

CASE REPORT

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# When it itches, dengue switches off: a retrospective case series

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## Abstract

**Background** Dengue fever (DF) is a viral illness caused by the dengue virus transmitted by *Aedes aegypti* mosquito. It manifests with a range of symptoms, from mild DF to severe forms like dengue hemorrhagic fever and dengue shock syndrome. Common symptoms include fever, headache, rash, muscle and joint pain, and itching. The relationship between itching and clinical improvement in dengue patients remains unclear.

**Case presentation** A retrospective analysis was conducted on hospital data from a tertiary care centre in South India from April 2021 to April 2023. Patients diagnosed with dengue fever (confirmed by Immunoglobulin (Ig) M and Non-Structural protein (NS) 1 positivity) who experienced itching were included. Clinical details, age, sex, and laboratory findings were collected. A total of 261 patients were examined. Itching typically occurred around day eight from fever onset and was associated with improved platelet count and hematocrit levels.

**Conclusions** Dengue fever, caused by the dengue virus, presents with various symptoms, including itching during the recovery phase. Studies suggest a correlation between itching and clinical improvement in dengue patients, indicating itching as a potential prognostic marker. Possible mechanisms for itching include direct viral infection of skin cells and cytokine release. However, further research is needed to understand this association fully. Despite limitations such as retrospective analysis, these findings highlight the significance of itching in dengue prognosis and emphasise the need for large-scale studies.

**Keywords** Rash, Exanthema, Itching, Children

## Background

Dengue fever (DF) is an arthropod-borne viral disease caused by the dengue virus transmitted by the *Aedes aegypti* mosquito. Dengue presents with a spectrum of symptoms, varying from self-limited DF to severe dengue hemorrhagic fever and fatal dengue shock syndrome. Common symptoms include fever, headache, retro-orbital pain, varied skin rash, myalgia, arthralgias, and itching (Huang et al. 2016). During recovery after

defervescence, a confluent erythematous convalescent rash is noted. The rash can be very pruritic, even disturbing sleep. Laboratory findings during the recovery phase include stabilisation of hematocrit. White blood cell count (WBC) rises soon after defervescence, and platelet count increases following WBC recovery (CDC 2024). Though itching is noted during the recovery phase, its relation to improving clinical and lab parameters has not been well established; hence, we conducted this study.

## Case presentation

A retrospective hospital data analysis from a tertiary care hospital in South India was done between April 2021 and April 2023. Data of all cases of diagnosed dengue fever, i.e., Immunoglobulin (Ig) M and Non-structural protein (NS)1 positive cases who had experienced itching, were included in the study. The

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institutional ethics committee exempted the study from ethics review. The cases of dengue fever were diagnosed based on the WHO case definition (CDC 2024). The clinical details of fever, itching and outcome were collected along with age and sex. The investigation results collected included platelet count and hematocrit at admission and around the onset of itching.

Data were summarised using descriptive statistics, including means, standard deviations, medians, interquartile ranges, and percentages according to appropriate distributions. Pearson correlations were used to assess association as the data was normally distributed. A *P-value* less than 0.05 was considered statistically significant. SPSS software program version 29.0 (SPSS, Chicago, IL, USA) was used.

The present study included 261 patients, of whom 157 (60%) were male, and 104 (40%) were female, with a median (IQR) age of 6.8 (4.7–8.4) years. Table 1. The median (IQR) duration of fever before admission was 3 (2–4) days; platelet count at admission was 118 (92–147) × 10<sup>9</sup>/L, and hematocrit at admission was 44 (38–53) %. The children developed itching by 5 (4–6) days of admission. This corresponds to 8 (6–10) days median (IQ) from onset of fever. The median (IQR) value of platelet count and hematocrit around the onset of itching was 138 (102–166) × 10<sup>9</sup>/L and 39 (35–44) %, respectively. A positive correlation was noted between the onset of itching and platelet count, as well as hematocrit improvement, with a Pearson correlation coefficient of 0.917 and 0.916, respectively. The correlation

was statistically significant, with a *P* value of less than 0.05 Table 2.

**Conclusions**

Dengue virus (DENV) is a single-strand RNA virus belonging to the Flaviviridae family. DENV 2 and DENV 3 are more predominant among the five serotypes circulating all over India (Huang et al. 2016).

Commonly, a rash is noted during a recovery phase. This rash is known as the convalescent rash of dengue, widely described as “islands of white in a sea of red.” During this phase, individuals may also experience a significant degree of pruritus, which can even interfere with sleep (CDC 2024). The study by Siddiqui et al. revealed a significant association between itching and dengue fever, with itching being observed in 20.5% of the dengue patients studied (Siddiqui et al. 2020). Furthermore, the study found that patients experiencing itching exhibited a better rate of correction of thrombocytopenia and a reduced need for blood/platelet transfusion compared to the non-itching group (Siddiqui et al. 2020). These findings suggest that itching may be a valuable prognostic indicator of dengue fever. In our study, we enrolled 261 proven dengue fever cases that had itching. The median (IQR) platelet count at admission was 118 (92–147) × 10<sup>9</sup>/L and hematocrit at admission was 44 (38–53)%. The itching was noted at a median of five days from admission and around day eight from the onset of the fever, similar to the finding of Abbas et al., who found itching on day 9 (Abbasi et al. 2009). There was a statistically significant positive correlation between the onset of itching and improvement in the haematological parameters, that is, platelet and hematocrit values. Upon the onset of pruritus, all children displayed stable hemodynamic functions and exhibited signs of clinical improvement.

The exact cause of itching in dengue is not fully understood, but multiple factors may play a role. One possible explanation is the dengue virus’s direct infection of skin dendritic cells, specifically Langerhans cells. This has

**Table 1** Characteristics of the study population

Characteristic	Value
Total number of patients	261
Male patients (%)	60% (157 patients)
Female patients (%)	40% (104 patients)
Median age (years)	6.8 (IQR: 4.7–8.4)

**Table 2** Clinical profile and key results

Parameter	Median (IQR)	Correlation Coefficient (r)	<i>P</i> -value
Duration of fever before admission (days)	3 (2–4)		
Platelet count at admission (× 10 <sup>9</sup> /L)	118 (92–147)		
Hematocrit at admission (%)	44 (38–53)		
Duration of itching onset from admission (days)	5 (4–6)		
Duration of itching onset from fever onset (days)	8 (6–10)		
Platelet count at itching onset (× 10 <sup>9</sup> /L)	138 (102–166)	0.917	< 0.05
Hematocrit at itching onset (%)	39 (35–44)	0.916	< 0.05

been observed in studies where these cells were susceptible to dengue virus infection, which could contribute to the skin-related symptoms of dengue, such as itchiness (Wu et al. 2000). Pruritus or itching in dengue patients can be attributed to the release of certain cytokines during the disease. Cytokines such as IL-1, IL-2, IFN- $\gamma$ , and TNF- $\alpha$  are released during dengue fever (Sheikh et al. 2011). The Th2 cytokines released during the disease's later stages are believed to play a role in the pathogenesis of pruritus in dengue patients. Moreover, the involvement of these cytokines in the pathogenesis of atopic dermatitis has also been noted, implying a correlation between the immune response and pruritus in various skin conditions (Sheikh et al. 2011). These findings could contribute towards a better understanding of the underlying mechanisms and potential therapeutic interventions for pruritus in dengue. However, the exact pathophysiological mechanisms underlying pruritus in dengue fever are still not fully elucidated, warranting further research to clarify this association. Our study revealed a significant improvement in platelet count and hematocrit, along with clinical recovery, upon the onset of itching. These findings were consistent with those of Siddiqui et al. from India (Siddiqui et al. 2020). Retrospective analysis and single-centred study were the main limitations of our study.

In conclusion, while "When it itches, dengue switches off" may hold some truth, it is important to note that further larger-scale studies are necessary to confirm itching as a reliable prognostic marker for dengue fever.

#### Abbreviations

DENV	Dengue virus
DF	Dengue fever
IFN- $\gamma$	Interferon gamma
IgM	Immunoglobulin M
IL-1	Interleukin 1
IL-2	Interleukin 2
IQR	Interquartile range
NS1	Non-structural protein 1
RNA	Ribonucleic acid
SPSS	Statistical package for the social sciences
TNF- $\alpha$	Tumor necrosis factor alpha
WHO	World Health Organization

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#### Author contributions

NK analysed and interpreted the patient data and contributed to writing the manuscript. VSK analysed and interpreted the patient data, managed the case, and contributed to writing the manuscript. DRR analysed and interpreted the patient data and contributed to writing the manuscript. KK analysed patient data and contributed to writing the manuscript. All authors read and approved the final manuscript.

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#### Availability of data and materials

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## Declarations

#### Ethics approval and consent to participate

Exemption from ethics review was obtained from IEC- Subbaiah Institute of Medical Sciences as per letter IEC-SUIIMS/135/JAN-2024 dated 01/01/2024.

#### Consent for publication

Written informed consent was obtained from the patient's parents/legal guardians to publish this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal. Contact the author for the form.

#### Competing interests

The authors declare that they have no competing interests.

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## References

- Abbasi A, Butt N, Sheikh QH, Bhutto AR, Munir SM, Ahmed SM (2009) Clinical features, diagnostic techniques and management of dual dengue and malaria infection. *J Coll Phys Surg-Pak JCPSP* 19(1):25–29
- CDC-Dengue Clinical Case Management (DCCM)-Home [Internet]. [cited 2024 Feb 2]. Available from: <https://www.cdc.gov/dengue/training/cme/ccm/index.html>
- Huang HW, Tseng HC, Lee CH, Chuang HY, Lin SH (2016) Clinical significance of skin rash in dengue fever: a focus on discomfort, complications, and disease outcome. *Asian Pac J Trop Med* 9(7):713–718. <https://doi.org/10.1016/j.apjtm.2016.05.013>
- Sheikh KR, Shehzad A, Mufti S, Mirza UA (2011) Skin involvement in patients of dengue fever during the 2011 epidemic in Lahore, Pakistan. *J Pak Assoc Dermatol* 2012(22):325–330
- Siddiqui Z, Yadav SM, Nath K, Rathor GS (2020) Prevalence of itching in dengue and its correlation with thrombocytopenia in bundelkhand region-a tertiary care hospital-based study in the Region of Central India. *J Evol Med Dent Sci* 9(13):1050–1053
- Wu SJL, Grouard-Vogel G, Sun W, Mascola JR, Brachtel E, Putvatana R et al (2000) Human skin Langerhans cells are targets of dengue virus infection. *Nat Med* 6(7):816–820. <https://doi.org/10.1038/77553>

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