Effect of mothers' empowerment guildelines about caring for children with cast on their knowledge and children selected outcomes

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Abstract

Casts are used to keep the bones and soft tissues lined up and protected while they are healing. A cast wraps completely around the arm or leg and is custom-made for the patient. It can only be taken off with a specialized cast saw. Casts also protect wounds after surgery while it heals. The hard, immobile part of most custom made casts is made from plaster or fiberglass**. Aim of the study:** evaluate the effect of mothers' empowerment guidelines about caring for children with cast on their knowledge and children selected outcomes. **Research Design:** Pre-posttest quasi-experimental research design will be used to fulfill the current study's goal. **Setting:** The current study was conducted at the orthopedic surgical unit and pediatric orthopedic outpatient clinic at Cairo University Specialized Pediatric Hospital (CUSPH). **Participants:** A purposive sample of 60 mothers whose children with cast, divided equally to study and control groups. **Data collection tools:** Structured Interview Questionnaire, Mother's Knowledge & Practices Assessment Sheet, and Post Cardiac Catheterization Assessment Record were used. **Results:** There was a significant statistical difference in the total mean scores for children's outcomes between both groups, as well as, in the mean scores for mothers' knowledge and practice between before and after empowerment guidelines implementation. **Conclusion:** there was a significant increase in knowledge and reported practice in caring for children with cast following empowerment guidelines. Moreover, children of mothers who received empowerment guidance had better cast's outcomes. **Recommendation:** Extensive prospective randomized studies required to enhance outcomes.

Keywords: Empowerment Guidelines, and Children Selected Cast Outcomes

Introduction

Musculoskeletal disorders (MSDs) are major disorders that affect the pediatric population, providing valuable insights into their diagnosis, treatment, clinical and radiologic outcomes, and prognosis predictors. Approximately 33% of childhood medical problems were related to the musculoskeletal system. They range from those that arise suddenly and are short-lived, such as fractures, to lifelong conditions associated with ongoing functioning limitations and disability. Musculoskeletal disorders are the leading contributor to disability worldwide [(1)]. As lifestyles have an impact on musculoskeletal health, studies show that more children and young people are developing MSDs, and doing so earlier in life[(2)].

Musculoskeletal disorders are injuries and conditions that influence the human body's musculoskeletal system, which contains the bones, muscles, tendons, ligaments, nerves, and discs. The muscles, joints, and bones of children are affected by a wide range of illnesses. These conditions may be as result of hereditary factors, trauma, inflammation, or infection[(3)]. Musculoskeletal disorders can be categorized as traumatic damage,

congenital defects, acquired defects, infections of the bones and joints, bone and soft tissue tumors, and disorders of the joints [4].

Children are different from adults as they are developing physically, socially, and psychologically. Due to physiology and biomechanics of growth, children and young people show a unique set of age-related problems. Children show a unique set of age related symptoms. Delays in diagnosis may lead to long term disability or mortality [5].

The improvement of a child's health-related quality of life is the ultimate goal of treatment for children with orthopedic issues. Options for treatment depend on the child's age, the type and degree of MSDS. Children can be treated without surgery, and the most frequent corrections involve the use of a splint, cast, traction, and braces to speed up healing. Drugs are administered to treat pain and stop infections. In order to retain bone fragments in place and allow for alignment and healing, surgical treatment techniques may be necessary [6].

Casts are used to keep the soft tissues and bones aligned and safe while they mend. A cast is manufactured specifically for the patient and completely encircles the arm or leg. It can only be removed using an expert cast saw. Casts can help to keep surgical wounds safe while they heal. Most bespoke casts are produced with plaster or fiberglass for the hard, immovable portion [7].

Cast immobilization can cause complications ranging from minor skin rashes to major iatrogenic nerve palsy, compartment syndrome, skin loss, and contracture [8]. Cast may cause a number of issues. Some of these complications, including soiling and moisture, can be found during a physical examination, while others might be more challenging to identify. A cast that smells bad could indicate a wound infection. With pediatric patients, localization of pressure sores may not be achieved [9].

In children, cast immobilization can result in pressure ulcers, especially around bone prominences and cast edges with inadequate padding, as well as dermatological issues including damp casts that can promote maceration skin breakdown and infection. Other cast-related complications include severe discomfort, skin irritation, ischemia, and necrosis [10].

Clinical pediatrics frequently expresses the desire to empower parents. Parental empowerment increases parental involvement in day-to-day care and decision-making, reduces symptoms in children, improves informational requirements and skills, and fosters more altruistic and pro-social conduct. Finding the correct balance between medical and community resources, as well as paying attention to parents' cognitive and emotional needs, can all help to foster parent' empowerment[11].

The nurse is tasked with involving the parents in the child's healthcare, particularly while the child is through a hospital procedure. She is regarded as a specialist professional. From hospitalization until release, nursing care is very thorough and includes directing, communicating safety, and letting patients and family express their emotions, concerns, and suffering [12].

Nurses assist parents in caring for their children through educating the parents. The goal of parent' education is to increase parents' health literacy and understanding while also fostering healthy relationships, life skills, and behavior changes that will help parents improve the health of their families. To assist parents in learning and comprehending the "what, why, how, and when" of necessary care, parent' education practices should draw on evidence-based learning theories [(13)].

Orthopedic nursing focuses on preventing and treating MSDs. An orthopedic nurse's role also includes teaching families and children on the prevention, symptoms, and treatments of musculoskeletal diseases [(14)].When a child with musculoskeletal diseases is immobilized, nurses are crucial to the patient's care. The general objectives of care for an immobile child and family are ensuring that they don't suffer any physical harm or psychological issues, and that they have enough nutrition, fluids, Infection control and surveillance. Other objectives include involving the child in divisional activities that are appropriate and providing the child and family with sufficient support and instruction [(3)]. One of the most challenging aspects of caring for child with cast is keeping the cast clean and dry and maintaining healthy skin integrity. Caring for the child in cast at home can be very stressful, therefore it is essential that nurses provide the appropriate support and discharge education. The care of the child include positioning, skin care, cast care, pain relief, child activities, follow up and warning signs of a problem with child's cast[(15)].Nurses play a major role in prevention of cast complications, as she is the one who early recognize the signs of cast complications and apply all measures to prevent complications of cast[(16)].

Significance of the study

Worldwide, the burden of MSDs increased significantly and MSDs being the second cause of the years lived with disability worldwide [(17)].Dermatologic complications have been reported in up to 1.4% of pediatric casts. Awareness of complications is important for timely recognition and reduced morbidity in this pediatric population [(10)].

In Egypt, musculoskeletal system anomalies were the most common types of congenital anomalies [(18)].Another study concluded that, musculoskeletal system anomalies were the most common in 48% of cases [(19)].

A study found that the incidence of cast-related skin complications was 8.9 per 1000 casts and the study recommended applying effective intervention to reduce cast complication[(9)]. Complications of casts have contributed a burden of non-emergent children seen in emergency departments. The study concluded that, equally as important as applying a cast is the detailed child' education on how children and children's family can maintain this cast [(8)].

Based on the medical records of the statistical affairs department in Cairo University Specialized Pediatric Hospital (CUSPH)[(20)], the total number of children admitted to the orthopedic pediatric surgery department "in the year 2015 to 2016" was 1185.Through empirical experience in surgical unit at CUSPH, the research investigator observed thatchildren with MSDs

dramatically increased and they were at high risk for occurrence of complications due to lack of instructions for those children and their families.

In Egypt, there are scarce studies conducted and focused on teaching the1. parents of children with cast. Hence, the current study is undertaken to evaluate the effect of mothers' empowerment guidelines about caring2. for children with cast on their knowledge and children selected outcomes. Hopefully the results will set a standard care that can be followed to improve the knowledge of these mothers and achieve better outcomes for their children. The results of the current study will help in reducing the incidence of cast complications among children with MSDs. As well as providing guidance and recommendations that should be reflected in pediatric nursing education and providing evidence based data that can develop nursing practice and research in the field of pediatric surgery nursing.

Operational Definition

Children' selected outcomes

In the current study, child's selected outcomes are the established criteria against which the success of implementing the empowerment guidelines is measured which is judged by child's vital signs, intensity of child's pain, status of the cast, skin integrity, occurrence of complications of immobilization, occurrence of potential injuries, child's nutrition as well as movement.

Aim of the study

The aim of the current study was to evaluate the effect of mothers' empowerment guidelines about caring for children with cast on their knowledge and children selected outcomes.

Research Hypotheses

The current study tested the following research hypotheses:

Mothers' level of knowledge related to care of their children with cast is expected to be improved after receiving empowerment guidelines.

Children outcomes are expected to be improved after empowerment of mothers' knowledge related to caring of their children's with cast.

Methods

Research Design

One pre- posttest group quasi experimental research design was utilized to achieve the aim of the current study.

Setting

The study conducted at the pediatric orthopedic surgical unit which is located at the fourth floor in Cairo University Specialized Pediatric Hospital (CUSPH). The unit capacity was 12 beds. The study also conducted in the pediatric orthopedic outpatient clinic, in the second floor at CUSPH. The hospital received children from all over Egypt. The orthopedic surgical unit and pediatric orthopedic outpatient clinic received cases of children affected with various orthopedic disorders either congenital or acquired at a great rate due to the scarcity of this specialty in the other hospitals.

Subjects

A purposive sample of 60 mothers and their children with cast participated in the study. The first 30 mothers received empowerment guidelines (study group). The second 30 mothers didn't receive the empowerment guidelines (control group). The number

of participants calculated based on the following formula. The mothers no is calculated according to children's total number per year. According to informal report of manager of pediatric orthopedic surgical unit, It was about 40 -70 children admitted to pediatric orthopedic surgical unit.

Inclusion criteria

-Mothers' of children who aged from 3 to less than 6 years (preschool child).

-Both gender of children.

-Children with different types of casts.

Exclusion Criteria

-Children with any congenital anomalies such as gastrointestinal, genitourinary, and central nervous system as well as congenital heart defects.

Data collection tools

The required data collected by the following tools, which were developed by the research investigators after extensive review of related literatures.

1-**Tool I: Structured Interview Questioner**

It assessed Sociodemographic data of the studied mothers and their children with cast. It included 14 items and divided into two parts:

Part 1: It involved 5 questions related to the personal data of the mothers such as age, level of education, occupation, and place of residence.

Part 2: It included 9 questions concerned with data about the child's personal characteristics as age, gender, and child rank in the family. It also involves child's past and present medical history questions related to cast (such as causes, type and site of cast).

2- Tool II: Mothers' Knowledge Assessment Questionnaire (Pre/Post Test):-

It divided into two parts to assess mothers' knowledge about cast and cast care.

Part 1: Mothers' knowledge regarding cast, it had 7 questions such as cast's definition, functions, indications, observations, complications, treatment, and care after implementation.

Part 2: Mother's reported practices regarding cast care included 43 questions regarding the mobility, bathing, elimination, feeding, fluids intake, accident prevention, follow-up, assessment of cast site (edema, injuries, and capillary refill), and treatment.

Scoring system:

Mothers' Knowledge and Reported Practices Assessment Questionnaire (Pre/Post Test). After the conversion of total scores of each part of the same Questionnaire**,** scores were 100 points**.** Fifty points were related to mothers' knowledge about cast, and a further 50 were related to the mother's reported practice in caring for children with cast. Each complete answer was given 2 points, an incomplete answer was given 1 point, and an incorrect or no answer was given 0 points. The total score was converted to 100% (100 points) and categorized as follows: A score of less than 60% (less than 60 points) is considered unsatisfactory, and a score of 60% or more (60 points) is considered satisfactory.

3- Tool III: Post Cast Child's Outcomes Assessment Record:

It assessed the children's outcomes. It divided into three parts.

Part 1: Assessment of Children's Intensity of Pain: It was performed using Faces Pain Rating Scale (FPRS), developed by Wong and Baker (1983), contented 6 faces. It was a pain scale to

assess pain intensity in children. Each face is rated by number to determine the pain intensity (0-10). The scores ranged from 0 (no hurt/pain) to 10 (hurts worst/worst pain). The higher the total scores (10), the more pain the child was experiencing. The scale had high test-retest reliability and content validity. In addition, the scale had high reliability with a Cronbach's alpha coefficient of 0.70, as tested by Drendel, Kelly, and Ali (2011). The scale was available online without copyright restrictions. It is available online at: www.health.gov.au.

Part 2: it had 15 questions to evaluate cast condition and cast complications, child's skin in affected limb, pulse in effected limb, child's movement, and complications of immobilization and potential injuries.

Part 3: it consisted of 9 questions regarding rash, redness, edema, warm limb, cold dry skin, anoxia, vomiting, low fluids intake, diarrhea, and constipation.

Mothers' empowerment guidelines:

It developed by the researchers. It had information about cast and cast care for mothers to provide accurate care for their children and had better outcomes and limit occurrence of complications. It contained information regarding definition, aim, duration, cause of cast, information about care of child with cast such as pain relief, cast care, skin care, enhancing activities, elimination, fluids intake and nutrition. In addition to, it had information about cast complications and immobilization and how to prevent these complications and what should the mother do if they happened. The guidelines booklet included figures and pictures to facilitate and enhance understanding of this information.

Validity and Reliability

The tools were reviewed by three experts in pediatric surgery nursing, and pediatric orthopedic surgery to test the content and face validity of the tools. Modifications of tools were done according to the experts' judgment. The tools were examined for content coverage, clarity, relevance, applicability, wording, length, format, and overall appearance. Reliability of tools performed to confirm its consistency using Cronbach's alpha. It equaled 0.72.

Pilot study

A pilot study was conducted on six mothers who had children with cast and their children to clarify the tool's contents and determine the time required to fill the tools. As a result, minor changes have been made, such as changing the wording of some districts. Based on the pilot study results, mothers of children participating in the pilot study were included in the study.

Procedure

The study tools were developed by the researches after extensive review of the literature. After taking the approval of the Research Ethics Committee of Faculty of Nursing, Cairo University. Official permissions obtained from the director of CUSPH and from the heads of pediatric orthopedic surgical unit and pediatric orthopedic surgery out-patient clinic. The researchers introduced themselves to the mothers of children who fulfill the inclusion criteria. In the first visit, a written formal consent attained after explanation of the aim, the nature of the study and mothers rights.

After the mothers accepted to participate in the study, the researchers met each mother alone at special quiet room in the surgical department in waiting area to keep their privacy to fill the study's tools. The researchers fall the structured interview questionnaire (tool I). Children's data obtained from mother and completed from the medical records on individual bases, then the mothers were given the **Mothers' Knowledge Assessment Questionnaire (tool II)** as pretest questionnaire regarding knowledge about cast and its related care. It took about 30-45 minutes for each mother. Then, **Post Cast Child's Outcomes Assessment Record** (Tool III) filled at the same room by researchers as the 1st time. It took about 20-30 mins.

In the 2nd day the researchers utilized mothers' empowerment guidelines Arabic booklet to empower mothers about cast and cast care. It had information about cast and cast care for mothers to help them to provide accurate care for their children, improve their outcomes and limit occurrence of cast complications. It contained information regarding definition, aim, duration, cause of cast, information about care of child with cast such as pain relief, cast care, skin care, enhancing activities, elimination, fluids intake and nutrition. In addition, it had information about cast complications and immobilization and how to prevent these complications and what should the mother do if they happened. The researcher used mothers' empowerment guidelines Arabic booklet and re-demonstration of practices on a doll, educational videos and pictures also utilized and distributed to each mother who participated in study group. This session was taking 30-45 minutes for each mother.

During follow up schedule, the 1st visit was 7 days of cast. The researchers were given the **Mothers' Knowledge Assessment Questionnaire (tool II)** to mother in quite room at waiting area of pediatric orthopedic outpatient clinic as posttest questionnaire regarding knowledge about cast and its related care. It took about 30-45 minutes for each mother. Then, **Post Cast Child's Outcomes Assessment Record** (Tool III) filled at pediatric orthopedic outpatient clinic by researchers as the 2nd time. It took about 20-30 mints.

The control group left for hospital routine of care. The researcher provided mothers' empowerment guidelines Arabic booklet, educational videos and pictures also utilized and distributed to each mother who participated in the control group. The control group collected after the completion of the study sample collection.

Statistical analysis

The collected data coded, categorized, tabulated, and analyzed using the Statistical Package for Social Science (SPSS) program version 21. Descriptive data expressed as mean and standard deviation. Qualitative data expressed as frequency and percentage. Chi- square used to detect the relation between mothers' knowledge based on their selected personal variables. Comparison of means performed using Paired sample t-test. Correlation among variables would be done using Pearson Correlation coefficient. Level of significance set at $P < 0.05$, 0.001

would be used as the cut of value for statistical significance.

Ethical Considerations

An approval obtained from the Research Ethics Committee in the Faculty of Nursing, Cairo University. A written informed consent attained from children' mothers by the researchers after complete description of the purpose and nature of the study in order to obtain their acceptance as well as, to gain their cooperation. Children and their mothers informed that participation in the study was voluntary; mothers had the right to withdraw from the study at any time without giving any reason and without any effect on the care of their children. Confidentiality assured to children and their mothers

Results

Table (1) showed that 40% of the mothers in both groups were 25-30 years old. Furthermore, regarding the mother's educational level, half (50%) of the mothers in the study group were illiterate, whereas 36.7% of mothers in the control group had basic education. Finally, regarding maternal occupation, most mothers in the study group (87.7%) and control group (73.4%) were working mothers.

Figure (1) illustrates that the highest percentage of mothers live in rural areas in n the study and control groups (60%, and 76.7%, respectively).

Table (2) clarified that more than two-fifths (43.3%) of the children in The study and control groups were between the ages of 4 and 5 years. Furthermore, in the study group, more than half of the children (53.3%) were male, and more than two-fifths (46.7%) were female, while the control group had the highest percentage of males (60%) and 40.0% of females.

Table (3) found statistically significant differences between mothers' mean knowledge before and after receiving cast's definition, function, time, complications, treatment, and care ($p<0, 05$).

Table (4) illustrated that There were statistically significant differences were detected between the total mean score of mothers' practices before and after receiving empowerment guidelines regarding bathing, feeding, activity, and follow up ($p < 0.05$).

Table (5) indicated that there was statistically significant difference detected between mothers' knowledge and practices before and after receiving empowerment guidelines ($p < 0.05$).

Table (6) indicated that 63.3 %of mothers had insufficient knowledge and practices compared to 36.7 % with sufficient knowledge and practices.

The Table (7) showed statistically significant differences between children's outcomes in both groups regarding many items.

Table (8) revealed that there was a highly statistically significant positive correlation between mothers' knowledge and practices before receiving empowerment guidelines $r=0.640$, $p=0.000$ and their level of education as well as there was a highly statistically significant positive correlation between mothers' knowledge and practices after receiving empowerment guidelines $r=0.507$, $p=0.000$ and their level of education.

It is evident from Table (9) that there was a highly statistically significant positive correlation between mothers'

knowledge and practices after getting empowerment guidelines and their place of residence. As well as there was a statistically significant positive correlation between mothers' knowledge and practices before receiving empowerment guidelines and working status

Table (1) Percentage Distribution of Mothers' Personal Data in study and control groups.

Mothers' Personal Data	Study (n=30)		Control (n=30)		X^2	P
	N	%	N	%		
Mothers 'age/years:-					23.067	0.574
< 20	2	6.7	1	3.3		
20 to less than 25	5	16.7	10	33.4		
25 to less than 30	12	40	12	40		
30 to less than 35	6	20	4	13.3		
35 to less than 40	4	13.3	2	6.7		
40 and more	1	3.3	1	3.3		
Mother's level of education:-					33.579	0.117
Not read or write	15	50	7	23.4		
Read and write	1	3.3	1	3.3		
Basic education	7	23.4	11	36.7		
Secondary school	4	13.3	7	23.4		
University education	3	10	4	13.3		
Mothers 'occupation:-					16.133	0.24
Working outside home	26	86.7	24	73.4		
Housewife	4	13.3	6	26.6		

* Significant at p < 0.05

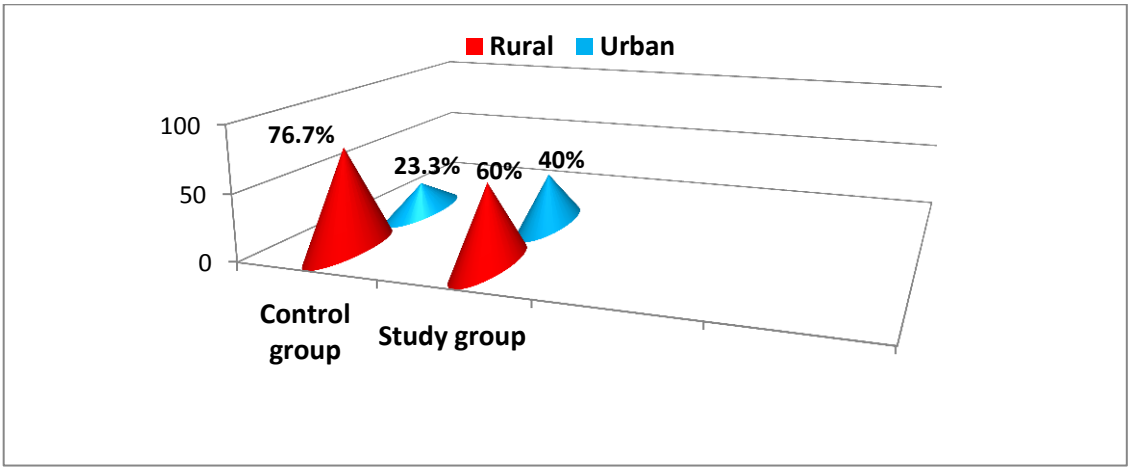

Figure (1) Mothers' Place of Residence in both groups.

Table (2) Percentage distribution of children's characteristics in both Groups.

Child's characteristics	Study(n=30)		Control(n=30)		X^2	P
	N	%	N	%		
Child's age/years:-					2.589	0.629
3- <4 yrs.	11	36.7	12	40.0		
4- < 5 yrs.	13	43.3	13	43.3		
5- 6 yrs.	6	20.0	5	16.7		
Mean ±SD	1.81 ±1.61		1.91 ± 1.64			
Gender:-					0.089	0.765
Male	16	53.3	18	60.0		
Female	14	46.7	12	40.0		
Child's rank in the family:-					14.694	0.100
First	12	40.0	12	40.0		
Second	5	16.7	11	36.7		
Third	6	20.0	5	16.7		
More than third	7	23.3	2	6.6		

Table (3) Comparison between Total Mean Scores of Mothers' Knowledge Before and After Receiving Empowerment Guidelines in the Study Group (n=30).

Items	Before Empowerment Guidelines At 1st day of cast	After Empowerment Guidelines After 1st week at follow up	t-test	P value
	Mean ± SD	Mean ± SD		
CAST definition (10 marks)	2.3±2.1	6.3+1.2	0. 73	0.001*
CAST functions (10 marks)	2.3±1.7	5.2±1.2	0.61	0.02*
CAST indications (5 marks)	1.3±0.3	3.3±1.2	1. 55	0.062
CAST observations (10 marks)	3.3±1.4	7.2±1.2	0.88	0.02*
CAST complications (5 marks)	0.3±1.1	2.3±1.2	0. 9	0.01*
CAST treatment (5 marks)	0.7±1.7	3.2±0.4	0.56	0.002*
CAST care after implementation (5 marks)	1.3±1.1	4.3±0.2	0. 93	0.001*

* Statistical significant at $P \leq 0.05$

Table (4) Comparison between Total Mean Scores of Mothers' Reported Practices Before and After Receiving Empowerment Guidelines in the Study Group (n=30).

Items	Before Empowerment Guidelines At 1st day of cast	After Empowerment Guidelines After 1st week at follow up	t-test	P value
	Mean ± SD	Mean ± SD		
Mobility (10 marks)	1.3±1.1	6.3+1.2	0. 93	0.001*
Assessment of cast site (edema, injuries, and capillary refill). (10 marks)	2.3±1.2	7.5±1.2	0.88	0.01*
Elimination. (5 marks)	0.3±0.9	2.5±1.2	0.73	0.02*
Bathing (5 marks)	1.3±0.3	3.2±1.1	0.51	0.000*
Feeding (5 marks)	1.3±0.3	3.3±0.2	0. 55	0.02*
Fluid intake (5 marks)	1.7+1.2	2.9±1.1	0.81	0.02*
Accidents prevention (5 marks)	1.3±1.1	2.3±1.2	1. 9	0.61
Follow-up (5 marks)	0.7±0.5	3.2±0.4	0.36	0.002*
Treatment (5 marks)	1.3±1.1	2.2±1.2	0. 9	0.53

* Statistical significant at P ≤ 0.05

Table (5) Comparison between Mother's Knowledge &Practices Assessment Scores Before and After Receiving Empowerment Guidelines in the Study Group (n=30).

Knowledge & Practices Assessment scores	Before Empowerment Guidelines At 1st day of cast		After Empowerment Guidelines After 1st week at follow up		X^2	P value
	No	%	No	%		
Satisfactory	8	26.7	16	53.4	0.29	0.04*
	60.3±2.1		**67.3±3.2**			
Unsatisfactory	22	73.3	14	46.6	0.33	0.03*
	34.3±1.7		**47.2±1.2**			

* Statistical significant at P ≤ 0.05

Table (6) Mother's Knowledge & Practices Assessment Scores in Control Group (n=30).

Knowledge & Practices Assessment scores	No Receiving Empowerment Guidelines		X^2
	No	%	
Satisfactory	11	36.7	7.19
	60.3±4.1		
Unsatisfactory	19	63.3	6.43
	41.3±1.7		

* Statistical significant at $P \leq 0.05$

Table (7) Percentage Distribution of children' outcomes in the Study and Control Group After One Week at Follow up.

Items	Study (n=30)		Control (n=30)		X^2	P
	N	%	N	%		
Anoxia:					0.207	0.001*
Present	11	36.7	25	83.3		
Not present	19	63.3	5	16.7		
Vomiting:					0.429	0.02*
Present	4	13.3	15	50.0		
Not present	26	86.7	15	50.0		
low fluids intake:					2.239	0.302
Present	3	10.0	4	13.3		
Not present	27	90.0	26	86.7		
Diarrhea:					1.824	0.317
Present	7	23.3	9	30.0		
Not present	23	76.7	21	70.0		
Constipation:					0.429	0.000*
Present	9	30.0	24	13.3		
Not present	21	70.0	6	86.7		
Skin discoloration:					0.429	0.001*
Present	7	23.3	12	30.0		
Not present	23	76.7	18	70.0		
Weak pulse in casted limb:					2.143	0.000*
Present	2	6.6	15	50.0		
Not present	28	93.4	15	50.0		
Child's ability to move:					3.159	0.690
Present	13	43.3	10	33.3		
Not present	17	56.7	20	66.7		
Skin surrounding cast characteristics: (More than one answer)					0.315	0.000*
Discolored	0	0.0	0	0.0		
Dry	2	6.7	12	40.0		

Cold	0	0.0	4	13.3		
Warm	2	6.7	12	40.0		
Presence of hematoma	1	3.3	5	3.3		
Bleeding	1	3.3	4	13.3		
Redness	1	3.3	1	3.3		
Edema	1	3.3	5	16.6		
Rash	0	0.0	4	13.3		
None of the above	26	86.7	11	36.7		
Presence of pain:						
Present	9	30.0	18	60.0	0.203	0.001*
Absent	21	70.0	12	40.0		

* Statistical significant at P < 0.001

Table (8) Correlation between Mothers' Level of Education and their Total Mean Score of Knowledge and Practices in the Study Group.

Mean ± SD	No read& write (n=15)	Read &write (n=1)	Basic school (n=7)	secondary school (n=4)	University education (n=3)	r P
Before Empowerment Guidelines	11.2±0.4	13.5±0.5	17.50±0.547	12.8±0.3	22.0±0.0	0.640 0.000**
After Empowerment Guidelines	24.2±1.	26.3±1.9	31.3±0.8	36.0±2.3	37.8±1.6	0.507 0.000**

* Correlation is significant at P≤ 0.05, two-tailed.

Table (9) Correlation between Mothers' Place of Residence, Occupation, and their Total mean Score of Knowledge and Practices in the Study Group (n=30).

Items Mean±SD	*Place of Residence*		R P	*Occupation*		r P
	Rural (n=18)	Urban (n=12)		Working (n=26)	Housewives (n=4)	
Before Empowerment Guidelines	22.02±4.4	26.5±6.4	r= 0.476 P= 0.000**	29.6±5.34	25.4±1.6	r= 0.311 P= 0.028*
After Empowerment Guidelines	34.9±1.9	36.09±2.1	r= 0.417 P= 0.003**	34.9±1.9	31.6±1.5	r= 0.360 P= 0.010*

* Correlation is significant at P≤ 0.05, two-tailed.

Discussion

The result of the current study revealed that two fifth of the mothers in both groups were 25-30 years old. These results agreed with Abd Alkhair, Mohamed, Mohamed & Elbarabary, (2020) [(21)] who found that less than two thirds of mothers in the study and control group' age ranged from 20 to less than 30 years old, the mean age of them was 26.8±5.9.

Regarding the mother's educational level, the current study revealed that, half of the mothers in the study group were illiterate, whereas more than one third of mothers in the control group had basic education. This result in accordance with Dingemann, Sonne, Ure, Bohnhorst, Kaisenberg, & Pirr, (2019) [(22)] who concluded that low maternal education is associated with a reduced uptake of screenings, adverse outcomes, and higher incidence of postoperative complications for their children. Moreover mothers' level of education could be a contributing factor that affecting mothers knowledge and practice for their children with cast.

It is evident from the current study that most mothers in the study group and control group were found to work outside the home. This result in agreement with Said, Ahmed, Mahmoud, & Ahmed, (2021) [(23)] who indicated that more than one-third and more than half of the studied mothers were working and these study and concluded that Mothers'work had a negative effect on the psychological wellbeing of their children. Also Desai, (2020) [(24)] concluded that maternal working is particularly important and influential children well-being and effect children's outcomes.

Based on the result of the current study, the highest percentage of mothers lived in rural areas in both groups. These findings in accordance with a study carried out by Abd Alkhair, et al (2020)[(21)] who showed that two thirds of mothers in the study group and more than half of mothers in the control group were come from rural areas. In Egypt musculoskeletal anomalies were the second common congenital anomalies and the majority of children were from rural areas (ElAwady, AlGameel, Ragab, & Hassan, 2021) [(25)].

The current study results indicated that the highest percentages of children in both groups aged 4 to 5 years. On the same line with this finding of a study done by Koskimies-Virta, Helenius, Pakkasjärvi, & Nietosvaara, (2020)[(26)] who studied hospital care and surgical treatment of children with congenital upper limb defects and concluded that most surgery for orthopedic congenital anomalies is done ideally in the first years of life and almost before school age.

The present study results clarified that the highest percentage of children were male. This result was in the same line with Shrestha & Shrestha (2020)[(27)] who reported The musculoskeletal system represents the third most common system involved in major congenital malformations and a higher rate in males than females In addition other study by Tan, et al (2018)[(4)] who also supported that musculoskeletal problem was significantly higher in males than females.

Clearly the current study emphasized that a significant statistical difference between mothers' mean

knowledge before and after receiving empowerment guidelines about cast's definition, function, time, complications, treatment, and care. This result matched with the result of Rahgoi, Sojoodi, Khoshknab, Rahgozar & Shahshahani (2019)[28] who showed that family-centered empowerment programs emphasize that family has an effective role on the motivation, psychological, knowledge, attitudes and perceived threat of the members and its primary goal is to empower family system that can lead to health promotion.

Regarding mothers practice the current study revealed that there were statistically significant differences were detected between the total mean score of mothers' practices before and after receiving empowerment guidelines regarding bathing, feeding, activity, and follow up. This finding goes with the opinion of Noipoung, Prasopkittikun, & Nookong (2019)[29] who concluded that that the empowerment program for mothers helps improving perceived self-efficacy in child care and increasing satisfaction towards nursing services and recommended that, the implementation of the program in routinely nursing services should be promoted to further improve the quality of care in orthopedic pediatric patients.

There was statistically significant difference was detected between mothers' knowledge and practices before and after receiving empowerment guidelines. This result is supported in Ashcraft, etal (2019)[11] that reported parent empowerment may enhance parent involvement in daily care and care decisions, improve child symptoms, enhance informational needs and skills, and increase advocacy and altruistic behaviors. In the same line Khalafallha & Bahnsawy (2020)[30] who concluded that the mothers who received nursing instructions had a higher overall mean score of knowledge and practices. As well as the infants of the mothers who received the nursing instructions there were fewer complications of casting and better outcomes.

Therefore, from the researcher’s point of view the empowerment education program in this study enabled the mothers to acquire accurate knowledge and practice about cast care which improved mother’s self-confidence by increasing their participation in caring their children and, eventually, prevention of cast complications.

The study results indicated that there were statistically significant differences between children's outcomes in both groups. These results are consistent with kearney, thompson, zychowicz, shaw & keyes (2022)[31] in their study about the role of patient and parent education in pediatric cast complications who found the role of parent education in pediatric cast complications and found that the complication rate declined and recommended that continuous access to clinic-specific cast instructions demonstrates decreased cast complications in pediatric populations, and this approach to patient education can be easily utilized across all medical specialties.

Therefore, the empowerment education program in the present study enabled the mothers to be in a better position to reflect on their children’s care, to set appropriate goals, and make decisions.

So, the current findings supported the study hypothesis.

In light of the findings of the present study regarding the correlation between mothers' level of education and mothers' knowledge and practices before and after receiving empowerment guidelines the results illustrated that of there was a highly statistically significant positive correlation between mothers' knowledge and practices and their educational level. This result is in agreement with Abd Alkhair, et al. (2020)[21], who found that there were statistical significant correlations between mothers' level of education and improve postoperative outcomes and decrease complication.

The study results reported that there was a statistically significant positive correlation between mothers' knowledge and practices before receiving empowerment guidelines and working status. In light of the findings Kocher, Ciarlo, Feroe, Dichtel & Traver (2022)[32] in their study found that The children with working parents demonstrated significantly higher discrepancy scores than children with a parent at home, signifying a greater impact of spica casting on the family based on Feetham Family Functioning Survey (FFFS) discrepancy score.

Conclusion

The results of the present study demonstrated that mothers who received empowerment guidelines experienced a significant increase in their level of knowledge, and their mean knowledge scores about cast itself and practices related to caring for children with casts were higher than others in the control group. The current study additionally discovered that, compared to children in the control group, children of mothers who received empowerment guidelines experienced less post-cast complications. They also had higher mean scores for outcomes. In comparison with the control group, children in the study group had normal vital signs, fewer complaints of pain, cast-related limb problems that were better controlled, and shorter hospital stays**.**

Recommendations

- Informing mothers about cast itself and how to care for children with casts through health education seminars should be performed.
- Mothers who cared for children with casts in hospitals should have access to receive a simple Arabic illustrated booklet explaining the cast and its care.
- A longitudinal research is required to monitor the long-term effects and late cast complications.
- Use the most recent trend of telenursing to follow mothers who have children with cast.
- Comprehensive cast randomized trials are required to develop suggestions for improving post-cast outcomes among children with cast.

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