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THE QUALITY OF LIFE OF PRIMARY CAREGIVERS OF CHILDREN WITH CEREBRAL PALSY IN LATUR CITY

A Prospective Cross-Sectional Study

[1]Mitali Pramod Mukkawar, [2]Dr. R. M. Singaravelan (PT)
[1]Intern (IV BPT, 2025–2026), [2]Professor and Head of Department
[1,2]Department of Physiotherapy,
[1,2]MAEER Pune's Maharashtra Institute of Physiotherapy, Latur, Maharashtra, India

Abstract: Background – Cerebral palsy (CP) is the leading cause of chronic disability in childhood, with a prevalence of about 3 per 1000 live births in India. Lifelong dependence of the child places a prolonged care demand on the primary caregiver, which can affect physical health, psychological well-being, family income and quality of life (QoL). Region-specific data from Latur city are lacking. Aim – To assess the QoL of primary caregivers of children with CP in Latur city across the physical, psychological, social relationships and environment domains. Methods – In this prospective cross-sectional study, 108 primary caregivers of children with CP aged 2–12 years were recruited by purposive sampling from hospitals and clinics in and around Latur over six months. QoL was measured with the WHOQOL-BREF (domain scores 0–100). Normality was tested with the Shapiro–Wilk test; the Friedman test with Holm-adjusted Wilcoxon post hoc tests, Mann–Whitney U tests and Spearman correlation were used, with $\alpha = 0.05$. Results – Mean child age was 7.0 ± 2.9 years and mean caregiver age 35.9 ± 6.6 years; 75.0% of caregivers were mothers, 76.9% were women and 65.7% were housewives. Mean domain scores were Physical 45.8 ± 14.7, Psychological 44.4 ± 14.9, Social relationships 57.5 ± 18.1 and Environment 44.8 ± 13.8. All domains were non-normally distributed ($p < 0.05$). The Social domain was significantly higher than the other three (Friedman $\chi^2(3) = 45.30$, $p < 0.001$; Holm $p < 0.001$), which did not differ from one another. Duration of caregiving and age were not correlated with any domain ($|\rho| \leq 0.08$), and no subgroup difference survived multiple-testing correction. Conclusion – Primary caregivers in Latur have reduced QoL (mean below 50) in the physical, psychological and environment domains, while the social domain is relatively preserved. The burden appears from the early years of caregiving, supporting early psychosocial support, counselling and respite care.

IndexTerms - Cerebral palsy, primary caregiver, quality of life, WHOQOL-BREF, Latur city

I. INTRODUCTION

Cerebral palsy (CP) refers to a group of movement disorders caused by non-progressive damage or abnormalities in the developing brain [1]. It is the leading cause of chronic disability in children, leaving them physically and mentally disabled and socially isolated [2]. Because the impairments are lifelong, the outcome of care is judged not only by motor recovery but also by quality of life (QoL), which the World Health Organization (WHO) defines as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns [3]. The worldwide prevalence of CP ranges from 1.5 to more than 4 per 1000 live births; in India it is estimated at nearly 3 per 1000 live births, and as a developing country the true number may be higher [4].

Children with CP often have epilepsy, communication disorders and visual or intellectual impairments in addition to physical disability, and they need long-term assistance with bathing, feeding, mobility and dressing [5]. This demand does not end with the child. Studies on caregivers show that the effects of the condition extend to the people who provide daily care [6]. Caregivers meet their first stress at diagnosis, followed by the demands of caregiving, the cost of treatment and disruption of their own social life. Mothers, who are the most common caregivers in low- and middle-income settings, carry a burden compounded by gender norms, poverty, stigma, lack of inclusive public spaces and insufficient welfare support [15]. Depression in mothers has been linked with lower QoL in the physical, psychological, social and environmental domains, and maternal QoL has been

reported to fall as the child's motor dysfunction increases [7]. Anxiety and depression are clearly higher in primary parental caregivers of children with CP than in parents of typically developing children [12], and fathers also describe the challenges of caregiving [9].

Over the past two decades, researchers have examined the effect of caregiving on mothers of children with CP in terms of psychological well-being [18], stress assessed through salivary cortisol [19], mental health and marital adaptation [20], musculoskeletal pain, QoL and depression [21], and QoL with anxiety and depression [22]. These studies show a significant effect of caregiving compared with mothers of children without developmental disabilities. Mothers who attend physiotherapy departments report substantial psychological and social problems that are often ignored [16].

1.1 Need of the study

Clinical management of CP has received substantial attention worldwide, but the QoL of primary caregivers remains comparatively under-explored. Caregiver QoL can directly or indirectly influence the quality of care given to the child and thereby the child's physical, emotional and social development. Evidence from India, and particularly from Latur city, is lacking. Studying caregiver QoL in Latur is therefore essential to understand caregivers' needs and to plan better support for both the caregiver and the child.

1.2 Research question, aim and objectives

The research question was: what is the quality of life of primary caregivers of children with cerebral palsy in Latur city, and what factors influence it? The aim was to find out the QoL of primary caregivers of children with CP in Latur city. The objectives were to assess the physical, psychological, social relationship and environmental factors that influence the QoL of these caregivers.

II. REVIEW OF LITERATURE

Liu et al. studied 189 caregivers of children with CP in China and found that care burden had a negative effect on physical and mental QoL, whereas social support and positive coping were positively associated with QoL; social support mediated the link between burden and QoL [23]. In Southwestern Nigeria, Solaja and Olaogun reported moderate burden in 42.4% of 92 carers, linked to physical stress, time constraints, lack of support and financial strain, with significant associations with education and occupation [24]. Eke and Paul found severe burden most often in the disappointment and general strain domains among caregivers of children with chronic illness [10]. Kouther et al. found moderate to extremely severe stress in a substantial share of 40 caregivers in Jeddah, associated with the child's visual impairment and frequent hospital admissions [26].

Among studies that used the WHOQOL-BREF, Kondekar et al. assessed 50 caregivers in Mumbai and found all four domains significantly affected, the psychological domain most and the environmental domain least [4]. Sonune et al. studied 203 mothers and found a significant negative correlation between depression severity and all QoL domains, with QoL falling as the child's motor dysfunction increased and being influenced by the child's age [7]. Çolak and Kahriman reported that parental QoL decreased as family burden rose in 518 parents of children with disabilities [14]. The WHOQOL-BREF has been shown to be a reliable and valid tool, with high internal consistency (Cronbach's alpha = 0.91) and a robust four-domain structure [25]. Qualitative work in South India and Nigeria described the unique burden of mothers arising from gender norms, poverty, stigma and non-inclusive public policy, and the psychosocial problems of mothers attending physiotherapy [15,16]. A study from Khartoum concluded that feasible changes could improve the QoL of children with CP and their caregivers [17].

III. MATERIALS AND METHODS

3.1 Study design, setting and participants

This was a prospective cross-sectional study of six months' duration, conducted in hospitals and clinics in and around Latur city, Maharashtra, India, after permission from the Institutional Ethical Committee. A total of 108 primary caregivers were enrolled by purposive sampling; the sample size was calculated with the formula $n = Z^2 \times P \times (1 - P) / d^2$. Primary caregivers of children with CP aged 2–12 years, with normal reading, writing and cognitive ability and willing to participate, were included. Caregivers with any chronic medical condition or a history of psychological disorder, and those unwilling to participate, were excluded.

3.2 Outcome measure

QoL was assessed with the WHOQOL-BREF, the 26-item short form of the WHO Quality of Life instrument [27]. It measures four domains – Physical health (7 items), Psychological health (6 items), Social relationships (3 items) and Environment (8 items) – plus two general items on overall QoL and health. Items are rated on a 5-point Likert scale, and raw domain scores are transformed to a 0–100 scale on which a higher score means better QoL.

3.3 Procedure

Eligible participants were identified using the inclusion and exclusion criteria. Written informed consent was taken in English or Marathi, the procedure was explained, and participants were free to leave the study at any point. Socio-demographic details (child's age and gender; relationship, age, gender and occupation of the caregiver; and duration of caregiving) were recorded on a data collection sheet. Each participant then completed the WHOQOL-BREF and the four domain scores were recorded.

3.4 Statistical analysis

Data were entered in Microsoft Excel and analysed in Python (SciPy 1.17); graphs were drawn with matplotlib. Continuous data are given as mean ± SD and median (IQR), and categorical data as n (%). Normality was checked with the Shapiro–Wilk test, skewness and kurtosis. Because all variables were non-normal and domain scores are bounded and tied, non-parametric tests were used: the Friedman test with post hoc Wilcoxon signed-rank tests to compare the four domains within the same caregivers, Mann–Whitney U tests to compare child gender, caregiver gender and occupation (housewife vs employed/other), and Spearman correlation for age and duration. Each family of tests was corrected with the Holm–Bonferroni method [28], effect sizes and 95% confidence intervals were reported, and a two-sided $p < 0.05$ was considered significant. An exploratory multiple linear regression was also fitted for each domain. No observation was altered, imputed or removed.

IV. RESULTS

4.1 Participant characteristics

Data were complete for all 108 caregivers, with no missing values. Most caregivers were mothers (75.0%) and women (76.9%), and 65.7% were housewives; boys formed 59.3% of the children (Table 1). Caregivers averaged 35.9 ± 6.6 years of age and had provided care for 7.0 ± 2.9 years, and children averaged 7.0 ± 2.9 years (Table 2). Duration of caregiving was almost identical to child age ($\rho = 0.996$).

Table 1: categorical characteristics of participants (N = 108)

Characteristic	n	%
Child gender – male	64	59.3
Child gender – female	44	40.7
Primary caregiver – mother	81	75.0
Primary caregiver – father	25	23.1
Primary caregiver – grandmother	2	1.9
Caregiver gender – female	83	76.9
Caregiver gender – male	25	23.1
Occupation – housewife	71	65.7
Occupation – employed/other	37	34.3

Table 2: descriptive statistics of continuous variables and WHOQOL-BREF domain scores (N = 108)

Variable	Mean ± SD	95% CI of mean	Median (Q1–Q3)	Min–Max
Child age (years)	7.0 ± 2.9	6.5–7.6	7.0 (5.0–9.2)	2–12
Caregiver age (years)	35.9 ± 6.6	34.6–37.1	35.5 (30.8–40.0)	24–57
Duration of caregiving (years)	7.0 ± 2.9	6.4–7.5	7.0 (5.0–9.0)	2–12

Variable	Mean ± SD	95% CI of mean	Median (Q1–Q3)	Min–Max
Physical health (0–100)	45.8 ± 14.7	43.0–48.7	44.0 (38.0–56.0)	19–94
Psychological (0–100)	44.4 ± 14.9	41.5–47.2	44.0 (31.0–56.0)	13–88
Social relationships (0–100)	57.5 ± 18.1	54.1–60.9	56.0 (50.0–75.0)	6–81
Environment (0–100)	44.8 ± 13.8	42.2–47.4	44.0 (31.0–56.0)	13–75

4.2 Normality and WHOQOL-BREF domain scores

All seven continuous variables departed significantly from normality on the Shapiro–Wilk test (all $p \leq 0.012$), so non-parametric tests were used. The Social relationships domain had the highest mean score (57.5 ± 18.1), whereas Physical health, Psychological and Environment scores were similar (44.4–45.8). Taking 50 only as a reference line, 63 (58.3%), 69 (63.9%), 26 (24.1%) and 62 (57.4%) caregivers scored below 50 in the Physical, Psychological, Social and Environment domains, respectively (Figure 1). The domain scores differed significantly in the same caregivers (Friedman $\chi^2(3) = 45.30$, $p < 0.001$; Kendall's $W = 0.14$). Post hoc tests showed that this was due entirely to the Social domain, which scored 11.7–13.1 points higher than each of the other three domains (Holm $p < 0.001$, $r = 0.48$–0.57), while Physical, Psychological and Environment scores did not differ from one another (Table 3, Figure 2).

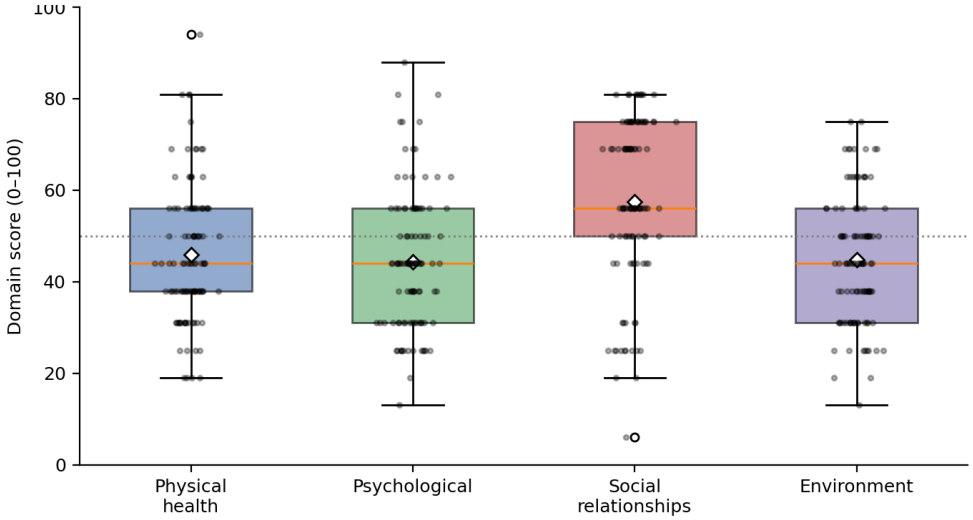

Figure 1: distribution of WHOQOL-BREF domain scores (box = median and IQR; diamond = mean; dotted line = scale midpoint of 50)

Table 3: post hoc pairwise comparison of domain scores (Wilcoxon signed-rank, N = 108 pairs)

Comparison (A vs B)	p	Holm p	Effect size r	Mean diff. A − B (95% CI)
Physical vs Psychological	0.243	0.728	0.11	+1.5 (−0.9, 3.9)
Physical vs Social	<0.001	<0.001	0.48	−11.7 (−15.6, −7.7)
Physical vs Environment	0.462	0.924	0.07	+1.0 (−1.6, 3.7)
Psychological vs Social	<0.001	<0.001	0.54	−13.1 (−17.0, −9.3)
Psychological vs Environment	0.788	0.924	0.03	−0.5 (−3.1, 2.2)
Social vs Environment	<0.001	<0.001	0.57	+12.7 (9.3, 16.1)

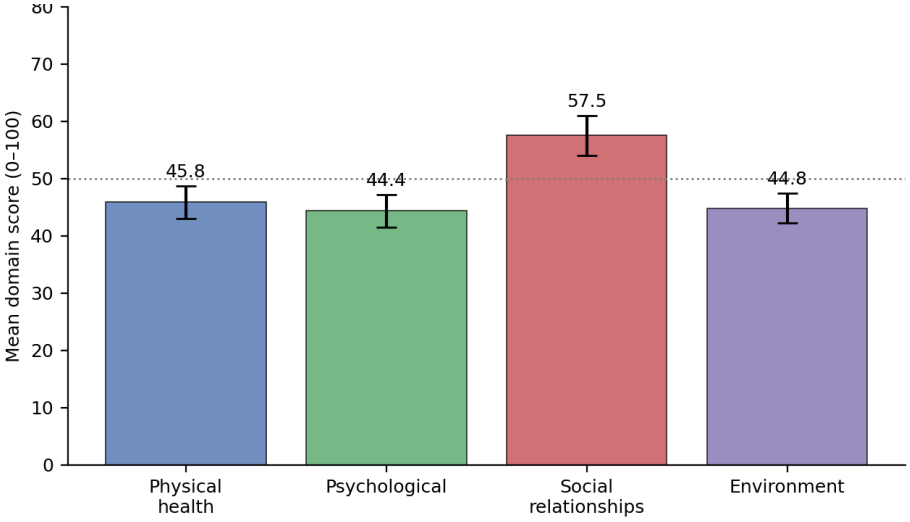

Figure 2: mean WHOQOL-BREF domain scores with 95% confidence intervals

4.3 Differences by child gender, caregiver gender and occupation

Caregivers of boys (n = 64) scored lower than caregivers of girls (n = 44) in every domain (Table 4). Only the Psychological domain reached unadjusted significance (41.9 vs 48.0; U = 1083.5, p = 0.040; Hedges' g = −0.41), and it was not significant after Holm correction for 12 comparisons (p = 0.485). No domain differed by caregiver gender (all p ≥ 0.225) or by occupation (all p ≥ 0.151), and effect sizes were small (|g| ≤ 0.33).

Table 4: WHOQOL-BREF domain scores by child gender, caregiver gender and occupation (Mann–Whitney U)

Grouping	Domain	Group A mean ± SD	Group B mean ± SD	p	Holm p	Hedges' g
Child gender: male (n = 64) vs female (n = 44)	Physical	43.5 ± 13.2	49.2 ± 16.3	0.079	0.792	−0.39
	Psychological	41.9 ± 14.5	48.0 ± 14.8	0.040	0.485	−0.41
	Social	55.8 ± 18.7	59.9 ± 17.0	0.261	1.000	−0.22
	Environment	42.7 ± 13.6	47.9 ± 13.7	0.070	0.771	−0.38
Caregiver gender: female (n = 83) vs male (n = 25)	Physical	46.4 ± 13.8	44.1 ± 17.6	0.225	1.000	+0.15
	Psychological	44.3 ± 14.6	44.6 ± 16.1	0.845	1.000	−0.02
	Social	56.7 ± 18.6	60.0 ± 16.5	0.500	1.000	−0.18
	Environment	44.2 ± 14.3	46.9 ± 12.2	0.370	1.000	−0.20
Occupation: housewife (n = 71) vs employed/other (n = 37)	Physical	45.5 ± 14.0	46.4 ± 16.3	0.984	1.000	−0.06
	Psychological	42.7 ± 14.3	47.6 ± 15.5	0.151	1.000	−0.33
	Social	57.4 ± 18.6	57.8 ± 17.4	0.963	1.000	−0.02
	Environment	43.9 ± 14.0	46.6 ± 13.3	0.348	1.000	−0.20

4.4 Correlations and regression

Child age, caregiver age and duration of caregiving were not correlated with any domain (all |ρ| ≤ 0.08, unadjusted p ≥ 0.436, Holm p = 1.00; Table 5). The Physical, Psychological and Environment domains were moderately and significantly correlated with one another (ρ = 0.45–0.58, Holm p < 0.001), while the Social

domain was only weakly correlated with the others (ρ = 0.18–0.30; Table 6). In exploratory linear regression, child gender, caregiver gender, age and occupation together explained at most 9.1% of the variance in any domain (adjusted $R^2 \leq 0.05$), and no model was significant overall (all $p \geq 0.077$).

Table 5: Spearman correlation (ρ, with unadjusted p) of domain scores with age and duration (N = 108)

Variable	Physical	Psychological	Social	Environment
Child age	−0.03 (0.730)	−0.02 (0.807)	−0.05 (0.590)	−0.08 (0.436)
Caregiver age	−0.03 (0.767)	−0.03 (0.758)	−0.04 (0.681)	−0.06 (0.534)
Duration of caregiving	−0.03 (0.795)	−0.02 (0.841)	−0.04 (0.698)	−0.06 (0.533)

Table 6: inter-domain Spearman correlations (N = 108)

Domain pair	ρ	95% CI	p	Holm p
Physical – Psychological	0.58	0.43, 0.70	<0.001	<0.001
Physical – Social	0.18	−0.02, 0.37	0.060	0.060
Physical – Environment	0.45	0.27, 0.59	<0.001	<0.001
Psychological – Social	0.23	0.03, 0.41	0.018	0.035
Psychological – Environment	0.49	0.33, 0.63	<0.001	<0.001
Social – Environment	0.30	0.11, 0.48	0.001	0.004

V. DISCUSSION

This study examined the QoL of 108 primary caregivers of children with CP in Latur city using the WHOQOL-BREF. Mean scores were 45.8 for Physical health, 44.4 for Psychological, 57.5 for Social relationships and 44.8 for Environment. The Social domain was the exception, scoring about 12–13 points above the other three domains, which did not differ meaningfully from one another. Between 57% and 64% of caregivers scored below 50 in those three domains, compared with 24% in the Social domain. The midpoint of 50 is only a reference line, as the WHOQOL-BREF has no validated clinical cut-off.

The comparatively higher Social score may reflect the value caregivers place on personal relationships and the support they receive. This is consistent with Liu et al., who reported that social support was positively associated with caregivers' QoL and mediated the effect of care burden [23]. However, social support was not measured here and the Social domain has only three items, so this explanation is tentative. Kondekar et al. also used the WHOQOL-BREF in caregivers of children aged 2–12 years in Mumbai and found all domains affected, with the psychological domain most and the environmental domain least affected [4]. In our sample the Psychological and Environment scores were nearly identical (44.4 and 44.8) and both were lower than the Social score; the difference in ordering may be due to setting, sample and analysis, but both studies agree that the psychological domain is among the most compromised. Kouther et al. and Sonune et al. linked caregiver mental health and depression to the child's clinical condition [26,7]. Our data contained no information on type or severity of CP, motor function or caregiver depression, so these links could not be examined.

Sonune et al. reported that the child's age influenced the mother's QoL [7]; we did not observe this. Child age, caregiver age and duration of caregiving were not correlated with any domain. Duration was almost identical to child age, so their effects cannot be separated. The absence of a trend suggests that the burden of caregiving is already present in the early years and does not rise steadily with time, which underlines the need for psychosocial support from the outset and not only for caregivers of older children.

Caregivers of boys scored lower than caregivers of girls in every domain, but only the Psychological difference (41.9 vs 48.0) reached significance before adjustment (p = 0.040) and it did not survive Holm correction (p = 0.485). It should therefore be treated as a lead for follow-up in a larger sample and not as a confirmed finding. Caregiver gender and occupation were not associated with any domain, although these comparisons were imprecise because all fathers were employed and only 25 caregivers were men. Solaja and Olaogun found an association between burden and occupation and education [24]; because we used a two-group occupation variable and had no education data, we could neither confirm nor refute this.

Strengths of this study include complete data, formal checks of data quality and normality, non-parametric tests suited to bounded and tied scores, correction for multiple comparisons, and reporting of effect sizes with confidence intervals. The findings support caregiver-focused interventions such as psychological counselling, social support, respite care and financial assistance, which may also benefit the child's rehabilitation because caregiver well-being can influence the care the child receives.

VI. CONCLUSION

In this sample of 108 primary caregivers of children with CP in Latur city, mean WHOQOL-BREF scores were 45.8 (Physical), 44.4 (Psychological), 57.5 (Social relationships) and 44.8 (Environment). The Social domain was significantly higher than the other three (about 12–13 points; Holm $p < 0.001$), which did not differ from one another, and 57–64% of caregivers scored below 50 in the Physical, Psychological and Environment domains. None of the demographic or caregiving variables studied was significantly associated with any domain after correction for multiple testing, and QoL did not change with longer caregiving, indicating that the impact is present from the early years. Because there was no comparison group, the study describes the level and profile of caregiver QoL but cannot show whether it is lower than in caregivers of typically developing children. Caregiver-targeted interventions, including counselling, social support, respite care and financial assistance, should be explored to improve both caregiver and child outcomes.

VII. LIMITATIONS AND FUTURE SCOPE

The study had no information on the child's clinical profile (type and severity of CP, motor function, comorbidity), family income, education, caregiver health, social support or number of children, so the regression models could not adjust for important determinants. Thirty-six inferential tests were performed, so exploratory findings remain provisional. The WHOQOL-BREF is self-reported and has no clinical cut-off, the 13 free-text occupation labels had to be simplified to two groups, and the single-group design lacked a reference population. Future work should include larger multicentric samples with a comparison group of caregivers of typically developing children, the child's clinical variables (including GMFCS level), caregiver education, income, social support and depression or burden scales, longitudinal follow-up, further study of the possible child-gender difference in psychological QoL, and interventional studies of counselling, social support, respite care and caregiver training, including programmes delivered through physiotherapy departments.

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REFERENCES

[1] Kliegman RM, Stanton BF, St Geme III JW, Schor NF. Encephalopathy. In: Kliegman RM, editor. Nelson Textbook of Pediatrics. 1st ed. New Delhi: Elsevier India; 2016. p. 2896.

[2] Eyong KI, Asindi AAA. Cerebral palsy in Calabar, Nigeria – a preliminary study. Nig Med Pract 2010;58:105-10.

[3] The World Health Organization Quality of Life assessment (WHOQOL): Position paper from the World Health Organization. Soc Sci Med 1995;41:1403-9.

[4] Kondekar A, Ansari Q, Ghatol H. The quality of life of primary caretakers of children with cerebral palsy. J Family Med Prim Care 2024;13:4457-61.

[5] Richards CL, Malouin F. Cerebral palsy: definition, assessment and rehabilitation. Handb Clin Neurol. 2013;111:183-95. https://doi.org/10.1016/B978-0-444-52891-9.00018-X.

[6] Raina P. The health and well-being of caregivers of children with cerebral palsy. Pediatrics. 2005;115(6):e626-36. https://doi.org/10.1542/peds.2004-1689.

[7] Sonune SP, Gaur AK, Shenoy A. Prevalence of depression and quality of life in primary caregiver of children with cerebral palsy. J Family Med Prim Care 2021;10:4205-11.

[8] Olawale OA, Deah AN, Yaadar RK. Psychological impact of cerebral palsy on families: The African perspective. J Neurosci Rural Pract 2013;4:159-63.

[9] Cardinali P, Migliorini L, Rania N. The caregiving experiences of fathers and mothers of children with rare diseases in Italy: challenges and social support perceptions. Front Psychol. 2019;10:468397.

[10] Eke GK, Paul NI. Caregivers' burden of caring for children with chronic illnesses at a tertiary health facility in Southern Nigeria. World J Adv Res Rev. 2021;10(1):105-14.

[11] Liu Z, Heffernan C, Tan J. Caregiver burden: A concept analysis. Int J Nurs Sci. 2020;7(4):438-45.

[12] Gugała B, Penar-Zadarko B, Pięciak-Kotlarz D, Wardak K, Lewicka-Chomont A, Futyma-Ziaja M, et al. Assessment of anxiety and depression in Polish primary parental caregivers of children with cerebral palsy compared to a control group, as well as identification of selected predictors. Int J Environ Res Public Health. 2019;16(21):4173.

[13] Novak-Pavlic M, Rosenbaum P, Macedo LG, Di Rezze B, Yong J, Noori A, et al. Effectiveness of interventions to promote physical, psychological, and socioeconomic well-being outcomes of parents of children with neurodevelopmental disabilities: protocol for a systematic review. JMIR Res Protoc. 2022;11(7):e38686.

[14] Çolak B, Kahriman I. Evaluation of family burden and quality of life of parents with children with disability. Am J Fam Ther. 2023;51(2):113-33.

[15] Vadivelan K, Sekar P, Sruthi SS, Gopichandran V. Burden of caregivers of children with cerebral palsy: an intersectional analysis of gender, poverty, stigma, and public policy. BMC Public Health. 2020;20:1-8.

[16] Michael O, Olufemi O, Jasola F, Abigail D, Adetutu L, Modinat A. Psychosocial problems among mothers of children with cerebral palsy attending physiotherapy outpatient department of two selected tertiary health centres in Ogun state: A pilot study. AIMS Med Sci. 2019;6(2):158-69.

[17] Mohammed FM, Ali SM, Mustafa MA. Quality of life of cerebral palsy patients and their caregivers: A cross sectional study in a rehabilitation center Khartoum Sudan (2014-2015). J Neurosci Rural Pract 2016;7:355-61.

[18] Barlow JH, Cullen-Powell LA, Cheshire A. Psychological well-being among mothers of children with cerebral palsy. Early Child Dev Care 2006;176:421-8.

[19] Bella GP, Garcia MC, Spadari-Bratfisch RC. Salivary cortisol, stress, and health in primary caregivers (mothers) of children with cerebral palsy. Psychoneuroendocrinology 2011;36:834-42.

[20] Florian V, Findler L. Mental health and marital adaptation among mothers of children with cerebral palsy. Am J Orthopsychiatr 2001;71:358-67.

[21] Kaya K, Unsal-Delialioglu S, Ordu-Gokkaya NK, Ozisler Z, Ergun N, Ozel S, et al. Musculo-skeletal pain, quality of life and depression in mothers of children with cerebral palsy. Disabil Rehabil 2010;32:1666-72.

[22] Zanon MA, Batista NA. Quality of life and level of anxiety and depression in caregivers of children with cerebral palsy. Rev Paul Pediatr 2012;30:392-6.

[23] Liu F, Zhang R, Cui C, Zhou H. Care burden and quality of life among family caregivers of children with cerebral palsy in China: the mediating roles of social support and coping styles. BMC Public Health. 2025. https://doi.org/10.1186/s12889-025-21679-7.

[24] Solaja OA, Olaogun AA. Caregiver burden among carers of children with cerebral palsy in selected hospitals in Southwestern Nigeria: a concurrent mixed-method study. 2025.

[25] Almarabheh A, Ben Salah A, Alghamdi M, Al Saleh A, Elbarbary A, Al Qashar A, et al. Validity and reliability of the WHOQOL-BREF in the measurement of the quality of life of sickle disease patients in Bahrain. Front Psychol. 2023;14:1219576. https://doi.org/10.3389/fpsyg.2023.1219576.

[26] Kouther DA, Shakir MO, Alhumaidah RA, Jamaluddin HA, Jaha AY, Alshumrani MJ, et al. Factors influencing the mental health of caregivers of children with cerebral palsy. Front Pediatr. 2022;10:920744. https://doi.org/10.3389/fped.2022.920744.

[27] The WHOQOL Group. Development of the World Health Organization WHOQOL-BREF quality of life assessment. Psychol Med. 1998;28(3):551-8.

[28] Holm S. A simple sequentially rejective multiple test procedure. Scand J Stat. 1979;6(2):65-70.