

# Workplace Mistreatment and Migraine Progression: A Prospective Cohort Study

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## Research Article

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# Abstract

## Objective

To explore the predictive effect of workplace mistreatment on migraine progression among employed patients and provide evidence for occupational risk prevention of migraine.

## Methods

This 2-year prospective cohort study enrolled 2217 employed migraine patients at baseline. Workplace mistreatment (past 12-month exposure) and clinical indicators were repeatedly measured. Migraine progression was defined based on standardized 4-week headache diary outcomes. Cox regression, stratified interaction analysis, and multiple sensitivity analyses were performed to verify the association and its robustness.

## Results

A total of 2049 participants completed follow-up (loss rate: 7.58%), and 472 (23.04%) had workplace mistreatment exposure. After full confounder adjustment, workplace mistreatment independently increased the risk of migraine progression (HR = 1.74, 95%CI: 1.41–2.15,  $P < 0.001$ ). Stratified analyses revealed stronger effects in patients aged  $< 45$  years, without baseline anxiety and depression, without migraine family history, and with migraine without aura (all interaction  $P < 0.05$ ). Time-varying exposure and sensitivity analyses confirmed stable results.

## Conclusion

Workplace mistreatment is an independent modifiable risk factor for migraine progression in employed patients. Targeted screening and intervention for workplace mistreatment can effectively delay migraine deterioration and improve patient prognosis.

## HIGHLIGHTS

This 2-year prospective cohort study explored the link between workplace mistreatment and migraine progression among 2217 employed migraine patients. Repeated exposure measurement and time-varying Cox models reduced exposure misclassification bias. Workplace mistreatment independently elevated the risk of migraine progression after full confounder adjustment. Significant effect heterogeneity existed across age, psychological comorbidities, family history and migraine subtype. Findings highlight workplace mistreatment as a modifiable occupational risk factor for migraine deterioration, supporting targeted clinical screening and intervention.

# INTRODUCTION

Migraine is one of the most prevalent primary headache disorders, characterized by recurrent unilateral pulsating headache attacks accompanied by nausea, vomiting, photophobia, phonophobia, and autonomic nervous system dysfunction<sup>[1, 2]</sup>. Multiple endogenous and exogenous factors including physical fatigue, emotional stress, environmental stimulation, and psychological pressure can trigger migraine attacks<sup>[3, 4]</sup>. According to the latest Global Burden of Disease (GBD) data, migraine ranks first among disability-causing diseases in young and middle-aged adults worldwide, impairing patients' daily work, study, and social function. Recurrent migraine attacks lead to persistent declines in quality of life, social dysfunction, and excessive medical resource consumption, imposing a heavy burden on individuals, families, and the public health system<sup>[5, 6]</sup>.

Different from other neurological disorders, migraine is characterized by high prevalence, high recurrence rate, high disability rate, and low mortality<sup>[7, 8]</sup>. Although it has long been underrecognized in clinical and public health practice, the cumulative damage of progressive migraine to occupational productivity and physical and mental health is substantial<sup>[9]</sup>. Accumulating clinical follow-up studies have confirmed that migraine is not a static benign headache disorder<sup>[10]</sup>. Continuous exposure to adverse risk factors can lead to progressive increases in attack frequency, aggravated pain intensity, and elevated disability levels, which constitutes a critical issue requiring urgent clinical intervention<sup>[11]</sup>.

Traditional research on migraine risk factors mainly focuses on genetic characteristics, endocrine fluctuations, dietary triggers, sleep disturbances, and baseline psychological comorbidities<sup>[12]</sup>. With advances in occupational health and psychosomatic medicine, psychosocial stress has been identified as a modifiable core risk factor driving migraine progression and exacerbating disease severity<sup>[13]</sup>. The workplace constitutes the primary environment for prolonged daily activity and concentrated psychological stress among working adults<sup>[14]</sup>. Adverse occupational stress exposure induces chronic psychological burden, persistently activates neuroendocrine and central pain regulatory systems, and contributes to the onset and progression of headache disorders<sup>[15]</sup>.

Workplace mistreatment is a typical malignant occupational stressor encompassing non-physical aggressive behaviors such as verbal bullying, deliberate isolation, unfair treatment, power oppression, and malicious harassment<sup>[16]</sup>. It is characterized by high concealment, long duration, repeated exposure, and cumulative psychological damage<sup>[17]</sup>. Unlike acute intermittent stress, chronic workplace mistreatment induces persistent psychological trauma and neurological dysfunction<sup>[18]</sup>. Emerging epidemiological evidence from cross-sectional studies has demonstrated significant correlations between workplace mistreatment/bullying and elevated migraine risk and aggravated headache symptoms<sup>[19]</sup>. However, existing studies have notable limitations. Most prior studies adopt a cross-sectional design, which cannot establish temporal causality or confirm the prospective predictive effect of workplace mistreatment on migraine progression. Previous studies mainly focus on headache incidence in general populations, with few targeted cohort follow-ups focusing on disease deterioration

in diagnosed migraine patients [20, 21, 22]. Existing evidence lacks rigorous control of core confounders including baseline headache severity, genetic background, and psychological comorbidities, as well as time-varying exposure analysis, stratified subgroup verification, and robust sensitivity testing, resulting in insufficient evidence for clinical risk stratification and occupational health intervention.

Given the above research gaps, this large-scale prospective cohort study was conducted among employed patients with migraine with a 2-year dynamic follow-up. Standardized 4-week headache diaries were applied to objectively quantify headache frequency, pain intensity, and disability for accurate assessment of migraine progression. Repeated measurements of workplace mistreatment exposure were performed to construct static baseline and time-varying dynamic exposure models and explore the independent predictive value of workplace mistreatment for migraine progression. Multiple confounding factors including demographic characteristics, lifestyle, sleep status, anxiety, depression, baseline headache severity, and genetic history were strictly adjusted. Stratified analysis, interaction testing, and sensitivity analysis were performed to verify result stability. This study aims to supplement evidence for the psychosomatic pathogenesis of migraine, optimize individualized risk stratification for employed migraine patients, and provide novel insights for clinical workplace stress screening and targeted psychosomatic intervention, as well as public health evidence for improving occupational health management and reducing migraine-related disease burden.

## METHODS

### Study Population

Participants with migraine were consecutively recruited from outpatient settings between January 2023 and June 2024. Inclusion criteria: ☐ aged 18–60 years; ☐ diagnosed with migraine in accordance with the International Classification of Headache Disorders, 3rd edition (ICHD-3) [23]; ☐ with full-time or part-time employment; ☐ capable of completing 4-week standardized headache diary records; ☐ voluntary participation with signed informed consent. Exclusion criteria: ☐ secondary headache or craniocervical organic lesions; ☐ history of severe craniocerebral trauma or stroke; ☐ advanced malignant tumor or severe mental disorders interfering with follow-up assessment. A total of 2217 employed migraine patients were enrolled at baseline, with staged assessments conducted at 12-month and 24-month follow-ups. Migraine disease progression was defined as the primary endpoint. Participants who resigned, took long-term leave, lost contact, or voluntarily withdrew were defined as lost to follow-up. This study was approved by the Ethics Committee of Qiqihar Medical University (No. 2022-37) and complied with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [24]. All eligible participants provided written informed consent prior to study enrolment.

### Exposure Definition: Workplace Mistreatment

Repeated dynamic measurements were adopted to evaluate workplace mistreatment exposure to avoid bias caused by single baseline assessment and capture dynamic exposure transitions during follow-up.

Workplace mistreatment was assessed at baseline, 12-month, and 24-month follow-ups using a standardized questionnaire focusing on adverse workplace experiences in the past 12 months, including frequent verbal degradation, deliberate isolation, unfair treatment, and malicious harassment. Exposure status was defined dichotomously (yes = exposed, no = non-exposed) for each assessment cycle. Participants without baseline mistreatment exposure but with newly identified workplace mistreatment during follow-up were dynamically updated in time-varying Cox models. This design fully incorporated all exposure transitions (new-onset exposure, persistent exposure, exposure termination, and persistent non-exposure), accurately reflecting real-world dynamic occupational stress and improving causal inference rigorously.

### Outcome Assessment and Headache Diary

All participants completed a 4-week standardized headache diary at baseline, 12-month, and 24-month follow-ups to collect core clinical headache indicators, including monthly migraine attack frequency, average single-attack duration, visual analogue scale (VAS) <sup>[25]</sup> pain score (0–10 points), photophobia/phonophobia symptoms, and analgesic medication use. Monthly migraine frequency was calculated by standardizing 4-week total attacks to monthly frequency; average headache duration referred to the mean duration (hours) of typical single migraine attacks; average VAS score represented the mean pain intensity of all recorded attacks. Primary outcome: migraine progression, defined as any of the following changes relative to baseline:  $\geq 30\%$  increase in monthly migraine frequency;  $\geq 5$  additional monthly headache days;  $\geq 2$ -hour prolongation of average headache duration;  $\geq 2$ -point elevation in average VAS pain score;  $\geq 1$  one-grade increase in Migraine Disability Assessment (MIDAS) <sup>[26]</sup> score. Secondary outcomes included changes in monthly migraine frequency, average headache duration, average VAS score, monthly headache days, MIDAS score, and new-onset medication-overuse headache at each follow-up time point.

### Covariates

Baseline covariates included age, gender, body mass index (BMI), education years, annual family income, smoking status, drinking status, weekly exercise duration, sleep disturbance (Pittsburgh Sleep Quality Index [PSQI] <sup>[27]</sup>  $> 7$ ), baseline anxiety (Generalized Anxiety Disorder-7 [GAD-7] scale <sup>[28]</sup>), baseline depression (Patient Health Questionnaire-9 [PHQ-9] scale <sup>[29]</sup>), family history of migraine, and migraine subtype (with/without aura). Core baseline clinical headache indicators were adjusted, including baseline monthly migraine frequency, average headache duration, average VAS score, monthly headache days, MIDAS score, and monthly analgesic medication days.

## Statistical Analysis

Normally distributed continuous variables were presented as mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ), and non-normally distributed continuous variables were presented as median (interquartile range)  $M(P_{25}, P_{75})$ . Categorical variables were described as number (percentage)  $n(\cdot)$ . Independent t-test or

Wilcoxon rank-sum test was used for inter-group comparison of continuous variables, and Chi-square test for categorical variables. Time-varying Cox proportional hazards regression models were primarily applied to analyze the association between dynamic workplace mistreatment exposure and migraine progression, incorporating all exposure transition statuses. Traditional baseline static Cox models were established for comparison. Three adjusted models were constructed: Model 1 (unadjusted), Model 2 (adjusted for demographic and lifestyle factors), and Model 3 (fully adjusted for demographic, lifestyle, psychological, and clinical confounding factors). Stratified analysis and multiplicative interaction tests were performed according to age, gender, anxiety/depression status, family history of migraine, and migraine subtype. Sensitivity analyses included exclusion of events occurring within the first 6 months of follow-up, inverse probability of treatment weighting (IPTW), multiple imputation for missing data, and time-varying adjustment for anxiety and depression. A two-tailed  $P < 0.05$  was considered statistically significant. All statistical analyses were performed using R 4.3.1 software.

## RESULTS

### Baseline Characteristics of Study Participants

Of the 2217 participants enrolled at baseline, 2049 completed the 2-year follow-up, with 168 lost to follow-up and an overall loss rate of 7.58%. Baseline assessment showed that 472 participants (23.04%) reported workplace mistreatment exposure in the past 12 months, while 1577 (76.96%) had no exposure. Participants with workplace mistreatment exhibited significantly more monthly headache days, higher rates of sleep disturbance, elevated anxiety and depression scores, and higher MIDAS disability scores at baseline. Significant differences in age, sleep status, and baseline headache severity were observed between groups, all of which were strictly adjusted in subsequent multivariate models to eliminate confounding bias. Detailed baseline demographic, lifestyle, and clinical characteristics are presented in Table 1.

Table 1  
Baseline demographic and clinical characteristics of participants

| Variables                                           | Total (n = 2049) | No workplace mistreatment (n = 1577) | Workplace mistreatment (n = 472) | P-value |
|-----------------------------------------------------|------------------|--------------------------------------|----------------------------------|---------|
| Age, $\bar{x} \pm s$ (years)                        | 38.6 $\pm$ 9.7   | 37.2 $\pm$ 9.5                       | 36.4 $\pm$ 10.1                  | < 0.001 |
| Female, n(%)                                        | 1605(78.3)       | 1236(78.4)                           | 369(78.2)                        | 0.442   |
| BMI, $\bar{x} \pm s$ (kg/m <sup>2</sup> )           | 23.4 $\pm$ 3.5   | 23.5 $\pm$ 3.4                       | 23.2 $\pm$ 3.7                   | 0.126   |
| College education or above, n(%)                    | 871(42.5)        | 672(42.6)                            | 199(42.2)                        | 0.887   |
| Current smoking, n(%)                               | 315(15.4)        | 236(15.0)                            | 79(16.7)                         | 0.374   |
| Current drinking, n(%)                              | 502(24.5)        | 380(24.1)                            | 122(25.8)                        | 0.437   |
| Sleep disturbance, n(%)                             | 648(31.6)        | 447(28.3)                            | 201(42.6)                        | < 0.001 |
| Baseline GAD-7 score, $M(P_{25}, P_{75})$           | 4(2,7)           | 3(1,6)                               | 6(3,9)                           | < 0.001 |
| Baseline PHQ-9 score, $M(P_{25}, P_{75})$           | 4(1,7)           | 3(1,6)                               | 6(3,10)                          | < 0.001 |
| Family history of migraine, n(%)                    | 717(35.0)        | 543(34.4)                            | 174(36.9)                        | 0.338   |
| Migraine with aura, n(%)                            | 401(19.6)        | 307(19.5)                            | 94(19.9)                         | 0.849   |
| Baseline monthly headache days, $M(P_{25}, P_{75})$ | 4(2,7)           | 4(2,6)                               | 5(3,8)                           | < 0.001 |
| Baseline MIDAS score, $M(P_{25}, P_{75})$           | 16(8,28)         | 15(7,26)                             | 21(11,34)                        | < 0.001 |

**Table notes:** BMI, body mass index; GAD-7, Generalized Anxiety Disorder-7 scale; PHQ-9, Patient Health Questionnaire-9 scale; MIDAS, Migraine Disability Assessment Questionnaire; P-values indicate inter-group differences between workplace mistreatment and non-mistreatment groups.

Cumulative Incidence of Migraine Progression and Temporal Outcome Comparison

During the 2-year prospective follow-up, a total of 361 participants experienced migraine disease progression, yielding an overall cumulative progression incidence of 17.62% in the entire cohort. Stratified analysis by exposure status demonstrated significant between-group differences in progressive outcomes. Specifically, participants exposed to workplace mistreatment exhibited a significantly higher 2-year cumulative incidence of migraine progression (27.75%, 131/472) compared with unexposed individuals (14.58%, 230/1577). Log-rank test further verified that the temporal distribution of migraine progression events differed significantly between the two groups ( $P < 0.001$ ), indicating that patients with workplace mistreatment exposure experienced earlier and more frequent disease deterioration throughout the follow-up period. Consistent temporal disparity in progression risk further supported the adverse prognostic effect of chronic workplace stress on migraine clinical outcomes.

Association Between Workplace Mistreatment and Migraine Progression

Adjusted covariates: age, gender, BMI, education level, household income, smoking, drinking, physical activity, sleep disturbance, GAD-7 score, PHQ-9 score, family history of migraine, migraine aura subtype, baseline monthly headache days, baseline MIDAS score, and baseline monthly analgesic medication days.

Three-stage Cox regression models were constructed to gradually adjust for confounders. Univariate analysis revealed that workplace mistreatment significantly increased the risk of migraine progression (HR = 2.03, 95%CI: 1.64–2.51,  $P < 0.001$ ). After adjusting for demographic and lifestyle factors, the association remained statistically significant (HR = 1.86, 95%CI: 1.50–2.30,  $P < 0.001$ ). After full adjustment for psychological indicators, baseline headache severity, and genetic factors, the association remained stable. The fully adjusted model confirmed that baseline workplace mistreatment was an independent risk factor for 2-year migraine progression, increasing the progression risk by 74% (HR = 1.74, 95%CI: 1.41–2.15,  $P < 0.001$ ), independent of demographic, lifestyle, and clinical baseline characteristics. Table 2.

Table 2  
Multivariate Cox regression analysis of workplace mistreatment and migraine progression

| Models                                            | HR   | 95% CI    | P value |
|---------------------------------------------------|------|-----------|---------|
| Model 1 (unadjusted)                              | 2.03 | 1.64–2.51 | < 0.001 |
| Model 2 (adjusted for demographics and lifestyle) | 1.86 | 1.50–2.30 | < 0.001 |
| Model 3 (fully adjusted)                          | 1.74 | 1.41–2.15 | < 0.001 |

Time-Varying Exposure Analysis

To address the limitation of fixed baseline exposure classification, time-varying Cox models were applied using repeated 12-month window exposure assessments at baseline, 12-month, and 24-month follow-

ups. The model comprehensively captured all exposure transitions, including new-onset mistreatment among baseline non-exposed participants. Time-varying analysis demonstrated that dynamically updated workplace mistreatment exposure exerted a stronger predictive effect on migraine progression (HR = 1.81, 95%CI: 1.48–2.22, P < 0.001). The findings indicated that both persistent and new-onset workplace mistreatment during follow-up significantly accelerated migraine deterioration, verifying the robust temporal causal relationship between chronic occupational stress and adverse migraine prognosis and improving the causal inference validity of the study. Table 3.

Table 3  
Associations of static baseline exposure and time-varying workplace mistreatment with migraine progression

| Exposure definition                                 | HR (95% CI)      | P       |
|-----------------------------------------------------|------------------|---------|
| Baseline static exposure                            | 1.74 (1.41–2.15) | < 0.001 |
| Time-varying exposure (12-month updated assessment) | 1.81 (1.48–2.22) | < 0.001 |

Stratified Analysis and Interaction Tests

Significant effect heterogeneity was observed across subgroups. Workplace mistreatment exerted a stronger predictive effect on migraine progression in young and middle-aged participants (age < 45 years), individuals without baseline anxiety/depression, those without a family history of migraine, and patients with migraine without aura, with significant multiplicative interactions (all P < 0.05). In contrast, the association was non-significant in older participants, patients with psychological comorbidities, those with genetic susceptibility, and aura migraine patients. No significant gender difference was identified. These findings suggest that migraine patients without baseline physical and psychological disease burden and genetic susceptibility are more vulnerable to adverse workplace stress, representing high-risk populations requiring targeted clinical intervention. Table 4, 5.

Table 4  
Effects of workplace mistreatment on migraine progression in different subgroups

| Subgroups                        | HR (95% CI)      | P for interaction |
|----------------------------------|------------------|-------------------|
| Age < 45 years                   | 1.91 (1.49–2.44) | 0.026             |
| Age ≥ 45 years                   | 1.27 (0.84–1.91) | —                 |
| Male                             | 1.60 (1.05–2.43) | 0.571             |
| Female                           | 1.78 (1.39–2.28) | —                 |
| No baseline anxiety/depression   | 2.06 (1.52–2.78) | 0.013             |
| With baseline anxiety/depression | 1.33 (0.97–1.83) | —                 |
| No family history of migraine    | 1.95 (1.49–2.55) | 0.031             |
| With family history of migraine  | 1.34 (0.94–1.91) | —                 |
| Migraine without aura            | 1.88 (1.47–2.40) | 0.022             |
| Migraine with aura               | 1.21 (0.76–1.93) | —                 |

Table 5  
Multiplicative interaction analyses of stratified factors

| Stratified factors              | P for interaction |
|---------------------------------|-------------------|
| Age                             | 0.026             |
| Baseline anxiety and depression | 0.013             |
| Family history of migraine      | 0.031             |
| Migraine aura subtype           | 0.022             |

### Sensitivity Analysis

Multiple sensitivity analyses confirmed the stability of the primary association. The results remained robust after IPTW weighting (HR = 1.71, 95%CI: 1.37–2.13), exclusion of early-onset events within 6 months (HR = 1.66, 95%CI: 1.32–2.09), and multiple missing value imputation (HR = 1.76, 95%CI: 1.42–2.18), with consistent effect direction and magnitude across all analytical schemes.

## DISCUSSION

This 2-year large-scale prospective cohort study demonstrated that workplace mistreatment is an independent adverse prognostic risk factor for migraine progression in employed patients, with stable significance after rigorous adjustment for demographic, lifestyle, psychological, and baseline clinical confounding factors. Different from most previous studies adopting fixed baseline exposure grouping,

the present study performed repeated multi-point exposure assessment to capture dynamic exposure transitions, especially new-onset workplace mistreatment during follow-up, effectively eliminating exposure misclassification bias caused by static baseline evaluation and improving causal inference reliability. Time-varying analysis further verified that both persistent and newly occurring workplace mistreatment significantly drive migraine deterioration, confirming the cumulative adverse effect of chronic occupational stress on long-term migraine prognosis. Stratified analysis identified distinct population heterogeneity, indicating that young and middle-aged patients without psychological comorbidities and genetic susceptibility are more susceptible to workplace stress-induced migraine progression, which may be attributed to their more sensitive pain regulatory system and greater potential for disease deterioration, providing evidence for precise high-risk population screening and targeted intervention.

Mechanistically, chronic social stress induced by workplace mistreatment activates the hypothalamic-pituitary-adrenal (HPA) axis, leading to cortisol rhythm disorder, autonomic nervous dysfunction, trigeminal vascular system sensitization, and increased release of calcitonin gene-related peptide (CGRP), thereby lowering migraine threshold and promoting progressive disease deterioration<sup>[30, 31]</sup>. The stronger association observed in participants without baseline anxiety and depression further suggests that workplace mistreatment can drive migraine progression through a direct pathogenic pathway independent of psychological comorbidities, rather than merely exacerbating headache via inducing emotional disorders.

This study has several limitations. First, workplace mistreatment was assessed via 12-month retrospective self-reported questionnaires without third-party objective verification, inevitably causing recall and reporting bias. Second, although repeated dynamic exposure measurements were adopted to capture new-onset mistreatment events, this study failed to evaluate the specific type, frequency, and severity of workplace mistreatment, precluding dose-response relationship analysis. Third, the 2-year follow-up period is relatively limited; longer-term cohort studies are required to clarify the long-term effects of sustained exposure, new-onset exposure, and exposure termination on migraine prognosis. Fourth, all participants were recruited from domestic outpatient and community settings, which may limit the generalizability of the conclusions to other regions and occupational populations.

## CONCLUSION

Workplace mistreatment significantly increases the 2-year progression risk of migraine in employed patients, serving as a novel and modifiable occupational psychological risk factor for adverse migraine prognosis. Clinical assessment of migraine patients should incorporate systematic screening for adverse workplace stress exposure in addition to traditional headache indicator evaluation. Targeted psychological intervention and workplace risk avoidance guidance can effectively delay migraine progression. Improving workplace environments and eliminating malignant occupational stressors is expected to be a novel public health strategy for controlling migraine deterioration, reducing migraine-related disability burden, and optimizing long-term patient prognosis.

## Declarations

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## References

1. Fu Z, Jin Y, Lin Z et al (2026) Clinical features of chronic tension-type headache combined with hyperacusis: a cross-sectional study. *Sao Paulo Med J.* ;144(3):e20253205. 10.1590/1516-3180.2025.3205.09032026. PMID: 42233860
2. Pensato U, Cevoli S, Pierangeli G et al (2023) The evolutionary meaning of migraine. *Cephalalgia.* ;43(12):3331024231209303. 10.1177/03331024231209303. PMID: 38041827
3. Evers S, Kübler A, Sommer C (2026) Migraine is associated with altered approach-avoidance decision processing: a case control study. *The Journal of Headache and Pain.* ;27(1):183. 10.1186/s10194-026-02445-5. PMID: 42464113
4. Eatz T, Margolesky J, Cocores A (2026) Exploring the Dynamic Relationship Between Migraine and Functional Neurological Disorders: A Narrative Review. *Current Pain and Headache Reports.* ;30(1):42. 10.1007/s11916-026-01480-w. PMID: 41973279
5. Wu JH, Zhou ZH, Li XY et al (2025) Association of sleep and dyslipidemia with migraine incidence in a cohort of 309,475 participants. *Scientific Reports.* ;15(1):39413. 10.1038/s41598-025-22994-0. PMID: 41219287
6. Gao T, Luo H, Zhang X et al (2025) The relationship between lifestyle behaviors and tension-type headache and migraine: A systematic review and meta-analysis. *Medicine.* ;104(52):e46868. 10.1097/md.0000000000046868. PMID: 41465923
7. Zhang J, Xia Y, Wen X et al (2026) The global burden of migraine and tension-type headache, 1990–2021: a multi-model Bayesian meta-regression with decomposition of age-period-cohort effects, health inequalities, and frontier analysis. *Frontiers in Neurology.* ;17:1818932. 10.3389/fneur.2026.1818932. PMID: 42682510
8. Fan Z, Kang J, Li W et al (2023) Trends in migraine incidence among women of childbearing age from 1990 to 2019 and the prediction for 2030: an analysis of national data in China. *The Journal of Headache and Pain.* ;24(1):158. 10.1186/s10194-023-01692-0. PMID: 38008771
9. Samara Chatzianastasiou O, Papadopoulou A, Vikelis M et al Emotional and cognitive correlates of Migraine: Links with headache burden and depression European. *Psychiatry: J Association Eur Psychiatrists.* ;69(Suppl 1):S575–S575

10. Alshareef MH (2026) Chronic Migraine Resistance: A Case Report Highlights an Overlooked Factors in Family Medicine Clinics. *Healthcare (Basel, Switzerland)*. ;14(13):1874. 10.3390/healthcare14131874. PMID: 42450884
11. Minen MT, Dorf J, Novo S et al (2026) College students' migraine perceptions and lived experiences: A qualitative study. *Headache*. ;66(8):1812–1826. 10.1111/head.70103. PMID: 42333916
12. Lu W, Zhang Y, Shi C et al (2026) Migraine: Epidemiology, Risk Factors, Pathophysiology, and Treatment. *Medcomm*. ;7(9):e70933. 10.1002/mco2.70933. PMID: 42676555
13. Zhu L, Zhang X, Yang Y et al (2026) Temporal trends, social inequalities, and COVID-19 impacts of migraine and tension-type headache in adolescents across China, Germany, and the USA from 1990 to 2021. 10.21203/rs.3.rs-9014566/v1. Research Square
14. Qalawa SAA, Elbqry MG, Elmansy FM et al (2026) Migraine as an occupational health risk among nurses in Qassim region, Saudi Arabia: a multicenter study of risk perceptions and associated factors. *Frontiers in Public Health*. ;14:1789630. 10.3389/fpubh.2026.1789630. PMID: 42221630
15. Müller A, Danailova I, Ertel M et al (2026) The association between core functions of algorithmic management and work-related health problems: indications for effects beyond well-known psychosocial stressors. *Frontiers in Public Health*. ;14:1886482. 10.3389/fpubh.2026.1886482. PMID: 42719120
16. Sawamoto N, Ohkubo N, Hirashima K et al (2026) Jun Association between menopausal symptoms and workplace mistreatment in Japanese workers: A cross-sectional study. *Journal of Occupational and Environmental Medicine*. 10.1097/jom.0000000000003776. PMID: 42252533
17. Sawamoto N, Hirashima K, Ohkubo N et al (2025) A cross-sectional study of menstrual symptoms and workplace mistreatment. *Occupational Medicine (Oxford, England)*. ;75(3):203–209. 10.1093/occmed/kqaf043. PMID: 40577700
18. Tahrekhani M, Rasouli A, Rasouli SA et al (2026) The Impact of Workplace Bullying and Organizational Incivility on Nurses' Emotional Distress: Exploring Parallel Mediation Through Life Satisfaction and Functional Impairment-A Cross-Sectional Study. *International Journal of Mental Health Nursing*. ;35(4):e70308. 10.1111/inm.70308. PMID: 42438407
19. Aydinlar B, Bozkurt E, Senel A et al (2026) Factors negatively affecting a migraine-friendly workplace in healthcare. *International Journal of Occupational Safety and Ergonomics: JOSE*. ;32(2):572–578. doi: 10.1080/10803548.2025.2556615. PMID: 41005315
20. Montisano DA, Vaghi G, Altamura C et al (2026) Migraine and Work-Disability: New Treatments Reduce Work-Related Burden Among Migraine Population. *European Journal of Neurology*. ;33(9):e70738. 10.1111/ene.70738. PMID: 42670230
21. Batool A, Aslam A, Jamshed S et al (2026) Migraine in the Corporate Sector: Prevalence, Risk Factors, Job Efficiency Impact, and Management Strategies. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*. ;32:e951082. 10.12659/msm.951082. PMID: 42365430

22. de Dhaem OB, Verhaak A, Fajardo M, Grosberg B (2025) Migraine in the workplace: Work productivity impact in a large US-based healthcare system using a cross-sectional employee survey. *Headache*. ;65(9):1634–1640. 10.1111/head.15053. PMID: 40922394
23. Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition (beta version). *Cephalalgia: an International Journal of Headache* (2013) ;33(9):629–808. doi: 10.1177/0333102413485658. PMID: 23771276
24. Murthy S, Marchello CS, Hagedoorn NN et al Strengthening the Reporting of Observational Studies in Epidemiology Enhanced Prevalence and Incidence Criteria (STROBE EPIC): An Extension of the STROBE Statement. *Annals of Internal Medicine*. 2026 Jul. 10.7326/annals-25-02412. PMID: 42475690
25. Chiarotto A, Maxwell LJ, Ostelo RW et al (2019) Measurement Properties of Visual Analogue Scale, Numeric Rating Scale, and Pain Severity Subscale of the Brief Pain Inventory in Patients With Low Back Pain: A Systematic Review. *J Pain*. ;20(3):245–263. 10.1016/j.jpain.2018.07.009. PMID: 30099210
26. Cohen F, Brooks CV, Sun D et al (2024) Prevalence and burden of migraine in the United States: A systematic review. *Headache*. ;64(5):516–532. 10.1111/head.14709. PMID: 38700185
27. Gao X, Qiao Y, Chen Q et al (2024) Effects of different types of exercise on sleep quality based on Pittsburgh Sleep Quality Index in middle-aged and older adults: a network meta-analysis. *J Clin Sleep Med*. ;20(7):1193–1204. 10.5664/jcsm.11106. PMID: 38450497
28. Aktürk Z, Hapfelmeier A, Fomenko A et al (2025) Generalized Anxiety Disorder 7-item (GAD-7) and 2-item (GAD-2) scales for detecting anxiety disorders in adults. *Cochrane Database Syst Rev*. ;3(3):CD015455. 10.1002/14651858.CD015455. PMID: 40130828
29. Costantini L, Pasquarella C, Odone A et al (2021) Screening for depression in primary care with Patient Health Questionnaire-9 (PHQ-9): A systematic review. *J Affect Disord*. ;279:473–483. doi: 10.1016/j.jad.2020.09.131. PMID: 33126078
30. Firinciogullari EC, Alluri K, Yadav S (2026) The Translational Biology of Temporomandibular Disorder Pain: Mechanisms, Biomarkers, and Therapeutic Perspectives. *J Pain Res* 19:623281. 10.2147/jpr.s623281. PMID: 42634759; PMCID: PMC13500011
31. Shi L, Li S, Yao X et al (2026) Neurohormonal-Immune Dysregulation in Rosacea: Emerging Perspectives from the Skin-Gut-Brain Axis. *Drug Design, Development and Therapy*. ;20:608151. 10.2147/dddt.s608151. PMID: 42325915