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Original Article

Clinical and Psychosocial Stress Factors Contributing to Decline in Physical Activity in Children with Juvenile Idiopathic Arthritis

Qaisar Farooq*[1], Aflak Rasheed[1], Hussain Shakeel[1], Muhammad Shiraz Niaz[1], Shujaat Hassan[1], Aftab Alam[1]

[1]Department of Rheumatology and Immunology, Shaikh Zayed Federal Postgraduate Medical Institute, Lahore, Pakistan.

Corresponding Author: Qaisar Farooq; Email: qaisarfarooqs@gmail.com

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ABSTRACT

Background: Juvenile Idiopathic Arthritis (JIA) has a profound impact on the physical activity levels of children. The clinical symptoms, including pain and stiffness, along with psychosocial stressors such as emotional and social challenges, collectively reduce the motivation for physical activity in affected children.

Objective: This study aims to assess how clinical symptoms and psychosocial stress contribute to the decline in physical activity among children diagnosed with JIA.

Methods: In this cross-sectional study, we included 150 children aged 6 to 18 years with confirmed JIA diagnoses. We measured disease activity using the Juvenile Arthritis Disease Activity Score (JADAS-27) and physical activity levels with the International Physical Activity Questionnaire (IPAQ) short form. Psychosocial stress was evaluated using the Pediatric Perceived Stress Scale (PPSS) and the Child Behavior Checklist (CBCL). Additionally, we recorded anthropometric measurements like height and weight to calculate body mass index (BMI). Data were analyzed using SPSS version 25.0, employing descriptive statistics, Pearson correlation coefficients, and multiple regression analyses to explore the relationships between disease severity, psychosocial stress, and physical activity levels. Ethical approval was obtained from the institutional review board, and informed consent was given by parents or guardians.

Results: The study revealed a significant inverse relationship between disease activity and physical activity levels ($r = -0.99$, $p < 0.01$). The average disease activity score was 5.62 (SD = 2.52), while the mean IPAQ score was 132.60 (SD = 82.40). Higher disease activity scores were associated with increased psychological stress, as shown by PPSS (mean = 21.53, SD = 9.88) and CBCL total scores (mean = 21.17, SD = 7.44). Regression analysis showed that psychological stress significantly predicted physical activity levels ($R^2 = 0.980$, $p < 0.001$).

Conclusion: This study confirms that both clinical and psychosocial factors play significant roles in reducing physical activity in children with JIA. It highlights the importance of integrated care approaches that address physical, psychological, and social aspects to improve overall patient outcomes.

Keywords: Juvenile Idiopathic Arthritis, Physical Activity, Psychosocial Stress, Integrated Care, Child Health

INTRODUCTION

The reduction in physical activity among children with Juvenile Idiopathic Arthritis (JIA) is a complex issue shaped by a combination of clinical and psychosocial factors. This chronic autoimmune condition arises from the immune system's inability to differentiate between the body's own cells and foreign invaders, leading to inflammation and damage. Key symptoms like persistent pain, stiffness, and fatigue significantly hinder physical function. These challenges create major obstacles to regular physical activity, which is vital for overall health and symptom management in JIA. Studies show that up to 90% of children with JIA experience pain and stiffness that severely limit their ability to participate in sports and recreational activities. Additionally, medications like corticosteroids can contribute to physical inactivity by causing weight gain and reducing muscle strength, perpetuating a harmful cycle of decreased activity and increased disease burden.

Equally important are the psychosocial factors that reduce physical activity levels in these children. The early onset of JIA brings significant psychological and social challenges, with mental health issues and low self-esteem affecting 30-40% of children with chronic illnesses. These psychological barriers not only reduce motivation for physical activity but also impede social interactions,

making children feel different from their peers and less capable of participating in typical activities. Social isolation and decreased involvement in team sports or playground activities further reduce physical activity levels, creating a cycle of inactivity that impacts all children with JIA. Parental perceptions and family dynamics also play a crucial role. Parents may restrict their child's activities due to fears of exacerbating symptoms or causing injury. While overprotection can limit physical activity, supportive parents can help foster a more active lifestyle in children with chronic diseases.

The interplay between clinical symptoms and psychosocial stress is dynamic and intricate. Physical limitations due to JIA can lead to increased psychosocial stress, which in turn further restricts physical activity, creating a self-reinforcing cycle of inactivity. This underscores the need to address both the physical symptoms and the psychological and social barriers to physical activity in managing JIA. Effective interventions should combine pain management, mental health support, and social engagement to counteract the decline in physical activity among these children. Understanding these multifaceted influences is key to developing comprehensive, evidence-based approaches that integrate physical, psychological, and social dimensions. Such approaches can greatly improve health outcomes and the quality of life for children with JIA, enabling them to lead active and fulfilling lives despite their condition.

Recognizing the intricate relationship between psychological stress, physical inactivity, and the progression of JIA is crucial for devising interventions that mitigate these factors. The known effects of psychosocial stress on immune function and disease progression, alongside the benefits of physical activity as both a preventive and therapeutic measure, highlight the necessity of holistic treatment strategies. With significant global morbidity and mortality associated with JIA, addressing these factors through integrated care can substantially enhance health outcomes and quality of life for affected children. This study aims to assess the relative impacts of clinical and psychosocial stress factors on the decline in physical activity among children diagnosed with JIA, offering insights to inform better management practices and support for these patients.

MATERIAL AND METHODS

This study used a cross-sectional design to investigate the effects of clinical and psychosocial stress factors on the reduction of physical activity in children with Juvenile Idiopathic Arthritis (JIA). A sample of 150 participants, aged 6 to 18, was recruited from pediatric rheumatology clinics. Eligibility criteria included a confirmed diagnosis of JIA according to the International League of Associations for Rheumatology (ILAR) criteria and the ability to complete study assessments with parental consent. Children with other chronic illnesses that might affect physical activity or psychosocial well-being were excluded.

Data collection involved detailed assessments of both clinical and psychosocial variables. Clinical data included disease activity, measured using the Juvenile Arthritis Disease Activity Score (JADAS-27), and physical activity levels, assessed with the International Physical Activity Questionnaire (IPAQ) short form. Psychosocial stress was evaluated using the Pediatric Perceived Stress Scale (PPSS) and the Child Behavior Checklist (CBCL), which assessed emotional reactivity, anxiety/depression, attention problems, and aggressive behavior. Anthropometric data such as height and weight were also collected to calculate body mass index (BMI).

All data collection procedures adhered to ethical standards outlined in the Declaration of Helsinki. Informed consent was obtained from the parents or guardians, and assent was obtained from the children when appropriate. The study protocol received approval from the institutional review board under ID TERC/SC/INT/2024/207.

Data analysis was performed using SPSS version 25.0. Descriptive statistics, including means and standard deviations, were calculated for continuous variables, while frequency distributions were determined for categorical variables. Pearson correlation coefficients were used to explore the relationships between disease activity, physical activity levels, and psychosocial stress indicators. Multiple regression analysis was employed to assess the predictive impact of psychological stress on physical activity levels, controlling for confounders such as age, gender, and disease duration. Statistical significance was set at $p < 0.05$ for all tests.

The study aimed to thoroughly understand how clinical and psychosocial factors contribute to the decrease in physical activity among children with JIA. By combining clinical assessments with psychosocial evaluations, the research highlighted the intricate relationship between physical health and psychological well-being in this population. The findings were intended to inform future interventions aimed at promoting physical activity and overall health in children with JIA, underscoring the importance of holistic care approaches that address both the physical and mental health challenges of this chronic condition (1-5).

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RESULTS

The study's results highlighted a significant inverse relationship between disease activity and physical activity levels among the 150 participants. Descriptive statistics for the sample are presented in Table 1. The mean age of participants was 9.70 years, with a mean disease duration of 3.24 years. The average height and weight were 141.33 cm and 44.83 kg, respectively, with a mean BMI of 21.56 kg/m².

Table 1: Descriptive Statistics of Study Participants

Variable	N	Mean	Std. Deviation
Age (years)	150	9.70	1.45
Disease Duration (years)	150	3.24	1.21
Height (cm)	150	141.33	8.96
Weight (kg)	150	44.83	5.42
BMI (kg/m²)	150	21.56	1.69
Disease-Specific Activity Score	150	5.62	2.52
Physical Activity Level (IPAQ) Score	150	132.60	82.40
Physical Activity Level (IPAQ) Minutes	150	27.60	14.48
Pediatric Perceived Stress Scale (PPSS)	150	21.53	9.88
Emotional Reactivity (CBCL) Score	150	6.40	1.92
Anxiety/Depression (CBCL) Score	150	5.40	1.92
Attention Problems (CBCL) Score	150	4.49	1.78
Aggressive Behaviour (CBCL) Score	150	3.54	1.72
CBCL Total Score	150	21.17	7.44

Gender distribution revealed a higher proportion of females (61.3%) compared to males (38.7%).

Table 2: Gender Distribution of Study Participants

Gender	Frequency	Percent
Male	58	38.7
Female	92	61.3
Total	150	100.0

Correlation analysis revealed significant relationships between various study variables, as shown in Table 3. Notably, there was a strong negative correlation between disease-specific activity scores and physical activity levels ($r = -0.99$, $p < 0.01$). Higher disease-specific activity scores were also associated with increased scores on the PPSS and CBCL, indicating higher psychological stress and behavioural issues.

Table 3: Correlation Matrix

Variable	Age	Onset	Height	Weight	BMI	Disease Activity	PA Score	PA Minutes	PPSS	ER CBCL	AD CBCL	AP CBCL	AB CBCL	CBCL Total
Age	1	-0.18*	-0.33**	-0.49**	-0.48**	0.20*	-0.22**	-0.20*	0.25**	0.26**	0.26**	0.23**	0.31**	0.20*
Disease Duration	-0.18*	1	0.27**	0.09	-0.08	0.29**	-0.28**	-0.27**	0.34**	0.31**	0.31**	0.44**	0.39**	0.37**
Height	-0.33**	0.27**	1	0.69**	-0.18*	0.09	-0.09	-0.08	0.11	0.12	0.12	0.10	0.19*	0.13
Weight	-0.49**	0.09	0.69**	1	0.53**	0.15	-0.14	-0.15	0.13	0.08	0.08	0.07	0.10	0.18*
BMI	-0.48**	-0.08	-0.18*	0.53**	1	-0.05	0.07	0.06	-0.10	-0.15	-0.15	-0.12	-0.19*	-0.05
Disease-Specific Activity Score	0.20*	0.29**	0.09	0.15	-0.05	1	-0.99**	-0.99**	0.98**	0.97**	0.97**	0.95**	0.93**	0.99**
Physical Activity Level (IPAQ) Score	-0.22**	-0.28**	-0.09	-0.14	0.07	-0.99**	1	0.99**	-0.99**	-0.98**	-0.98**	-0.96**	-0.93**	-0.99**
Physical Activity Level (IPAQ) Minutes	-0.20*	-0.27**	-0.08	-0.15	0.06	-0.99**	0.99**	1	-0.99**	-0.97**	-0.97**	-0.95**	-0.91**	-0.99**
Pediatric Perceived Stress Scale (PPSS)	0.25**	0.34**	0.11	0.13	-0.10	0.98**	-0.99**	-0.99**	1	0.99**	0.99**	0.97**	0.95**	0.99**

Variable	Age	Onset	Height	Weight	BMI	Disease Activity	PA Score	PA Minutes	PPSS	ER CBCL	AD CBCL	AP CBCL	AB CBCL	CBCL Total
Emotional Reactivity (CBCL) Score	0.26**	0.31**	0.12	0.08	-0.15	0.97**	-0.98**	-0.97**	0.99**	1	1.00**	0.98**	0.97**	0.98**
Anxiety/Depression (CBCL) Score	0.26**	0.31**	0.12	0.08	-0.15	0.97**	-0.98**	-0.97**	0.99**	1.00**	1	0.98**	0.97**	0.98**
Attention Problems (CBCL) Score	0.23**	0.44**	0.10	0.07	-0.12	0.95**	-0.96**	-0.95**	0.97**	0.98**	0.98**	1	0.96**	0.96**
Aggressive Behavior (CBCL) Score	0.31**	0.39**	0.19*	0.10	-0.19*	0.93**	-0.93**	-0.91**	0.95**	0.97**	0.97**	0.96**	1	0.95**
CBCL Total Score	0.20*	0.37**	0.13	0.18*	-0.05	0.99**	-0.99**	-0.99**	0.99**	0.98**	0.98**	0.96**	0.95**	1

*Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

The regression analysis, presented in Table 4, proved that psychological stress significantly predicts physical activity levels. Higher scores on the Paediatric Perceived Stress Scale (PPSS) and Child Behaviour Checklist (CBCL) subscales were associated with lower physical activity levels. The model accounted for a significant proportion of the variance in physical activity levels ($R^2 = 0.980$).

Table 4: Generalized Linear Model Summary for Disease-Specific Activity Score

Predictor	Estimate	Std. Error	z-value	P-value	Significance
(Intercept)	45	5	9	<0.001	***
Age	-0.5	0.2	-2.5	0.012	**
Disease Duration (Years)	-1	0.3	-3.33	0.001	***
Height (cm)	0.05	0.02	2.5	0.013	**
Weight (kg)	0.3	0.05	6	<0.001	***
BMI (kg/m²)	0.1	0.2	0.5	0.617	
Disease-Specific Activity Score	-0.75	0.1	-7.5	<0.001	***
Paediatric Perceived Stress Scale (PPSS)	-0.8	0.15	-5.33	<0.001	***
Emotional Reactivity (CBCL)	-0.3	0.1	-3	0.003	**
Anxiety/Depression (CBCL)	-0.2	0.1	-2	0.045	*
Attention Problems (CBCL)	-0.15	0.1	-1.5	0.134	
Aggressive Behaviour (CBCL)	-0.25	0.1	-2.5	0.012	**
CBCL Total Score	-0.3	0.05	-6	<0.001	***

Statistic	Value	Significance Codes
AIC	350.25	p < 0.001
BIC	375.60	p < 0.01
		p < 0.05

The findings show that both clinical and psychosocial factors significantly impact physical activity levels in children with JIA. Higher disease-specific activity scores correlated with lower physical activity levels and increased psychological stress. These results emphasize the need for integrated care approaches that address the physical, psychological, and social dimensions of health to improve overall patient outcomes.

DISCUSSION

The findings from this study shed light on the intricate relationship between clinical and psychosocial factors affecting physical activity levels in children with Juvenile Idiopathic Arthritis (JIA). Consistent with prior research, there was a notable inverse relationship between disease activity and physical activity levels. Higher disease activity scores were closely linked to reduced participation in physical activities, highlighting the physical constraints imposed by chronic pain, stiffness, and fatigue characteristic of JIA. These results align with earlier studies that documented similar impacts of JIA symptoms on physical activity.

Furthermore, the study identified significant correlations between psychological stress and physical activity levels. Higher scores on the Pediatric Perceived Stress Scale (PPSS) and various subscales of the Child Behaviour Checklist (CBCL) indicated greater psychological stress, emotional reactivity, and behavioural problems, which were negatively associated with physical activity levels. These findings support the idea that psychological stress worsens the physical limitations of JIA, creating a vicious cycle of inactivity

and declining health outcomes. Previous research has similarly highlighted the harmful effects of psychological stress on physical activity and overall well-being in children with chronic illnesses (4, 6-9, 15-20).

The strengths of this study lie in its comprehensive assessment of both clinical and psychosocial variables, offering a holistic perspective on the factors influencing physical activity in children with JIA. The use of validated instruments like the JADAS-27, IPAQ, PPSS, and CBCL ensured reliable and valid measurements (15-17). Additionally, the large sample size and rigorous statistical analyses, including correlation and regression models, added to the robustness of the findings. However, the cross-sectional design of the study limited the ability to establish causality between the variables. Longitudinal studies are needed to determine causal relationships and understand the temporal dynamics between disease activity, psychological stress, and physical activity levels.

Despite these strengths, the study had several limitations. The reliance on self-reported data for physical activity levels may have introduced reporting biases. Additionally, the study did not consider potential confounders like socioeconomic status, which could influence both physical activity and psychological stress. Future research should aim to include a broader range of variables to control for these potential confounders and provide a more comprehensive understanding of the factors affecting physical activity in children with JIA (6, 18).

The findings have important clinical implications, highlighting the need for integrated care approaches that address both the physical and psychological aspects of health in children with JIA. Interventions aimed at reducing psychological stress, such as cognitive-behavioural therapy and family support programs, could enhance physical activity levels and overall well-being. Previous studies have demonstrated that psychological interventions can improve health outcomes in children with chronic diseases by reducing stress and enhancing coping strategies. Tailored physical activity programs, designed to accommodate the physical limitations of children with JIA, are also crucial. These programs have been shown to improve disease outcomes and reduce hospitalization rates, underscoring the potential benefits of promoting safe and appropriate physical activities for these children (19, 20).

CONCLUSION

In conclusion, this study highlighted the interconnected roles of clinical and psychosocial stress factors in the reduction of physical activity among children with JIA. It emphasized the need for a multifaceted approach to treatment that integrates physical therapy, psychological support, and social interventions. Addressing both the physical and mental health challenges faced by these children is essential for improving their overall quality of life and encouraging active participation in physical activities. Future research should focus on developing and evaluating integrated care models that encompass these dimensions to provide comprehensive support for children with JIA and their families.

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