

Episodic Migraine Pain Curves: Real-Time Smartphone-Based Analysis and Clinical Implications [Letter]

Yalan Zhang, Junyi Wang, Peng Zhao, Xiaojia Chen, Shirui Zhang, Xiaoling Zhang

The Affiliated Hospital of Gansu University of Chinese Medicine, Lanzhou, People's Republic of China

Correspondence: Xiaoling Zhang, The Affiliated Hospital of Gansu University of Chinese Medicine, Lanzhou, 730000, People's Republic of China, Email zxlw616@163.com

Dear editor

We read with great interest the recent research article by Ana Beatriz Gago-Veiga et al, titled “Episodic Migraine Pain Curves: Real-Time Smartphone-Based Analysis and Clinical Implications”.¹ The study innovatively utilizes a smartphone application for real-time data collection and explores migraine pain attack patterns through cluster analysis, providing valuable preliminary insights for advancing towards personalized disease management. However, we believe the following aspects warrant further discussion, which may help deepen the research conclusions.

Lack of Validity Metrics for Cluster Analysis

This study employed K-means clustering to analyze 344 attacks and reported the solution with the optimal within-cluster sum of squares (WCSS). However, no key validation metrics were provided to demonstrate the stability and internal validity of the clustering results. The study mentions that the algorithm was run 10 times with different random centroid seeds, and the final reported cluster solution was the one with the lowest WCSS, ensuring it represents a stable and optimal partitioning of the data. This procedure significantly enhances the stability and optimality of the results, but strictly speaking, it does not by itself “guarantee” stability, rather it “pursues” and “enhances” it. We recommend using independent internal validity metrics (such as the silhouette coefficient) to evaluate clustering quality and quantitatively demonstrate the consistency among the results from multiple runs.²

Lack of Multiple Comparison Correction in Statistical Analysis

The study performed numerous between-group comparisons across dozens of variables in several tables (Tables 2–5), yet none of the p-values were adjusted for multiple comparisons. Conducting multiple comparisons simultaneously on numerous baseline and clinical characteristic variables significantly increases the risk of Type I error (false positives). Using only $p < 0.05$ as the significance threshold without any multiple comparison correction (eg, Bonferroni, FDR) may lead to misinterpreting non-significant differences as significant.

Marked Gender Ratio Imbalance Warrants Cautious Interpretation of Gender-Related Findings

Among the 51 participants included in this study, females constituted 90.2%, while males accounted for only 9.8%, indicating a significant gender ratio imbalance. Although statistical analysis showed a significant difference in gender distribution among different pain curve types, within the context of this highly unbalanced sample, this difference is more likely to reflect the characteristics of the sample itself rather than a universal clinical pattern. Therefore, the gender-related p-values should be interpreted with caution.³ Conclusions regarding gender differences should be viewed as preliminary findings requiring verification in future studies with larger, more gender-balanced samples.

Data Query

We noted that the data for age and age at onset presented in Table 2 are completely identical. Given that the inclusion criteria did not specify “incident cases within the year”, and the text mentions that some patients had an early onset (mean 14.6 years), indicating a wide distribution of onset times, we suspect there might be an error in data entry or presentation. Consequently, the conclusion that there is no significant difference in age and age at onset within the same pain curve type may be questionable, and we recommend the authors verify the raw data.

Missing Key Unit Identifiers in Tables

In several tables in the article (eg, Tables 1, 2, 4 and 5), key unit identifiers such as the percent sign (%) or standard deviation (SD) are missing in the first column. We suggest adding these to enhance the clarity of the tables and the accuracy of data interpretation.

In summary, the study by Ana Beatriz Gago-Veiga et al provides a novel and valuable direction for the objective assessment and management of migraine. We offer the above suggestions aiming to contribute ideas for further refining this excellent research. We look forward to seeing more high-quality research in this field to jointly promote the diversification and precision of migraine diagnosis and treatment strategies.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In revision of this manuscript, artificial intelligence (AI) tools were utilized solely for language-related tasks, including translating portions of draft text and refining linguistic expression to enhance clarity of the authors.

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Disclosure

The authors declare that there is no conflict of interest in this communication.

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