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Original Research Article

ASSOCIATION BETWEEN GROSS MOTOR DYSFUNCTION SEVERITY IN CHILDREN WITH CEREBRAL PALSY AND PARENTAL DEPRESSION

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ABSTRACT

Background: Cerebral palsy (CP) is a group of permanent neurodevelopmental disorders caused by non-progressive brain injury occurring during early brain development. It is the most common cause of physical disability in children, with a global prevalence of approximately 1.8 to 2.3 per 1,000 live births. Children with CP often experience impaired gross motor function, which increases the physical, emotional, and psychosocial burden on their parents and caregivers. **Objective:** To examine the association between the severity of gross motor dysfunction in children with cerebral palsy and the level of depression among their parents. **Study Design:** Cross-sectional study. **Duration and Place of Study:** This study was conducted at Liaquat University of Medical and Health Sciences Jamshoro, Hyderabad from April 2025 to April 2026.

Materials and Methods: This cross-sectional study included 120 children with cerebral palsy aged 1 to 18 years and one parent of each child. Gross motor function was assessed using the Gross Motor Function Measure-88 (GMFM-88), while parental depression was evaluated using the Depression subscale of the Depression, Anxiety and Stress Scale (DASS-42). Data were analyzed using SPSS version 22. Descriptive statistics were calculated, and because the data were not normally distributed, Spearman's correlation and regression analyses were performed.

Results: A total of 120 children and their parents participated in the study. The mean age of the children was 6.81 ± 3.91 years, while the mean age of the parents was 32.90 ± 7.10 years. The mean GMFM-88 score was 38.70 ± 24.90, and the mean depression score was 16.49 ± 9.30. Spearman's correlation analysis demonstrated a statistically significant negative correlation between parental depression and GMFM-88 scores ($r = -0.250$, $p = 0.005$). Regression analysis showed that each one-unit increase in parental depression score was associated with a 0.63-unit decrease in GMFM-88 score. Male parents reported lower depression scores, while their children demonstrated higher GMFM-88 scores.

Conclusion: A significant inverse association was found between gross motor function in children with cerebral palsy and parental depression. Greater impairment in gross motor function was associated with higher levels of depression among parents, highlighting the importance of integrating psychological support for caregivers into the comprehensive management of children with cerebral palsy.

Keywords: Cerebral palsy; Gross motor function; Gross Motor Function Measure (GMFM-88); Parental depression; Caregivers.

INTRODUCTION

Cerebral palsy (CP) is a group of permanent neurodevelopmental disorders caused by non-progressive injury to the developing brain during the prenatal, perinatal, or early postnatal period.[1] It is the most common cause of physical disability in childhood, with a global prevalence ranging from 1.8 to 2.3 per 1,000 live births. The burden of CP is higher in low- and middle-income countries because of limited access to quality maternal and neonatal healthcare services.[2] In Pakistan, a prevalence of 1.22 per 1,000 live births has been reported in the Swabi district.[3] Approximately 70–80% of CP cases are attributed to prenatal factors, whereas perinatal and postnatal causes account for a smaller proportion.[4] Major risk factors include perinatal hypoxia, maternal anemia, hypertension, prematurity, and low birth weight.[5]

Children with CP commonly present with impaired posture, muscle tone, balance, and motor control, resulting in limitations in mobility and reduced participation in daily activities.[6] Clinical manifestations include spastic diplegia, hemiplegia, and quadriplegia, with the severity of functional impairment depending on the location and extent of the brain injury.[7] In addition to motor dysfunction, children with CP frequently experience associated conditions such as pain, gait abnormalities, hip dislocation, intellectual disability, speech and hearing impairments, and epilepsy, all of which contribute to reduced quality of life.[8] Gross motor function is an important indicator of functional ability and is commonly used to assess the severity of physical impairment in children with CP.[9]

The impact of cerebral palsy extends beyond the affected child and substantially influences the psychological and social well-being of parents and caregivers.[10] Providing long-term care for a child with CP is associated with considerable emotional, physical, social, and financial challenges, particularly for primary caregivers who are responsible for the child's daily care.[11] The level of caregiver burden is influenced by several factors, including the severity of the child's disability, socioeconomic status, and the availability of family and community support.[12,13] Consequently, parents of children with CP have been reported to experience significantly higher rates of depression and other psychological disorders than parents of healthy children.[14,15]

Although previous studies have documented increased psychological distress among parents of children with cerebral palsy, limited evidence has specifically examined the relationship between the severity of gross motor dysfunction and parental depression in the local population. Understanding this relationship may help clinicians identify families at greater psychological risk and facilitate the development of comprehensive rehabilitation programs that address both the functional needs of children and the mental health needs of their caregivers. Therefore, the present study aimed to examine the association between the severity of gross motor dysfunction in children with cerebral palsy and parental depression.

MATERIALS AND METHODS

This cross-sectional study was conducted after obtaining approval from the Institutional Ethical Review Committee. The study included children diagnosed with cerebral palsy (CP) aged 1–18 years and one parent of each child. A total of 120 child-parent pairs were recruited using a non-probability convenience sampling technique.

Inclusion Criteria

Children aged 1–18 years with a confirmed diagnosis of cerebral palsy and one of their parents who provided informed consent were included in the study.

Exclusion Criteria

Children with moderate to severe autism spectrum disorder or any serious systemic illness were excluded. Parents with a known psychological disorder or any serious systemic illness were also excluded from the study.

Gross motor function in children was assessed using the Gross Motor Function Measure-88 (GMFM-88), a validated instrument for evaluating functional motor abilities in children with cerebral palsy. Parental depression was assessed using the Depression subscale of the Depression, Anxiety and Stress Scale (DASS-42).

Data were analyzed using SPSS version 22.0. Descriptive statistics, including mean, standard deviation, frequencies, and percentages, were calculated. The normality of the data was assessed and found to be non-normal. Therefore, Spearman's rank correlation test was used to determine the association between gross motor function and parental depression. Linear regression analysis was performed to evaluate the effect of parental depression on gross motor function. A p-value of less than 0.05 was considered statistically significant.

RESULTS

There were a total of 120 children and 120 parents enrolled in this study. There were a total of 75 male children and 45 female children. Among parents, there were 107 females and 13 males. Table number 1 shows the statistics for the variables of our study.

Table 1

Variables	Mean ± SD
Children Age (yrs)	6.81 ± 3.91

Parents Age (yrs)	32.90 ± 7.1
Depression Scale	16.49 ± 9.3
GMFM Total Score	38.70 ± 24.9

Table number 2 shows the Spearman's correlation analysis between parental depression and GMFM. The results suggest that there is an association between higher levels of parental depression and lower gross motor function in children with CP.

Table 2: Comparison of serum vitamin D levels between CTE and AGA groups (N = 120)

Variables	Correlation (r)	p-value
GMFM vs. Depression Score	-0.250	0.005

The regression analysis of depression and GMFM is shown in table number 3.

Table 3

Variables	B	R2	F	p-value
Depression	-0.630	0.055	7.350	0.008

Table number 4 shows the impact of gender on GMFM scores and depression.

Table 4

Gender of parent	Depression Score	GMFM Score
Male	8	46
Female	17	33.7

A total of 120 children with cerebral palsy (CP) and 120 parents participated in this study. Among the children, 75 (62.5%) were males and 45 (37.5%) were females. The majority of the participating parents were females (n = 107, 89.2%), while 13 (10.8%) were males.

Table 1 presents the descriptive statistics of the study participants. The mean age of the children was 6.81 ± 3.91 years, whereas the mean age of the parents was 32.90 ± 7.10 years. The mean parental depression score was 16.49 ± 9.30, while the mean Gross Motor Function Measure (GMFM-88) score was 38.70 ± 24.90.

Table 1: Descriptive Statistics of the Study Participants

Variable	Mean ± SD
Age of children (years)	6.81 ± 3.91
Age of parents (years	32.90 ± 7.10
Depression score (DASS-42	16.49 ± 9.30
GMFM-88 total score	38.70 ± 24.90

Spearman's rank correlation analysis was performed to determine the relationship between parental depression and gross motor function in children with cerebral palsy. As shown in Table 2, a statistically significant negative correlation was observed between parental depression scores and GMFM-88 scores (r = -0.250, p = 0.005). These findings indicate that higher levels of parental depression were associated with lower gross motor function in children with CP.

Table 2: Spearman's Correlation Between Parental Depression and GMFM-88 Score

Variables	Correlation coefficient (r)	p-value
GMFM-88 score vs. Depression score	-0.250	0.005*

Statistically significant at p < 0.05.

Linear regression analysis was performed to evaluate the effect of parental depression on gross motor function. As shown in Table 3, parental depression was a significant predictor of GMFM-88 score (B = -0.630, F = 7.350, p = 0.008). The model explained 5.5% (R^2 = 0.055) of the variation in gross motor function. The regression coefficient indicates that for every one-unit increase in parental depression score, the GMFM-88 score decreased by approximately 0.63 units.

Table 3: Linear Regression Analysis of Parental Depression Predicting GMFM-88 Score

Predictor	Regression coefficient (B)	R^2	F-value	p-value
Depression score	-0.630	0.055	7.350	0.008*

Statistically significant at p < 0.05.

Table 4 summarizes the mean depression and GMFM-88 scores according to the gender of the parent. Male parents had a lower mean depression score (8.0) than female parents (17.0). Similarly, children of male parents demonstrated a higher

mean GMFM-88 score (46.0) than children of female parents (33.7).

Table 4: Comparison of Depression and GMFM-88 Scores According to Parent Gender

Parent gender	Mean depression score	Mean GMFM-88 score
Male	8.0	46.0
Female	17.0	33.7

DISCUSSION

The present study examined the association between gross motor function in children with cerebral palsy and the level of depression among their parents. The findings demonstrated a statistically significant inverse relationship between gross motor function and parental depression, indicating that parents of children with greater motor impairment experienced higher levels of depressive symptoms. Furthermore, linear regression analysis identified parental depression as a significant predictor of gross motor function, suggesting that worsening parental psychological well-being is associated with lower functional motor performance in children with cerebral palsy.

These findings are consistent with those reported by Yoo et al. (2016), who demonstrated a significant relationship between Gross Motor Function Measure (GMFM) scores and caregivers' quality of life and depression levels.[16] Children with greater functional limitations generally require increased assistance with mobility, self-care, and activities of daily living. Consequently, the prolonged physical, emotional, and financial demands placed on caregivers may contribute to increased psychological distress and depression.

The findings of the present study also agree with those reported by Baloach et al. (2021), who observed a high prevalence of depression among parents of children with cerebral palsy and reported a significant association between caregiver burden and psychological distress ($p = 0.001$).[18] Similarly, Gugala et al. (2018) found significantly higher levels of depression among parents of children with cerebral palsy compared with parents of healthy children.[19] Collectively, these findings support the growing evidence that the functional limitations associated with cerebral palsy affect not only the child but also the psychological well-being of family members, particularly primary caregivers.

However, the findings of the present study differ from those reported by Khan et al. (2021), who found no significant association between gross motor function and parental depression ($p = 0.155$).[17] This discrepancy may be explained by differences in sample size, participant characteristics, assessment instruments, severity of cerebral palsy, cultural factors, and access to rehabilitation and social support services. Such methodological variations may influence the relationship observed between functional impairment and parental mental health.

The present study further demonstrated that female caregivers had higher depression scores than male caregivers. This finding is clinically plausible because mothers often assume the primary responsibility for the daily care, rehabilitation, and emotional support of children with cerebral palsy. The increased caregiving responsibilities, combined with social and economic pressures, may contribute to higher levels of psychological distress. Although Gugala et al. (2018) did not observe significant gender differences in caregiver depression or burden,[19] Sajedi et al. (2009) reported that mothers of children with cerebral palsy had a significantly greater risk of developing depression than the control group, supporting the findings of the present study.[20]

The findings of this study have important clinical implications. Routine psychological screening of parents, particularly primary caregivers of children with severe motor impairment, should be incorporated into multidisciplinary rehabilitation programs. Early identification and management of parental depression may improve caregiver well-being, strengthen family support, and potentially enhance adherence to rehabilitation programs, thereby contributing to better functional outcomes for children with cerebral palsy.

The present study has several limitations. First, its cross-sectional design precludes the establishment of causal relationships between parental depression and children's gross motor function. Second, participants were recruited using convenience sampling from a single setting, which may limit the generalizability of the findings. Finally, the unequal distribution of mothers and fathers in the study population may have influenced the gender-based comparisons. Future multicenter longitudinal studies with larger and more representative samples are recommended to further investigate this relationship and evaluate interventions aimed at improving both caregiver mental health and child functional outcomes.

CONCLUSION

The present study demonstrated a statistically significant inverse association between gross motor function in children with cerebral palsy and parental depression. Greater impairment in children's gross motor function was associated with higher levels of depression among their parents. Female caregivers also exhibited higher depression scores than male caregivers. These findings highlight the importance of adopting a multidisciplinary approach to the management of cerebral palsy that addresses not only the child's physical rehabilitation but also the psychological well-being of parents and caregivers.

Routine mental health screening and appropriate psychosocial support should be integrated into rehabilitation programs to improve the overall quality of care for both children and their families.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical Approval

Ethical approval for this study was obtained from the Institutional Ethical Review Committee.

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