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Adolescent headache in a changing world: Diverging trends, shared challenges

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Headache disorders are among the most common neurological conditions worldwide and a leading cause of disability across the lifespan. Tension-type headache (TTH) is more prevalent, but migraine accounts for most headache-related disability.[1] Much of this burden is described in adults, although headache commonly begins much earlier and affects around 1 in 5 children and adolescents worldwide.[2] Recurrent headaches at this age can disrupt school attendance, learning, friendships, and quality of life, while migraine in this age group is associated with higher rates of anxiety and depressive symptoms.[3,4] Adolescence therefore matters twice over—it is a period in which the development of headache disorders can be observed, and one in which recognition and early management can limit the educational, psychological, and social impact.

In this issue of the *Annals*, Zhu et al.[5] used the Global Burden of Disease (GBD) 2021 data to compare migraine and TTH among adolescents aged 10–19 years in China, Germany, and the US between 1990 and 2021. They examined incidence, prevalence, years lived with disability (YLDs), age and sex patterns, temporal trends, and associations with the socio-demographic index (SDI). China had the largest absolute number of adolescents affected by migraine and TTH, despite having the lowest age-standardised rates (ASRs), while also experiencing the largest increases in age-standardised incidence and prevalence rates for both disorders. Germany had the highest age-standardised incidence, prevalence, and YLD rates for migraine, whereas the US had the highest corresponding rates for TTH. However, trends in both countries were generally stable or declining.[5]

This rise in ASRs in China is perhaps the most striking finding. There are at least 2 explanations, and they are not mutually exclusive. First, headache may genuinely be increasing in frequency. Earlier global analyses have also reported increasing incidence, prevalence, and disability among adolescents and young adults, with East Asia showing the fastest rise in TTH prevalence.[2,6] Shorter sleep, heavier academic demands, less physical activity, more screen exposure, and greater psychosocial stress are plausible contributors. Second, some of the apparent increase may reflect better recognition of existing cases. Because migraine and TTH are diagnosed clinically using symptom-based criteria, population estimates depend heavily on survey methods, disease awareness, and access to care—all of which affect the quality of the underlying data. A low recorded prevalence does not always mean a low true burden, and a rising one may reflect worsening disease, better recognition, or both.

The age-specific findings are particularly interesting. Migraine incidence was higher at 10–14 years of age, while prevalence and disability were greater at 15–19 years. This may represent different points on the same trajectory: migraine presenting earlier in adolescence, with greater accumulated burden later. TTH prevalence and disability were also greater in the older age group.[5] Biological changes, including puberty, are likely to be relevant, alongside the lifestyle and psychosocial changes of adolescence: sleep, schooling, social pressures, and mental health. Although the study identifies when the trends diverge, it cannot establish what drives these differences.

The findings should be read in a wider Asian context. Because of its population size, Asia carries an enormous absolute burden even where the ASRs appear modest. Across all age groups, Asia had an estimated 684 million people with migraine and 1.13 billion with TTH in 2021.[7] The financial consequences extend well beyond headache days. An adult population-based survey in China estimated the annual cost of primary headache disorders at 2.24% of gross domestic product, with indirect costs accounting for most of that burden.[8] In adolescents, analogous indirect costs may instead appear as missed classes, impaired performance, and parents taking time away from work—all of which are harder to quantify.

The relationship between SDI and headache burden needs to be interpreted with caution. Higher headache rates in more developed settings do not mean that socioeconomic development itself causes headache. Wealthier countries may have greater diagnostic awareness, better access to healthcare, and

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stronger epidemiological data. Rapidly developing societies may concomitantly experience major changes in education, lifestyle, and psychological well-being. In the article by Zhu et al., the slope index of inequality widened for migraine but narrowed slightly for TTH, while concentration indices rose for both—a reminder that absolute and relative measures of inequality can move in different directions within the same dataset.[5] SDI therefore helps contextualise the observed patterns but cannot explain the mechanisms underlying them.

The same caution applies to extrapolations from data collected during the COVID-19 pandemic. The pandemic simultaneously altered sleep, screen time, physical activity, schooling, and stress, all of which could influence headache patterns. However, the increase in China had begun before 2020, and some age- and sex-specific trends flattened in 2019–2021.[5] The study cannot determine how much of the observed change was caused by the pandemic.

GBD analyses are valuable because they allow comparisons across countries and decades using standardised methods, but they inherit the limitations of their inputs. Rural Chinese adolescents may be under-represented, diagnostic practice differs between countries, and population-level associations cannot establish causation. These limitations should temper causal explanations, but they are not a reason to wait.

Adolescent headache is still too readily normalised by young people, families, and clinicians alike. Improving awareness among adolescents, parents, teachers, and primary care clinicians may be one of the most accessible interventions available. Better recognition could lead to earlier assessment and management of headache, including associated disability, effects on sleep, mood, and impact on school and daily life. Medication overuse deserves particular attention, as frequent reliance on acute treatments can further complicate headache and is potentially preventable. Schools and primary care are well placed to identify adolescents whose headaches are frequent or disabling and to direct them towards appropriate care.

Historically, many randomised trials of preventive medication in children and adolescents have not shown clear superiority to placebo, and guidelines have therefore emphasised education, lifestyle and behavioural measures, management of comorbidities, and shared decision-making.[9] More recently, however, the emergence of therapies targeting the calcitonin gene-related peptide (CGRP) pathway has changed the treatment landscape of migraine in adults, and these therapies are increasingly positioned as first-line preventive options. Their role is now beginning to extend into paediatric migraine. Fremanezumab, an anti-CGRP monoclonal antibody, has demonstrated efficacy in children and adolescents with episodic migraine, with phase 3 evidence showing a modest reduction in migraine days and substantially higher 50% responder rates than placebo.[10] Other CGRP-targeted therapies are also being evaluated in paediatric populations, making the outlook increasingly promising. As treatment options expand, care should remain holistic, aiming not only to reduce headache frequency but also to restore the opportunities that headaches can disrupt in young people, including learning, social participation, psychological well-being, and everyday functioning.

Moving forward, advances in treatment should be matched by a better understanding of why adolescent headache burden is changing. Longitudinal studies following adolescents into adulthood are needed to understand how sleep, psychological health, school demands, physical activity, digital exposure, and healthcare access shape headache over time. The findings of Zhu et al.[5] show that adolescent headache is evolving differently across societies. The challenge now is to translate these trends into earlier recognition, better access to care, and timely intervention for adolescents living with headache.

Ethics statement

Not applicable, as no study participants were recruited.

Declaration

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REFERENCES

1. GBD 2023 Headache Collaborators. Global, regional, and national burden of headache disorders, 1990-2023: A systematic analysis for the Global Burden of Disease Study 2023. Lancet Neurol 2025;24:1005-15.
2. Lu G, Xiao S, Wang Y, et al. Global epidemiology and burden of headache disorders in children and adolescents from 1990 to 2021. Headache 2025;65:1170-9.
3. Berring-Uldum AA, Skovgaard LT, Miranda MJ, et al. Education and social life: The impact of headache on participation in children and adolescents attending a headache clinic-A case-control study. Pediatr Neurol 2025;169:185-95.
4. Falla K, Kuziek J, Mahnaz SR, et al. Anxiety and depressive symptoms and disorders in children and adolescents with

migraine: A systematic review and meta-analysis. JAMA Pediatr 2022;176:1176-87.

5. Zhu L, Zhang X, Yang Y, et al. Temporal trends of migraine and tension-type headache in adolescents across China, Germany and the US. Ann Acad Med Singap 2026;55:Online First.
6. Yang Y, Cao Y. Rising trends in the burden of migraine and tension-type headache among adolescents and young adults globally, 1990 to 2019. J Headache Pain 2023;24:94.
7. Zhao Y, Yi Y, Zhou H, et al. The burden of migraine and tension-type headache in Asia from 1990 to 2021. J Headache Pain 2025;26:49.
8. Yu S, Liu R, Zhao G, et al. The prevalence and burden of primary headaches in China: a population-based door-to-door survey. Headache 2012;52:582-91.
9. Oskoui M, Pringsheim T, Billinghurst L, et al. Practice guideline update summary: Pharmacologic treatment for pediatric migraine prevention: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology and the American Headache Society. Neurology 2019;93:500-9.
10. Hershey AD, Szperka CL, Barbanti P, et al. Fremanezumab in children and adolescents with episodic migraine. N Engl J Med 2026;394:243-52.