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The Impact of a Structured Homecare Intervention Program on Caregivers' Knowledge of Children with Cerebral Palsy in Kirkuk City

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ABSTRACT

Introduction: Cerebral palsy (CP) describes a group of long-term neurological disorders that affect posture, mobility, and muscle tone due to damage to the developing brain, usually before or immediately after birth. Children with CP may have difficulty with balance, coordination, and fine motor skills. Some may also experience problems with speech, vision, or learning. The severity of symptoms can vary widely between people. For children with CP, prompt diagnosis and treatment—such as occupational therapy, physical therapy, and supportive care—are essential to improving function, independence, and general quality of life.

Methods: A quasi-experimental study design was used. Caregivers and their children who had CP attended physiotherapy in the rehabilitation units at Azadi Teaching Hospital in Kirkuk City, Iraq. Non-probability sampling (purposive) was used to recruit 60 caregivers (30 in the intervention group and 30 in the control group). The intervention group received a specific educational program to improve caregivers' knowledge of home care, while the control group did not receive it. Only caregivers caring for children with CP were included. Data were collected through face-to-face interviews; the Mann-Whitney test was used to compare pre- and post-test measurements. The p value ≤0.05 was considered a statistically significant difference.

Results: Most caregivers (66.7-76.7%) were mothers from diverse educational and socioeconomic backgrounds. The most frequent type of spastic CP, occurring in 66.7-76.7% of cases, was observed in both groups. The pre-test results revealed no significant difference between the two groups before implementing the program. The program's effectiveness was demonstrated by the intervention group's statistically significant difference between pre- and post-test scores, whereas the control group's post-test scores remained unchanged.

Conclusion: The structured educational program significantly enhanced caregivers' knowledge in the intervention group, with no improvement in the control group.

Keywords: Caregivers, cerebral palsy, program evaluation, delivery of healthcare

Introduction

Cerebral palsy (CP) is a long-term, non-progressive disorder affecting the developing brain of the fetus or newborn. It's one of the most common causes of physical disability and is associated with motor disorders, causing problems with perception, sensation, cognition, and communication (1). Historically, CP was first described as a movement disorder in ancient Sumerian and Hippocratic writings (2). The disorder results from brain damage during a critical stage of cerebral cortex development (3). Such an injury may occur either before birth or during the child's first five years of life. Several factors such as premature birth, stroke, birth asphyxia, genetic abnormalities, head injuries, home delivery, hypoxic-ischemic encephalopathy, intrauterine growth restriction, hyperbilirubinemia, low birth weight, microcephaly, multiple pregnancies, small for gestational age, infections (such as chorioamnionitis, maternal urinary tract infections, cytomegalovirus, and neurotropic virus infection), and other factors can lead to CP (4,5). Globally, this neuro-developmental disorder affects around 17 million people (5). The prevalence of CP ranges from 1 to 4 per 1000 live births worldwide, predominantly reported in high-income countries, while data from low- and middle-income countries suggest higher rates, with estimates of 3 to 4 per 1,000 live births (6). The incidence of CP is estimated at approximately 3 per 1,000 children, with a reported male-to-female ratio of 1.4:1 (7). Classification of CP is primarily based on the predominant type of motor impairment, which may include involuntary

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movements such as dyskinesia, spasticity, and ataxia (8). According to topographical distribution, CP is further categorized into diplegia, quadriplegia, hemiplegia, triplegia, and monoplegia (9-12).

The most frequent complications associated with CP are related to movement, self-care, and communication. Social, intellectual, and physical isolation are more prevalent among children diagnosed with CP (13). Based on the severity of impairments, children with CP can experience issues such as spasticity, contractures, scoliosis, joint dislocations, skin breakdown, aspiration pneumonia, malnutrition, dental issues, low bone mass, epilepsy, psychological challenges, poor vision, perceptual impairment, difficulties while performing self-care tasks like eating, dressing, getting around, and bathing, and complications with bowel and bladder (1,14). The Management of CP requires professional medical, therapeutic, social, and educational programs because there is no widely recognized cure. Physical therapy, occupational therapy, speech therapy, behavioral therapy, medication, and surgery play essential roles in patient care (1,15). Botulinum toxin type A (Botox) may lessen spasticity, and the treatment of dystonia has historically involved anti-Parkinsonian drugs, such as anticholinergic and dopaminergic drugs, and anti-spasticity agents such as baclofen. However, anticonvulsants, anti-dopaminergic drugs, and antidepressants have also been tested (16). Beyond medical treatment, caring for children with CP requires a comprehensive home-care approach in which caregivers play a crucial role. Therefore, assessing caregivers' knowledge and practices is essential to ensure effective care and optimal outcomes for affected children (1,17).

Ensuring enough nourishment, protecting skin health and safety, providing emotional support, promoting growth and development, and instructing parents on how to care for their child are all important aspects of caring for children with CP (18,19). Parents who care for their children with CP play a critical role in helping those children achieve significant developmental milestones. Caregivers who have a better understanding of CP are better equipped to handle caregiving duties; well-informed caregivers are more likely to have high self-efficacy and positive psychosocial indicators and to offer enhanced care and support. The health and quality of life of children with CP can be enhanced by caregivers by improving their understanding of the illness, which often leaves them ill-prepared to confidently provide the care their children require (1,14,20). Insufficient parental awareness of CP can exacerbate disorders, hindering children's growth, while well-informed individuals promote a cooperative mindset, indirectly benefiting their children's development (21). However, caregivers of children with CP frequently face considerable physical and psychological challenges, including stress and health-related problems, which may restrict their capacity to offer appropriate care (22). Therefore, nurse-prepared, structured educational programs are crucial for enhancing caregivers' knowledge and ability to manage children with CP at home. These initiatives assist parents by providing guidance on appropriate nutrition, physical well-being, care techniques, and engagement activities, while also supporting them in building confidence and skills in everyday caregiving. Previous studies have demonstrated that caregivers involved in nurse-led structured initiatives show a markedly improved understanding of CP management and deliver enhanced care quality to their children (15,23).

Objectives of the study

- Find out the socio-demographical characteristics of caregivers.
- Find out the biographical information of children with CP in Kirkuk City.
- Assess the level of caregiver's knowledge regarding home-care pre and post-tests.
- Find out the impact of home-care program on caregivers' knowledge pre and post-tests.
- Find out the association between selected socio-demographic characteristics of the study sample and caregivers knowledge.
- Construct an educational program for caregivers' who take care of children with CP.

Methods

A quasi-experimental study was conducted among 60 caregivers and their children with CP who received physiotherapy in the rehabilitation unit of Azadi Teaching Hospital, Kirkuk City, Iraq. The study period was from May 1st to August 1st, 2025. Participants were selected using a non-probability (purposive) sampling technique because of the exacting inclusion criteria and the small number of caregivers who visited the rehabilitation center throughout the research period. They were divided into two groups: the intervention group consisted of thirty caregivers who were exposed to the educational program, and the control group consisted of thirty caregivers who were not exposed to the program. Additionally, the educational program was developed based on relevant literature and focused on caregivers' knowledge of CP and home-care management, including general information, causes, signs and symptoms, complications, treatment, and critical home-care practices. The program was provided through seven structured face-to-face sessions conducted by the researcher, each lasting approximately 30 minutes, over two weeks. For data collection, an appropriate tool was developed based on an extensive review of the literature and divided into two parts. Part I included two subsections. Section I focused on the socio-demographic characteristics of caregivers, such as age, gender, and socioeconomic status. Section II presents the demographic characteristics of children with CP, providing details such as age and sex. Part II: Assessment of caregiver knowledge about CP. It comprises 38 items designed to assess knowledge. Dichotomous scoring was used: one (1) for a correct answer and zero (0) for an incorrect answer. The pre-test was performed immediately before the intervention, and the post-test was given two weeks after the intervention group had completed the instructional program. Verbal consent was received from all caregivers. Voluntary participation was assured; participants were free to withdraw at any time without penalty; privacy was maintained; confidentiality was ensured; and the study was approved by the Ethical Committee of the Hawler Medical University, College of Nursing (approval number:

2425, date: 22.08.2024) before starting the study. Content validity was established by a panel of experts, and Cronbach's alpha (reliability coefficient) was 0.77.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS version 27). In order to examine the differences between the two independent groups, the Mann-Whitney U test used as the Shapiro-Wilk test revealed that the data were not normally distributed ($p<0.05$). A p value of less than 0.05 was deemed statistically significant.

Demographic Characteristics of Caregivers

Most caregivers of children with CP were mothers (76.7% and 66.7% in the control and intervention groups, respectively). Most of the studied mothers were aged 35 years and above, represented by 53.3% of the control group and 46.7% of the intervention group. Regarding education, 36.7% of caregivers in the control group were illiterate, while 30% of caregivers in the intervention group could read and write. Most caregivers were housewives in the control and intervention groups (70% and 73.3%, respectively). The majority had full-term children (70% vs. 60%), and most had only one affected child in the family (86.7% vs. 100%) (Table 1).

Table 1. Distribution of socio-demographic characteristics of caregivers of CP children

	Variables	Control group F. (%)	Intervention group F. (%)
The caregiver	Mother	**23 (76.7)**	**20 (66.7)**
	Father	4 (13.3)	4 (13.3)
	Other	3 (10)	6 (20)
Age; years old	21-27	1 (3.3)	10 (33.3)
	28-34	13 (43.3)	6 (20)
	35-41 and more	**16 (53.3)**	**14 (46.7)**
Level of education	Illiterate	**11 (36.7)**	5 (16.7)
	Can read and write	6 (20)	**9 (30)**
	Primary school graduate	6 (20)	6 (20)
	Secondary school graduate	1 (3.3)	6 (20)
	Diploma or college graduate	6 (20)	3 (10)
	Postgraduate certificate	0 (0)	1 (3.3)
Occupation	Public employee	6 (20)	3 (10)
	Private employee	1 (3.3)	0 (0)
	Self-employee	2 (6.7)	4 (13.3)
	Student	0 (0)	1 (3.3)
	Housewife	**21 (70)**	**22 (73.3)**
Gestational age	Full-term	**21 (70)**	**18 (60)**
	Pre-term	9 (30)	11 (36.7)
	Post-term	0 (0)	1 (3.3)
Number of affected CP children	One child	**26 (86.7)**	**30 (100)**
	Two children	3 (10)	0 (0)
	3 and more children	1 (3.3)	0 (0)

CP: Cerebral palsy

Distribution of Biographical Characteristics of CP Children

In the control group, 50% of children were at the preschool developmental stage, compared with 56.7% of children in the intervention group who were mainly at the toddler stage. Among the CP children, 56.7% of the control group were female, while the intervention group had equal proportions of males and females. Regarding birth weight, 60% of CP children were underweight, whereas 43.3% were of normal weight. Most children in both groups were born in public hospitals (90% vs. 73.3%). The 53.3% of children in the control group cried immediately after birth, whereas 73.3% of children in the intervention group did not cry. The most frequent type of spastic CP was observed in both groups (66.7-76.7%) (Table 2).

Compare the Pre-Test of Both Groups (Control and Intervention) Regarding Mothers' Knowledge

Mothers' pre-intervention knowledge in both the control and intervention groups was assessed to determine baseline similarities before implementing the structured home care program; this assessment revealed no significant differences between the groups. General knowledge had the highest p value ($p=0.692$), followed by knowledge of causes ($p=0.064$); the mean difference was -0.80. Signs

Table 2. Distribution of biographical characteristics of CP children (control and intervention groups) n=60

	Variables	Control group F. (%)	Intervention group F. (%)
Developmental stage	Toddler	11 (36.7)	**17 (56.7)**
	Pre-school age	**15 (50)**	10 (33.3)
	School age	4 (16.7)	3 (10)
Gender	Male	13 (43.3)	**15 (50)**
	Female	**17 (56.7)**	**15 (50)**
Weight at time of birth	Less than 1,000 g	4 (13.3)	4 (13.3)
	Less than 1,500 g	0 (0)	5 (16.7)
	Less than 2,500 g	**18 (60)**	7 (23.3)
	2500 g-3999 g	8 (26.7)	**13 (43.3)**
	High birth weight (>4000 g)	0 (0)	1 (3.3)
Place of birth	In general hospital	**27 (90)**	**22 (73.3)**
	In private hospital	1 (3.3)	5 (16.7)
	At home	2 (6.7)	3 (10)
Cry of the child at birth	Soon after birth	**16 (53.3)**	8 (26.7)
	After some time	14 (46.7)	**22 (73.3)**
Type of CP	Spastic	**23 (76.7)**	**20 (66.7)**
	Athetoid	1 (3.3)	1 (3.3)
	Ataxic	0 (0)	2 (6.7)
	Mixed	6 (20)	7 (23.3)

CP: Cerebral palsy

and symptoms had a mean difference of -0.67 (p=0.083); problems had a mean difference of -0.47 (p=0.278) with the largest upper confidence interval (CI) (0.39); and therapy had a mean difference of -0.27 (p=0.290). Overall, mothers' knowledge showed the largest mean difference (-2.07; p=0.074; 95 % CI: -4.34 to 0.21) indicating that the two groups were similar in knowledge before the implementation of the program (Table 3).

Comparison Between Pre-Test and Post-Test of the Control Group Regarding Mothers' Knowledge

The effect of the health education program on mothers' knowledge in the control group was assessed by comparing pre-test and post-test results. The analysis revealed no significant differences in knowledge domains between the pre- and post-tests. The p values for general knowledge, knowledge of causes, and signs and symptoms were p=0.716 (upper CI: 0.862), p=0.539 (upper CI: 0.522), and p=0.938 (upper CI: 0.819), respectively. Knowledge of difficulties had p=0.714 (upper CI: 0.858), whereas therapy showed the highest t value (1.157) with a mean difference of 0.333 (upper CI: 0.910). Overall, mothers' knowledge showed p=0.777, a mean difference of 0.333, and the broadest CI (-2.01 to 2.68), indicating that knowledge levels remained similar in the control group following the program (Table 4).

Comparison Between Pre-Test and Post-Test of the Intervention Group Regarding Mothers' Knowledge

The impact of the health education program on mothers' knowledge in the intervention group was evaluated by comparing pre-test and post-test results. The analysis showed statistically significant improvements

Table 3. Comparison between pre-test of both groups (control and intervention) group regarding mothers' knowledge

Knowledge	Domain	T	Df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
							Lower	Upper
General knowledge	Control pre-test	0.399	58	0.692	0.13333	0.33448	-0.53620	0.80287
	Intervention pre-test	0.399	51.560	0.692	0.13333	0.33448	-0.53799	0.80465
Knowledge on causes	Control pre-test	-1.887	58	0.064	-0.80000	0.42390	-1.64853	0.04853
	Intervention pre-test	-1.887	57.744	0.064	-0.80000	0.42390	-1.64861	0.04861
Knowledge on sign and symptoms	Control pre-test	-1.764	58	0.083	-0.66667	0.37794	-1.42319	0.08985
	Intervention pre-test	-1.764	56.720	0.083	-0.66667	0.37794	-1.42355	0.09022
Knowledge on difficulties*	Control pre-test	-1.096	58	0.278	-0.46667	0.42571	-1.31881	0.38548
	Intervention pre-test	-1.096	54.449	0.278	-0.46667	0.42571	-1.32000	0.38666
Knowledge on treatment	Control pre-test	-1.068	58	0.290	-0.26667	0.24975	-0.76660	0.23326
	Intervention pre-test	-1.068	56.557	0.290	-0.26667	0.24975	-0.76687	0.23354
Overall mothers' knowledge	Control pre-test	-1.818	58	0.074	-2.06667	1.13678	-4.34217	0.20884
	Intervention pre-test	-1.818	57.196	0.074	-2.06667	1.13678	-4.34285	0.20952

*Difficulties include: drooling, difficulty in swallowing, functional constipation, epilepsy, sensory defect, stiff joints, dental caries, and delayed speech millstone). Sig.: Significant, Std.: Standard, Df: Degrees of freedom

Table 4. Comparison between control (pre-test and post-test) group before, and after implement health education program regarding mother's knowledge

Compare between mothers' knowledge after implementation of education program		T	Df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
							Lower	Upper
General knowledge	Control pre-test	0.366	58	0.716	0.13333	0.36410	-0.59549	0.86215
	Control post-test 1	0.366	56.850	0.716	0.13333	0.36410	-0.59580	0.86247
Knowledge on causes	Control pre-test	-0.619	58	0.539	-0.23333	0.37717	-0.98833	0.52166
	Control post-test 1	-0.619	56.197	0.539	-0.23333	0.37717	-0.98885	0.52218
Knowledge on sign and symptoms	Control pre-test	-0.078	58	0.938	-0.03333	0.42566	-0.88539	0.81872
	Control post-test 1	-0.078	57.500	0.938	-0.03333	0.42566	-0.88555	0.81888
Knowledge on difficulties*	Control pre-test	0.368	58	0.714	0.13333	0.36209	-0.59147	0.85814
	Control post-test 1	0.368	57.951	0.714	0.13333	0.36209	-0.59149	0.85815
Knowledge on treatment	Control pre-test	1.157	58	0.252	0.33333	0.28821	-0.24358	0.91025
	Control post-test 1	1.157	57.048	0.252	0.33333	0.28821	-0.24379	0.91045
Overall mothers' knowledge	Control pre-test	0.285	58	0.777	0.33333	1.17163	-2.01194	2.67861
	Control post-test 1	0.285	57.837	0.777	0.33333	1.17163	-2.01208	2.67875

*Difficulties include: drooling, difficulty in swallowing, functional constipation, epilepsy, sensory defect, stiff joints, dental caries, and delayed speech millstone) Sig.: Significant, Std.: Standard, Df: Degrees of freedom

in all knowledge domains following the program (p=0.000). The greatest increase was observed in total knowledge (mean difference: 15.902, 95% CI: 14.32-17.49), followed by an increase in knowledge of causes (mean difference: 7.767, t: 25.09). Other areas showed substantial improvement, including general knowledge (mean difference: 1.581), signs and symptoms (mean difference: 3.800), problems (mean difference: 3.367), and therapy (mean difference: 2.550), indicating the effectiveness of the program in enhancing mothers' understanding (Table 5).

Discussion

The present study examined the demographic characteristics of caregivers and children with CP, as well as caregivers' knowledge before and after an educational intervention, and compared the findings with previous literature.

Mothers constituted the largest proportion of caregivers in both groups, accounting for 76% of caregivers in the control group and 66% of caregivers in the intervention group. Fathers accounted for 3-13% in each group, whereas other family members provided more care in the intervention group (20%) than in the control group (10%). Almosallam et al. (1) and Hussein et al. (19) found comparable results, showing that mothers are the major caregivers for daily physical care, medical appointments, and treatment adherence. Bibi et al. (22) and Abo Hamed (23) confirmed that mothers play the primary caring role for children with CP in a variety of cultural situations. 46.7% of caregivers in the intervention group and 53.3% in the control group were 35 years of age or older. Thirty-three percent of caregivers in the intervention group were younger than caregivers in the control group. The age range of these caregivers was 21 to 27 years, which differs from the average ages reported in other studies (36.35±6.97 years and 36.76±7.85 years). As a result of the long-term caregiving responsibilities for children with CP, previous studies by Almosallam et al. (1), Rashad et al. (12), Gad Ahmed et al. (15), Bibi et al. (22), Hamed and Abo Hamed (23), Ramadan Mohamed Ebeed et al. (24), Samia et al. (25), Gamal et al. (26), and Jahan et al. (27), have found that most caregivers are in their early to middle years of life.

Regarding employment, the percentage of caregivers who were housewives in the present study was between 21% and 22%, substantially lower than reported in other studies (for instance, 75% to 80%). Cultural norms, socioeconomic conditions, and sampling methods may explain this difference [Almosallam et al. (1); Rashad et al. (12); Hussein et al. (19); Samia et al. (25); Gamal et al. (26); Jahan et al. (27)]. Regarding education, the present study showed an 11% illiteracy rate in the control group and a 9% literacy rate for those who could "read and write" in the intervention group, consistent with the wide variety in educational levels discovered in prior studies, from high educational level of 53.7% to significant rates of illiteracy. These demographic discrepancies are significant because caregivers' ability to provide care and their access to essential resources are affected by their educational background and employment status. According to earlier studies by Almosallam et al. (1), Rashad et al. (12), Gad Ahmed et al. (15), Bibi et al. (22), Samia et al. (25), Gamal et al. (26), Jahan et al. (27), caregivers' employment status and educational background have a direct impact on their capacity to manage CP, provide care, and make effective use of healthcare resources.

In the current sample, 50% of the children in the control group were preschool-aged, similar to previous research, whereas 56.7% of the intervention group were toddlers, and there were fewer school-aged children in both groups. On the other hand, the median age of the children was 8 years. The control group had a higher proportion of females (56.7%) than males, but the intervention group had equal gender distribution. Gender distribution has been reported to vary across studies. Low birth weight (<2500 g) was more common in the control group (73.3%) than in the intervention group (43.3%), whereas a

Table 5. Comparison between intervention (pre-test and post-test) groups after implement health education program regarding mother's knowledge

Compare between pre and post-test of intervention after implement the education program		T	Df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
							Lower	Upper
General knowledge	Intervention pre-test	-7.384	56	0.000	-1.58095	0.21411	-2.00987	-1.15203
	Intervention post-test 1	-7.560	40.488	0.000	-1.58095	0.20911	-2.00342	-1.15848
Knowledge on causes	Intervention pre-test	24.225	56	0.000	7.76667	0.32061	7.12441	8.40892
	Intervention post-test 1	25.090	29.000	0.000	7.76667	0.30955	7.13356	8.39978
Knowledge on sign and symptoms	Intervention pre-test	14.893	56	0.000	3.80000	0.25515	3.28887	4.31113
	Intervention post-test 1	15.425	29.000	0.000	3.80000	0.24635	3.29615	4.30385
Knowledge on difficulties*	Intervention pre-test	9.638	56	0.000	3.36667	0.34932	2.66689	4.06644
	Intervention post-test 1	9.982	29.000	0.000	3.36667	0.33728	2.67686	4.05647
Knowledge on treatment	Intervention pre-test	13.712	56	0.000	2.55000	0.18597	2.17745	2.92255
	Intervention post-test 1	14.005	43.151	0.000	2.55000	0.18208	2.18285	2.91715
Overall mothers' knowledge	Intervention pre-test	20.124	56	0.000	15.90238	0.79021	14.31941	17.48535
	Intervention post-test 1	20.809	30.475	0.000	15.90238	0.76420	14.34269	17.46207

*Difficulties include: drooling, difficulty in swallowing, functional constipation, epilepsy, sensory defect, stiff joints, dental caries, and delayed speech millstone).
Sig.: Significant, Std.: Standard, Df: Degrees of freedom

higher proportion of high birth weight (>4000 g) infants was observed in the intervention group. This indicates differing perinatal characteristics, resembling those observed in previous studies. Rashad et al. (12), Gad Ahmed et al. (15), Hussein et al. (19), Samia et al. (25), and Jahan et al. (27) have previously documented that the majority of children with CP are diagnosed in early childhood, that the gender distribution varies among studies, and that low and high birth weights are significant risk factors during the perinatal period. Most children in both groups were born in general hospitals (90% vs. 73.3%), although the intervention group had a slightly higher percentage of deliveries in private hospitals and home births. More than half of the children in the control group cried immediately (53.3%), while fewer children in the intervention group did so (26.7%). In the present study, birth histories showed between-group variation in the timing of the first cry, similar to observations in other research. In all groups, spastic CP was the most prevalent subtype (76.7% and 66.7%), followed by the mixed type, with one occurrence of ataxic CP (6.7%), which is consistent with epidemiological statistics from comparable studies.

The current study reveals no statistically significant differences in any of the knowledge domains between the mothers in the study's control and intervention groups' baseline knowledge before implementing the educational program ($p>0.05$), with the greatest p value (0.692) found in general knowledge, followed by knowledge of causes ($p=0.064$), knowledge of signs and symptoms ($p=0.083$), knowledge of difficulties ($p=0.278$), knowledge of treatment ($p=0.290$), and overall mothers' knowledge ($p=0.074$). These results indicate homogeneity between groups at baseline, consistent with the baseline similarities reported in previous studies. Analysis of pre- and post-program knowledge levels in the control group showed no statistically significant differences ($p>0.05$) across general knowledge, causes, signs and symptoms, difficulties, and treatment; the mean difference was only 0.33 ($p=0.777$). This suggests that mothers' understanding did not improve in the absence of the educational intervention. These results align with previous studies indicating that caregivers' knowledge remains largely unchanged without structured educational programs [Perveen et al. (14); Gad Ahmed et al. (15); Hussein et al. (19); Abo Hamed (23); Samia et al. (25); Sayed et al. (28)], supporting the conclusion that observed benefits in previous research are primarily due to the educational intervention rather than extraneous influences.

The intervention group showed highly significant changes across all knowledge domains following the implementation of the educational program ($p<0.001$). The most substantial gain was observed in overall knowledge, with a mean difference of 15.90 (95% CI: 14.32–17.49). Knowledge of causes also showed a marked improvement (mean difference: 7.77), followed by knowledge of signs and symptoms (mean difference: 3.80), difficulties (mean difference: 3.37), treatment (mean difference: 2.55), and general knowledge (mean difference: 1.58). These results illustrate that the training program significantly improved mothers' knowledge of CP. The post-intervention results of the this study demonstrated a statistically significant improvement in the intervention group's knowledge, while no significant change was observed in the control group. These findings are consistent with previous studies [(Rafique (5); Perveen et al. (14); Gad Ahmed et al. (15); Samia et al. (25)] reporting that structured educational programs considerably improve caregivers' knowledge in a variety of domains.

Improvements in caregiver knowledge were observed, increasing from 12% pre-intervention to 94% post-intervention; however, these gains declined over time, underscoring the need for ongoing reinforcement. Persistent misconceptions about CP management remain problematic, indicating that single-session interventions may not ensure lasting behavior change. Nevertheless, the study provides evidence that structured educational programs can effectively improve caregiving practices, with outcomes influenced by caregivers' educational background, motivation, and resource availability, as evidenced by the Assessment of Caregivers' Knowledge. Previous studies by Gad Ahmed et al. (15) and Abo Hamed (23) found that educational and training programs can successfully improve caregiver knowledge. However, both studies emphasized that without ongoing reinforcement, the advantages may diminish, and one-time interventions are frequently ineffective. They stated that caregiver motivation, education, and available resources substantially influence the effective application of new knowledge to daily care practices.

Study Limitations

This study has certain limitations. The short follow-up duration prevented evaluation of long-term knowledge retention. Variability in caregivers' educational backgrounds and learning abilities may have influenced the outcomes of the intervention. Moreover, caregivers' household responsibilities and difficulties with transport occasionally restricted their full participation in the training sessions. Finally, limited availability of rehabilitation services in the region may have affected caregivers' ability to consistently apply the learned home-care skills.

Conclusion

The study reveals that the caregivers of children with CP are predominantly mothers in their thirties. It underscores differences in socioeconomic status, job availability, and literacy, which affect the quality of care and access to resources. Children with CP exhibit diverse characteristics, including age, gender, and CP type. The study recommended the following:

- Home care visits to improve caregivers' performance in CP home care.
- Focused educational programs to enhance caregivers' knowledge of CP.
- Ongoing and personalized educational programs to address varied caregiver backgrounds and ensure lasting improvements.
- Further research with longer follow-up periods is recommended to evaluate knowledge retention and the long-term impact on child outcomes.

Ethics

Ethics Committee Approval: The study was approved by the Ethical Committee of the Hawler Medical University, College of Nursing (approval number: 2425, date: 22.08.2024).

Informed Consent: Verbal informed consent was obtained from all caregivers who participated in the study.

Footnotes

Authorship Contributions: Concept - S.S.H.; Design - S.S.H.; Data Collection or Processing - H.F.M., Analysis or Interpretation - H.F.M., S.S.H.; Literature Search - S.S.H.; Writing - S.S.H.

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