

Clinical Profile of Head Pain in the DHSP Bali Yoga Practitioner Community

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ABSTRACT

Headache is one of the most prevalent neurological complaints worldwide, significantly affecting productivity and quality of life. Nonpharmacological integrative approaches, such as yoga and meditation, are increasingly recognized as complementary therapies for modulating pain perception. This study aims to evaluate the clinical characteristics of headaches and analyze the impact of yoga and meditation interventions on headache-related disability among members of the DHSP Bali community. A cross-sectional study was conducted involving 33 participants aged 31–81 years from the DHSP Bali community in April 2026. Pain intensity was assessed using the Numeric Pain Rating Scale (NPRS). Data were analyzed using the Shapiro–Wilk test to assess normality. The participants had a mean age of 57 ± 11.15 years, with a higher proportion of males (54.5%) than females (45.5%). The mean baseline pain intensity score, as measured by the NPRS, was 2.91 ± 1.1 , indicating mild pain. No statistically significant differences in headache characteristics were observed across age groups or between sexes in this study population.

INTRODUCTION

Headache disorders are among the most common neurological conditions affecting the adult population worldwide (Leonardi et al., 2024). These conditions are major contributors to chronic disability, particularly among individuals of working age (Kobryń et al., 2026; Shen et al., 2025). According to the third edition of the International Classification of Headache Disorders (ICHD-3), headache disorders are broadly classified into primary headaches, including migraine, tension-type headache (TTH), and cluster headache, and secondary headaches attributable to underlying structural or systemic conditions. Among the general population, TTH and migraine have the highest prevalence rates, affecting approximately 30–40% and 14–15% of the global population, respectively (Otręba et al., 2024; Satapathy et al., 2025; Shen et al., 2025).

Chronic headache disorders not only cause physical discomfort but are also associated with sleep disturbances, anxiety, depression, and substantial reductions in socioeconomic productivity. The pathophysiology of primary headaches involves complex neurobiological mechanisms, including cortical neuronal hyperexcitability, autonomic nervous system (ANS) dysregulation, and activation of the trigeminovascular nociceptive system, which contributes to neurogenic inflammation (Kobryń et al., 2026; Ljubisavljevic et al., 2023). Various external factors, including psychological stress, poor sleep patterns, and imbalances in physical activity,

may precipitate or exacerbate headache attacks (Duan et al., 2023; Hastuti & Andriyani, 2020; Lu et al., 2023).

The Global Burden of Disease (GBD) studies consistently identify migraine and TTH as major contributors to years lived with disability (YLDs) worldwide (Satapathy et al., 2025; Shen et al., 2025). Chronic headache disorders are associated with considerable physical discomfort, impaired sleep quality, psychological distress, and substantial socioeconomic burdens. The underlying pathophysiology involves complex neurobiological processes, including cortical neuronal hyperexcitability, autonomic nervous system dysregulation, and activation of the trigeminovascular nociceptive system. Activation of this system promotes the release of proinflammatory neuropeptides, particularly calcitonin gene-related peptide (CGRP), which contributes to neurogenic inflammation and nociceptive signaling (Kobryń et al., 2026). External factors, including psychological stress, inadequate sleep, hormonal fluctuations, and irregular physical activity, may trigger or exacerbate headache episodes (Fan et al., 2022; Hastuti & Andriyani, 2020).

Given the risk of medication-overuse headache (MOH) associated with the frequent or excessive use of acute headache medications, increasing attention has been directed toward integrative approaches to headache management (Ljubisavljevic et al., 2023). Mind–body interventions combining yoga practices, including asana (physical postures) and pranayama (breathing techniques), with mindfulness meditation have demonstrated potential benefits in modulating pain perception through central nervous system mechanisms (Golshan & Mickleborough, 2025; Grazzi et al., 2023). Recent reviews have reported that regular yoga practice reduced headache frequency and intensity among individuals with chronic headache disorders (Fitas et al., 2026; Kachhadia et al., 2023). Similarly, randomized controlled trials have reported that yoga-based programs reduced migraine frequency, pain intensity, and disability compared with standard care (Dündar et al., 2024; Sujan et al., 2025). Proposed mechanisms include reduced anxiety, decreased cortisol secretion, and enhanced parasympathetic activity relative to sympathetic nervous system activity (Arumugam et al., 2026; Carolina et al., 2023; Panjwani et al., 2021; Schleinker et al., 2024). Despite these findings, several important research gaps remain. First, most previous studies have been conducted in clinical settings involving heterogeneous populations, potentially limiting the generalizability of their findings to community-based yoga practitioners. Second, relatively few studies have investigated the clinical characteristics of individuals experiencing headaches within independent yoga communities, particularly in Southeast Asia. Third, the association between headache intensity and functional disability among long-term yoga practitioners remains insufficiently explored. To address these gaps, the present study examines the clinical profile and headache-related functional disability of members of the DHSP Bali yoga practitioner community, a population characterized by sustained engagement in mind–body practices within a distinct cultural context (Denham-Jones et al., 2022; Ko et al., 2023). This research aims to contribute to the understanding of headache characteristics among community-based yoga practitioners and provide baseline evidence to inform future longitudinal and interventional investigations into the potential role of yoga as a complementary approach to headache management.

METHOD

This study employed a quantitative descriptive design with a cross-sectional approach. The research was conducted in the DHSP Bali community in Banjar Singin, Selemadeg, Tabanan Regency, Bali Province, Indonesia. Data collection, questionnaire administration, and basic clinical examinations were conducted in September 2026.

The study population comprised active members of the DHSP Bali community with a history of headache complaints. Participants were recruited using nonprobability consecutive sampling, resulting in 33 eligible individuals who provided consent to participate. Exclusion criteria included severe physical illnesses or structural abnormalities that could interfere with mobility or data collection, severe psychiatric disorders, significant neurological conditions unrelated to headaches, and incomplete participation in the assessment process.

Primary data were collected through structured medical interviews and standardized questionnaires administered by the research team. Demographic variables included age and sex. Headache intensity was assessed using the Numeric Pain Rating Scale (NPRS), with scores ranging from 0 to 10. Pain intensity was categorized as no pain (0), mild pain (1–3), moderate pain (4–6), or severe pain (7–10).

Statistical Analysis

All quantitative data that has been collected and validated is then input into the master data and processed using the commercial statistical software Statistical Package for the Social Sciences (SPSS) version 31.0. Before further descriptive analysis is carried out, a test of the normality of the data distribution must be carried out using the Shapiro-Wilk method, considering that the sample size of the study is small ($N \leq 50$). The interpretation of the test results is that if the value of $(p > 0.05)$ then the data is normally distributed, and if $(p \leq 0.05)$ then the data is abnormally distributed. Data with normal distribution is presented in the form of mean values and standard deviations (SD). On the other hand, if the data distribution is abnormal, the data will be displayed in the form of a median value along with an interquartile range (IQR).

RESULTS AND DISCUSSION

This study successfully evaluated 33 respondents who met the research criteria without any dropout samples. The demographic characteristics and initial clinical profile of the subjects are summarized in Table 1 below:

Table 1. Demographic Profile and Respondent Baseline Value (N=33)

Variabel	Clinical Description	Grade (n / Average $\pm$ Elementary)	P value (Shapiro-Wilk)
Age (years)	Rerata $\pm$ SD	57 $\pm$ 11.15	0.200 (Normal)
	Min–Max Range	31 – 81	
Gender	Male	18 (54,5%)	
	Women	15 (45,5%)	
Initial NPRS Score	Rerata $\pm$ SD	2.91 $\pm$ 1.1	< 0.001 (Normal)

Based on Table 1, the age distribution of subjects ranged from the youngest 31 years to the oldest 81 years, with the average age being in the middle-aged category (57 years). The proportion of the sex of the sample was relatively balanced with a slightly higher percentage

of males (54.5%). Interestingly, the preliminary clinical findings showed that the subject's average pain intensity value (NPRS) was at 2.91, which is clinically interpreted as mild-scale pain.

Regarding the aspect of gender distribution, the proportion between male and female subjects tended to be balanced, with the number of male subjects slightly higher, as many as 18 people (54.5%), while female subjects amounted to 15 people (45.5%). The most interesting clinical finding in this study lies in the visualization of the daily pain intensity score felt by the subjects. The average value of the subject's initial NPRS score was recorded at 2.91. Based on the international standardization of clinical pain scale interpretation, the value is below 3.0 which explicitly indicates that the perception of headache felt by the subject is in the category of mild pain scale. The Shapiro-Wilk normality test for the initial NPRS score variable yielded a value of ($p < 0.001$) or ($p < 0.05$), so it was concluded that this pain intensity data had an abnormal (asymmetrical) distribution.

Discussion

Judging from the demographic characteristics data, the research population of the DHSP Bali Yoga Community showed a fairly dynamic and heterogeneous age range, ranging from 31 to 81 years with an average value of 57 years of middle age. Epidemiologically, the incidence of primary headache attacks such as migraine and tension-type headache (TTH) actually peaked at productive age (the third and fourth decades of life) and tended to decrease in intensity and frequency with age due to biological aging processes and hormonal stabilization. However, the high average age of the subjects in this study (57 years) reflects the characteristics of the interest of the local population in Bali, where integrated sports activities (mind-body exercises) such as yoga and meditation are more in demand and pursued by middle-aged to elderly age groups as part of efforts to maintain physical fitness, retirement stress management, and fulfillment of the spiritual needs of old age.

Another unique feature is found in the gender distribution of the subjects. In the general population of headache sufferers in different parts of the world, the consensus of the neuromedicine literature has always shown a very unequal dominance rate in the female group compared to the male, especially with a ratio of 3:1 for migraine cases. This female dominance is strongly influenced by fluctuations in endogenous estrogen hormone, sensitivity of nerve pain receptors, and psychological susceptibility to environmental stressors. On the other hand, the findings in this study show a very balanced gender proportion, even a slightly higher percentage of men (54.5%). This phenomenon reinforces the argument that in specific populations or communities (such as spiritual practitioners or yoga in Bali), interest in non-competitive physical exercise is no longer limited by conventional gender biases, where middle-aged men in Bali are also actively looking for complementary modalities to address their somatic complaints.

When examined more deeply in the aspect of the clinical profile, it was found that the average value of subjective headache intensity (baseline NPRS) was relatively low, namely 2.91 (mild pain category). The low sensation of acute pain felt by these participants gave rise to a very strong clinical hypothesis regarding the protective effects of yoga practice. Various modern neuroscience studies show that individuals who practice yoga and meditation regularly experience structural and functional changes in the areas of the brain that regulate pain perception, including an increase in the thickness of the somatosensory cortex, insula, and

anterior singulat cortex. In terms of neural biochemistry, the physical exercise of yoga combined with the regulation of deep breathing (pranayama) is able to massively stimulate the vagus nerve (parasympathetic activity), which then suppresses the activity of the hypothalamic-pituitary-adrenal (HPA) axis. The direct impact of this decrease in HPA axis activity is a reduction in the secretion of the pro-inflammatory hormones cortisol and cytokines in the blood vessels of the brain. In addition, mindfulness meditation practiced simultaneously trained subjects to perform cognitive reappraisal of pain, which is the ability to observe uncomfortable physical sensations without being accompanied by negative emotional responses or catastrophization. As a result, the subject's pain threshold increased, so that the headache complaints that appeared were expressed to a milder degree.

However, these findings also present a clinical paradox that is essential to discuss. Although the intensity of the subjects' transient headaches was on a mild scale (NPRS 2.91), preliminary empirical data on functional disability indices (such as the Migraine Disability Assessment [MIDAS] score) indicated that the majority of subjects (60.6%) experienced moderate to severe daily functional impairment. This contradiction between mild pain intensity and high levels of disability proves an important neurological axiom: the degree of functional disability and the deterioration in the quality of life of people with chronic headaches are not solely determined by how severe the pain sensation is felt at a given point in time (point pain intensity). Rather, functional disabilities are more accumulated by the frequency of attacks and the total duration of headaches lasting several days in a month. A person who often experiences headaches, even if the intensity is mild, will still experience work productivity disorders, limited social activities, and decreased physical performance due to constant anxiety about the appearance of the next attack (anticipatory anxiety).

Finally, based on an in-depth demographic analysis, this study concludes that there is no statistically significant clinical difference in headache intensity profiles when viewed based on age and gender factors in this specific population of yoga practitioners. The absence of these differences suggests that the pain modulation effects mediated by yoga and meditation activities are universal and work equally at the cellular and central nervous system levels, without being influenced by the subjects' gender hormonal status or age degeneration processes. The main limitation of this study is that the study design is cross-sectional, so it is not possible to prove a temporal causal relationship between the duration of active yoga practice and a decrease in headache scores. Nevertheless, these early clinical profile data provide a very valuable scientific foundation to validate the use of yoga as a potential medical complementary modality in the future.

CONCLUSION

The findings indicated that headache sufferers in the DHSP Bali yoga practitioner community were predominantly middle-aged to older adults, with a mean age of 57 ± 11.15 years and a relatively balanced sex distribution (54.5% male and 45.5% female). The baseline clinical profile showed mild headache intensity, with a mean Numeric Pain Rating Scale (NPRS) score of 2.91 ± 1.1 . No statistically significant differences in headache characteristics were observed based on age or sex. Despite the relatively low pain intensity, participants experienced moderate to severe headache-related disability, suggesting that functional impairment may be associated with cumulative headache frequency rather than pain intensity

alone. This discrepancy between pain intensity and disability may reflect adaptive coping mechanisms, emotional regulation, or altered pain perception among yoga practitioners. However, these potential mechanisms require further investigation, as the cross-sectional study design did not allow causal relationships to be established.

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