



Research Article

Surveillance of *Aedes aegypti* (Diptera: Culicidae) and COVID-19 in Cuba: General Considerations

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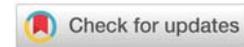
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Abstract

The Pan American Health Organization (PAHO) has emphasized the need to maintain efforts to prevent, detect, and treat vector-borne diseases during the COVID-19 pandemic since the combined impact of both could have potentially devastating consequences on the population at risk. Cuba during the COVID-19 pandemic established its protocol for its combat, respecting the provisions of the World Health Organization (WHO) and adding other internal measures in the country that have ensured its effective control. Parallel to the epidemic, the country continues to monitor and control of *Aedes aegypti* to avoid a possible dengue epidemic. This article provides some considerations that must be taken into account in the presence of COVID-19 and dengue cases that contribute to the strengthening of effective and rapid surveillance and control of *Ae. aegypti*.

Introduction

Dengue (DENV) and other diseases transmitted by *Ae. aegypti*, such as Chikungunya (CHIKV) and Zika (ZIKV) affect 129 countries with more than 4 billion people at risk of these diseases worldwide. The year 2019 witnessed an unprecedented dengue outbreak in many countries of the Americas, with more than 3.1 million cases reported, including 28,176 severe cases and 1,535 deaths, a situation that could recur in 2020 [1]. However, the health problem with the greatest health, economic, political and social impact at the moment is COVID-19 [2]. Its recent appearance and worldwide distribution; variable and exponential rates of infection and mortality; the high number of asymptomatic cases; and the clinical and psychological manifestations associated with the disease, have alerted all health and political systems internationally [2,3].

The pandemic caused by the expansion of COVID-19 in the world is a complex international health phenomenon that increasingly translates into serious political and social

problems in many countries, including the most economically developed ones [4].

The World Health Organization / Pan American Health Organization (WHO / PAHO) and other international organizations have provided and supported various prevention and control measures to deal with this pandemic [3], in this way, Cuba established its protocol to combat it, respecting the provisions established by the WHO and adding other measures such as active inquest in the population, isolation of confirmed, suspected and surveillance cases, cleaning of streets with chlorinated solution, among others, measures corresponding to prevention and others such as, diagnostic protocols and treatments that have led to effective control of the disease and a control in the number of deceased [4,5].

PAHO has emphasized the need to continue efforts to prevent, detect, and treat vector-borne diseases during the pandemic since the combined impact of COVID-19 and dengue epidemics could have potentially devastating consequences for the population at risk [1].

The presence of DENV and COVID-19 may be possible since they are viruses belonging to different families that can coexist in the same organism, in addition to the fact that both have some similar signs and symptoms [6,7].

COVID-19 in Cuba was evident in the second week of March 2020 when the first cases were registered, reaching its highest number in the second half of April and early May [8].

Historically, the months of March and April are characterized by the absence or low transmission of dengue since the populations of *Ae. aegypti* in this period corresponding to months of the dry season in Cuba (November–April) decrease⁹ due to the decrease in natural breeding sites and the lack of water in the artificial deposits abandoned in the courtyards. These months, due to these characteristics, it is used by the National Program for the Control of *Ae. aegypti* and *Ae. albopictus* to carry out phases of intensive attacks against the dengue vector to avoid an increase in the populations of the vector and to prevent the appearance of cases of dengue, which is not It was able to carry out due to the existing epidemiological situation related to COVID-19 during March and April in the country.

This situation explained above is reversed during the month of May when the rainy season (May–October) begins and the proliferation of the mosquito becomes evident [9], so at this time the activities to combat *Ae. aegypti* using the advantages of established active research, obtaining information for suspected cases of both diseases. This activity together with the visit of the vector personal that provides the necessary information to determine the rates referring to the vector mosquito and take the necessary control measures in certain locations, contributed to integrated surveillance.

This article provides some considerations that must be taken into account when COVID-19 and cases of DENV are present simultaneously that contribute to the strengthening of effective and timely surveillance and control of *Ae. aegypti*.

General considerations

- It is essential to promote that people allow vector personnel to enter their homes in these moments of isolation, since they first comply with the protection measures established by COVID-19 and secondly, their work contributes to reducing the occurrence of breeding sites with the vector presence at times when most people stay at home.
- Maintain active inquest in the population with a dual objective of early detection of suspected cases of DENV and COVID-19.
- Historically, the national vector program has identified entomological risk blocks in each health area of each municipality in the provinces of Cuba, so surveillance must be prioritized in these places, providing effective use of human resources in current circumstances in which personnel are also diverted for response to COVID-19.

- During COVID-19, where one of the measures is to stay indoors, residents should be encouraged to work together in and around their homes to control and eliminate *Ae. aegypti* breeding sites that are identified as producers of this mosquito as the water storage tanks and the non-destructible artificial ones where religious tanks, refrigerator drawers, vases and small tanks storing water in kitchens stand out, as well as eliminating stagnant water in their courtyards and the presence of solid waste being carried out as a weekly family activity.
- Among the preventive measures against COVID-19 is continuous hand washing and adequate personal hygiene, where the availability of water is essential, which is sometimes it's necessary to store for several days in a large part of the population due to the frequency in its supply. To guarantee the coverage of these deposits to avoid the presence of dengue vector is essential in the fight against these two diseases.
- Although it is true that the closing of the borders contributes to breaking the continuous introduction of carriers with the dengue virus in the country, the occurrence of vertical transmission of serotypes DENV1, DENV2, DENV3 and DENV4 cannot be ignored in populations of *Ae. aegypti* [10], in Cuba which, together with the capacity of the eggs to dry out, could generate a transmission from this mechanism favored by the rains that occurred during the month of May in the country.
- Maintain the actions against the adult mosquito using the thermal fogging established by the program for the drastic reduction of the active adult population, but the possibility of using the residual treatment is recommended due to its long period of effectiveness in places such as work centers, schools, areas of the population with a high entomological risk and others.
- The analysis of the data collected by the national program that contribute to the determination of entomological indicators at the level of each municipality in the country should be encouraged in order to be prepared for any epidemiological event that occurs.
- Although citizens by themselves cannot solve their health problems, the government without the support of citizens and the participatory channels available to the country cannot solve the health problems of society as a whole [11], so the guidelines given by the media should emphasize so that the population knows the possibility of co-infection (DENV-COVID-19) to raise awareness about it and to know about the impact this would have on human health.

Conclusions

An integrated work must be achieved in the combat against *Ae. aegypti* at times of the COVID-19 pandemic where they are taken into account; 1) the scientific results carried out in the country on the surveillance, biology, ecology and control of *Ae.*



aegypti; 2) stratification of entomological risk; 3) the supervision of the work of the vector personnel in both way in monitoring and in the application of vector control methods, 4) keeping active inquest of inestimable value in the rapid detection of cases of DENV and COVID-19; 5) encourage community participation; 6) guarantee the continuous existence of a clear and precise educational communication to the population on these health issues (DENV and COVID-19); 7) guarantee the systematic evaluation of all the activities that are carried out.

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