Simultaneous epidemics of dengue and COVID-19 in Brazil: clinical-epidemiological considerations

Epidemias simultâneas de dengue e COVID-19 no Brasil: considerações clínico-epidemiológicas

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ABSTRACT
Analytical study based on literary discussions and epidemiological data, in the historical series from 2016 to 2020 for dengue and from 2020 to 2021 for COVID-19 in Brazil. It will be discussed the clinical and epidemiological consequences felt by health care in the face of the epidemic coexistence of both, in addition to underreporting. In the case of dengue, an arbovirus of the Flavirae family, its clinical features are an acute febrile condition and risk of death in its most severe manifestation. Similarly, the coronavirus clinically manifests itself with fever, non-productive cough, sore throat, general malaise, headache, myalgia and, as a worse prognosis, also death. When they share the same epidemiological scenario, such diseases make it difficult to differentiate the diagnosis, as they both have a viral cause, start with fever and do not respect age or gender. In view of viral cocirculation and possible co-infection, it is essential to understand the clinical and the laboratory between the two pathologies. Furthermore, with the start of the fight against COVID-19, both dengue and other diseases have become secondary and underreported concerns in the pandemic situation. Thus, through this, we aim to reinforce the need for readaptation of the health system in the face of the simultaneous occurrence of dengue and COVID-19 epidemics.

Keywords: dengue, COVID-19, epidemiologia.

RESUMO
Estudo analítico baseado em discussões literárias e dados epidemiológicos, nas séries históricas de 2016 a 2020 para a dengue e de 2020 a 2021 para a COVID-19 no Brasil. Serão discutidas as conseqüências clínicas e epidemiológicas sentidas pelo cuidado com a saúde diante da coexistência epidêmica de ambos, além da subnotificação. No caso da dengue, um arbovírus da família Flavirae, suas características clínicas são uma condição febril aguda e o risco de morte em sua manifestação mais grave. Da mesma forma, o coronavírus se manifesta clinicamente com febre, tosse não produtiva, dor de garganta, mal-estar geral, dor de cabeça, mialgia e, como um prognóstico pior, também morte. Quando partilham o mesmo cenário epidemiológico, tais doenças tornam difícil diferenciar o diagnóstico, pois ambas têm uma causa viral, começam com febre e não respeitam a idade ou o sexo. Em vista da cocirculação viral e possível co-infecção, é essencial compreender a clínica e o laboratório entre as duas patologias. Além disso, com o início da luta contra a COVID-19, tanto a dengue quanto outras doenças tornaram-se preocupações secundárias e subreportadas na situação pandêmica. Assim, através disto, pretendemos reforçar a necessidade de readaptação do sistema de saúde diante da ocorrência simultânea da dengue e das epidemias da COVID-19.

Palavras-chave: dengue, COVID-19, epidemiologia.

1 INTRODUCTION

Epidemiological surveillance in Brazil, defined within the Unified Health System (*Sistema Único de Saúde* - SUS), aims at permanent technical orientation for healthcare professionals, who carry out actions for controlling pathologies by researching factors and receiving notifications. Promoting quality public health in any county is a challenging objective, which may be hindered when there are two or more diseases of strong occurrence, such as the cases of COVID-19 and dengue in Brazil.

Currently, viral diseases are common and emerging in the national territory, added to the new clinical challenge of the coronavirus named SARS-CoV-2, allied to the percentage of non-communicable diseases that remain present[1]. In the case of the present paper, we will analyze the simultaneity of dengue and COVID-19 epidemics, with the increased impact on the administration of healthcare networks and on the socioeconomic responsibilities of the country[2].

For a long time, studies have acknowledged recurring viral diseases in Brazil, particularly arboviruses. However, despite that acknowledgement, dengue prevention remains flawed since part of the population wrongly considers that to be a benign virus disease and, consequently, only seek medical attention after the worsening of the setting[3]. In addition to this situation, the arrival of COVID-19 is also a factor that makes it difficult for data to reveal the actual viral circulation of dengue.

According to the Epidemiologic Report of the Brazilian Ministry of Health (2021), ever since the confirmation of the first cases of COVID-19, a decrease was observed in the records of probable cases of dengue. That is the first difficulty factor for the surveillance to receive official notifications of dengue cases. In this scenario, the notification seems to only estimate the magnitude of the epidemic and not its reality[3]. A second factor for the current undernotification of dengue is the COVID-19 care, which was being prioritized due to the high number of suspected cases[4].

According to the Ministry of Health, Brazil had the first case of coronavirus SARS-CoV-2 confirmed on February 25th, 2020 and, in May, about 293,000 cases were recorded nationwide[5]. When the situations of dengue and COVID-19 are correlated, some hurdles make this coexistence troublesome: The similar clinical setting that leads to the late diagnosis of dengue; the increase in assistance demand in healthcare; the prioritization of COVID-19 care that worsens the undernotification of dengue cases[2].

The dengue clinical setting is characterized by fever, particularly, with duration of two to seven days, and two more manifestations (nausea, vomit, exanthema, myalgia or arthralgia, headache with retro-orbital pain, positive tourniquet test, leucopenia). While COVID-19 cases also feature fever, it is associated with headache, sore throat, coughing, or running nose. Thus, medical professionals must be trained to be better in the suspicion and notification of cases. Since little is known about COVID-19, physicians must be reminded of the possibility of coinfection of both viruses, which would further impact care and notification[2].

When analyzing the laboratory side of the virus, some circumstances were observed. First, patients infected by SARS-CoV-2 and diagnosed with dengue, via quick test, evolve to more severe clinical settings. Another issue is that less sensitive laboratory methods yield false positive, favoring the expansion of COVID-19[2].

The need to fight the viruses is evident. Dengue has been fought seasonally from March to June since 1986. However, recently, the fight of COVID-19 was added, which led more Brazilians to seek healthcare. This space-temporal coincidence of epidemics is being challenging to Brazil and the decision of healthcare networks is to prioritize respiratory problems and urgencies, i.e., COVID-19 has become the priority epidemic. In face of the intensification of the pandemic combat, the country had a clear reflection of undernotification of dengue, since it has become secondary both to healthcare professionals and the overall population[4,6].

This study aims to analyze epidemiological data of dengue and COVID-19 in Brazil, in the historical series from 2016 to 2020 for dengue and 2020 to 2021 for COVID-19. We also point out the undernotification of dengue and the effects for healthcare in face of the clinical-epidemiological situations of viral co-circulation.

2 METHODS

This is an analytical, cross-sectional, quantitative study based on secondary data regarding the notification of cases of dengue in the years 2018, 2019, 2020, and 2020 for COVID-19, indexed by epidemiological weeks.

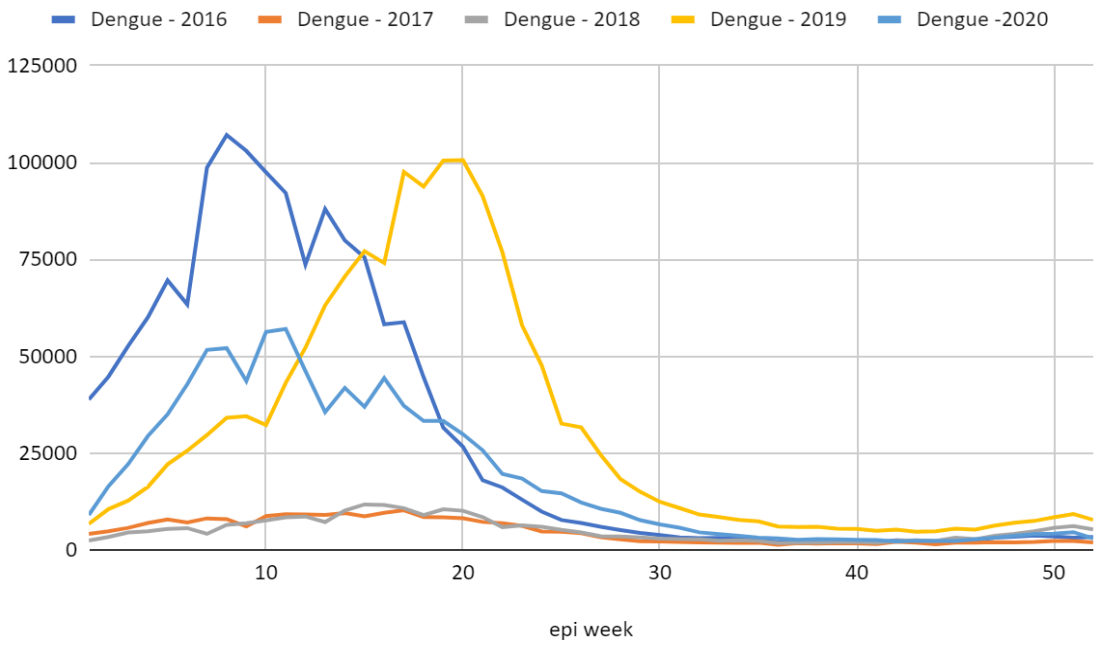
For the cases of dengue, data from the System of Information of Pathologies of Notification (*Sistema de Informação de Agravos de Notificação* - SINAN/SUS) were used, available at the electronic address of the Computing Department of the SUS (DATASUS). For COVID-19 cases, the Federal Government platform was used (covid.saude.gov.br), notified by the State Secretaries of Health, created at the beginning of the pandemic for purposes of epidemiologic control of COVID-19 in Brazil.

The data were collected in the electronic systems and then stored and made available in the digital tool Excel for later comparison and obtention of the results. For a broader sample that allowed avoiding the biases of the secondary data, the present study also used plots created with the previously selected data.

3 RESULTS AND DISCUSSION

The historical series of dengue between 2016 and 2020 shows the evolution of the diagram below, which represents the number of probable cases notified by clusterings of epidemiological weeks.

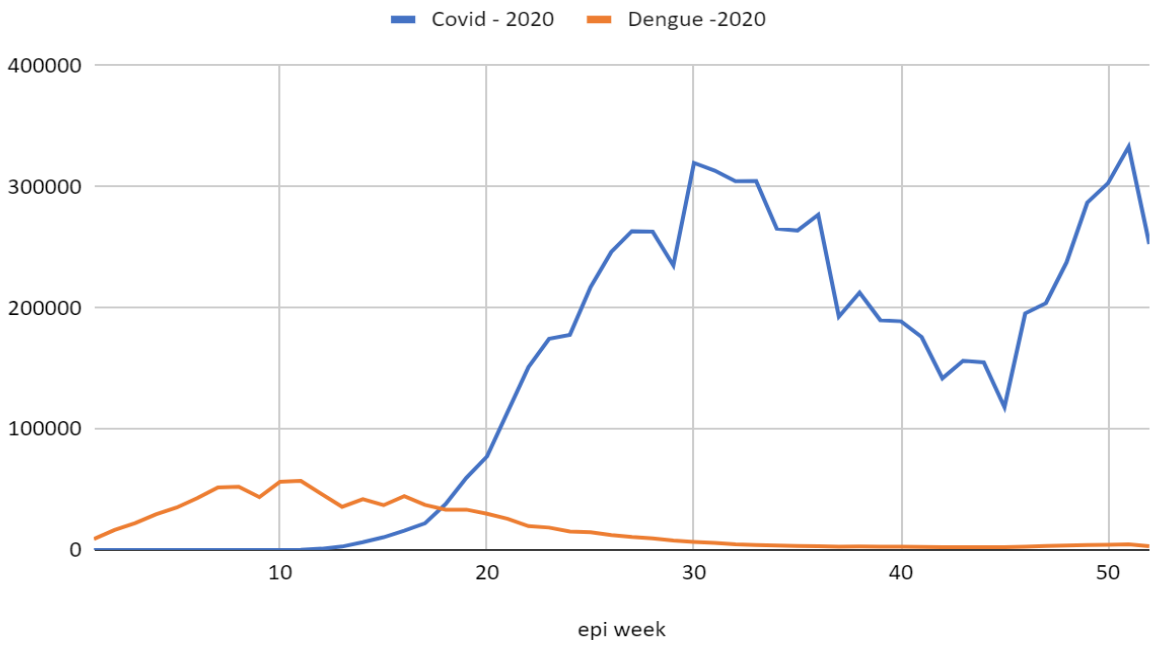
Graphic 1 – Dengue notification number per epidemiological week



A trend can be seen in the increase in the number of notifications in the 20 first epidemiological weeks, with a drop starting at epidemiological week 30, which seasonally are the months of greater rainfall and heat in the country, thus enabling the proliferation of the etiological agent that transmits the dengue virus.

The comparison of dengue and COVID-19 in 2020 shows a reduction in the notification of cases of dengue as the notifications of COVID-19 increases. The behavior of possible undernotification has been the object of study in some regions of the country[6].

Graphic 2 – Dengue and Covid-19 notification number in the year 2020 per epidemiological week



When the analysis is expanded to the year 2021, according to data from the Ministry of Health, until epidemiological week 21 of 2021, 348,508 cases of dengue were notified, a reduction by 57.4% in the cases recorded in relation to the same period of 2020[7].

Regarding COVID-19, from the first cases confirmed until July 2021, 191,281,182 were tallied globally; 70,103,320 in the Americas; 2 million in Brazil[8]. Furthermore, concerning the cases of dengue in the Americas, between the 1st and 22nd epidemiological weeks of 2021, 673,148 cases have been notified[9]. This way, it is visible that both diseases have relevance in their population breadth and, therefore, we chose to study the impact of their coexistence in Brazil.

Both dengue and COVID-19 threaten large population centers and overload public and private healthcare services. When they share the same epidemiologic scenario, they carry a difficulty in the moment of differentiating the diagnosis seen as both have viral cause, start with a fever, and do not respect age or sex[10]. In face of that, it becomes important to know the pathological, clinical, and epidemiologic part of both diseases so that healthcare teams better receive the patients.

Dengue is understood as a fever disease caused by a virus belonging to the Flaviridae family, which may be characterized by four serotypes: DENV 1, 2, 3, 4 – which are related to RNA[11]. Currently, DENV-2 is the predominant serotype in the country, except in the Northeast region, where serotype DENV-1 prevails[12]. Its transmission occurs via the bite of the female

Aedes aegypti mosquito, preferably in densely populated urban areas and tropical or subtropical regions. That is unlike the propagation of SARS-CoV-2, which occurs via direct contact between people and with no preference for regions or periods of the year[12].

Given the viral cocirculation and possible coinfection, it becomes essential to understand the clinical and laboratorial aspects of both pathologies, as both have great similarity in physiopathological events, in addition to signs and symptoms[13]. In the clinical perspective, when dengue is investigated, it is common to find an approximate statistic of 60% with headache, retro-orbital pain, arthralgia, and myalgia; 50% with skin rash, and, less incident, with anorexia, nausea, emesis, abdominal pain, diarrhea, and respiratory symptoms (cough, odynophagia, and nasal congestion)[13]. Such manifestations may confuse the differential diagnosis between COVID-19 and dengue as they share coughing (50%), fever above 38 °C (43%), myalgia (36%), headache (34%), odynophagia (20%), diarrhea (19%), nausea, and emesis (12%)[14]. In an analysis of Brazil, it can be projected that, of the patients with SARS-CoV-2, 1% will be asymptomatic, 80.9% will have mild clinical manifestations; and 20% will require hospitalization[12].

Likewise, in the laboratorial perspective, there is also confusion in the diagnosis of infected people. There are reports of SARS-CoV-2 cases that in laboratory tests, as they are less sensitive, were reported as false positives for dengue[12]. Among the tests for COVID-19, the main one used is PCR (Polymerase Chain Reaction)[12]. Those patients, when hospitalized, usually show lymphopenia, high transaminases, high level of lactate dehydrogenase and/or high values of inflammatory markers (ferritin, C-reactive protein, erythrocyte sedimentation rate, and d-dimer)[14]. Meanwhile, in dengue, the serologic tests or viral detection also show alteration such as lymphopenia and high transaminases[14]. A red flag in dengue is the appearance of thrombocytopenia and/or hemodynamic disorders that may complicate to shock and death[11].

In face of that, when any of the epidemics is suspected, a careful investigation must be conducted to determine the adequate treatment, particularly in individuals with comorbidities and the elderly[15].

4 CONCLUSION

Due to the parallel occurrence of the epidemics, their impact is clear when we identified: the undernotification of dengue coinciding with the intensification of COVID-19 response; the prioritization of COVID-19 care in basic healthcare units; the decrease in household visits by healthcare agents[4]. The literatures also comprise the idea of the “invisible

patient" or 'third wave," which is a consequence of the decrease in care with other health conditions due to the pandemic. Such situation has registered great decreases in the numbers of consultations, exams, and surgeries, and, consequently, an increase in the number of deaths due to other infirmities other than COVID-19[16].

Therefore, the healthcare system must adapt to the simultaneous occurrence of two epidemics. In endemic areas, it is important to implement protocols that include: training medical professionals for adequate suspicion and notification of cases; optimizing the screening in all patients reporting fever; dedicating the budget needed for supplies, medications, and equipment in the hospitals of the country[2,11,13]. In addition, the Ministry of Health must not neglect the monitoring and campaigns of vector control of dengue[11]. Those measures are needed since, in face of respiratory emergencies and fever settings, the pandemic caused changes in the healthcare service flow.

In this work, we analyzed, presented, and evidenced epidemiological data, with literature-based discussions, pointing to the consequences experienced by healthcare services in face of the clinical-epidemiologic situations in the coexistence of epidemics of COVID-19 and dengue in Brazil.

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