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Analysis of knowledge and control practices of Aedes Aegypti in the population of the southern zone of São Paulo

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ABSTRACT

OBJECTIVE

To identify gaps in dengue awareness and intervention strategies, in addition to measuring the population's level of knowledge about strategies for preventing and controlling this disease.

METHODS

Observational study with the application of a questionnaire among the population using the public health service in the south zone of São Paulo. The sample consisted of 202 users of a polyclinic and a teaching hospital, over 18 years of age, who agreed to participate in the study. The questionnaire, based on and adapted from previous dengue research instruments, addressed issues related to knowledge and attitudes towards the disease, as well as demographic characteristics such as gender, age, and level of education. For data analysis, absolute and relative frequency measures were used, presented in descriptive tables.

RESULTS

The study revealed that most of the interviewees have knowledge about the transmission of dengue (98.51%), its breeding sites (96.53%) and forms of prevention (94.05%), such as the elimination of standing water and the use of repellents. In addition, 97.52% understand the restrictions on the use of drugs to treat the disease. The data highlights the relevance of awareness campaigns to strengthen prevention and reduce the incidence of dengue.

CONCLUSION

The results of this study indicate that most of the interviewees are aware of dengue transmission and forms of prevention, highlighting the importance of raising awareness and engaging the population in the control of Aedes aegypti. In addition, health education and community campaigns play an essential role in preventing disease, reinforcing the need for continuous and integrated actions to minimize the impact of dengue on public health.

KEYWORDS

Dengue; Aedes Aegypti; Economic Disparity; Health; Control; Prevention.

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INTRODUCTION

Aedes aegypti is the main vector of arboviruses such as dengue, zika and chikungunya, configuring itself as one of the greatest public health challenges in tropical and subtropical regions, including the extreme south of the city of São Paulo. In addition to arboviruses, this arthropod can also act as a vector of parasitic diseases, which reinforces its epidemiological importance and the challenge of its control. The introduction of new dengue virus serotypes compromises the effectiveness of control measures, since the high vector density reduces the ability to interrupt transmission. In addition, the speed of viral circulation is usually higher than the time needed to reduce mosquito population. [1]

This vector has characteristics that favor its dispersion: it lays eggs in containers with clean water, is resistant to desiccation, has diurnal and household habits, and adapts easily to different environmental conditions. Such factors make control a significant obstacle to public health. [2]

In recent years, dengue has reached epidemic levels on a global scale. In 2019, 5.2 million cases were recorded in 129 countries, the highest number ever documented. In 2023, more than five million cases and about five thousand deaths were reported in more than 80 countries, with approximately 80% of them concentrated in the Americas. Climate change, such as the El Niño phenomenon, the expansion of the distribution area of vectors, and the fragility of health systems after the COVID-19 pandemic contributed to this scenario. Currently, the World Health Organization (WHO) estimates between 100 and 400 million infections annually, classifying the global risk as high. [3]

In Brazil, the situation is equally worrying. In 2023, 1,362,132 cases of dengue were confirmed, with 1,094 deaths and another 94 under investigation. The incidence coefficient was 638.6 per 100 thousand inhabitants. São Paulo recorded 286 deaths, while Santa Catarina concentrated the highest number of severe cases (4,243). Espírito Santo (ES) had the highest incidence rates (2,998.9) and probable cases (123,208 per 100 thousand inhabitants). Although the overall lethality rate is low (0.08%), in severe cases it reached 4.63.[4] These data highlight the urgency of effective surveillance and control strategies.

Health education is essential to promote critical reflection on daily habits and encourage preventive behaviors. In Brazil, primary care plays a central role in this process, but structural factors — such as disorderly urbanization, socioeconomic inequalities, home water storage, and sanitation failures — favor the formation of breeding sites and make it difficult to control the vector. [2]

In this context, the present study identified the knowledge and practices of prevention and control of Aedes aegypti among users of secondary and tertiary care in the extreme south of São Paulo, seeking to offer subsidies for the strengthening of health policies aimed at the prevention of arboviruses in this region.

METHODS

Study design

This observational study was carried out with users of the public health system in the southern region of the city of São Paulo.

Casuisty

The sample size was initially estimated at 200 participants. However, the effective number of interviewees totaled 202 individuals, all over 18 years of age, who agreed to participate in the research by signing the Informed Consent Form (ICF).

Inclusion and exclusion criteria

Individuals of both sexes, aged 18 years or older, users of a polyclinic and a teaching hospital in the south of São Paulo were included. Minors, people with mental disorders that could compromise the comprehension or coherence of the answers and individuals who did not master the Portuguese language were excluded.

Data collection

Data collection was carried out through a structured questionnaire, applied in person. The instrument was based on previous research conducted in São Paulo, with specific adaptations for this study. The questionnaire addressed aspects related to knowledge about dengue transmission, identification of Aedes aegypti, preventive measures, forms of treatment and use of medications, recognition of symptoms, as well as sociodemographic data, such as gender, age and education. It is noteworthy that no post-test questionnaire was applied.

Risks and benefits

As this was a study with the application of a questionnaire, the risks were minimal and restricted to possible discomfort during the interview. As a benefit, participants received updated information on dengue prevention and vector control measures.

Research ethics

The study was approved by the Research Ethics Committee of the Universidade Santo Amaro (UNISA), under CAAE number: 80261824.2.0000.0081. All participants were previously informed about the objectives, procedures, risks, and benefits of the research, and signed the informed consent form before answering the questionnaire.

Data analysis

The data obtained were analyzed by descriptive statistics, expressed in absolute and relative frequencies. The results were organized in descriptive tables, to facilitate the visualization and interpretation of the information collected.

RESULTS

Table 1 of the sociodemographic characterization of the participants presents information on the basic characteristics of the study sample. The variables included were age, represented by the age group and mean age of the participants; sex, indicating the percentage distribution between female and male; and schooling, which covered different levels of education, such as elementary, secondary, incomplete/complete higher education and post-graduation.

Table 1 - Sociodemographic characterization of the participants. São Paulo, 2024.

VARIABLE	TOTAL
Sex	
Male	43.06%
Female	56.43%
Age	
1. 18 a 25	6.93%
2. 26 a 35	6.93%
3. 36 a 45	5.94%
4. 46 a 55	26.7%
5. 56 a 65	38.61%
6. 66 a 75	9.4%
7. 76 a 85	2.47%
8. Mais de 85	0%
Education level	
1. Complete elementary school	6.93%
2. Incomplete elementary school	23.76%
3. Complete high school	28.71%
4. Incomplete high school	11.88%
5. Complete higher education	17.82%
6. Incomplete higher education	4.95%
7. Specialization course	1.98%
8. No level of education	3.46%

Source: Prepared by the authors.

The sample was predominantly female, 56.43%, and the most interviewed age group was 56 to 65 years, representing 38.61% of the responses. Most of the interviewees had not completed elementary school, with 23.76% (Table 1).

Table 2 presents a questionnaire on the level of information of the participants about dengue, addressing key questions about the disease, and 86.63% of them knew how to identify the mosquito that caused the disease, while 96.53% knew how the Aedes aegypti mosquito emerged and proliferated. The question, "Where is the mosquito raised?" assessed participants' knowledge of Aedes aegypti breeding sites, such as areas with standing water, including potted plants, tires, and uncovered containers. The other question, "How do you get the disease?" checked whether the participants know that dengue is transmitted exclusively by the bite of the infected mosquito and not by direct contact between people. Regarding prevention, the question "How do you prevent the disease?" examined the level of knowledge about measures such as the elimination of standing water, the use of repellents and the installation of screens to prevent the proliferation of the mosquito.

Also, the question "When do symptoms appear?" addressed the understanding of the incubation period of dengue, which is 4 to 10 days after the bite of the infected mosquito. Regarding care, the question "Can you take any medication when you have dengue?" evaluated whether the participants are aware that certain medications, such as anti-inflammatory drugs and aspirin, can be harmful, reinforcing the importance of seeking medical advice for treatment. Finally, the question "Can an infected person pass the disease to another?" explored whether participants know that dengue is not directly transmissible between people, and whether the bite of an infected mosquito is necessary for transmission to occur.

Table 2 - Questionnaire on the participants' level of information about dengue. São Paulo, 2024.

QUESTION	TOTAL
Do you know what the image is?	
1. No	5.44%
2. Yes. Mosquito larva	86.63%
3. Yes. Dirt	6.93%
4. Yes. Tadpole	1.98%
Do you know where the mosquito is raised?	
1. No	0%
2. Yes. Dry places	0%
3. Yes. Places with standing water	96.53%
4. Yes. Anywhere	2.97%
Do you know how to catch the disease?	
1. Don't know.	0%
2. Yes. Through the bite of the *Aedes aegypti mosquito*	98.51%
3. Yes. Drinking water contaminated with the larvae of the *Aedes aegypti mosquito*	1.48%
4. Yes. Through contact with *Aedes aegypti mosquito feces*	0%
Do you know how to prevent the disease?	
1. Yes. Through the use of hand sanitizer and masks	1.45%
2. Yes. Keeping water in places such as tires and dishes	0%
3. Yes. Do not let standing water accumulate in places such as tires and toilet dishes, in addition to the regular use of repellents	94.05%
4. Don´t know	4.45%
When do symptoms appear?	
1. Don´t know	10.39%
2. Yes. Between 3 to 15 days	85.64%
3. Yes. At the moment when the mosquito bites the person	2.47%
4. Yes. After 1 month	1.48%
Can you take any medication when you have dengue?	
1.Yes	2.47%
2.No	97.52%
Can an infected person pass the disease on to another?	
1. No	96.03%
2. Yes. Eating food contaminated by the infected person	0.49%
3. Yes. Through contact of secretions from the infected	3.46%
Differentiate a dengue mosquito with a mosquito.	
Image 1	79.70%
Image 2	20.29%

Source: Prepared by the authors.

Image 1:

Image 2:

Under these conditions, in relation to prevention, 94.05% of the respondents had knowledge about how to fight the mosquito, avoid outbreaks and protect public health. Regarding the appearance ofthe symptoms of the disease, 85.64% of the interviewees knew and 10.39% did not know at all about the subject. Regarding the use of medication in the disease, 97.52% stated that it is not possible to take any medication. Regarding transmission, 98.51% of the interviewees were aware of how the disease was contracted, and 96.03% of the respondents knew that dengue cannot be passed from patient to patient, but through the bite of the mosquito. Regarding the identification and differentiation of mosquitoes and dengue mosquitoes by means of images, 79.70% identified image 1 and 20.29% identified image 2, respectively (Table 2).

Although the study provides relevant evidence about the level of knowledge of this sample of the population about dengue, it is important to recognize that no educational or practical intervention was carried out with the participants. It should be noted that the knowledge gap identified in the form was the non-identification of the transmitting insect.

DISCUSSION

The results of the study demonstrate that most participants have a satisfactory level of knowledge about dengue, especially in relation to the transmission of the disease. More than 98% of the interviewees recognized the bite of infected Aedes aegypti as the main route of contagion, which converges with scientific literature that describes dengue as a viral arbovirus transmitted exclusively by this vector, whose proliferation is favored by hot and humid climatic conditions, typical of tropical and subtropical regions. This finding is relevant because it indicates a collective awareness of the mosquito's role in maintaining the disease cycle, although it does not ensure, by itself, effective changes in preventive behavior.[6]

Regarding prevention, 94% of the participants demonstrated knowledge about fundamental measures, such as the elimination of standing water, the use of repellents and the installation of protective screens. This data reinforces that educational campaigns have achieved part of their informative objectives. However, when analyzing critically, it is important to consider whether this knowledge is effectively

translated into daily practices. Previous studies indicate that the gap between knowing and doing is one of the greatest challenges in the control of Aedes aegypti, especially in areas with socioeconomic vulnerabilities, where financial, structural and cultural barriers limit the implementation of preventive measures.[7]

Another point to highlight is the recognition of symptoms. Although 85.64% of the interviewees knew how to identify the incubation period of dengue, a significant portion (10.39%) still did not have any information about it. This gap can delay the search for medical care and favor complications, especially in cases of progression to severe dengue. This indicates the need to reinforce health education actions aimed at warning signs, in addition to emphasizing the risks of inappropriate use of medications — an issue in which, fortunately, 97.52% of the participants demonstrated adequate knowledge.[8]

The sociodemographic analysis of the sample reveals a predominance of females (56.43%) and mean age between 56 and 65 years, with emphasis on incomplete elementary education (23.76%). These factors can influence the degree of assimilation of preventive messages and engagement in effective practices, highlighting the importance of actions adapted to different age groups and levels of education, with the use of accessible languages and participatory strategies. Previous research shows that community mobilization, partnerships with schools, and collective cleanup actions are more effective when they consider the sociocultural context of the target population.[6]

Despite the high levels of knowledge, a weakness found was the difficulty in visual identification of the vector. Only 79.70% were able to correctly differentiate the Aedes aegypti from the mosquito. This limitation can compromise the perception of risk, leading individuals to underestimate the presence of the vector in their homes. The literature emphasizes that the correct identification of the mosquito is a motivating factor for control practices, since it increases the perception of threat and preventive engagement.[8]

From a critical point of view, even though the study shows significant levels of knowledge, there is still a need to evaluate whether this knowledge results in effective changes in behavior. The literature warns of the risk of a false sense of security: informed individuals may believe that isolated measures (such as the use of repellent) are sufficient, neglecting collective and structural actions, such as basic sanitation and elimination of breeding sites in public areas.

It is also important to consider the limitations of the present study. The possibility of response bias cannot be ruled out, since the participants may have informed what they considered socially more appropriate, without necessarily reflecting on their daily practices. In addition, because the sample was carried out with individuals treated in secondary and tertiary health services, it does not fully represent the community, which may restrict the generalization of the results. These limitations reinforce the need for caution in interpreting the findings and point to the importance of future research in different population settings. In addition, the cost of preventive inputs, mosquito resistance to insecticides, and the sustainability of campaigns are factors that can limit the effectiveness of current strategies.[9]

Behavioral and psychosocial factors, such as risk perception, also influence adherence to preventive practices. Fear of the disease, concern for family members and the desire to avoid contamination are important motivators. Correcting myths and misconceptions about the mosquito and its forms of prevention, such as believing that the mosquito only proliferates in rural areas, is also essential for control practices to be effective. To measure the success of the actions, the reduction in the incidence of diseases transmitted by Aedes aegypti in the study areas can be an indirect indicator of progress in knowledge and control practices. Comparison with historical data and the population's satisfaction with the campaigns help to identify trends and assess the impact of the interventions. The community's adherence to preventive practices and participation in joint efforts indicate positive changes in awareness.[7]

Awareness even in relation to the treatment of dengue, which is basically symptomatic, as there is no specific antiviral for the virus. The main objective is to relieve symptoms and avoid complications. Hydration is essential to prevent dehydration and other complications, especially in severe cases. To relieve fever and pain, analgesics and antipyretics such as paracetamol can be used, but anti-inflammatory drugs and aspirin should be avoided, which increase the risk of bleeding. In the most severe cases, monitoring in a hospital environment is necessary to monitor possible warning signs, such as severe abdominal pain and persistent vomiting. In addition, rest is recommended until complete recovery.[10]

Thus, although the findings point to significant advances in the population's knowledge, they also highlight important gaps. It is recommended that public health policies intensify integrated actions that unite education, infrastructure, and community mobilization, as well as intersectoral partnerships that facilitate access to preventive measures. In this way, it will be possible to transform the knowledge identified in this study into consistent and sustainable practices to combat Aedes aegypti, contributing to the reduction of the incidence of dengue and its complications.[6]

CONCLUSION

The present study allowed us to measure the level of knowledge of the population about dengue and to identify gaps in awareness and intervention strategies against the disease. The findings showed that, although most participants have adequate information on the transmission, prevention and treatment of arbovirus, weaknesses persist that can compromise the effectiveness of Aedes aegypti control. The difficulty in identifying the vector, the limitations in recognizing the incubation period and the lack of information of a portion of the interviewees about warning signs reveal critical points that need greater attention.

In view of this scenario, it is concluded that the fight against dengue requires an integrated and continuous approach, involving the association between health education, community mobilization, health surveillance, and strengthening of public policies for sanitation and urban infrastructure. Intersectoral articulation, combined with the constant monitoring of epidemiological indicators, is essential to guide targeted and sustainable actions. Thus, the consolidation of strategies that combine knowledge, practice, and structural support can contribute to consistently reducing the impact of dengue, promoting greater protection of public health and the well-being of affected populations.

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