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The effectiveness of the educational program on knowledge and caring performance of parents of children with colostomy: a clinical trial study

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Abstract

Background Colostomy is an important emergency procedure to save children's lives. It is necessary to use a suitable educational program to improve the knowledge and caring performance of parents. Therefore, this study was conducted with the aim of determining the effectiveness of the educational program on the knowledge and caring performance of parents of children with colostomy.

Methods This clinical trial study was conducted on 78 parents of children with colostomy. The patients were randomly divided into 39 test groups and 39 control groups using the 4 block method. The data were collected with demographic information questionnaire and parents' knowledge and care performance questionnaire. Collected data were analyzed using $SPSS_{25}$, employing descriptive (including frequency, percentage, mean, and standard deviation) and inferential (including paired t-test, independent t-test, chi-square, and analysis of covariance) statistics.

Results There is no difference between the control and test groups with demographic characteristics. There was a significant difference between the average score of parental care knowledge after the intervention in the control and test groups ($P < 0.001$). There was a significant difference between the average score of parental care performance after the intervention in the control and test groups ($P < 0.001$).

Conclusions The educational program can be used as an effective way to increase the knowledge and care performance of parents of children with colostomy and to control complications caused by colostomy.

Trial registration IRCT20230507058110N1, 2023-05-13.

Keywords Colostomy, Educational program, Knowledge, Caring performance, Children

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Introduction

Congenital anomalies affecting the lower gastrointestinal tract or urinary tract are present from birth and can profoundly impact the structural integrity and functionality of intestines in children [1]. Common causes of these anomalies in infants include necrotizing enterocolitis, imperforate anus and Hirschsprung's disease, while in older children, inflammatory bowel diseases are prominent [1, 2]. Ostomy surgery, a frequently employed treatment for these anomalies, involves creating a surgical connection between the intestines or urinary tract and the body's external surfaces, with the procedure named according to the anatomical location [3]. During this procedure, which is performed across all age groups from infancy to old age [4], an opening is created in the abdominal wall to facilitate feces and urine excretion. Despite its necessity for patient survival or improved quality of life, ostomy surgery can impose significant psychological strain on individuals [5].

In their study, Davis et al. reported that accurate statistics on the number of individuals living with a stoma remain elusive in the United States due to underreporting and coding limitations. However, estimates suggest that there are between 750,000 and 1 million ostomates in the United States, with approximately 150,000 new cases arising annually [6]. The Iranian Ostomy Association reports that approximately 30,000 individuals are living with a stoma in Iran [7].

Ostomy surgery can result in temporary or permanent physiological changes, affecting functionality of the gastrointestinal and urinary systems, as well as functional and psychological alternations [8]. The most common types of ostomies include colostomies, ileostomies, and urostomies [9]. A colostomy is a surgical procedure that involves creating an opening, known as a stoma, for the colon, or large intestine, through the abdomen, with a collection bag affixed to the stoma for feces excretion [9, 10]. The primary goal of colostomy surgery is to ensure effective feces excretion through this artificial opening [10]. Individuals undergoing colostomy, particularly in cases where the anal sphincter muscle is absent, may encounter challenges in controlling bowel movements and fecal excretion, often requiring the use of a colostomy bag. Colostomy surgery is typically temporary, lasting about 3 to 4 months, and is removed after subsequent procedures to restore the child to their typical physiological state [1, 10].

Despite its common occurrence, reports suggest that over 70% of patients encounter post-surgical complications. These complications impose substantial economic burdens on both families and healthcare systems, resulting in prolonged hospital stays and increased readmission rates [11]. Additionally, psychological problems such as stress, anxiety and depression are prevalent among ostomates, alongside alterations and challenges in social interactions, job considerations, and daily activities [12]. Given the significant physical and psychological challenges associated with colostomies, individuals affected by this condition necessitate prompt physical, emotional, and social support throughout various stages of life [13]. Providing care for these patients is crucial for minimizing complications, fostering adaptability, and promoting a desirable quality of life. For children, this responsibility often falls on other family members, particularly parents, who are recognized as the primary caregivers [14]. Therefore, their level of awareness about this condition significantly impacts their children' quality of life [1].

Previous research highlights the prevalence of post-surgical complications among children with ostomies, often attributed to inadequate knowledge, improper pre- and post-operative care, and non-standardized practices [1]. These complications may include stoma stenosis, prolapse, necrosis, rupture, bleeding, and hernias around the stoma [15]. Reports indicate that the information and guidance provided by nurses and surgical specialists to ostomates, particularly those aged 25 to 55 years, after surgery are often insufficient [16, 17], emphasizing the need for standardized care practices to improve the quality of care and their subsequent evaluation. As the fundamental unit of society, families play a vital role in ensuring that patients and their companions receive accurate and appropriate healthcare [18].

Nurses, as essential members of the healthcare team, play a crucial role in supporting families, nurturing hope and trust, and delivering care for children, which enhances the overall health and well-being of families. They also provide essential knowledge, skills, and support to ensure quality of care. The objective of nursing interventions in family-centered care is to enhance the awareness and capabilities of family members in certain areas, empowering them to navigate health challenges and promote wellness [19].

Hence, incorporating educational methods into every learning process is essential. Among the various teaching approaches available, programmatic training, face-to-face sessions, virtual workshops, group discussions, lectures, question-and-answer sessions, demonstrations, practice sessions, simulations, and role-plays are notable. In recent decades, with significant advances in educational technology, educational systems have recognized the necessity of adopting new and client-oriented methods. These methods have become commonplace across diverse fields, including family education [20]. Such training is indispensable for enhancing knowledge and caregiving performance, as well as alleviating stress and mental concerns within families. Moreover, it proves to be economically viable [21].

According to the points mentioned, one of the most significant challenges faced by children with colostomies is how their parents care for them, encompassing aspects such feeding, pre- and post-operative care, long-term physical and mental care, home care practices, parental attitudes, and limiting beliefs regarding medication usage. Insufficient understanding of these factors exacerbates challenges for the patient, their family, and society at large. Furthermore, due to various intervening factors such as a lack of understanding and misconceptions, parents' knowledge about colostomies is alarmingly limited [15]. Additionally, parents of infants and children with colostomies experience significantly higher stress levels than the general population, which can impact the formation of the parent-child relationship during the first year of life, crucial for the child's development. Providing education and resources concerning colostomies enables parents to better understand their child's condition, thereby alleviating their stress levels [22]. Improved parental knowledge leads to more efficient care for children. Nurses play a pivotal role in educating parents about preventing complications, understanding treatment duration, and offering support to minimize potential issues related to colostomies, all while preparing the child for subsequent treatment procedures [19]. Therefore, considering the significance of education and the invaluable role of nurses in providing information to address these challenges and enhance parents' caregiving capabilities, this study aims to investigate the effectiveness of an educational program on the knowledge and caregiving performance of parents with children having colostomies, with the hope of mitigating some of the challenges faced by these children and their families, as well as the healthcare community.

Methods

The current study is a clinical trial with the code IRCT20230507058110N1, 2023-05-13 (https://irct.behdasht.gov.ir/trial/70061). After obtaining thesis approval, ethical approval (IR.AJUMS.REC.1402.084) from Ahvaz Jundishapur University of Medical Sciences, and consent from the officials of the affiliated teaching hospitals, along with obtaining a letter of introduction and written permissions from the vice-chancellor for research and the hospital officials, the study was carried out. Following participant introduction and consent acquisition, the research objectives, significance of the problem, and research methodology were explained to the participants. An informed consent form was prepared, detailing the research methodology, participants' rights concerning participation and withdrawal, as well as data confidentiality measures. This form was thoroughly explained to the participants, who then provided their written consent to take part in the study. In this study, participants were recruited based on specific inclusion criteria. Children eligible for enrollment were between the ages of one month and 24 months, with a minimum of one month having elapsed since their surgery. It should be noted that the inclusion criteria for the study included all gastrointestinal surgeries. Additionally, the condition for children to enter this study was that they should not have any physical or psychological illness, except for digestive disorders that require surgery. In addition, if participants had more than one absence from training sessions, they were excluded from the study.

Parents eligible for enrollment were those who had not previously participated in educational groups, and possessed the mental and intellectual capacity to complete the questionnaires and actively participate in the educational sessions. Participants were randomly selected and allocated into two groups of intervention ($n=39$) and control ($n=39$), employing a randomized block design with blocks of four participants. The sample size was determined using the study conducted by Najafi [23] and the following formula.

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}\right)^2 \left(S_1^2 + S_2^2\right)}{\left(\bar{X}_1 - \bar{X}_2\right)^2}$$

In this study, data were collected using a researcher-made data collection tool developed through a thorough review of relevant literature. The tool comprised several sections: a demographic characteristics questionnaire for both parents and children, a questionnaire evaluating parents' caregiving knowledge (12 items), a questionnaire evaluating parents' knowledge of complications associated with colostomies (10 items), a questionnaire evaluating parents' caregiving performance (13 items), and a questionnaire specifically developed to evaluate parents' performance in managing complications arising from colostomies (6 items). Responses to each item in the questionnaires evaluating parents' caregiving knowledge and knowledge of complications associated with colostomies are rated on a five-point Likert scale, ranging from "completely agree" [5] to "completely disagree" [1]. Responses to each item in the questionnaires evaluating parents' caregiving performance and performance in managing complications arising from colostomies are rated on a four-point Likert scale, ranging from "always" [3] to "never" (0).

To evaluate validity, the content validity method was employed. A panel comprising esteemed faculty members from the school of Nursing and Midwifery at Ahvaz Jundishapur University of Medical Sciences assessed the tool for this purpose. To evaluate reliability, Cronbach's alpha, a measure of internal consistency, was utilized.

The obtained Cronbach's alpha coefficient for the tool was 0.96, indicating robust scientific reliability.

After introducing themselves, outlining the research objectives, and obtaining consent, the researcher asked the participants to complete the data collection tool. Subsequently, both intervention and control groups filled out the tool immediately before the intervention. For the intervention group, the educational intervention, consisting of face-to-face and structured training sessions, was endorsed by the relevant physician, and implemented by three researchers throughout ten sessions, each lasting 45 min, with one session held per week. To implement the educational intervention, the initial explanations were first delivered to the parents through face-to-face communication. Subsequently, the training sessions were conducted for the participants.

It is worth noting, participants contacted the researcher if they had any problems during home care. In each session, the researcher first asked the participants for tips on the care provided in the previous session and explained the correct care again. In addition, each week, the training was dedicated to one item, which included: information about the disease, training on the timing of surgery, training on pre-and post-surgery care, training on nutrition, training on the child's activity level, how to take medications and side effects of drugs, training on physical and emotional needs and follow-up interventions, and finally, in the tenth session, general summary, questions and answers, and delivery of pamphlets to the participants.

Table 1 Comparison of demographic characteristics between the intervention and control groups

Variable		Groups		P-value
		Intervention (*n*=39)	Control (*n*=39)	
		Freq. (%)	Freq. (%)	
Age	1 month	25 (64.1)	22 (56.2)	0.48
	24 months	14 (35.9)	17 (43.6)	
Gender	female	16 (41)	20 (51.3)	0.36
	male	23 (59)	19 (48.7)	
Complications resulting in hospitalization	yes	12 (30.8)	5 (12.8)	0.05
	no	27 (69.2)	34 (87.2)	
Cause of stoma	yes	39 (100)	39 (100)	-
	no	0 (0)	0 (0)	
Educational level	under diploma	15 (38.2)	9 (23.1)	0.22
	diploma	18 (46.2)	19 (48.7)	
	university	6 (15.4)	11 (28.2)	
Family history of stoma	yes	7 (17.9)	5 (12.8)	0.5
	no	32 (82.1)	34 (87.2)	
Place of residence	city	29 (74.4)	31 (79.5)	0.59
	village	10 (25.6)	8 (20.5)	

For control group, no educational intervention was implemented. The topics covered in these sessions encompassed familiarity with colostomy, general treatment and care, and nursing care. One month following the intervention, the data collection tool was once again completed by both groups.

It should be noted that this study adheres to CONSORT guidelines.

Collected data were analysed using SPSS version 25, employing descriptive (including frequency, percentage, mean, and standard deviation) and inferential (including paired t-test, independent t-test, chi-square, and analysis of covariance) statistics.

Results

In the current study, no statistically significant difference was found among any of the demographic variables investigated (Table 1). For data analysis initially, the univariate method (paired t-test) was used before and after the intervention, but to neutralize and control for confounding variables, analysis of covariance was also used before the intervention.

The mean pre- and post-test overall scores of parents' knowledge within both the intervention and control groups were analysed using the paired t-test. The results revealed no significant difference between the mean pre- and post-test scores in the control group ($p=0.406$). However, a significant difference was found between the mean pre- and post-test scores in the intervention group ($p<0.001$) (Table 2). The mean pre- and post-test scores of parents' knowledge of complications associated with colostomies within both the intervention and control groups were analysed using the paired t-test. The results revealed no significant difference between the mean pre- and post-test scores in the control group ($p=0.087$). However, a significant difference was found between the mean pre- and post-test scores in the intervention group ($p<0.001$). Furthermore, the analysis of covariance regarding pre-test effects and complications resulting in hospitalization were neutralized, and the effect size was 0.172 (Table 3). The mean pre- and post-test scores of parents' performance in managing complications arising from colostomies within both the intervention and control groups were analysed using the paired t-test. The results revealed significant difference between the mean pre- and post-test scores within both the control ($p<0.005$) and intervention ($p<0.001$) groups. Furthermore, the analysis of covariance regarding pre-test effects and complications resulting in hospitalization were neutralized, and the effect size was 0.656 (Table 3). The results of the analysis of covariance indicated a statistically significant difference regarding the mean pre- and post-test overall scores of parents' knowledge in the intervention and control groups ($p<0.001$) (Table 4).

Table 2 Comparison of the mean pre- and post-test overall scores of parents' knowledge and caregiving performance within and between the intervention and control groups

Variable		Intervention (*n*=39)		Control (*n*=39)		*P*-value
		M	SD	M	SD	
Overall score of parents' knowledge	pre-test	37.97	4.67	39.38	4.94	0.20*
	post-test	52.64	3.02	38.51	3.73	<0.001*
P-value		<0.001**		0.40**		
P-covariance		<0.001*				
Effect size		0.82**				
Overall score of parents' caregiving performance	pre-test	24	4.12	23.51	4.97	0.63*
	post-test	32.23	2.27	22.66	3.73	<0.001*
P-value		<0.001**		0.27**		
P-covariance		<0.001				
Effect size		0.73				

* An independent t-test / **A paired t-test

*P-covariance/ **Effect size

Table 3 Comparison of the mean pre- and post-test scores of parents' knowledge of complications associated with colostomies and performance in managing complications arising from colostomies within and between the intervention and control groups

Variable		Intervention (*n*=39)	Control (*n*=39)	*P*-value
		M±SD	M±SD	
Scores of parents' knowledge of complications associated with colostomies	pre-test	33.25±4.2	28.89±4.2	<0.001*
	post-test	43.20±3.56	29.69±4.07	<0.001*
P-value		<0.001**	0.08**	
The effects of complications resulting in hospitalization were neutralized		0.17		
P-covariance		<0.001		
Effect size		0.55		
Scores of parents' performance in managing complications arising from colostomies	pre-test	10.41±1.99	9.87±2.29	0.27*
	post-test	14.76±1.30	10.58±2.08	<0.001*
P-value		<0.001**	0.005**	
The effects of complications resulting in hospitalization were neutralized		0.65		
P-covariance		<0.001*		
Effect size		0.48**		

* An independent t-test / ** A paired t-test

*P-covariance/ **Effect size

The mean pre- and post-test overall scores of parents' caregiving performance within both the intervention and control groups were analysed using the paired t-test. The results revealed no significant difference between the mean pre- and post-test scores in the control group ($p = 0.27$). However, a significant difference was found between the mean pre- and post-test scores in the intervention group ($p < 0.001$) (Table 2). The results of the analysis of covariance indicated a statistically significant difference regarding the mean pre- and post-test overall scores of parents' caregiving performance in the intervention and control groups ($p < 0.001$) (Table 4).

Table 4 Analysis of covariance of the overall scores of parents' knowledge and caregiving performance in the intervention and control groups

Variable	F-statistic	*P*-value
Overall score of parents' knowledge in the control group	3459.66	<0.001
Overall score of parents' knowledge in the intervention group	1796.60	<0.001
Overall score of parents' caregiving performance in the control group	1144.76	<0.001
Overall score of parents' caregiving performance in the intervention group	1585.58	<0.001

Covariance analysis was used to compare scores in the intervention and control groups. The results showed that there was a statistically significant difference between the mean total score of the parental knowledge and care performance assessment before and after the intervention in the control and intervention groups ($P < 0.001$). Also, confounding factors such as complications leading to hospitalization were controlled

Discussion

The current study aimed to investigate the effectiveness of an educational program on the knowledge and caregiving performance of parents with children having colostomies. Overall, the implemented educational program demonstrated a positive impact on the knowledge and caregiving performance among mothers of children with colostomies. The results revealed similar demographic characteristics between the intervention and control groups, with no statistically significant differences observed. Therefore, the insignificant differences in demographic characteristics suggest their lack of

influence on changes in scores of parents' knowledge and caregiving performance.

The results revealed no statistically significant difference regarding the mean pre-test scores of parents' knowledge between the intervention and control groups ($p = 0.20$). However, a statistically significant difference was found regarding the mean post-test scores between the intervention and control groups ($p < 0.001$). In the control group, where no training program was implemented and the routine care was only provided, there was no significant difference between the mean pre- and post-test scores. However, the intervention group showed a significant improvement in mean pre- and post-test scores following the implementation of the educational program among parents of children with colostomies. In this regard, it can be asserted that the implementation of an educational program enhances parents' knowledge and awareness, consequently improving their caregiving skills and capabilities. To conclude, education emerges as a pivotal factor in consistently providing care to the patients and enhancing their quality of life.

In this regard, the results of Dabas et al.'s study on the effectiveness of an educational program about colostomy management among caregivers of children with colostomies in the surgical department revealed that caregivers' mean knowledge scores increased from 10.9% before the intervention to 16.4% after the intervention. Based on these results, education demonstrated its effectiveness in enhancing the knowledge of caregivers of children with colostomies [14].

Furthermore, the results of El-Wasefy et al.'s study on the effectiveness of an educational program for mothers regarding care of their children having intestinal stomas indicated a significant relationship between mothers' caregiving knowledge before and after the intervention. Based on these results, it can be concluded that the educational program has a positive effect on improving mothers' knowledge regarding the care of their children with intestinal stomas. Therefore, educational programs for pediatric nurses are essential for enhancing mothers' knowledge and practices regarding the care of their children with intestinal stomas [22].

The present study shares a similarity with the aforementioned studies in that both assessed the knowledge of caregivers of children with colostomies or intestinal stomas after an educational intervention, and concluded that education enhances caregivers' knowledge.

The results revealed no statistically significant difference regarding the mean pre-test scores of parents' performance between the intervention and control groups. However, a statistically significant difference was found regarding the mean post-test scores between the intervention and control groups ($p < 0.001$). Based on these findings, there was an increase in the mean caregiving performance scores of parents in the intervention group after the educational program. Hence, it can be concluded that education can enhance parents' understanding and their capabilities to accurately identify symptoms, prevent symptom recurrence and complications arising from colostomies, and ultimately improve their caregiving performance.

In this regard, the results of Attia et al.'s study showed that educational guidelines are useful in reducing mothers' stress levels and increasing coping strategies used by mothers of children with colostomy. They also, emphasized in this study that, nurses should seriously participate in health education and counseling of mothers regarding all aspects of caring for their children who have a colostomy, as well as strategies for managing the stress caused by this care [24].

In this regard and considering the importance of the educational programs, in their study regarding stoma care for children having colostomies, Rashed et al. stated that most of the caregivers possess a poor level of knowledge and performance. Hence, it seems essential to provide the necessary education and counseling for caregivers so as to improve their performance levels in relation to colostomy care [15].

Despite the differences in sample size and target population between the aforementioned studies and the current study, both investigated the effectiveness of an educational program on parents' knowledge and caregiving performance, concluding that education enhances their performance. Therefore, interventions such as educating families should be employed to alleviate caregiver burden, thereby enhancing both the quality of patient care and the physical and mental wellbeing of caregivers, who can be considered as hidden patients.

The results revealed no statistically significant difference regarding the mean pre-test scores of parents' knowledge of complications associated with colostomies between the intervention and control groups. However, a statistically significant difference was found regarding the mean post-test scores between the intervention and control groups ($p < 0.001$). Therefore, an improvement was observed in parents' knowledge of complications associated with colostomies. Based on these findings, it can be concluded that educational programs can help parents recognizing these complications, foster critical thinking, and enhance awareness, capabilities and skills to mitigate the occurrence of complications in children.

In this regard, the researchers stated that it is necessary to hold periodic meetings with all mothers with children with intestinal stoma to discuss prevention methods and early detection of problems related to stoma opening and different ways of management [22].

In this regard, Rajabi et al. revealed statistically significant differences regarding the scores of mothers'

knowledge and attitude after the intervention compared to before the intervention ($p < 0.01$). Therefore, educating and empowering families have positive effects on the knowledge and attitude of parents in better control and management of the disease in young children [25].

Although the target population and educational methods in the aforementioned studies differ from the current study, both studies evaluated parents' knowledge through education and concluded that education increases knowledge and improves parents' attitudes accordingly. Providing parents with awareness and enhancing their attitudes about the disease and its complications is an important step in reducing their stress and anxiety levels. Therefore, healthcare providers can alleviate both patient and caregiver burdens through family participation in disease management. While the results of Forsmo et al.'s study regarding whether stoma education can reduce the duration of hospitalization, re-hospitalization, and complications related to stoma showed that stoma education before and after the surgery shortens the length of hospitalization, there was no significant difference between readmission rates or complications related to stoma [26]. The discrepancy between the results of this study and the current study may stem from differences in the educational methods, as well as demographic and cultural variations among the target population.

The results revealed no statistically significant difference regarding the mean pre-test scores of parents' performance in managing complications arising from colostomies between the intervention and control groups. However, a statistically significant difference was found regarding the mean post-test scores between the intervention and control groups ($p < 0.001$). Therefore, an improvement was observed in parents' performance in managing complications arising from colostomies.

In this regard, the results of Modanloo et al. on the knowledge and caregiving performance among parents of children with cancer showed that family functioning in parents of children with chronic diseases should be considered as one of the priorities of healthcare to give support and effective planning for family-centered nursing care, especially in problem solving and affective involvement dimensions. Therefore, initiating planning for family-centered nursing care in families of children with chronic diseases by assessing and recognizing the family's performance is essential for taking effective steps towards empowering the families [27]. It should be noted that there were no special restrictions for the implementation of this study.

Conclusions

In the current study, the implementation of an educational program demonstrated a positive effect on the knowledge and caregiving performance among parents of children with colostomies. Therefore, considering its convenience, lack of complications, cost-effectiveness, absence of requirement for special equipment and devices, and the involvement of the family as a member of the treatment team, this program is recommended for controlling and improving complications caused by colostomies.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12887-025-05591-y.

Supplementary Material 1

Author contributions

Ashrafalsadat Hakim: Writing– original draft Sara Kazemi: Data collection Ashrafalsadat Hakim, Mehran Peyvasteh, and Mohammad Hossein Haghighizadeh: Data analysis Ashrafalsadat Hakim: Reviewing the final edition.

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Data availability

Data is provided within the manuscript.

Declarations

Ethics approval and consent to participate

This study was approved by the ethics committee of the Vice Chancellor for Research and Technology of Ahvaz Jundishapur University of Medical Sciences) IR.AJUMS.REC. 1402.084 / IRCT20230507058110N1). Also, informed consent was obtained from all the parents of the children to start the research. This study adhered to the Declaration of Helsinki for this effect.

Consent for publication

Not applicable.

Conflict of interest

The authors declare that there is no conflict of interest in the present study.

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