

Differential diagnosis between Dengue and COVID-19: A study made in the epidemiological surveillance board of Itajaí

RESUMO | Objetivo: Apresentar e discutir os casos de dengue no município de Itajaí-SC através de estudo realizado pela Diretoria de Vigilância Epidemiológica da Secretaria Municipal de Saúde. Método: Trata-se de estudo observacional transversal com abordagem analítica quantitativa, com dados coletados no ano de 2021, entre os meses de abril a julho. A análise de dados foi realizada através das investigações de Covid-19 e prontuário eletrônico dos pacientes. Resultados: Os dados levantados obtiveram 119 investigações e os sujeitos da pesquisa foram os pacientes suspeitos de Covid-19 que tiveram resultados negativos para a doença, com sintomatologia sugestiva de dengue. A amostra foi composta por 44 participantes, onde foram identificadas e analisadas categorias relacionadas ao sexo, bairro de residência e faixa etária. Conclusão: Acredita-se que esses achados possam ser de extrema relevância para gestores e profissionais de saúde, contribuindo assim para o diagnóstico diferencial da doença.

Descritores: Dengue; Covid-19; Serviços de Vigilância Epidemiológica.

ABSTRACT | Objective: To present and discuss cases of dengue in the city of Itajaí-SC through a study carried out by the Board of Epidemiological Surveillance of the Municipal Health Department. Method: This is a cross-sectional observational study with a quantitative analytical approach, with data collected in the year 2021, between April and July. Data analysis was performed through investigations of Covid-19 and electronic medical records of patients. Results: The data collected obtained 119 investigations and the research subjects were patients suspected of Covid-19 who had negative results for the disease, with symptoms suggestive of dengue. The sample consisted of 44 participants, where categories related to gender, neighborhood of residence and age group were identified and analyzed. Conclusion: It is believed that these findings may be extremely relevant for managers and health professionals, thus contributing to the differential diagnosis of the disease.

Keywords: Dengue; Covid-19; Epidemiological Surveillance Services.

RESUMEN | Objetivo: Presentar y discutir casos de dengue en la ciudad de Itajaí-SC a través de un estudio realizado por la Dirección de Vigilancia Epidemiológica de la Secretaría Municipal de Salud. Método: Se trata de un estudio observacional transversal con enfoque analítico cuantitativo, con datos recolectados en el año 2021, entre abril y julio. El análisis de datos se realizó a través de investigaciones de Covid-19 y registros médicos electrónicos de pacientes. Resultados: Los datos recolectados obtuvieron 119 investigaciones y los sujetos de investigación fueron pacientes sospechosos de Covid-19 que tuvieron resultados negativos para la enfermedad, con síntomas sugestivos de dengue. La muestra estuvo conformada por 44 participantes, donde se identificaron y analizaron categorías relacionadas al género, barrio de residencia y grupo etario. Conclusión: Se cree que estos hallazgos pueden ser de extrema relevancia para gestores y profesionales de la salud, contribuyendo así al diagnóstico diferencial de la enfermedad.

Palabras claves: Dengue; COVID-19; Servicios de Vigilancia Epidemiológica.

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Recebido em: 11/12/2022

Aprovado em: 23/01/2023

INTRODUÇÃO

With the Covid-19 pandemic at the beginning of December 2019 in the city of Wuhan, in the People's Republic of China, the World Health Organization (WHO) was alerted to several cases of pneumonia which, after investigations as to the etiology, confirmed infection by a new virus from the coronavirus family being named SARS-CoV-2⁽¹⁾. On January 30, 2020, the WHO issues an alert for a Public Health Emergency of International Concern (PHEIC) in order to

inform countries so that they could prepare for the development of actions to combat the spread of the virus⁽²⁾.

In February 2020, Brazil identified the first contamination by Covid-19, in the state of São Paulo, and in March, the country records the first death, and declares community transmission⁽³⁾. In order to contain the spread of the disease, social isolation was instituted in April as a non-pharmacological measure, in order to reduce transmission in the short term and avoid a collapse in the health system. However, other diseases could not be left unattended, such as dengue, where one of the main factors for the occurrence of deaths is related to the clinical management

of the disease.

Dengue is an acute febrile disease, with universal susceptibility, ranging from mild and self-limiting cases to severe forms of the disease with hemorrhagic manifestations. It is caused by a virus of the genus flavivirus, of which four serotypes are known: DENV1, DENV2, DENV3 and DENV4. The main symptoms of dengue are: fever, headache, myalgia, arthralgia, retro orbital pain, nausea, vomiting and red spots on the skin may also occur. The average incubation period for the disease is 5 to 6 days and can range from 4 to 10 days. The period of viremia in humans begins one day before the onset of symptoms and can last up to the 5th day of the disease, being transmitted by the bite of an infected female *Aedes aegypti* mosquito⁽⁵⁾.

According to the WHO, Dengue is among the 20 Neglected Tropical Diseases (NTD) and its goal is to control it. In the initial phase of dengue, in the prodromal period, the disease can easily be confused, and with the pandemic, the differential diagnosis of the disease is necessary, given the similarity of the first symptoms, such as fever, myalgia and headache and in patients who residing in places with the presence of *Aedes aegypti*, especially in endemic regions, can configure underreporting of the disease and culminate in a public health problem⁽⁶⁾.

In view of this, the following guiding question emerged: has the differential diagnosis between covid-19 and dengue been carried out in the city of Itajaí? The present study aimed to present and discuss the cases of dengue in the city of Itajaí between the months of April to July 2021, using the analysis of cases notified for Covid-19 that had a negative serological result and suggestive symptoms for suspected dengue.

Even so, present the differential diagnosis between covid-19 and dengue in a selected sample, present the prevalence rate of dengue in the city of Itajaí in the selected months, identify the occurrence of underreporting in suspected cases of dengue, investigate the Probable Site of

Infection (LPI) of cases confirmed by clinical epidemiological criteria, and instigate reflections by health professionals in the city about the approach to dengue in the scenario of the Covid-19 pandemic.

METHODOLOGY

This is an observational, cross-sectional study with a quantitative analytical approach, with data collected in the year 2021, in epidemiological weeks 13 to 30, that is, between April and July 2021.

Cross-sectional studies are defined by collecting and analyzing data over a given period, including the selection of study participants, data collection and disease definitions⁽⁷⁾.

An observational study is a type of epidemiological study design, being defined as non-experimental research, the researcher does not interfere with the determining factors of the process that leads to the injury or disease, they are often used in epidemiological research⁽⁸⁾.

The place chosen for the study was the city of Itajaí, located on the north coast of the state of Santa Catarina, with an estimated population of 226,617 inhabitants according to data from the Brazilian Institute of Geography and Statistics (IBGE).

As a field of research, there was the Board of Epidemiological Surveillance of Itajaí/SC, through the Zoonoses Control Management, which is the place where the researcher acts as responsible for the surveillance service of arboviruses, which brings subsidies and supports the interest in the object of research, thus justifying the relevance of the study.

The local epidemiological surveillance board is composed of the following managements: Zoonosis Control Management; Compulsory Notifiable Disease Monitoring Management and Vital Statistics Management. Currently, epidemiological surveillance has 48 professionals, including 11 nurses, 17 nursing technicians, two nutritionists, two psychologists, one occupational therapist, two veterinarians, one infectologist, seven endemic agents,

three drivers, one technician in administrative activities and an epidemiological surveillance director distributed by diseases and management.

The Dengue Control Program is composed of: 71 (seventy-one) field agents, 8 (eight) field supervisors, 1 (one) general supervisor and 1 (one) local coordinator, who carry out *Aedes aegypti* Surveillance in the city.

The research sample is composed of patients suspected of Covid-19 between the months of April and July 2021 who had a negative serological result. V Patients who presented suggestive symptoms such as: fever, usually between 2 and 7 days, and two or more of the following manifestations: nausea, vomiting, rash, myalgia, headache, retro-orbital pain, petechiae or positive loop test and leukopenia are eligible.

As exclusion criteria were all patients who did not have symptoms compatible with a suspected case of dengue and/or did not reside in the city of Itajaí.

From this data collection through the patients who met the selection criteria, the notification was filled out and the investigation of the suspected case of dengue was triggered using information such as: place of residence, epidemiological link with cases that resulted positive for Dengue in the same period of symptoms.

It should be noted that the entire process only took place after approval by the Unisul Research Ethics Committee, located at the Grande Florianópolis University Campus, Block J. Avenida Pedra Branca, 25, Cidade Universitária Pedra Branca - Palhoça/SC, under the opinion number 131827 and CAAE: 53229721.3.0000.5369 and would follow, in its development, the requirements of Resolution 466/12 of the National Health Council. However, there were changes in the elaboration stage, due to the impossibility of analyzing biological samples, which resulted in the release of the use of the Free and Informed Consent Form (TCLE) since there was no involvement with human beings. The research

complies with Resolution 510 of 2016 of the National Health Council, which provides for the permission of studies involving public data under shared domain.

Data analysis took place through the use of mathematical techniques through percentages, probabilities and statistics using Microsoft Excel (2013) software as a calculation tool, enabling the use of formulas and resorting to predefined functions, organized into various categories.

You can manage and access a large amount of data, create, define and change variables, know the number of cases and the variables that exist in the database. The following variables were used: sex, age, neighborhood of residence and symptomatology. Data were quantified and presented in tables and charts, by analysis of frequency and percentage, being discussed in the light of the current literature.

The study used as a database the cases of Dengue in the city of Itajaí that were investigated in the defined period, the confirmation or discard occurred by clinical epidemiological criteria of the suspected cases, being inserted in the information system and accounted for with the other cases that were notified in a timely manner. It is noteworthy that patients notified through the survey and whose place of residence was close to cases with a positive result for dengue by laboratory criteria, were considered confirmed cases of dengue by clinical epidemiological criteria, thus closing the diagnosis.

When laboratory confirmation of dengue cases is not feasible, or even when the laboratory result is inconclusive, confirmation by epidemiological link can be considered, based on the evaluation of the availability of cases confirmed by laboratory criteria in the same area covered by the suspected case, considering the patient's clinical history and the local epidemiological situation. For cases compatible with other diseases during the epidemiological clinical investigation, they can be discarded for dengue, as long as the epidemiological situation is observed⁽⁹⁾.

RESULTS:

148 Covid-19 investigation forms of patients who tested negative for the disease were analyzed, of these six residing in other municipalities and another 23 patients did not have a date of onset of symptoms in the investigation form and had no record of care in the information systems which culminated in exclusion criteria for the research, 44 had symptoms that characterized a suspected case for dengue.

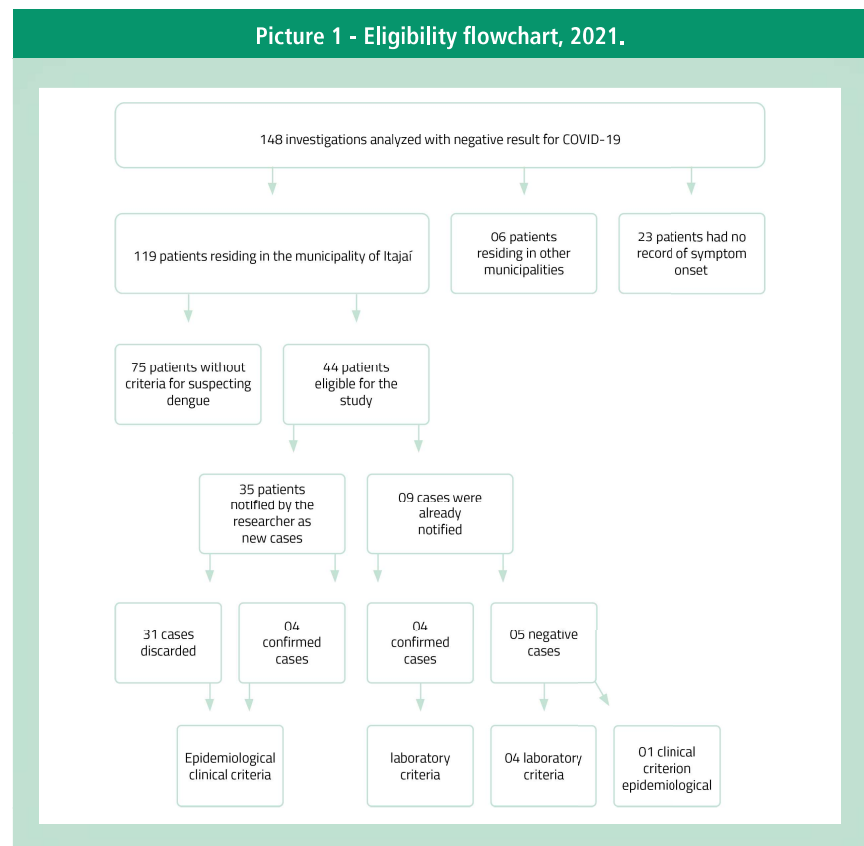
During the investigation, it was observed that nine patients were already notified and closed in the Notifiable Diseases Information System (SINAN online), that is, at the same time that they were suspected of having Covid-19, they were also notified as suspected cases of dengue, of these, four were confirmed and five discarded according to the eligibility flowchart (picture 1). It is noteworthy that another 35 were reported as new cases of

suspected dengue by the researcher, and through the epidemiological investigation, four were confirmed and another 31 discarded, both by clinical epidemiological criteria.

Regarding the results of the research, we first opted to work with the variables gender, neighborhood of residence and age group that made up the study sample, as shown in the table below (Table 1).

As for the gender variable, there was a prevalence of females with 26 cases, while 18 cases were male, representing 59.1% of reported cases.

The neighborhood with the highest rate of notified cases was Cidade Nova, with 16 cases of the total, that is, 36.4%, which shows a relationship with the peculiar conditions of this neighborhood, such as the number of vacant lots used by the population as a deposit of garbage and debris, favoring improper disposal, which serves as a breeding ground for mosqui-



Source: Survey data, 2021.



toes..

In the period between March 8 and 18, 2021, the LIRAA was carried out in all neighborhoods of the city of Itajaí. About 40 agents to combat endemic diseases worked on this activity. During the operation, 3,268 properties were visited, and 7,310 deposits were inspected, with 316 positive outbreaks of the *Aedes aegypti* mosquito being found. Of these, eight were found in vacant lots, 205 in residences and/or businesses and 103 in properties where two or more outbreaks were detected, which is considered a serious situation. The main tanks where positive outbreaks were found are: one in a water tank, 23 in other water storage tanks, 155 in small mobile tanks (pots, small plates in vases, buckets, among others), 42 in fixed tanks (drains, swimming pools), 36 in tires, 50 in garbage and nine in bromeliads.

As for the risk of transmitting dengue, Zika virus and Chikungunya fever, 12 neighborhoods were at high risk: Barra do Rio, Cabeçadas, Centro, Cidade Nova, Cordeiros, Dom Bosco, Fazenda, Praia Brava, São João, São Judas, São Vicente and Vila Operária. Three other neighborhoods are at medium risk: Canhanduba, Itaipava e Ressacada. And two neighborhoods are considered low risk: Salseiros and Espinheiros. Compared to the year 2020, in which eight neighborhoods were considered high risk, four neighborhoods considered medium risk and five low risk, the data show an increase of 33.4% in communities considered high risk in 2021, according to the table 2.

The study obtained in the year 2021, in the epidemiological weeks 13 to 30, from April to July 1113 (65.2%) notified cases of dengue from the total notified in the year 2021, being 1707. Of these, 313 (28.1%) of the total cases reported in the period were confirmed by laboratory and clinical epidemiological criteria, and 800 (71.9%) cases were considered negative.

With regard to the notified, investigated and closed cases carried out through the survey, it was found that 35 (3.1%) suspected cases were notified, of the cases

Table 1 - Distribution of variables of suspected cases according to % included in the study sample. N= 44, 2021.

Variables	N	(%)
Gender		
Male	18	40.9
Female	26	59.1
Age group		
0 – 9 years old	03	6.8
10 – 19 years old	08	18.2
20 – 29 years old	05	11.4
30 – 39 years old	13	29.5
40 – 49 years old	09	20.5
50 – 59 years old	05	11.4
Over 60 years old	01	2.3
Neighborhood of residence		
Cidade Nova	16	36.4
Cordeiros	06	13.6
Dom Bosco	01	2.3
Espinheiros	05	11.4
Fazenda	02	4.5
Itaipava	01	2.3
Praia Brava	01	2.3
São João	02	4.5
São Vicente	10	22.7

Source: Survey data, 2021

Table 2 - Classification of neighborhoods according to the risk of dengue transmission. Itajaí, 2021

	2021		
	High Risk	Medium Risk	Low Risk
Barra do Rio		Canhanduba	Espinheiros
Cabeçadas		Itaipava	Salseiros
Centro		Ressacada	
Cidade Nova			
Cordeiros			
Dom Bosco			
Fazenda			
Praia Brava			
São João			
São Judas			
São Vicente			
Vila Operária			

Source: Survey data, 2021

notified in the period. Still regarding this variable, 04 (1.3%) cases were confirmed and 31 (3.9%) were discarded according to clinical epidemiological criteria. For

this, investigations of cases that obtained positive and negative results by laboratory criteria and the local entomological and epidemiological situation were taken into account, as shown in table 3.

Fever was the most identified clinical sign in the survey, being present in 42 (95.4%) patients, with suspected cases of dengue being considered even if reported, followed by symptoms such as headache (88.6%, 39/44), myalgia (56.8%, 25/44), retro orbital pain (15.9%, 07/44), nausea (11.4%, 05/44), arthralgia (9.1%, 04/44), diarrhea (6.8%, 3/44), vomiting (4.5%, 2/44), and rash (2.3%, 1/44). It is also noteworthy that abdominal pain is considered an important alarm sign, and was observed in only one patient (2.3%, 1/44).

Regarding deaths from dengue, in 2021, the city of Itajaí did not record deaths from the disease, while Covid-19 claimed 527 victims, thus making a comparative analysis between viral diseases unfeasible. Table 4 highlights the prevalence rates observed in the city of Itajaí in 2021.

Regarding the prevalence of dengue cases, there is a high prevalence in the São Vicente, São Judas and Cordeiros neighborhoods when compared to the Covid-19 rate, the prevalence was in Cordeiros, São Vicente, Cidade Nova and Espinheiros, respectively. We emphasize the fragility of the notification process and the urgent need to make epidemiological data available to the population so that greater correlations between diseases are carried out, enabling and strengthening differentiation and adequate management.

DISCUSSION

Studies show the prevalence of females with 54.2% of cases with females being the most affected in relation to suspected cases, with a positive diagnosis for dengue, which may be related to the fact that transmission occurs in home environments and women remain longer time in the residences becoming more exposed to the vector that has preferentially daytime

Table 3 - Distribution of notified cases of dengue residing in the city of Itajaí, according to established clinical and epidemiological criteria. Itajaí, 2021

	Notified ones	Confirmed ones	Discarded ones
SINAN data online	1078	309	769
Survey data	35	04	31
Total	1113	313	800

Source: Survey data, 2021.

Tabela 4 - Prevalência da dengue e Covid-19 segundo o bairro de residência. Itajaí, 2021 (continua)

Neighborhood	N	Prevalence (100,000 inhabitants)		
		Dengue	N	Covid-19
Barra do Rio	01	0,44	241	106,35
Brilhante	00	0,00	126	55,60
Cabeçadas	00	0,00	18	7,94
Canhanduba	01	0,44	69	30,45
Centro	09	3,97	512	225,93
Cidade Nova	03	1,32	925	408,18
Cordeiros	54	23,8	1615	712,66
Dom Bosco	20	8,83	265	116,94
Espinheiros	00	0,00	925	408,18
Fazenda	16	7,06	584	257,70
Itaipava	01	0,44	317	139,88
Limoeiro	00	0,00	110	48,54
Praia Brava	00	0,00	127	56,04
Ressacada	03	1,32	122	53,84
Salseiros	01	0,44	58	25,59
São João	21	9,27	435	191,59
São Judas	72	31,8	284	125,32
São Vicente	75	34,0	1492	658,38
Vila Operária	05	2,21	118	52,07

Source: Survey data, 2021.

habits⁽¹⁰⁻¹²⁾.

With regard to mosquito breeding sites, a condition similar to that demonstrated in research was observed, where despite the accumulation of water in homes, vacant lots are still the main focus, due to the population being responsible for garbage disposal in these areas.⁽¹³⁾

This corroborates the problem of underreporting, already known and widely discussed in health services, and the decrease in records due to the Covid-19 pandemic alert. The simultaneous occurrence of cases of Covid-19 and dengue poses

challenges, as it contributes to the incorrect diagnosis of the two pathologies, resulting from clinical similarities, delaying adequate treatment and presenting greater severity, which may require greater proactivity from health services on the part of health professionals in view of the large number of people who may be infected or reinfected, leading to serious and devastating outcomes.

This fact corroborates the study that revealed significance for the prevalence between dengue and Covid-19. Thus, it is extremely important to have a timely and



reliable diagnosis for both pathologies, since each infection must be treated in a specific way. Delay in diagnosis can negatively interfere with the management of public health control and combat actions, the tracking of Covid-19 cases, the care of infected people, and control measures to prevent its spread. As a result, guidelines related to control measures aimed at the population should be intensified.

CONCLUSION

Through the study, the importance of suspicion for dengue is highlighted in the first consultation, so that the patient is managed properly. There was a need for training health professionals to adequately approach patients clinically suspected of having dengue.

It is noteworthy that for the final classification of the notifications carried out through the study, the epidemiological cli-

nical criterion was used for the outcome of the cases, therefore, for the confirmation of the cases, the epidemiological link with other positive cases by laboratory confirmation was necessary.

Dengue is a notifiable disease and, in the initial period of symptoms, it may resemble other suspicions, and failure to observe the differential diagnosis may delay the suspicion or even lead to underreporting of the disease, which implies the failure to carry out surveillance actions and vector control of the site, which can result in a public health problem. To improve access to early diagnosis and treatment, actions at different levels of care are needed, as health professionals play an important role in caring for patients suspected of dengue.

The city of Itajaí, through the PCD, permanently carries out vector control actions at the municipal level and the arboviruses surveillance service, acts directly

to guarantee access to laboratory tests, as well as training of professionals in the service units.

It is believed that this study can contribute to the work process of the dengue surveillance service, in the sense of motivating the continuity of the analysis raised, considering the clinical similarity of dengue with other diseases.

As limitations of the study, the illegibility of the instrument used in the investigations of Covid-19 stands out, in which 15.5% (23/148) had no described date of onset of symptoms, which prevented the inclusion of this population in the study. Another important limitation was the impossibility of analyzing the biological samples, which culminated in the confirmation or discard of the cases by the epidemiological clinical criteria, making it impossible to confirm cases that had no epidemiological link.

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