



ORIGINAL ARTICLE

## Arboviral Infections in Patients with Nonspecific Febrile Syndrome at a Polyclinic in Pinar del Río

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### ABSTRACT

**Introduction:** dengue and Oropouche are considered important arboviral diseases due to their marked increase.

**Objectives:** to diagnose dengue and Oropouche in patients presenting with nonspecific febrile syndrome at a polyclinic in Pinar del Río.

**Methods:** an observational, descriptive, cross-sectional study was conducted at the Luis Augusto Turcios Lima University Teaching Polyclinic in 2024. The universe comprised all 2,317 patients with nonspecific febrile syndrome, with no sampling required. Data were collected using epidemiological surveys issued during that year. Descriptive statistical methods were employed, and medical ethics were respected.

**Results:** no differences were observed by age group or sex. The initial consultation predominantly occurred at the Polyclinic's Emergency Department. Final diagnoses of suspected or confirmed cases were concentrated in the Capitán San Luís and La Coloma Popular Councils, areas with a high infestation index (14,0 %). No association was found with general demographic characteristics. However, these arboviruses were associated with: age under 60 years (more than 34 times higher odds), being a student or worker (more than 8 times higher odds), and urban residence (more than 3 times higher odds).

**Conclusions:** surveillance, early diagnosis, and timely treatment of nonspecific febrile syndromes must be intensified to address emerging arboviral diseases.

**Keywords:** Aedes; Dengue; Arbovirus Infections; Epidemiological Monitoring.

## INTRODUCTION

Over the past 30 years, dengue has shown a marked increase and is considered the most important of the arboviral diseases. Currently, the disease is endemic in nearly all tropical countries and spans multiple continents. Environmental and sociocultural factors, unfavorable living conditions and lifestyles, coupled with insufficient financial resources, influence the persistence of high vector infestation levels. <sup>(1,2)</sup>

The World Health Organization (WHO) proposed modifying the international surveillance system for notifiable diseases under the concept of syndromic surveillance. Among these syndromes is the nonspecific febrile syndrome (NFS), defined as an acute febrile illness of less than seven days' duration in which no signs or symptoms suggesting a specific infectious focus have been identified in the population. <sup>(2,3)</sup>

Recently, in 2024, Oropouche virus has been detected in areas where transmission had not previously been reported. Additionally, deaths associated with the infection and cases of vertical transmission have been documented. Since the last epidemiological alert issued by the Pan American Health Organization (PAHO), thousands of additional Oropouche cases have been reported across six countries, bringing the total to over 10,000 confirmed cases. Brazil is the most affected country, with more than 8,000 cases and 2 deaths. The other affected countries include Bolivia, Colombia, Cuba, Peru, and the Dominican Republic. Imported cases have also been reported in the United States and Canada following travel to endemic countries, as well as in Europe. <sup>(3,4)</sup>

Given this context and the current epidemiological situation, strict surveillance of NFS is essential. It is therefore necessary to identify the characteristics associated with the diagnosis of arboviral infections in patients presenting with these symptoms. This need motivated the present study, which aimed to describe the behavior of arboviral infections in patients with nonspecific febrile syndrome at the Luis Augusto Turcios Lima University Teaching Polyclinic.

## METHODS

An observational, descriptive, cross-sectional study was conducted in the catchment area of the Luis Augusto Turcios Lima University Teaching Polyclinic in the municipality of Pinar del Río. The study population comprised all 2,317 patients diagnosed with nonspecific febrile syndrome during 2024.

Primary data were collected using the standard epidemiological survey designed for nonspecific febrile syndrome with suspected arboviral infection. This instrument provided data for the following variables: age (years), sex (female or male), occupation (preschool, student, worker, unemployed, incarcerated, homemaker, retired), area of residence (urban or rural), popular council (Capitán San Luís, Hermanos Barcón, San Vicente, Vizcaíno, Coloma), site of first consultation (family physician's office, polyclinic emergency department [ED], hospital ED), symptoms (fever, headache, arthralgia, malaise, rash, retro-orbital pain, myalgia, abdominal pain, etc.), initial diagnosis (nonspecific febrile syndrome), symptom onset date, admission site (home, isolation center, hospital, no admission), and laboratory results (IgM, IgG, PCR). Final diagnoses were categorized as: suspected dengue (positive IgM) or confirmed dengue (positive IgM and IgG); suspected Oropouche (negative IgM) or confirmed Oropouche (positive PCR).

A normal infestation index was defined as 0,05 %. Patients presenting with febrile illness or symptoms suggestive of arboviral infection were included, while those with signs or symptoms indicating a localized infection focus were excluded.

Following formal request and justification, Microsoft Excel databases of patients with nonspecific febrile syndrome in 2024 were accessed at the Hygiene and Epidemiology Department of the polyclinic. Descriptive analysis included frequencies, proportions, and means for categorical variables.

The dependent variable was suspected or confirmed dengue or Oropouche. Odds ratios (OR) and 95 % confidence intervals (CI 95 %) were calculated, along with incidence rates of suspected/confirmed cases. Chi-square tests were used for categorical variables, and the Z-statistic for continuous variables, all at a significance level of  $p < 0,05$ . A multivariate analysis was subsequently performed to identify the significant model associated with suspected or confirmed dengue and Oropouche. The EpiInfo 2000 statistical package was used. Calculations were based on a polyclinic catchment population of 45,564 inhabitants and 12,578 households. Ethical principles governing the handling of medical information were strictly followed, in accordance with the internal ethical regulations of the polyclinic.

## RESULTS

In the analysis of patients with suspected and/or confirmed dengue and Oropouche by age and sex (Table 1), the 0–20 years age group predominated, with 63 (6,63 %) dengue cases and 251 (26,42 %) Oropouche cases, totaling 314 (33,05 %) patients ( $\chi^2 = 7,61$ ;  $df = 4$ ;  $p > 0,05$ )—a non-significant difference. No significant differences were found by sex between the two groups ( $\chi^2 = 1,60$ ;  $df = 1$ ;  $p > 0,05$ ).

**Table 1.** Distribution of patients with suspected and/or confirmed dengue and Oropouche by age and sex.

Variable		Suspected/Confirmed Dengue	Suspected/C onfirmed Oropouche	Total	Statistic (p-value)
		No. (%)	No. (%)	No. (%)	
<b>Age</b>	0-20 years	63 (6,63)	251 (26,42)	314 (33,05)	X <sup>2</sup> =7,61 (p>0,05)
	21-40 years	41 (4,31)	210 (22,10)	251 (26,42)	
	41-60 years	46 (4,84)	201 (21,15)	247 (26,00)	
	61-80 years	31 (3,26)	95 (10,00)	126 (13,26)	
	> 80 years	5 (0,52)	7 (0,73)	12 (1,26)	
<b>Sex</b>	Female	89 (9,36)	405 (42,63)	494 (52,00)	X <sup>2</sup> =1,60 (p>0,05)
	Male	97 (10,21)	359 (37,78)	456 (48,00)	

In the analysis of patients by site of first consultation and final diagnosis across popular councils (Table 2), the polyclinic emergency department (ED) was the most frequent site of initial consultation in all councils. Final diagnoses of suspected/confirmed dengue (72 [7,57 %] and 47 [4,94 %]) and Oropouche (175 [18,42 %] and 192 [20,21 %]) were concentrated in the Coloma and Capitán San Luís councils ( $\chi^2 = 449,76$ ;  $df = 16$ ;  $p < 0.001$ )—a highly significant difference. Of the 2,317 patients with nonspecific febrile syndrome (NFS), only 121 (12,73 %) and 18 (1,89 %) were diagnosed with suspected/confirmed Oropouche and dengue, respectively.

**Table 2.** Distribution of patients by site of first consultation and final diagnosis according to popular council.

Popular Council	Variable				
	Site of first consultation			Final diagnosis	
	Physician's office No. (%)	Polyclinic ED No. (%)	Hospital ED No. (%)	Dengue No. (%)	Oropouche** No. (%)
COL	37 (3,89)	712 (74,94)	23 (2,42)	72 (7,57)	175 (18,42)
CSL	186 (19,57)	282 (29,68)	46 (4,84)	47 (4,94)	192 (20,21)
VIZ	139 (14,63)	174 (18,31)	63 (6,63)	26 (2,73)	138 (14,52)
HB	89 (9,36)	194 (20,42)	60 (6,31)	23 (2,42)	138 (14,52)
SV	64 (6,73)	186 (19,57)	62 (6,52)	18 (1,89)	121 (12,73)

Notes: COL (Coloma); CSL (Capitán San Luís); VIZ (Vizcaíno); HB (Hermanos Barcón); SV (San Vicente);

\*Suspected/confirmed dengue; \*\*Suspected/confirmed Oropouche

Analysis of *Aedes aegypti* mosquito foci by popular council revealed the highest infestation index in Capitán San Luis (12,4), followed by Hermanos Barcón (9,6), with a polyclinic-wide average of 7,6.

In the analysis of the association between suspected/confirmed dengue and Oropouche and general patient characteristics (Table 3), no significant associations were found with any of the variables studied ( $Z < 2$ ;  $p > 0,05$ ).

**Table 3.** Distribution of patients with suspected or confirmed dengue and Oropouche according to general characteristics.

Variables	Dengue	Oropouche	Total	Z (p-value)
Age <60 years	150 (34,5)	662 (57,35)	812 (33,9)	-29,95 (p>0,05)
Female sex	89 (9,36)	405 (42,63)	494 (52,00)	-31,52 (p>0,05)
Occupation: Studies/works	302 (31,78)	409 (43,05)	711 (74,84)	-18,22 (p>0,05)
Urban area	132 (13,89)	477 (50,21)	609 (64,10)	-41,39 (p>0,05)
Coloma council	72 (7,57)	175 (18,42)	247 (25,26)	-7,57 (p>0,05)
Hospital admission	48 (5,05)	79 (8,31)	127(13,36)	-1,69 (p>0,05)
First consult: Hospital ED	42 (4,42)	66 (6,94)	104 (10,94)	-1,56 (p>0,05)

Notes: \*Suspected/confirmed dengue; \*\*Suspected/confirmed Oropouche

Multivariate analysis of patients with suspected or confirmed dengue according to general characteristics (Table 4) revealed the strongest association with age <60 years (OR >34), followed by occupation (studying or working) (OR >8), and urban residence (OR >3)—all highly significant ( $p < 0,001$ ).

**Table 4.** Multivariate analysis of patients with suspected or confirmed dengue and Oropouche according to general characteristics.

Suspected/Confirmed Dengue	OR	X <sup>2</sup>	P	IC
Age <60 years	34,62	956,37	p<0,001	26,82-44,69
Occupation	8,85	4,69,02	p<0,001	7,19-10,89
Urban area	3,19	151,21	p<0,001	2,64-3,85
Infestation index (%) CP_CSL	1,39	18,00	p<0,001	1,18-1,63
Female sex	1,17	3,04	p>0,05	0,98-1,41
CP_Coloma	0,12	437,78	p<0,001	0,10-0,15
Hospital admission	0,02	1019,82	p<0,001	0,02-0,03
First consult: Hospital ED	0,02	1159,08	p<0,001	0,001-0,02

Notes: CP\_CSL (Capitán San Luís Popular Council); CP\_Coloma (Coloma Popular Council)

## DISCUSSION

According to existing studies, the epidemic trend is exponential—each epidemic surpasses the previous one in magnitude, with transmission patterns showing progressive annual increases and peaks during the second half of each year.<sup>(1,2,3)</sup>

Regarding sociodemographic variables, several studies have been published. Brooks Carballo et al.,<sup>(4)</sup> in Guantánamo, found that 2019 had the highest number of confirmed cases (72,6 %) compared to the previous year, with males (50,4 %) and the 15–18 age group (30,2 %) predominating.

Cobas-Planchez et al.,<sup>(5)</sup> in Havana, reported a predominance of the 1–19 age group (48,44 %), with case numbers rising from July and peaking in December. Negative cases (non-dengue) outnumbered positive ones, with a female predominance and urban areas accounting for 72,58 % of cases. Fever was the main symptom (87 %).

Similar results were observed in this study: negative cases predominated over positive ones, with no significant differences by age or sex. The main causes of nonspecific febrile syndrome included common cold, acute bronchitis, acute diarrheal disease, pneumonia, acute otitis media, acute pharyngotonsillitis, acute sinusitis, and respiratory allergy, among others. The incidence rate for suspected/confirmed dengue was 408.2 cases per 100,000 inhabitants—lower than the Americas' rate (426,8) but higher than those of Africa (11,7), and Asia and Oceania (20,3) in 2023. The incidence rate for suspected/confirmed Oropouche was 1,6 cases per 100,000 inhabitants; however, due to limited available studies, comparisons remain unfeasible.<sup>1,2,3)</sup>

In Cuba, from the first identification of Oropouche cases on May 27, 2024, through epidemiological week 35, 506 confirmed cases were reported.<sup>(6)</sup> Cases have been recorded in 99 municipalities across all 15 provinces. By sex and age, 55 % were female and aged 65 years or older. No deaths have been associated with Oropouche virus (OROV) infection.

Clinically, fever and headache are common in Oropouche fever but do not distinguish it from dengue. In contrast, odynophagia and abdominal pain are more frequent in Oropouche, while myalgia, arthralgia, and rash predominate in dengue. Additional studies on symptom recurrence and duration are needed to improve diagnostic strategies.

Pérez Díaz et al.,<sup>(7)</sup> found a predominance in the 50–59 age group and among females. The “Joaquín de Agüero” polyclinic reported the highest case count, and the Mella area had the highest infestation index. Llibre-Mendoza and Corrales-Reyes,<sup>(8)</sup> reported that 40,07 % of cases were from urbanized areas, specifically the Jiguaní Norte popular council. Most cases were female (53,95 %) and aged 41–60 years (41,47 %); 64,74 % of diagnoses were made through active screening.

Escalona Vázquez et al.,<sup>(9)</sup> found that *Aedes aegypti* infestation was highest in surveillance systems and low-elevation water tanks. The rainy season (June–October) was most associated with vector proliferation, especially in the Veguita and Yara popular councils. Ferreira et al.,<sup>(10)</sup> using ovitraps in field sampling, identified *Aedes aegypti* breeding sites in areas influenced by informal human settlements, with larval infestation indices between 8,6 % and 9,5 %—far exceeding the tolerable threshold of <1%.

Bazán Mosquera et al.<sup>(11)</sup> reported high dengue prevalence in Latin America: Colombia (19.30%), Costa Rica (50 %), Peru (50 %), Venezuela (14 %), and Ecuador (64 %). However, Ayón Lucio et al.,<sup>(13)</sup> demonstrated that Brazil and the Dominican Republic were the most affected by viral prevalence.

González Fiallo et al.,<sup>(13)</sup> showed that vector surveillance data revealed increased *Aedes aegypti* focalization from June onward, defining March–June as the optimal period to intensify vector suppression efforts. Catalá Rivero et al.,<sup>(14)</sup> found dengue cases with demographic and clinical features consistent with national and international reports, with hematological abnormalities in over half of the patients studied.

The complexity of Oropouche fever in the Americas clearly demands an interdisciplinary One Health approach—integrating diagnosis, vector and host biology, and human activity. The overall exposure rate to Oropouche in South America is 19,61 %.

In this study, no age or sex predominance was observed, consistent with most Oropouche outbreaks, which affect individuals of all ages and both sexes. In populations with prior virus exposure, children and youth were most affected.<sup>(15,16,17)</sup> Anthropogenic disturbances—such as deforestation, urbanization, and colonization of new areas—affect vector distribution and the interplay between urban and sylvatic transmission cycles. Additionally, climate change alters temperature and rainfall patterns, influencing vector population dynamics and increasing transmission risk.

Updated studies on the disease, vector distribution, and seasonality in Oropouche-endemic regions are lacking. It is therefore imperative to investigate the most relevant biological aspects of the vector in affected areas to design and implement integrated control strategies. Mathematical epidemiology tools, such as infectious disease modeling, could enhance understanding of the problem—particularly in clarifying the mechanisms driving Oropouche expansion and dynamics, estimating risk, and forecasting potential scenarios.<sup>(18,19,20)</sup>

## CONCLUSIONS

It is essential to strengthen epidemiological surveillance systems to ensure early detection of suspected cases and rapid response protocols. Early diagnosis allows differentiation of nonspecific febrile syndromes from other pathologies, guiding appropriate interventions. Timely treatment reduces complications and helps contain the spread of emerging arboviruses, thereby protecting public health and preventing larger outbreaks.

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This study required no external funding.

### Conflict of Interest

The authors declare no conflicts of interest.

### Author Contributions

**JFRR:** Conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, validation, visualization, original draft writing and revision, final manuscript writing, review, and editing.

**JCRB:** Conceptualization, data curation, formal analysis, investigation, methodology, original draft writing and revision, final manuscript writing, review, and editing.

**JAH:** Investigation, methodology, original draft writing and revision, final manuscript writing, review, and editing.

**AMBC:** Investigation, methodology, original draft writing and revision, final manuscript writing, review, and editing.

**RAA:** Investigation, methodology, original draft writing and revision, final manuscript writing, review, and editing.

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