

ORIGINAL RESEARCH

The effect of kinesiophobia on fear of falling, quality of life and physical activity in children with headache

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Abstract

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Kinesiophobia, the excessive fear of movement due to anticipated pain or injury, contributes to disability. While prevalent in headache patients, its associations with clinical factors in pediatric headache populations remain underexplored. To examine the relationships between kinesiophobia, fear of falling, quality of life, and physical activity in children and adolescents with headaches. Methods: This study included 127 children aged 6–18 years with headache complaints. Kinesiophobia was assessed using the Tampa Kinesiophobia Scale (TKS), fear of falling with the Falls Efficacy Scale (FES-I), physical activity via the International Physical Activity Questionnaire (IPAQ–Short Form), quality of life using the Quality-of-Life Scale for Children (QOLS), and pain severity with a visual analog scale (VAS). The study was registered at ClinicalTrials.gov (Id: NCT06136052). Kinesiophobia was prevalent among children with headaches and was significantly associated with longer headache duration ($p < 0.05$), greater pain severity, reduced physical activity, and lower quality of life ($p < 0.001$). Increased pain severity correlated with higher fear of falling ($p < 0.001$). Children without kinesiophobia reported significantly better quality of life ($p < 0.05$). Kinesiophobia in children with headaches is linked to fear of falling, decreased physical activity, and lower quality of life, emphasizing the need for targeted interventions.

Introduction

Headache is an unpleasant sensory or emotional experience resulting from the activation of pain-sensitive receptors within or outside the skull due to various causes (Raja et al., 2020). It can be categorized as primary or secondary pain, referred pain, or a symptom of underlying conditions. Headaches significantly impact children's health, disrupting daily activities and increasing anxiety. According to the WHO's 2010 Global Burden of Disease Study, migraines rank among the top ten most disabling diseases globally (Vos et al., 2012). Pediatric headaches are common, with approximately 90% of children experiencing at least one episode in their lifetime.

Causes include acute sinusitis, migraines, tension-type headaches, post-traumatic cluster headaches, and intracranial lesions (Kim, 2022). In Turkey, the prevalence of recurrent headaches among school-age children ranges from 31% to 49%, with migraine prevalence at 2%-21% and tension-type headaches at 5%-25% (Poyrazoğlu et al., 2015).

Kinesiophobia, defined as the fear of movement due to discomfort or hypersensitivity, often affects individuals with recurrent headaches (Knapik et al., 2011). This fear can reduce physical activity and is linked to disability progression and diminished quality of life in chronic pain conditions (Luque-Suarez et al., 2019; Leung et al., 2024). For migraine patients, physical exertion may exacerbate symptoms,

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reinforcing avoidance behaviors. Fear of falling and vestibular symptoms are also prevalent in migraine cases, where kinesiophobia may serve as an adaptive behavior to prevent falls and mitigate dizziness (Carvalho et al., 2020).

In children, headaches have profound implications, including reduced school attendance and adverse effects on mental and physical well-being (Al-Futaisi, 2023). By exploring the relationships between kinesiophobia, fear of falling, quality of life, and daily activities, this study seeks to provide insights into addressing these challenges.

Methods

This cross-sectional study included 127 patients aged 6–18 years who presented with headache complaints to a pediatric neurology clinic between April 2022 and April 2023. The study was conducted in accordance with the Declaration of Helsinki and the necessary Ethics Committee approval was received from SBU Izmir Tepecik Training and Research Hospital Non-invasive Research Ethical Committee (decision number: 2022/05-20), and written informed consent was collected from all participants and their families.

Participants

Patients aged 6–18 years with headache complaints and no medical conditions restricting physical activity were included. Patients with communication difficulties or chronic illnesses limiting physical activity were excluded. All participants completed a case evaluation form, which included demographic details, headache-related information, and scores from standardized questionnaires. No external financial support was received for this study.

Procedure

Kinesiophobia evaluated using the TKS, a 17-item questionnaire scored from 1 (strongly disagree) to 4 (strongly agree), with scores >37 indicating high kinesiophobia (Vlaeyen et al., 1995). In a study validating the scale for the Turkish population, scores above 37 were identified as indicative of high kinesiophobia (Yılmaz et al., 2011). Fear of Falling assessed with the FES-I, a 16-item scale measuring concern about falling, categorized into low concern (<24) and high concern (≥ 24) (Ulus et al., 2012). Pain Intensity measured using the VAS scale, ranging from 0 (no pain) to 10 (worst imaginable pain) (McCormack et al., 1988). Physical Activity assessed via the IPAQ-SF, classifying activity into three levels:

Level I (<600 MET-min/week, inactive), Level II (600–3000 MET-min/week, moderate), and Level III (>3000 MET-min/week, high). Sedentary time was also recorded (Öztürk, 2005). Quality of Life measured using the QoLSC, a validated tool for assessing physical and psychosocial well-being in children aged 2–18 years (Memik et al., 2007).

Data Analyses

The sample size was calculated using G*Power 3.1 software (Universities, Düsseldorf, Germany). The primary outcome measure was the TKS score, with its mean and standard deviation used to estimate the sample size (Pinheiro et al., 2022). Based on a power of 0.80, an alpha level of 0.05, and a beta of 0.2, the required sample size was determined to be 88 participants. Ultimately, 127 patients were included in the study to enhance robustness.

Statistical analyses were performed using IBM SPSS Statistics version 20 (IBM Corporation, USA), with statistical significance set at $p < 0.05$. Normality was assessed using the Shapiro-Wilks test. Descriptive statistics for categorical variables are presented as frequencies and percentages, while continuous variables are reported as means \pm standard deviations.

For group comparisons, independent samples t-tests were used for normally distributed continuous variables, and the Mann-Whitney U test was applied for non-normal distributions. Differences in categorical variables were analyzed using the Chi-square test.

Correlation analyses examined relationships between continuous variables. Spearman's correlation coefficient was used for non-normal data, while Pearson's correlation coefficient was applied for normally distributed data. Correlation strength was interpreted as mild (<0.3), moderate (0.31–0.69), and strong (≥ 0.7).

Results

A total of 127 patients aged 6–18 years were included, of whom 68 (53.5%) were girls and 59 (46.5%) were boys. The mean age of the patients was 12.75 ± 3.20 years, with an average height of 147.84 ± 18.32 cm and a mean body weight of 51.03 ± 17.15 kg. The average pain duration was 7.37 ± 6.65 months, while the mean scores for the Tampa Kinesiophobia Scale (TKS) and Visual Analog Scale (VAS) were 44.34 ± 5.21 and 4.99 ± 1.94 , respectively. The Falls Efficacy Scale score averaged 26.92 ± 7.91 , and the Quality-of-Life Scale

score was 44.33 ± 17.93 . Lastly, the mean score for the International Physical Activity Questionnaire (IPAQ) was 0.88 ± 0.76 , reflecting the participants' physical activity levels. These findings provide a comprehensive overview of the study population's physical and clinical profiles.

In the pediatric neurology clinic, 70 participants were diagnosed with tension-type headaches, 19 with migraines, and 38 with mixed-type headaches. Eight pediatric patients reported a history of alcohol use, while 14 had a history of smoking. The mean duration of headache complaints was 7.3 ± 6.6 months (range: 1–36 months). Comorbid conditions included asthma in 3 patients, allergic rhinitis in 3 patients, epilepsy in 1 patient, and celiac disease in 1 patient. Among the pediatric patients with headaches, 118 (92.91%) were found to have kinesiophobia, while 9 (7.08%) did not exhibit kinesiophobia.

The study found that increased headache severity in children was significantly associated with higher kinesiophobia, greater fear of falling, less physical activity, and reduced quality of life. Higher pain severity corresponded to lower quality of life, with children exhibiting greater fear of falling and avoiding physical activity as headache severity increased. A strong association was observed between physical activity levels and quality of life ($p < 0.001$), with reduced activity linked to poorer quality of life. Additionally, physical activity levels were inversely related to fear of falling ($p < 0.005$), as children with higher fear of falling demonstrated lower activity levels (Table 1).

No significant relationship was found between age and kinesiophobia in children with headache complaints ($p > 0.05$). However, pain duration was significantly longer in children with kinesiophobia compared to those without it ($p = 0.010$). There were no significant differences in pain intensity or fear of falling between the two groups ($p > 0.05$). There was no significant difference in physical activity level between the two groups ($p > 0.05$). Notably, children with kinesiophobia had significantly lower quality of

life scores compared to those without kinesiophobia ($p = 0.034$; Table 2).

Table 1
Relationship of questionnaires.

Variables	R value	p value
Pain duration-TKS	0.165	0.064
Pain duration- VAS	0.0273	0.761
Pain duration- FES I	0.0009	0.992
Pain duration- QOLS	0.0612	0.495
TKS- VAS	0.2824	<0.001
TKS - FES I	0.1417	0.112
TKS - QOLS	0.3508	<0.001
TKS-IPAQ	0.39	<0.001
VAS- FES I	0.5187	<0.001
VAS- QOLS	0.444	<0.001
FES I- QOLS	0.2986	<0.001
IPAQ- QOLS	0.3254	<0.001
IPAQ-VAS	0.4457	<0.001
IPAQ-FES I	-0.2684	0.002

Pearson correlation analysis (TKS: Tampa Kinesiophobia Scale, VAS: Visual Analog Scale, FES-I: Falls Efficacy Scale I, QOLS: Quality of Life Scale-Short, IPAQ: International Physical Activity Questionnaire -Short)

No significant associations were found between kinesiophobia scores and pain severity or fear of falling ($p > 0.05$). However, kinesiophobia scores were significantly correlated with quality of life, with lower quality of life observed in patients with kinesiophobia ($p < 0.05$). Kinesiophobia scores were significantly associated with physical activity levels, and lower physical activity was observed in patients with kinesiophobia ($p < 0.001$). Pain severity was strongly associated with quality of life, with higher pain intensity linked to significantly lower quality of life. Increased pain severity was also correlated with reduced physical activity levels ($p < 0.001$) and greater fear of falling ($p < 0.001$). Fear of falling was significantly associated with both reduced physical activity levels ($p < 0.05$) and lower quality of life ($p < 0.001$). Similarly, patients with higher fear of falling exhibited notably decreased physical activity ($p < 0.05$; Table 3).

Table 2
Comparison of questionnaires results between groups.

Kinesiophobia Group		Age	Pain Duration	VAS	FES-I	QOLS	IPAQ
wKG (n: 9)	Min-max	10-17	5-15	1-7	18-37	14-49	1-25
	Median	14	10	4	25	34	10
nKG (n:118)	Min-max	6-18	1-36	1-9	16-52	2-90	2-28
	Median	13	5	5	26	43.5	9
Intergroups		P value	0.010	0.215	0.966	0.034	0.391

Independent two sample – Mann Whitney U (wKG: with kinesiophobia, nKG: without kinesiophobia VAS: Visual Analog Scale, FES I: Falls Efficacy Scale I, QOLS: Quality of Life Scale-Short, IPAQ: International Physical Activity Questionnaire-Short)

Table 3
Comparison of questionnaires results.

Variables	Data	Scores	N	Median	Min.	Max.	Statistic	P value	
TKS	QOLS	0-24	15	43	24	49	11.76	0.008	
		25-50	73	44	31	64			
		51-74	30	45	38	53			
		75-100	9	48	41	57			
	VAS	0-3	26	44	24	52	2.66	0.264	
		4-7	87	45	31	57			
		8-10	14	45.5	38	64			
	FES-I	16-19	24	44.5	36	55	4.98	0.083	
		20-27	54	43	24	52			
		28-64	49	45	34	64			
	IPAQ	Level I	45	25	20	52	13.06	<0.001	
		Level II	52	27	16	57			
Level III		30	27	15	55				
VAS	QOLS	0-24	15	3	1	8	18.04	<0.001	
		25-50	73	5	1	9			
		51-74	30	5.5	3	9			
		75-100	9	7	2	9			
	IPAQ	Level I	45	6	2	9	33.06	<0.001	
		Level II	52	5	1	9			
		Level III	30	5.5	1	8			
	FESI-I	VAS	0-3	26	20.5	16	32	28.37	<0.001
			4-7	87	27	16	52		
8-10			14	31.5	24	44			
IPAQ	Level I	45	27	16	52	8.09	0.017		
	Level II	52	27	16	43				
	Level III	30	25	16	32				
QOLS	FES-I	16-19	24	43	2	89	15.10	<0.001	
		20-27	54	38.5	14	87			
		28-64	49	49	16	90			
	IPAQ	Level I	45	46	14	90	8.47	0.014	
		Level II	52	42	8	84			
		Level III	30	37.4	2	77			

Independent k Samples – Kruskal Wallis & Dunn Tests (TKS: Tampa Kinesiophobia Scale, VAS: Visual Analog Scale, FES-I: Falls Efficacy Scale I, QOLS: The Quality-of-Life Scale-Short, IPAQ: International Physical Activity Questionnaire-Short)

Discussion

This study explored the relationships between kinesiophobia, fear of falling, quality of life, and physical activity in children with headache complaints. Our findings align with existing literature, demonstrating that kinesiophobia is more prevalent in children with headaches and is associated with longer pain duration, reduced quality of life, increased fear of falling, and decreased physical activity.

Fear of falling during physical activities appeared to exacerbate kinesiophobia, further discouraging children from engaging in physical activity. Both headaches and kinesiophobia significantly impacted quality of life, with physical activity avoidance often leading to social isolation and compounding these negative effects.

A study by Benatto et al. (2019) reported that 53% of migraine patients experienced kinesiophobia, with many believing physical activity worsened their pain. Similarly, migraine patients with kinesiophobia exhibited greater fear of falling, dizziness, and related symptoms. While prior research has primarily focused on migraines, our study included a broader range of headache types, with tension-type headaches being more prevalent in our sample.

Chronic tension-type headaches have been shown to negatively impact daily tasks, physical activity, and mental health, leading to higher anxiety and reduced self-efficacy (González de la Flor et al., 2022). Additionally, the frequency and intensity of tension-type headaches and migraines have been associated with long-term disability (Houle et al., 2020). In line with these findings, our study observed higher levels of

kinesiophobia, fear of falling, and reduced quality of life in children with various headache complaints.

A systematic review of 63 studies confirmed that higher kinesiophobia levels are linked to greater pain intensity, increased disability, and poorer quality of life (Luque-Suarez et al., 2019). These findings underscore the clinical importance of assessing kinesiophobia, as it may act as a barrier to successful treatment outcomes.

Our study highlights the critical role of addressing kinesiophobia in pediatric headache management to improve treatment outcomes and quality of life. However, the study faced limitations, including a relatively small sample size, reliance on subjective measures, and a wide age range among participants. Future studies should include larger samples, use objective assessment tools, and focus on narrower age groups. Additionally, pre- and post-intervention assessments and the establishment of pediatric-specific threshold values for the TKS could provide more robust insights.

Kinesiophobia was pronounced in children with headaches caused by various factors beyond migraines. Children with kinesiophobia exhibited increased fear of falling, longer pain duration, greater pain intensity, decreased physical activity, and reduced quality of life. These findings emphasize the need to address kinesiophobia in pediatric headache management, with the goal of enhancing treatment adherence and improving overall quality of life.

Conclusion

Kinesiophobia is prevalent among the majority of pediatric patients with headaches. Children with headache complaints and kinesiophobia demonstrate heightened fear of falling, reduced physical activity levels, and diminished quality of life. Moreover, the presence of kinesiophobia, along with increased fear of falling, greater physical activity restriction, and reduced quality of life, is associated with a longer duration of pain complaints.

Authors' Contribution

Study Design: ÖBÇ, MB, PG, NOD; Data Collection: ÖBÇ, MB; Statistical Analysis: ÖBÇ; Manuscript Preparation: ÖBÇ, MB.

Ethical Approval

The study was approved by the SBU Izmir Tepecik Training and Research Hospital Non-invasive Research Ethical Committee (2022/05-20) and it was carried out in accordance with the Code of Ethics of the World Medical Association also known as a declaration of Helsinki.

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Conflict of Interest

The authors hereby declare that there was no conflict of interest in conducting this research.

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