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Clinical and diagnostic characteristics of dengue in children during the 2023–2024 outbreak in Buenos Aires, Argentina

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ABSTRACT

Introduction. Dengue fever presents a broad clinical spectrum in pediatrics, and there is limited information on its course in children. During 2023-2024, Argentina experienced its largest dengue epidemic.

Objective. To describe the clinical manifestations and hematological and biochemical alterations in pediatric patients with confirmed dengue and compare the results by age subgroup.

Population and methods. Retrospective, observational, analytical study in children under 17 years of age with dengue confirmed by RT-PCR or IgM, treated between July 1, 2023, and June 30, 2024, at a privately managed tertiary general hospital. Clinical, biochemical, and hematological variables were analyzed, comparing subgroups by age (<13 vs. ≥13 years).

Results. A total of 383 patients were included; 86.4% presented dengue without warning signs and 13.6% with warning signs. The most frequent symptoms were fever, headache, and myalgia. The most common laboratory abnormalities were leukopenia, thrombocytopenia, and elevated transaminases. Patients ≥13 years of age had a higher frequency of warning signs and hematological abnormalities. Most were treated on an outpatient basis; only 1.8% required hospitalization. No patients with severe dengue or deaths were recorded.

Conclusions. Early leukopenia and thrombocytopenia were the most frequent findings. The group aged ≥13 years had a higher proportion of dengue with warning signs.

Keywords: *dengue virus; child; pediatrics; mosquito-borne diseases.*

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INTRODUCTION

The dengue virus, of the *Flaviviridae* family, is transmitted by *Aedes* mosquitoes, mainly *Aedes aegypti*, which are predominant in urban areas and most active during warm months.[1]

In the Americas, dengue cases reached unprecedented numbers in 2024. As of epidemiological week (EW) 23, 9 386 082 cases were reported in the region, double the number in 2023.[2]

In Argentina, during the period covered by this study, three serotypes were identified in autochthonous cases, with a predominance of DEN-2 (81%), DEN-1 (18.9%), and isolated cases of DEN-3 detected in early 2024.[3]

Aedes aegypti was first documented in the country in 1995, and the first autochthonous cases of dengue were confirmed in Buenos Aires in 2009.[4] Since then, outbreaks of increasing magnitude have been reported. In 2023 and 2024, the largest dengue epidemic occurred, with 583 297 suspected cases nationwide,[3] of which 53 630 were in the Autonomous City of Buenos Aires (CABA).[5]

In children under 20 years of age, 157 805 cases were reported in 2023-2024. Of these, 333 (0.21%) were severe dengue, and 44 deaths were reported (specific case fatality rate: 0.03%).[3]

There is limited scientific literature on the clinical and biochemical aspects of dengue in children, hindering the development of clinical tools for early detection and appropriate management.

OBJECTIVES

To describe the clinical manifestations and hematological and biochemical alterations in pediatric patients with confirmed dengue, and to compare the results by age subgroups.

POPULATION AND METHODS

Retrospective, observational, analytical study. Children under 17 years of age treated at the CEMIC University Hospital between July 1, 2023, and June 30, 2024, were included. Patients with a concomitant diagnosis of other acute febrile illnesses were excluded.

Definitions

The definitions established by the guidelines of the Argentine Ministry of Health and the World Health Organization (WHO) were used.

Confirmed dengue case: patients with a positive reverse transcription polymerase chain reaction (RT-PCR) test for dengue within the first 5 days of symptom onset, or with dengue-specific immunoglobulin M after the fifth day of symptoms onset, during the months of dengue circulation in CABA.

Dengue case with warning signs: presence of one or more of the following: severe and sustained abdominal pain; persistent vomiting; serous effusion (in the peritoneum, pleura, or pericardium) detected clinically, by laboratory tests (hypoalbuminemia), or by imaging (abdominal ultrasound or chest X-ray); mucosal bleeding; change in the patient's mental status (drowsiness or irritability); hepatomegaly greater than 2 cm; sudden increase in hematocrit concomitant with rapid decrease in platelet count.

Severe dengue case: one or more of the following: severe plasma leakage, expressed by the presence of hypovolemic shock and/or respiratory distress due to excess fluid accumulation in the lungs; severe bleeding; organ involvement: severe hepatitis (transaminases greater than 1000 IU/L), encephalitis, or severe involvement of other organs, such as myocarditis.

In terms of hematological results, a sudden increase in hematocrit was defined as an increase >10% from baseline during the disease, leukopenia as a white blood cell count <4000/mm³, neutropenia as a neutrophil count <1000/mm³, thrombocytopenia as a platelet count <150 000/mm³, and an increase in liver enzymes, glutamic-oxaloacetic transaminase (GOT) and/or glutamate pyruvate transaminase (GPT) >40 IU/L.

Molecular detection was performed using qualitative qRT-PCR (altona Diagnostics™) employed in the cobas Z480 system (Roche™), following automated nucleic acid extraction (Bioer™). Serum samples from patients up to 7 days after symptom onset were used. Serological testing was performed in patients with symptoms lasting more than 5 days to detect anti-DENV IgG and IgM antibodies using a commercial enzyme-linked immunosorbent assay (ELISA) (DIA.PRO™) in addition to PCR. From the seventh day onwards, only serology was performed.

Statistical analysis was performed using Stata 13™. Continuous variables were summarized as medians and interquartile ranges (IQR), and categorical variables were summarized as percentages and frequencies. To evaluate the association between sociodemographic, clinical, and laboratory variables according to age group (<13 years versus 13 years or older), the chi-square (χ^2) test or Fisher's exact test was used,

as appropriate. A p-value <0.05 was considered statistically significant. Data collection and analysis were performed retrospectively, ensuring the confidentiality and anonymity of patients and their families. The study was approved by the CEMIC Ethics and Research Committee (Registration code 13615, 10/21/2024).

RESULTS

Between July 1, 2023, and June 30, 2024, 383 cases of dengue infection were confirmed in patients under 17 years of age treated at the CEMIC University Hospital: 381 cases (99.5%) were diagnosed by RT-PCR and 2 (0.5%) by serological detection of dengue-specific IgM. No viral serotyping was performed.

The median age was 11.6 years (range: 1 month to 17 years, IQR 9-14). There was a predominance of males (58%).

The mean number of days between symptom onset and the first consultation was 2.6, with a median of 2 (range: 0-7, IQR 2-4); 22.7% of patients consulted within 2 days of symptom onset.

Regarding reported comorbidities with a risk of developing severe dengue, asthma (n = 7) and obesity (n = 3) were identified.

Regarding clinical manifestations, 99.7% presented with fever and 77.8% with headaches. The detailed distribution of clinical signs and symptoms is presented in *Table 1*.

In the laboratory tests performed during the first consultation, the most frequent finding was leukopenia, present in 65.8% of patients. This abnormality was particularly prevalent during the first five days after symptom onset, with a frequency of 72.4% in blood counts performed during that period (including multiple determinations in some patients). Throughout the clinical course, 84.9% presented leukopenia in at least one determination.

Neutropenia was identified in 19.4% of patients on the first blood count and in 48.6% at some point during the disease. Thrombocytopenia was documented in 30.4% in the initial laboratory tests and in 57.6% during the disease.

Among the 316 patients who had at least two hematological check-ups, 22 (6.96%) showed an increase in hematocrit of more than 10% from baseline. In 15 of these patients, the increase was accompanied by a sharp decrease in platelet count, a criterion considered an alarm sign.

An increase in GOT (>40 IU/L) was observed in 62% of patients (median: 62 IU/L, range: 11-935). GPT was >40 IU/L in 37.5% (median: 47 IU/L, range: 0-685).

The lowest white blood cell count was recorded between days 3 and 5 from the symptoms onset (median 3055/mm³, range: 1260-11 070/mm³). Recovery to normal values was observed between days 7 and 15 of clinical evolution (*Figure 1*).

The nadir of the platelet count was observed between days 6 and 7 of the disease (median: 140 624/mm³, range: 10 000-285 000/mm³).

Table 1. Clinical manifestations in pediatric patients with dengue (n = 383)

Symptom	n (%)
Fever	382 (99.7)
Headache	298 (77.8)
Myalgia	244 (63.7)
General malaise	187 (48.8)
Rash	154 (40.2)
Nausea	140 (36.5)
Retroocular pain	136 (35.5)
Abdominal pain	121 (31.5)
Vomiting	118 (30.8)
Diarrhea	110 (28.7)
Arthralgia	104 (27.1)
Asthenia	94 (24.5)
Anorexia	80 (20.8)
Back pain	70 (18.2)
Pruritus	40 (10.4)
Epistaxis	31 (8)
Conjunctival injection	21 (5.4)
Petechiae	7 (1.8)
Gingival bleeding	6 (1.5)

Platelet normalization occurred between days 8 and 16 of clinical evolution (*Figure 2*).

The most common clinical presentation was dengue without warning signs, observed in 331 patients (86.4%). Warning signs were identified in 52 patients (13.6%), and no patients with severe dengue were recorded.

Among the 52 patients with warning signs, the following clinical findings were described. Of those who presented with mucosal bleeding, 31 (59.6%) had epistaxis, 6 (11.5%) had gingival bleeding, and 4 (7.7%) had metrorrhagia. In 15 (28.8%), a sudden increase in hematocrit was detected, accompanied by an abrupt decrease in platelet count. Six (11.5%) suffered persistent vomiting, and 3 (5.7%) suffered intense and sustained abdominal pain. No serous effusions, changes in mental status, or hepatomegaly were recorded.

Figure 1. Variations in white blood cell count according to days after symptom onset

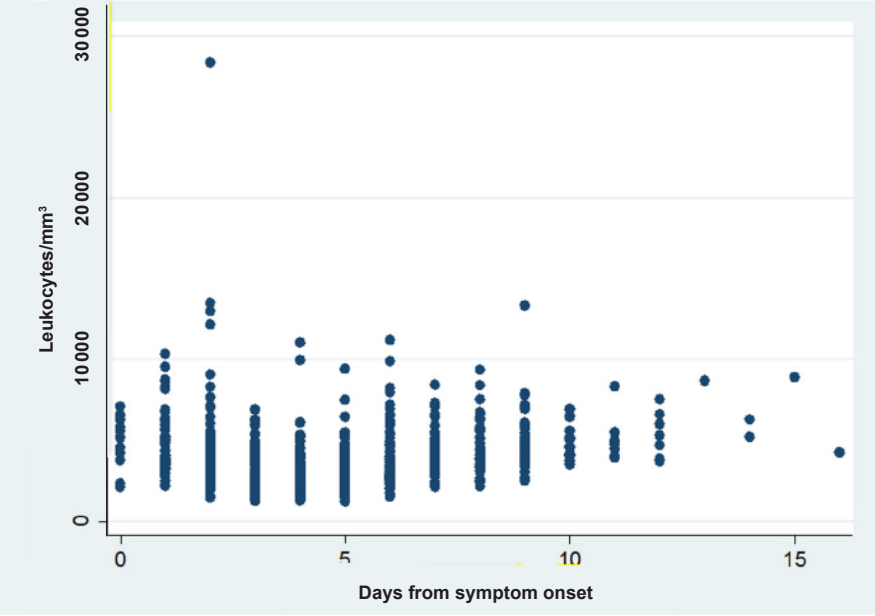
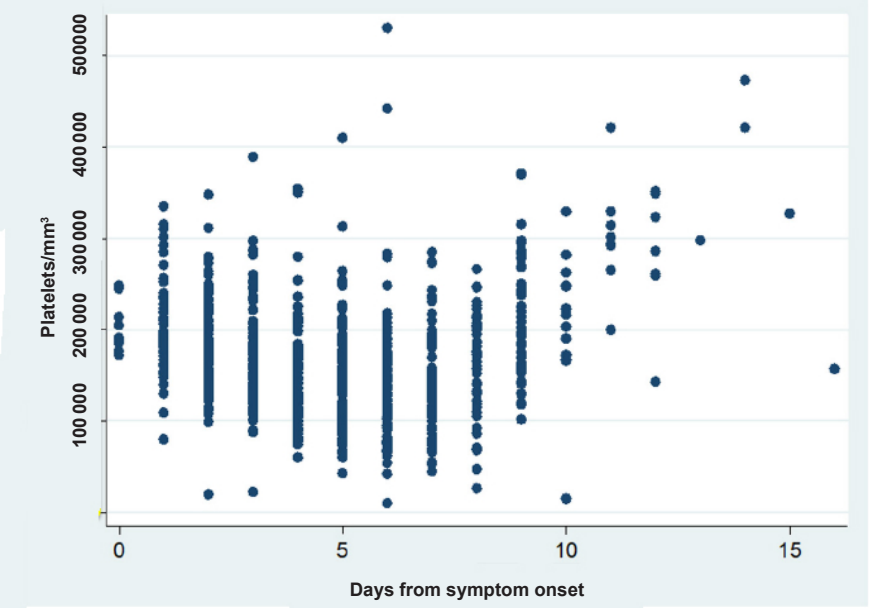


Figure 2. Variations in platelet count according to days of evolution



Most patients were treated on an outpatient basis, without hospitalization or prolonged observation.

Nine of 383 patients (2.35%) required observation for <24 hours. Of these, 8 patients had warning signs, while 1 case was observed for hypothermia. All received intravenous hydration according to WHO recommendations.

As for hospitalizations, 7 patients (1.8%) required hospitalization in the general ward: 6 received supportive treatment for warning signs (1 with abdominal pain, increased hematocrit, and sudden decrease in platelets; 1 with gingival bleeding, increased hematocrit, and sudden decrease in platelets; 1 for metrorrhagia; 1 for metrorrhagia and increased transaminases; and 1 for vomiting and epistaxis).

One 36-day-old patient required a platelet transfusion due to severe thrombocytopenia (10 000/mm³).

All hospitalized patients progressed without complications.

Only three patients reported a history of previous dengue infection. Although one of them presented with epistaxis, all were treated on an outpatient basis and progressed favorably. There were no deaths.

A comparative analysis was performed by age subgroup, dividing the sample into patients <13 years (n = 199) and ≥13 years (n = 184), to evaluate clinical and laboratory differences by age.

In terms of clinical manifestations, those ≥13 years of age showed a statistically significant difference in myalgia (72.8% vs. 55.3%, p <0.001), retroocular pain (41.3% vs. 30.2%, p = 0.023), back pain (23.9% vs. 13.1%, p = 0.006), and general malaise (54.3% vs. 43.7%, p = 0.038). The other symptoms did not show significant differences.

Patients ≥13 years of age had a higher frequency of hematological and biochemical abnormalities compared to younger patients, with statistically significant differences in leukopenia (90.8% vs. 79.4%, p = 0.002), neutropenia (54.9% vs. 42.7%, p = 0.017), thrombocytopenia (69.6% vs. 46.7%, p <0.001), and GPT >40 IU/L (48.6% vs. 27.3%, p <0.001).

Dengue with warning signs was significantly more frequent in the ≥13-year-old group, with an incidence of 17.9% compared to 9% in children under 13 years of age (p = 0.011).

DISCUSSION

Dengue is a disease with a broad clinical spectrum ranging from asymptomatic forms to fatal cases. Classic dengue, characterized by fever, headache, retroocular pain, myalgia, arthralgia, and rash, is more common in older children and adolescents. At younger ages, the clinical picture may be less specific and confused with other febrile syndromes.

During the 2023-2024 outbreak, Argentina recorded an incidence 3.4 times higher than in the previous period and 8.6 times higher than in 2019-2020.[3] This shift tends to push cases toward the pediatric population as immunity in adults increases. In this regard, the proportion of severe dengue in people under 20 years of age was 0.21%. In our series, no cases of severe dengue were recorded.

The patients analyzed presented fever, headache, and myalgia, followed in frequency by general malaise, rash, and nausea. In other pediatric series, the most common symptoms were fever (99-100%), headache (56-84%), myalgia (42-63%), and rash (51-67%).[6-10] Retroocular pain, present in approximately one-third of patients, was significantly less common in children under 13 years of age in this study. Although it is considered a cardinal symptom, its absence should not rule out clinical suspicion, especially in younger children.

The most frequent abnormalities in laboratory analysis were leukopenia,[11] followed by thrombocytopenia and elevated transaminases, predominantly GOT. These findings are consistent with previous studies in pediatric populations, which describe mild to moderate liver involvement attributable to both direct viral cytopathic effects and immune-mediated mechanisms.[12] In our cohort, these abnormalities were more frequent in adolescents, who also had more cases of elevated GPT (>40 IU/L), leukopenia, and neutropenia.

As described in the natural course of the disease, thrombocytopenia and increased transaminases were more pronounced in the post-febrile phase (4-7 days after symptom onset), reinforcing the value of clinical and laboratory follow-up due to the risk of plasma extravasation and progression to severe forms.

Warning signs were more frequent in patients ≥13 years of age, especially hemoconcentration, a finding consistent with a series analyzing adolescents and young adults.[13] This could be explained by physiological differences such as

body composition, relative blood volume, or less adequate hydration habits in this age group.

Only 13.6% of children showed warning signs of severe dengue, a lower figure than that reported in other pediatric series (30-50%). This difference could be attributed to a non-endemic epidemiological context, such as that of the Buenos Aires metropolitan area, with a high level of institutional and community alertness, timely access to the health system, and a pediatric population closely monitored by their caregivers, which led to early consultation —with a median of 2 days from the symptom onset— and allowed for the establishment of clinical and laboratory follow-up according to protocol, especially during the critical phase. The institutional protocol included clinical, hematological, and biochemical checks every other day, with emphasis on 48 hours after the fever subsided.

In other cases, due to system overload and delays in receiving results, patients completed their recovery favorably before warning signs were detected.

In March 2025, a new pediatric care protocol was published,[14] in which hemorrhagic warning signs are defined as persistent mucosal bleeding. According to this new classification, several patients in this series would not have been categorized as cases with alarm signs, as they were single and self-limiting episodes.

The tetravalent dengue vaccine, recently approved in Argentina, was not included in the National Vaccination Schedule during 2023-2024, and its use in the private sector was exceptional. In this context, although we do not have individual records, it is reasonable to assume that the cohort analyzed corresponds to an unvaccinated population.

Among the strengths of this study are the large number of pediatric cases with laboratory-confirmed diagnoses and the detailed analysis of clinical evolution and laboratory results. Among its limitations, the study population is drawn from a privately managed hospital, which may limit the generalizability of the results to other sectors with less access to the health system, different sociodemographic characteristics, and different consultation habits.

In a scenario of high dengue circulation and health system saturation, it is crucial to maintain a high index of suspicion for all febrile patients, especially if they present with leukopenia and, secondarily, thrombocytopenia, even in the absence of warning signs. This allows for adequate clinical management, anticipates complications, and permits preventive isolation until etiological confirmation is achieved.

CONCLUSION

Early leukopenia and thrombocytopenia were the most frequent findings. The group aged 13 or older had a higher proportion of dengue cases with warning signs. ■

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