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# Physical activity time is associated with less disability in individuals with migraine

## *Tempo de atividade física está correlacionado com menor incapacidade em indivíduos com migrânea*

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**ABSTRACT**
Objective: To analyze the physical activity profile in individuals with migraine and its correlation with disability. Method: This is a cross-sectional study involving 81 participants (aged 18 to 59 years), of both sexes, diagnosed with migraine based on a score of ≥ 2 on the ID-Migraine. The physical activity profile was assessed using the International Physical Activity Questionnaire (IPAQ), and disability was measured by the Headache Disability Inventory (HDI). Results: The average weekly physical activity time was 638.7 minutes per week (±776.76). Among the participants, 36% were very active, 29% active, 21% irregularly active, and 14% sedentary. Total physical activity time was associated with lower levels of disability (r = -0.202, p = 0.035). Conclusion: In this study, more than half of the individuals with migraine were very active or active. Increased physical activity time is correlated with lower disability in individuals with migraine.

**Keywords:** Physical activity; Headache; Migraine

**RESUMO**
Objetivo: Analisar o perfil de atividade física em indivíduos com migrânea e sua correlação com a incapacidade. Método: Este é um estudo transversal envolvendo 81 participantes (idade entre 18 a 59 anos), de ambos os sexos, com diagnóstico de migrânea obtido pela pontuação ≥ 2 no ID-Migraine. O perfil de atividade física foi avaliado pelo Questionário Internacional de Atividade Física (IPAC) e a incapacidade foi mensurada pelo Headache Disability Inventory (HDI). Resultados: O tempo médio de atividade física semanal foi de 638,7 minutos semanais (±776,76). Entre os participantes, 36% eram muito ativos, 29% ativos, 21% irregularmente ativos e 14% sedentários. O tempo total de atividade física foi associado a menores níveis de incapacidade (r = -0.202, p = 0.035). Conclusão: Neste estudo, mais da metade dos migranosos eram muito ativos e ativos. Maior tempo de atividade física está correlacionado a menor incapacidade em indivíduos com migrânea.

**Palavras-chave:** Atividade física; Cefaleia; Migrânea

## INTRODUCTION

Migraine is a type of headache, among more than 200, that has an estimated overall prevalence of 14-15%.[1] In the U.S., its prevalence is roughly 12% of the general population, with 18% of women and 6% of men affected every year.[1] In Brazil, migraine affects 15.2% of the population.[2] In the global context of health problems, this disease is responsible for 4.9% of the years lived with disability and is linked to medical and psychiatric comorbidities, usage of health care resources, direct and indirect costs, and lower socioeconomic status and quality of life. [1,3–6] Personal, family, social, academic, and occupational aspects of an individuals' life are affected by migraine, making it the second most disabling condition in the world.[7]

Physical activity is defined as any body movement produced by skeletal muscles that requires energy expenditure. In this broad definition, physical exercise is a subcategory that is characterized by its planned, structured, and repetitive nature, which is intended to enhance or maintain one or more aspects of physical fitness.[11] The practice of regular physical activity, including physical exercise, is widely recognized as an effective health promotion strategy, as it reduces the risk of mortality and acts as a primary and secondary preventive measure for at least 25 chronic medical conditions.[1] In addition, physical activity reduces medication consumption and the number of medical consultations. It contributes to a greater focus and productivity at work, and results in an increase in well-being and quality of life.[8,9] According to the World Health Organization (WHO), to achieve health benefits, a minimum of 150 minutes per week of moderate physical activity or 75 minutes per week of vigorous physical activity is recommended. [10] However, lower volumes of physical activity than recommended ones can also bring significant health benefits.[10]

The need to incorporate other non-pharmacological strategies in the treatment of migraine has led to analyses on the effects of regular physical activity on individuals suffering from this condition. Studies that examined migraine features in individuals with different physical activity levels showed that migraineurs who were regularly active experienced reduced pain intensity, frequency, and duration than sedentary migraineurs. [11–15] Additionally, individuals who were physically inactive had not only a greater chance of developing migraines, but also a higher frequency of episodes throughout their lives.[12,16] It has been observed that individuals with migraine tend to exercise less compared to healthy individuals. This pattern seems to be associated with avoidance behavior due to fear of causing migraine symptoms even during interictal periods. [11,15,17]

Thus, considering the need to corroborate and deepen the existing knowledge about the mapping of the physical activity levels in individuals with migraine, this study aimed to analyze the profile of physical activity in migraineurs and investigate its correlation with disability level. Our hypothesis is that individuals with migraine are predominantly sedentary and that there is an inverse relationship between the practice of physical activity and the degree of disability associated with this condition.

## METHODOLOGY

This is a cross-sectional, observational study conducted according to the recommendations of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).[19]

Volunteers of both sexes, between 18 and 59 years old, who reached a score of $\geq$2 in the ID-Migraine questionnaire, in the Brazilian Portuguese version, were included. Individuals who had experienced head or cervical trauma in the last 3 months, pregnant women, and those with uncontrolled arterial hypertension were excluded.

The study was approved by the Ethics and Research Committee of the Health Sciences Center of the Federal University of Pernambuco (UFPE) under the number: 6,571,996 and conducted at the Physiotherapy Department of UFPE, Pernambuco, Brazil. A structured online

form was used to collect data asynchronously, covering demographic information like age and sex, as well as variables related to physical activity, and disability associated with migraine.

INSTRUMENTS

**ID-migraine**

The Brazilian Portuguese version of the ID-Migraine questionnaire was used for screening individuals with migraine, which is an appropriate tool for diagnosing the condition. Individuals who received a score of $\geq 2$ were considered migraineurs. This instrument has a combined sensitivity of 0,87 (CI 95%: 0,85–0,89) and specificity of 0,75 (CI 95%: 0,72–0,78)[20].

**International physical activity questionnaire, short version**

Time and level of physical activity were assessed through the short version of the International Physical Activity Questionnaire (IPAQ), a self-administered and subjective instrument, with a quantitative score representing the total physical activity time performed in the last week or a usual week, and a qualitative score representing the level of physical activity[21,22]. The classification of total physical activity time was performed by the sum of the product between the frequency and duration of vigorous and moderate physical activities and walking reported by participants in the intensity domain. Sitting time was not taken into account for quantitative analysis, but was evaluated separately to estimate inactivity time. The qualitative classification categorized the participants in a) very active; b) active; c) irregularly active and d) sedentary.

**Headache disability inventory**

Disability was assessed using the Brazilian version of the questionnaire Headache Disability Inventory (HDI-Brazil), that evaluates different dimensions related to headache-associated disability, as well as its interference in daily life during the last month. The total score ranges from 0-100 points and categorizes the individual from absence to maximum level of disability. The higher the score, the higher the level of disability related to headache.[23]

**Statistical analysis**

Data descriptive analysis was presented as percentage, mean and standard deviation. The significance level adopted by this research was 0.05 with a statistical power of 0.80. The normality of the data was verified by the Shapiro-Wilk test. The Pearson test was used to analyze the correlations between the variables. Correlations were classified as weak ($r < 0.3$), moderate ($r = 0.3 - 0.7$) or strong ($r > 0.7$). Data were analyzed using the JAMOVI software, version 2.3.28.0.

**RESULTS**

The volunteer selection flowchart is described in Figure 1. 110 participants who agreed to participate in the study, 19 obtained scores lower than 2 in the ID-Migraine. The eligibility criteria were not met by four participants and nine participants were excluded because of incomplete information. The final sample consisted of 81 volunteers, of which 72 (88.9%) were women and 9 (11.1%) men.

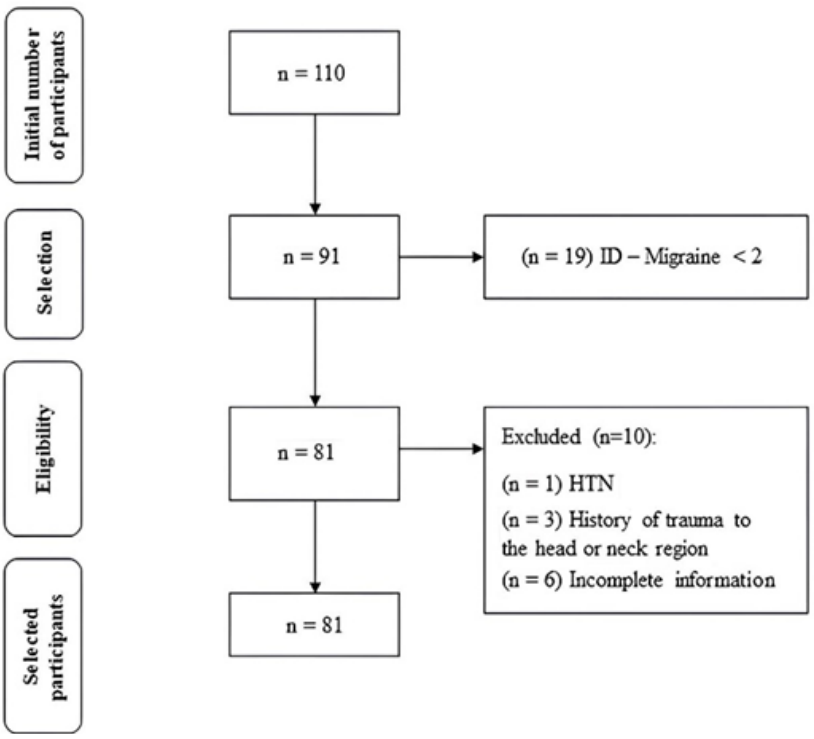


**Figure 1**. Volunteers Selection Process

After analyzing the participants' physical activity time, an average weekly time of 638.7 (±776.76) minutes was observed, distributed as follows: 204.3 (±268.78) minutes of vigorous physical activity, 237.9 (±305.93) minutes of moderate physical activity; 196.5 (±434.78) minutes of walking and 916.9 (±460.00) minutes of sitting time. In addition, participants had an average migraine-related disability of 51.1 (±21.87) points (Table 1).

**Table 1**: Demographic and clinical data of the sample

| | |
|---|---|
| Age, mean (M±SD) | 26,1 (9,36) |
| Female n (%) | 72 (88,9) |
| Male n (%) | 9 (11,1) |
| IPAQ quantitative score (M±SD) | 638,7 (776,76) |
| Vigorous physical activity time | 204,3 (268,78) |
| Moderate physical activity time | 237,9 (305,93) |
| Walking time | 196,5 (434,78) |
| Sitting time | 916,9 (460,00) |
| HDI score (M±SD) | 51,1 (21,87) |

M: mean; SD: standard deviation; IPAQ: international physical activity questionnaire; HDI: Headache disability inventory

Regarding the level of physical activity, 36% of the volunteers were categorized as very active, 29% as active, 21% as irregularly active and 14% as sedentary (Figure 2).

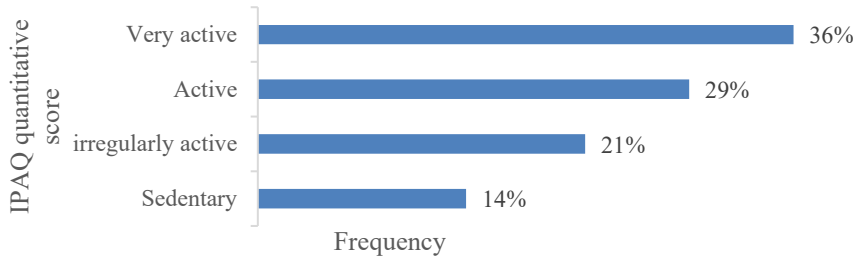


**Figure 2**. Frequency of the qualitative IPAQ score.

There was a weak negative correlation between HDI scores and total physical activity time (r = -0.202, p 0.035) and between HDI and moderate physical activity time (r = -0.203, p 0.035). There was no correlation between HDI and vigorous physical activity time (r = -0.065, p 0.281), HDI and walking time (r = -0.178, p 0.056) and HDI and sitting time (r = 0.003, p 0.489) (Table 2).

**Table 2**. Correlation between disability and physical activity variables.

| | | HDI |
|---|---|---|
| HDI | R of Pearson | — |
| | gl | — |
| | p-value | — |
| Total physical activity time | R of Pearson | -0.202 |
| | gl | 79 |
| | p-value | 0.035* |
| Vigorous physical activity time | R of Pearson | -0.065 |
| | gl | 79 |
| | p-value | 0.281 |
| Moderate physical activity Time | R of Pearson | -0.203 |
| | gl | 79 |
| | p-value | 0.035* |
| Walking time | R of Pearson | -0.178 |
| | gl | 79 |
| | p-value | 0.056 |
| Sitting time | R of Pearson | 0.003 |
| | gl | 79 |
| | p-value | 0.489 |

HDI: Headache Disability Inventory; * Significant statistical correlation established at $p < 0.05$

## DISCUSSION

The results suggest that individuals with migraine present an inversely proportional relationship between total physical activity time and migraine-related disability, indicating that shorter weekly physical activity time is correlated to greater disability. This finding is in agreement with several studies that prove the beneficial effects of physical activity in reducing pain levels, episode frequency and disability, in addition to demonstrating that active individuals suffer less migraine-related impact compared to sedentary individuals.[11,16]

Even with limited knowledge about migraine's underlying pathophysiology, physical activity seems to be beneficial because it activates the releasing of beta-endorphins and endogenous opioids with pain neurotransmission inhibition properties, also promoting changes in lifestyle and reducing the risk of sedentary behavior. [24]

In the present study, most of the participants were categorized as very active and active, which refutes the initial hypothesis. This is remarkable considering the tendency of migraineurs to avoid physical activity due to fear of triggering new headache episodes.[12,13,19,25] One of the factors that may explain this finding is related to the subjectivity of the IPAQ responses, since the physical activity time was based solely on the individual report of each participant. This may have led to overestimation of exercise time. Furthermore, it is well stablished in the literature that migraineurs tend to exercise less than people without migraine, which suggests that, despite apparently favorable results, there may still be significant differences between the groups. [11,13,19] It is important to emphasize that the study did not aim to compare these two groups, so no control group data was collected for said analysis.

It was observed that, among the different levels of physical activity, migraineurs tend to engage more in moderate and vigorous activities, respectively, but maintain a significantly longer sitting time compared to both activity categories. In addition, it was observed that only the total physical activity time and moderate physical activity time showed a negative correlation with migraine-related disability. These results suggest that, despite exercising, they face significant challenges related to physical inactivity time, which may contribute to the persistence or worsening of migraine-associated disability.

The relationship between exercise intensity and migraine severity has been under investigated, but studies indicate that moderate-intensity physical activity, when practiced regularly, has a positive influence on reducing disability associated with the disease. In contrast, the absence of this practice is associated with a worsening of attacks in individuals with migraine.[13,26] Nonetheless, the high amount of time devoted to vigorous physical activity and its absence of correlation with disability, identified in this study, differ from previous literature, since most studies highlight a positive effect of vigorous activity on migraine frequency and symptoms. [12,13,15,25,26] Due to the cross-sectional nature of this study, we cannot assume causality or clinical effectiveness relationships of our findings.

Due to the lack of studies on walking time in migraineurs, it was not possible to compare our results with previous literature. As for sitting time, it is known that inactivity has a great influence on migraine behavior. Therefore, it may be insufficient to determine inactivity exclusively based on sitting time, which could explain the absence of correlation between disability and sedentary time observed in this study.[27]

Regarding sex, the results show a higher prevalence of migraine among women compared to men. This was an expected finding, considering that migraine is more common in women. [5,28,29,30] Due to the important difference between the number of men and women, sex was not used as a parameter of analysis, and it was not possible to observe differences between migraine disability and level of physical activity according to sex.

Even though, so far, there is no specific data on the relationship between kinesiophobia and physical activity in migraineurs, it is recognized that they seem to have a tendency to avoid exercise.[13] This behavior may be linked to a cycle in which fear of triggering new migraine episodes leads to the avoidance of physical activities considered as potential triggers, perpetuating a maladaptive lifestyle and aggravating the disease's impact.

Our results indicate that we cannot generalize that individuals with migraine are

predominantly sedentary. Additionally, the current literature shows that physical activity is an important alternative for migraine treatment, as it demonstrates effectiveness in reducing associated disability.[25,26]

Thus, the results of this study provide a detailed understanding of the physical activity profile of migraineurs, highlighting the predominance of women in the sample and the diversity in physical activity levels. The categorization of participants into "very active", "active", "irregularly active" and "sedentary" reveals important variations in physical activity behaviors, essential for the personalization of therapeutic interventions.

It is important to notice that the negative correlation between HDI scores and total and moderate physical activity times, although weak, suggests that higher levels of physical activity, especially moderate, may be associated with lower migraine-related disability. This finding highlights the relevance of promoting moderate physical activity as a potentially effective strategy for migraine management. Moreover, the detailed exploration of different types of physical activity, including vigorous, moderate and walking, along with sedentary time, provides a robust basis for future research, aiming to clarify the underlying mechanisms between physical activity and migraine severity. Our research not only contributes with extensive quantitative data on migraineurs physical activity patterns, but also highlights the need for personalized interventions that take into account individual variations to improve patients' quality of life.

Future studies should have larger samples, allowing analysis by sex, and use objective tools, such as accelerometry, to evaluate physical activity more accurately. It is also advised to include a control group in order to compare levels of physical activity between healthy individuals and those with migraine. These measures may contribute to a better understanding of the relationship between physical activity and migraine, deepening our understanding of the role of physical activity in this condition.

## CONCLUSION

Migraineurs tend to be primarily very active or physically active. Shorter time of weekly physical activity is correlated with higher levels of migraine-related disability. These findings highlight the importance of implementing physical activities in the therapeutic approach for migraine.

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