| **Upper Egypt** | 12 | 6 | 50% |
| **Total** | **170** | **84** | **49.4%** |

## Discussion

In cattle, goats and sheep, BTV causes an acute disease with high morbidity and mortality, BTV also infects goats, cattle and other domestic animals as well as wild ruminants **(Roy, 2008)**. Multivariate logistic regression analysis would have probably given a more appropriate answer on the influence on the BTV prevalence of each of the variables considered BTV disease is a highly infectious non -contagious disease of ruminants and listed as a transboundary animal disease (TADs) that can spread rapidly across countries borders **(Sohail *et al.*, 2019).** In this study, a seroprev-

alence for the high number of serum samples from different localities in Egypt found (2365) out of (5219) in percentage (45.3%) were positive for BTV antibodies **(Table 1).**

Among several ELISAs that have recently been developed, the Competitive ELISA in which a group-specific Mab (monoclonal antibodies) to BTV is used, has proved to be the most sensitive and specific assay for detection of antibodies to BTV. Following extensive national and international validation, the competitive ELISA is gradually replacing the AGID as a universal test to certify ruminants for trade purposes and to diagnose BT infection in domestic and wild animals. **(Abduslam Mahmoud *et al.,* 2019).** In this study five districts, the overall seroprevalence was not uniformly distributed and significantly. Higher seroprevalence in cattle was recorded in upper Egypt (Southern region) (77.9%); conversely, the other small ruminant showed the highest prevalence values were found in (Western region) (60.6% in sheep and 54.1% in goat respectively in (**Tables 4 and 5 )** and these results were in agreement with **(Abduslam Mahmoud *et al.,* 2019)** who mentioned that similar overall and species seroprevalence in Similarly, The differences were found between small and large ruminant prevalence values in Libyan provinces. The higher percentage in cattle was recorded in upper Egypt and the Southern part was observed where animal movements across the borders either transitional are recurrent thus, related to the risk of importing animals infected with different pathogens from the Southern borders is high **(Dayhum *et al.* 2018).**

Moreover, seasonal variation have important role in viral infection as in **(Table 2**) where percentage of positive serum samples to antibodies against BTV sample were 56.9% in autumn (early winter) than in winter the percentage decrease to 35.3% as recorded by **(Purse *et al.,* 2005)** that BTV occurrence is seasonally in the affected Mediterranean countries, subsiding when temperatures drop and hard frosts kill the adult midge vectors. Viral survival and vector longevity are seen during milder winters **(International Society, 2007)**.

Free livestock movements or pastoralist activities present and common in the Southern regions might have facilitated the introduction of the emerging serotype which already reported in Sudan **(Elfatih *et al.* 1987).**

## Conclusion

We recommended Northern African authorities collaborate in organizing common surveillance programmer to early detect novel strains or emerging serotypes in order to set up proper preventive measures, and, in case, develop specific vaccines and plan coordinated vaccination campaigns. That our results gave attention to quarantine measures should be investigated suspected cases repeatedly to obtain the updated about the situation of the disease in Egypt and periodical diagnosis for the evidence of disease using suitable diagnostic techniques and vector control should be done in the suspected area.

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