

Artículo de Investigación

Dengue's mortality in department of Meta, Colombia 2010-2014

Mortalidad por dengue en el departamento del Meta, Colombia 2010-2014

Mortalidade por dengue na departamento do Meta, Colômbia 2010-2014

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ABSTRACT

Introduction. Dengue is a priority in the health system in Colombia. In department of Meta, it is endemic and generates mortality, even though the Department has good coverage and access to health services. **Objectives.** To describe mortality by dengue, socio-demographic characteristics and possible determinants associated to mortality in department of Meta. **Materials and Methods.** A retrospective descriptive revision study was performed of clinical files and notification cards in the Sivigila medical vigilance system. **Inclusion criteria.** Notification card, availability of complete clinic history and laboratory results, confirmation of death by dengue. **Exclusion criteria.** Non-confirmed cases by pathology or laboratory. **Results.** 35 cases of death by dengue were studied between 2010 and 2014; average age 27.3 years old; 51.43% younger than 10 years old; 51.4% male. The time between

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the beginning of the appearance of symptoms and consultation with the health system was 4 days. The main symptoms associated with mortality were fever, myalgia, arthralgia, abdominal pain and vomiting. **Conclusions.** People younger than 10 years old, with scarce resources and from the subsidized system have a greater risk of mortality. Abdominal pain and vomit are important predictors of shock, it was also evidenced that the use of Aines (Spanish acronym for non steroidal anti-inflammatory agents) augments the risk, tests of liver function presented the greatest alterations, and hemoconcentration is not used to evaluate the risk of severe dengue. It is necessary to better the education and information given to the community to enhance the chance in consultation. It is also important to continue to improve medical education to guarantee the adherence to dengue management methods, especially to teach patients to recognize the warning signs of dengue.

Key words: severe dengue; dengue shock syndrome; mortality..

RESUMEN

Este es un estudio descriptivo retrospectivo de revisión de historias clínicas y fichas de notificación en el sistema de vigilancia epidemiológica (Sivigila). Su objetivo es describir la mortalidad por dengue, características sociodemográficas y los posibles determinantes asociados a la mortalidad en el departamento del Meta, Colombia. Se analizaron la ficha de notificación, la disponibilidad de la historia clínica y de laboratorio con resultados completos y la confirmación de la muerte por el dengue. Se excluyeron los casos no confirmados por patología o laboratorio. Se estudiaron 35 casos de muerte por dengue entre enero de 2010 y mayo de 2014; la edad promedio fue de 27,3 años de edad; 51,43% menores de 10 años de edad; 51,4% hombres. El tiempo entre la aparición de los síntomas y la consulta con el sistema de salud fue de cuatro días. Los principales síntomas encontrados fueron: fiebre, mialgias, artralgias, vómitos y dolor abdominal. El 90% de los pacientes presentaron variaciones en las pruebas hepáticas TGP y TGO, y en alteraciones de la función renal se observó la mayor alteración en BUN. De acuerdo con los resultados, las personas menores de 10 años de edad, con escasos recursos y del régimen subsidiado tienen un mayor riesgo de mortalidad. El dolor abdominal y vómito son predictores importantes de choque; también se puso de manifiesto que el uso de antiinflamatorios no esteroides aumenta el riesgo; las pruebas de función hepática presentan las mayores alteraciones y la hemoconcentración no se utiliza para evaluar el riesgo de dengue grave.

Palabras clave: dengue grave, síndrome de choque por dengue, mortalidad.

RESUMO

Introdução. A dengue é uma prioridade no sistema de saúde da Colômbia. No departamento do Meta, ela é endêmica e causa mortalidade, ainda que o Departamento tenha uma boa cobertura e acesso a serviços de saúde. **Objetivos.** Descrever a mortalidade por dengue, características sociodemográficas e possíveis determinantes associados à mortalidade no departamento do Meta. **Materiais e métodos.** Estudo descritivo retrospectivo de revisão de prontuários médicos e cartões de notificação para o sistema de vigilância epidemiológica, Sivigila. **Critério de inclusão.** Cartão de notificação, disponibilidade de prontuário médico e laboratorial com resultados completos e confirmação da morte por dengue. **Critério de exclusão.** Casos não confirmados por patologia ou laboratório. **Resultados.** 35 casos de morte por dengue foram estudados entre janeiro de 2010 e maio de 2014; idade média de 27,3 anos de idade; 51,43% menores de 10 anos de idade; 51,4% do sexo masculino. O tempo entre o início do aparecimento de sintomas e a consulta com o sistema de saúde foi de 4 dias. Os principais sintomas encontrados foram: febre, mialgia, arthralgia, vômitos e dor abdominal. 90% dos pacientes apresentaram alterações nos testes de função hepática, TGP e TGO, e, nas alterações da função renal, foi observada uma maior alteração no BUN. **Conclusões.** Pessoas menores de 10 anos de idade, com recursos escassos e que recebem subsídio do governo, têm um maior risco de mortalidade; a dor abdominal e vômito são importantes preditores de choque. Também foi evidenciado que o uso de Aines (NSAIDs em português) aumenta o risco de choque e morte por dengue. Testes de função hepática apresentaram as maiores alterações e não se utiliza hemoconcentração para avaliar o risco de dengue grave. É necessário melhorar a educação e a informação dada à comunidade para aumentar a chance de consulta. Também é importante melhorar a educação médica contínua, para garantir a adesão aos protocolos relacionados à dengue, especialmente para ensinar aos pacientes a reconhecer os sinais de alerta de dengue.

Palavras-chave: dengue grave; síndrome de choque da dengue; mortalidade.

INTRODUCCIÓN

Dengue is a viral disease produced by the DEN virus, of the *Flavivirus* genus, type ARN, of positive polarity, from the *Flaviviridae* family. Mosquitoes, in tropical humid zones, generally transmit it. It produces fever associated with myalgias, arthralgias, cephalaea, asthenia, adynamia, retro ocular pain, skin rash with or without hemorrhagic manifestations like petechia or spontaneous bleedings, it can be clinical or subclinical, and it is currently classified in two presentation types: dengue, which covers the majority of cases, or severe dengue, that implies abdominal pain, neurological changes, bleeding, hemoconcentration, diminishing of plaques, and shock. Severe dengue is the cause of mortality. High risk mortality populations by dengue are children younger than 5 years old, people older than 65 years old, pregnant women (1), and people with base diseases like diabetes, hypertension or Human Immunodeficiency Viruses HIV (2). This mortality has been associated with access barriers, low education and lack of warning signs, also aspects related to poor adherence to management guidelines by health workers you described (2).

The most common transmitter mosquito in Colombia is the *Aedes aegypti*, although it has also been identified the *Aedes albopictus*, these vectors live in zones under 2,200 m above sea level, which corresponds to 80% of Colombia (3).

Dengue has been an endemic disease in the Orinoquia region; in department of Meta, its behavior has been endemic and fluctuating; that is, it has had endemic peaks with associated mortality. The incidence of dengue in Meta in 2010 and 2011 was in values of 645 and 624 per 100,000 inhabitants. The fatality rate in 2011 was 5.3 per 100,000. Public policies of vector control, community education and the action of health services personnel have had a very limited effect in the control of the disease. The objective of this study is to describe mortality by dengue in department of Meta - Colombia, sociodemographic and clinical characteristics of affected population, and possible determinants associated with mortality in the Department, between January 2010 and May 2014,

so that activities of control and the generation of mortality by dengue prevention interventions can be reevaluated.

MATERIALS AND METHODS

A retrospective descriptive study was designed, with a quantitative approach. The cases were taken from the confirmed death by dengue by the National Health Institute (INS), through the National Epidemiological Vigilance System Sivigila. Notification cards and clinic histories of confirmed death by dengue in department of Meta were revised; sociodemographic and clinical variables, clinical laboratory results and drugs treatments were analyzed.

Inclusion criteria: Notified and confirmed case by the vigilance system Sivigila, availability of complete clinical history. Case confirmation was made by PCR tissue samples at the National Institute of Health Colombia.

Exclusion criteria: Non-confirmed cases by pathology or laboratory. Absence of clinical history, absence of evolution or laboratory data or illegibility of history.

Information was tabulated in an Excel database; the analysis was carried out with the Stata software; it was a univariate and bivariate analysis, to know the direction and magnitude of variables; to compare percentages Chi square tests were carried out, and to establish association the OR (Odds Ratio) was used. This study was carried out fulfilling the ethical principles contained in the Declaration of Helsinki and within the frame of the 8430 Resolution from the Ministry of Social Protection of Colombia (4).

RESULTS

39 cases of mortality by dengue were found; four were excluded according to the previously explained criteria. The time span is January 2010 to May 2014, in department of Meta - Colombia. Between 2011 and 2014 20,308 cases of dengue were reported, 232 of them were severe dengue (5). Dengue lethality was 192 per 100,000.

Univariate analysis

Sociodemographic variables: 35 confirmed cases of mortality by dengue were found during the period; average age was 27.3 years old; the mean was 10 years old; 57.14% of cases were 20 years old or younger; and 51.43% were male $p=0.239$; 82.86% live in town and 68.57% are in the subsidized system $p=0.702$ (Table 1).

Sociodemographic characteristics		Cases	Percentages (%)
Sex	Female	17	48.57
	Male	18	51.43
Area of case occurrence	Center of municipality	29	82.86
	Urban center	1	2.86
	Rural	5	14.29
Ethnicity	Indigenous	1	2.86
	Gitano	0	0.00
	Raizal	0	0.00
	Palenquero	0	0.00
	Afro Colombian	1	2.86
	Other	33	94.29
Type of health insurance	Exception	1	2.86
	Contributive	5	14.29
	Not insured	5	14.29
	Especial	0	0.00
	Subsidized	24	68.57

Table 1. Characteristics of population with mortality by dengue 2010 and 2014
Source: Sivigila

The time between the beginning of the appearance of symptoms and consultation with the health system was 4 days. 91.43% of cases were hospitalized; 62.8% of cases entered the system as probable, later, with laboratory results, all cases were confirmed by the analysis unit.

Of 35 cases of mortality, 9 cases (25.7%) had background of dengue, 16 did not have dengue background and 10 did not know if they had such background (28.57%). In 9 cases, there were family dengue back-

ground, 15 did not have family dengue background and 11 did not know if they had such background.

The years of the analysis with the most incidences were 2010 and 2013 (Table 2).

Year	Perc. x 100.000	Freq.	%
2010	1.14	10	28.57
2011	0.67	6	17.14
2012	0.66	6	17.14
2013	0.97	9	25.71
2014	0.64	6	11.43

Table 2. Yearly distribution of mortality by dengue in department of Meta – Colombia 2010-2014
Source: Sivigila

Clinical data

Main symptoms found were fever (100%), myalgias (71.43%), arthralgias (60%), vomit (60%) and abdominal pain (54.29%). The latter are closely related to the onset of shock (Table 3). Among other semiology findings are oliguria, consciousness alteration, tachycardia, and lung edema (Table 3).

Semiology findings	N	%
Fever	35	100.00
Myalgias	25	71.43
Arthralgias	21	60.00
Vomit	21	60.00
Abdominal pain	19	54.29
Cephalea	16	45.71
Diarrhea	9	25.71
Ascites	8	22.86
Retrocular pain	7	20.00
Oliguria	7	20.00
Conscience alteration	7	20.00
Tachycardia	6	17.14
Lung edema	6	17.14
Hematemesis	5	14.28
Hypotension	5	14.28
Convulsions	3	8.57

Table 3. Semiology findings
Source: research group

Laboratory data

With respect to the serology tests, it was found that for IGM (immunoglobulin M) a 25% of positive tests, for RT-PCR (Chain reaction of polymerase with inverse transcriptase) 13.33% and for isolation 43.75%.

The leukocytes recount had a range between 1,500 and 22,190, with an average of 9282 and a mean of 9,000. The initial hematocrit had a range of 17 to 74% with an average of 45.8% and was registered only in 55.26% of cases; the control hematocrit had a range between of 26 to 56 with an average of 36.6 and it was only registered in 47.36% of cases.

The plaque recount had a range between 7,000 and 343,000, with an average of 123,341 and it was registered in the 89.45% of the cases. The plaque control recount had a range between 6,000 and 360,000 with an average of 76,364 and it was registered in 76.31% of cases. 61.76% of cases presented a recount inferior to 150,000.

In other diagnostic tests, it was reported: albumin alterations in 2 cases; in arterial gases, 2 cases; electrolytic alterations, 5 cases; hepatic function was altered, TGP-ALT (aminotransferase of alanine) in 90% of patients, TGO-ALS aminotransferase of aspartate in 100% of patients. Kidney function was altered in patients with BUN (ureic nitrogen in blood) greater than 20 in 87% of cases, creatinine was altered in lesser proportion in 35.29% of patients.

Coagulation tests reported prothrombin time altered in 5 patients and thromboplastin partial time in 2 cases. On other diagnostic helps, electrocardiographic alterations were recorded in 2 patients, in other 2 alterations were found in the echocardiogram in the abdominal echography (ascites, hepatomegaly). In tissue sampling, of the 35 cases, 21 were sampled, 60% from liver, spleen, and lung, and 14 of them, 40% of brain, myocardium, kidney and marrow.

Final classification

It is worth noting that the final register of the case is not very precise, 28.57% classifies it as shock by dengue; 17.14% dengue with alarm signals; 14.28% as severe dengue; and 27.71% is unclassified (Table 4).

This is related to the management installed that does not correspond with the gravity of the case (Table 4).

Final classification	N	%
Dengue without alarm signals	1	2.85
Dengue with alarm signals	6	17.14
Severe dengue	5	14.28
Shock by dengue	10	28.57
Myocarditis by dengue	0	0.00
Encephalitis by dengue	0	0.00
Hepatitis by dengue	1	2.85
Other complications	3	8.57
Without classification	9	25.71
Level of attention		
First level	1	2.85
Second level	3	8.57
Third level	31	88.57
Behavior		
Ambulatory	1	2.85
Floor hospitalization	5	14.28
Intensive care unit	27	77.14
Observation	2	5.72

Table 4. Final classification, level of attention and behavior
 Source: Siviigila

Is evident in this case the weaknesses of health personnel in classifying dengue in this case they were severe dengue, however not classified as such, which represents a risk to patient safety and taking preventive health behaviors before the shock. This classification reflects the low adherence of health personnel to guide management and disease surveillance.

Bivariate analysis

Gender: mortality is greater in women than in men; it is greater in the subsidized system and in people without insurance than in the contributive system and special regime OR 0.68 CI 95% (0.1-3.93). In relation to signs and symptoms, there is more myalgias in men than in women OR 0.65

(0.15-2.77) $p=0.556$, vomit is more frequent in women than in men OR 1.15 (0.31-4.33) $p=0.832$, abdominal pain was present more in women than in men OR 2.2 (0.57-8.47) $p=0.248$, the shock affected more women than men OR 0.93 (0.25-3.47) $p=0.832$.

Aines (Analgesics, no steroid anti-inflammatory)

There was a greater presence of shock by dengue in people who received Aines OR 4.67 (1.1-23.04) $p=0.05$. Regarding the administration of dipyrone OR suggesting was found to be a risk, but confidence intervals were not significant.

DISCUSSION

Mortality by dengue is concentrated in population of extreme ages, mainly in pediatric population, and from scarce economic resources, this situation is similar to the one found in Honduras (6) and Bucaramanga – Colombia (7). Mortality and lethality rates by dengue in department of Meta are much greater than the national level, and the same occurs when comparing these rates with those of other countries in Central and South America (2).

The time between the beginning of signs and symptoms and consultation in the health system has been already found in studies in El Salvador (8), to be associated to a greater risk of shock and complications with the white organ; in this case it was found in 4 days, which implies a low level of knowledge of the alarm signals of the disease in the population, or access barriers.

The found mortality and its characteristics show the existence of barriers to access to health services and low preparation of health personnel in detecting signs of alarm and of poor ability to teach their patients the signs, it must be assessed from providers services and also in medical training schools.

In relation to the semiology findings, it was found more frequently myalgias, vomit and abdominal pain, similar to what was found in studies in Cartagena - Colombia (9), Mexico (10) and Ecuador (11), which corresponds with the delay of the contact with the health system; however, it contrasts with studies in Salvador (8) where there were greater hemorrhagic manifestations.

Taking into account attributes of the vigilance system in public health (Sivigila) like simplicity, acceptability, flexibility and integrality; they are mainly influenced by the complete and coherent register of the information, if it is not like that, it is necessary to search again missing data.

It is for that reason that in this case and in other studies carried out in the country, the vigilance system is considered complex and difficult, since it depends on the acceptance, compromise and adherence of health professionals and people responsible for the vigilance process to fulfill those processes, limiting the optimal functioning of the system and the integrality of the information (12).

It is evident in this case that the activities of education, prevention and sensitization to the community, and the continuing medical education have had a limited effect in the prevention of the mortality by dengue.

CONCLUSIONS

A mortality rate by dengue of 2.12 per 100.000 inhabitants was found, with a tendency to increase in the last 3 years; the rate of lethality was of 0.11, much greater than that of the country (Colombia) 0.07 per 100 inhabitants. Mortality by dengue in department of Meta affects extreme ages, mainly the group of people younger than 10 years old. It affects more men than women OR 0.87 95% CI (0.31-2.43) and it is predominantly urban. The municipalities that present more mortality are Villavicencio, Acacias, and Puerto Gaitán, and it affects more the population of the subsidized system (population without payment capabilities).

Time between the beginning of symptoms and consultation with the health system was 4 days, which evidences a high risk of complications because of barriers of access, ignorance of alarm signals or negative experiences with health services, this is associated to scarce contact with the health system, low cultural level, and scarce economic resources.

The most common semiology findings associated to mortality by dengue, besides fever, are myalgias (73.68%), vomit (60.53%), abdominal pain (57.89%), arthralgias (55.56%), cephalgia (42.11%), shock (39.47%), diarrhea (32.35%), and abdominal

effusion (30.30%). Important alterations were found in TGO – TGP hepatic function tests; in kidney function, BUN was significantly altered.

The use of Aines was associated with shock with OR 4.67 95% CI (1.1-23.04) being a clear risk factor. Aines use increases the risk of shock and death from dengue. There are difficulties in the registry and final classification of the case, there is no correlation between the signals of alarm, the clinical state, the time of evolution and the final classification.

Health promotion activities and disease prevention developed by the health system have had little impact in the prevention of the mortality by dengue. It is very important to strengthen decisions of health workers, based on the signs of alarm, as a key strategy to reduce mortality from dengue this approach and vigilant, proactive in patients at risk and comorbidities (under 5 years, over 65, pregnant women, hypertension and diabetes), accompanied by good training hydration and dengue shock prevention must be priority actions warranted in this work.

It is evident that there is a need to strengthen information and education activities with the community, to better in aspects like opportunity of consultation and knowledge of alarm signals. It is recommended to strengthen actions of continuing medical education, mainly to the guides of management of dengue, with media and pedagogic instruments that guarantee changes in the conduct and a better perception of the risks and alarm signals for dengue in order to be able to communicate them and teach them assertively to the patients.

It is important to strengthen the medical schools, the clinical knowledge of the warning signs on dengue, vigilant, proactive in patients at risk and comorbidities (under 5 years old, over 65, pregnant women, hypertension and diabetes) accompanied by good training hydration and prevention of dengue shock, actions are recommended to reduce mortality from dengue in Colombia. It is necessary to keep in mind that although hospital attention can be bettered, this disease must incorporate an integral approach of control of the risk factors, vector control, education to the community and

continuous betterment in health institutions; it is evident that the activities developed by the health system have not been enough, have been poorly planned or have had a very low impact.

The epidemiologic vigilance system is complex but valid to obtain information and generate knowledge, nevertheless, it requires a better compromise and acceptability by health professionals in order for it to function as an analysis and diffusion instrument for the results, for timely decision making.

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CONFLICT OF INTERESTS

There is no conflict of interests between the authors and the content of this paper.

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