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Effect of colostomy empowerment program for mothers on occurrence of peristomal skin complications among their infants

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Abstract---Colostomy is often a life-saving procedure but is still associated with significant morbidity. Aim of the study: To evaluate the effect of colostomy empowerment program (CEP) for mothers on occurrence of peristomal skin complications among their infants. Design: Quasi -experimental design was utilized. Sample: A convenient sample of 60 infants undergoing colostomy operation and their mothers. Setting: The current study conducted in three settings at Cairo University Specialized Pediatric Hospital (CUSPH) (surgical neonatal intensive care unit, in-patient surgical unit, and the out-patient surgery clinic). Tools for data collection: Tool I structured interview questionnaire; Tool II mothers' knowledge and reported practice assessment sheet pre-posttest; Tool III observational checklist and tool IV complications recording sheet. Results: There were statistically significant differences regarding total mean score of mothers' knowledge, reported practice and skills in both groups. Peristomal skin complications were higher in the control group. Conclusion: The current study concluded that after CEP, there was a significant improvement in the level of knowledge, reported-practices, and skills among mothers in the study group. Infants in the study group were exposed to less postoperative complications regarding peristomal skin complications than infants in the control group. Recommendation: It was recommended to integrate the CEP for mothers in the pediatric surgery ward and incorporated into the discharge plan.

Keyword---colostomy, empowerment program, peristomal skin complicaions, infants.

Introduction

A colostomy is not a disease but an alter in how the body works (Hollister, 2020), its performance dates back to the latter part of the 18th century (Maria & Lieske, 2021). Colostomy is the exteriorization of part of the colon to the anterior abdominal wall fashioning a bypass to allow fecal egestion artificially. The colostomy is usually performed for protection, decompression and evacuation (Abd El-Rahman, Mekkawy, Sayed & Ayoub, 2020). Colostomy formation and closure are essential surgical steps in managing high anorectal malformation (ARM), Hirschsprung's disease (HD), left colonic atresia, necrotizing enterocolitis and peri-anal trauma (Boroni et al., 2020). Most pediatric surgeons continued to adhere to the profitability of preliminary colostomy and delayed proctoplasty at the age of 6-18 months or when the child gets a specific bodyweight (Narbaev et al., 2021).

Although colostomy plays a crucial role in the treatment and even with careful surgical intervention, infants and children with stomas may suffer from many complications and considerable morbidity and mortality associated with a colostomy (Shalaby, 2021). The worldwide incidence of colostomy-related complications and morbidity has been reported to be high and ranged as high as 42 to 75% (Hamdi, Mohamed & Al-Ani, 2021). However, these complications are preventable with good surgical techniques and proper nursing care. High quality of care is required because colostomy results in a dramatic change in elimination pattern, accompanied by the need to adjust to a new way of life. Adequate pre-operative consent of parents, counseling, care, and follow-up gives optimum results (Chanchlani and Shrivastava, 2019; Black, 2020).

The care of children with colostomy is lengthy, complex and challenging. The attitudes of the family strongly impress the adjustment to surgery; the child needs to be provided all the care by the parents post hospital discharge (Rashed, Khalifa, Zein El Dein & Omar, 2020). Furthermore, children require special skills and competencies from their caregivers for their rehabilitation, requiring training, supervision, and care observation (Dantas et al., 2021). Growing evidence supports family empowerment interventions which is based on the family-centered nursing care philosophy. Empowerment education is a process planned to help patients and families develop the attitudes, knowledge, skills and degree of self-awareness necessary to simulate responsibility for their health-related decisions (Dardouri et al., 2021). So far, the family empowerment is used in parents of children with chronic diseases such as thalassemia, disabilities, asthma, ostomy, and psychological problems. Fortunetly, the results showed the beneficial impact of the family empowerment (Nemati et al., 2021; Dashtban, Shahdadi, Mansouri, Afshari & Abdollahimohammad, 2021).

Nurses should have more of an educational place than a teacher since the maternal empowerment program aughts to make mothers independent in caring

of the child, be more efficient and worthy and be the best supporter of themselves (Barnes et al., 2020). The strength of educating parents of children with colostomy has not been in depth evaluated in most developing countries. Empowerment will help to overcome the transition period and enable healthy adaptation when starting with an ostomy (Sousa& Santos, 2020). Parental empowerment to care for colostomy is pity in developing countries, and parents find it incapable and difficult (Dehsorkhi, Vashani, Ramezani and Shojaeian, 2020).

Significance of the study

As reported by the Egyptian Pediatric Surgical Association (2018), 3000 surgeries are performed for children every year; 150 of this number was for colorectal surgeries (0.5%) in the pediatric surgery department at CUSPH. Through empirical observations and experiences as a clinical instructor in the pediatric surgery department, it was observed that children undergoing colostomy were at high risk for many complications related to the lack of knowledge and improper care given by the mothers of these children, despite the importance of accurate care needed for these children, there is a great lack of attention in explaining the condition for mothers and guiding them to what to do. Therefore, mothers need to be provided with ongoing education and support.

In Egypt, there are scarce studies conducted in the nursing care of children with the colostomy. Hence, the current study is undertaken to evaluate the impact of empowerment program provided for the mothers of children having colostomy on the occurrence of complications. Hopefully, this empowerment program could help improve the mother's knowledge and reported- practice regarding the care of their children having a colostomy and decreasing colostomy complications. Moreover, 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 pediatric surgical nursing. So the current study aims to evaluate the effect of empowerment program about colostomy care for mothers on occurrence of complications among their infants.

Aim of the study

The aim of the current study was to evaluate the effect of colostomy empowerment program for mothers on occurrence of peristomal skin complications among their infants.

Research Hypotheses

- Mothers of infants who will receive the empowerment program will have higher total mean score of knowledge, reported- practice and skills than mothers in the control group.
- Infants of mothers who will receive the empowerment program will be exposed to less peristomal skin complications than infants in the control group.

Methods

Research design

A quasi-experimental research design was utilized to achieve the aim of the current study.

Settings

The proposed study was conducted at three different settings at CUSPH. The first one was the Surgical Neonatal Intensive Care Unit, the second one was the in-patient general pediatric surgical unit and the third one was the out-patient surgery clinic for follow-up.

Sample

A convenient sample of all available infants (60) undergoing colostomy surgical operation and their mothers (60) over six months period were participated in the current study and fitted with the study's inclusion criteria. Mothers and their infants were divided into two equal groups. The first 30 mothers and their infants were included in the control group who received the hospital routine care. The other 30 mothers and their infants were considered study group and subjected to the empowerment program.

Inclusion criteria

- All infants were undergoing the surgical operation of a colostomy for the first time regardless of the indications for a colostomy (congenital or acquired surgical disorders)
- Infants aged less than one year.
- Infants discharged from SNICU free from colostomy complications.
- Mother was the primary caregiver.

Exclusion criteria

- Children with multiple congenital anomalies or critically ill such as cardiac disorders and sepsis.
- Mothers who have previous experience regarding caring for colostomy.

Data collection tools

The required data were collected through the following tools: -

- **Tool 1: Structured Interview questionnaire:** It was developed by the researcher after reviewing the related literature; it was in the form of multiple-choice questions (MCQ) and consisted of two parts:
  - **Part I:** Questions related to personal data about mothers as age, level of education, occupation, family members, number of children, consanguinity, and the place of residence.

  - **Part II:** Questions related to characteristics of infants such as age, gender, rank within the family, history of the previous hospitalization. It contained items pertinent to infants' diagnosis, time of discovering the disease, past medical history, colostomy data as type, site, indication, colostomy appearance, type of colostomy bag, and type of feeding.
- **Tool 2: Mothers' Knowledge and Reported Practice Assessment Sheet (Pre-Posttest**): Developed by the research investigator in the form of MCQ which and consisted of two parts:
  - **Part I:** Questions assessed the mothers' knowledge regarding GIT, colostomy and its characteristics, the importance of colostomy care, danger signs, complications, prognosis, and follow-up of colostomy.
  - **Part II:** Questions assessed mothers' reported practices regarding their role in infant care, colostomy care with and without a bag, general infant's care as feeding and hygiene, and follow-up.
- **Tool 3: Observational Checklist:** It was adapted from Bowden, Vicky, Greenberg, and Cindy (2015) that evaluated mothers' practice of colostomy care. The checklist was modified and simplified by the researcher to fit the capabilities of the mothers.
- **Tool 4: Postoperative Complications Recording Sheet:** it was developed by the researcher after reviewing the related literature in the form of closed items (present or not present) to assess the occurrence of peristomal skin complications of color (erythema), turgor (flaccid and firm) and integrity (irritation, rash, ulcer, erosion and skin breakdown).

Validity and reliability

Data collection tools of the study were given to a group of 5 experts in the field of pediatric surgery and pediatric surgery nursing to test the content validity of the tools. The tools were examined for content coverage, clarity, relevance, and applicability. Based on experts` comments and recommendations, minor modifications were made, such as rephrasing and rearranging some sentences. Reliability of tools was performed to confirm tool consistency using Cronbach's alpha, and the reliability coefficients' alpha between questions was 0.77.

Procedures

The study was carried out in three phases: preparatory, implementation, and evaluation.

The preparatory phase

Before conducting the study, official permission was obtained from the director of CUSPH and the head of the pediatric surgery department and SNICU. Due to the emergency nature of surgical operation of colostomy and other limiting factors, it wasn't easy to interview infants' mothers preoperatively, so at the mother's first visit postoperatively, the researcher introduced herself to the mothers who fulfilled study criteria and explained the aim of the study. The written informed consent was obtained from each mother after a complete description of the purpose and nature of the study; the interview was carried out in the waiting area

of the SNICU for a neonate or in the waiting room of the out-patient clinic or the in-patient surgical unit for infants at CUSPH.

The researcher filled the structured interview questionnaire from infants' mothers in both control and study group through an instructional interview on an individual basis to take personal data about mothers and their infants then mothers in both groups exposed to fill the mothers' knowledge and reported practice assessment sheet. Evaluation of mothers reported practice regarding colostomy care performed using an observational checklist. Data for the control group were collected before the study group and received routine care in the pediatric surgical unit and out-patient clinic.

The implementation phase

The empowerment program was provided to the mothers in the study group at the first visit postoperative through four sessions (2 theoretical and 2 practical training sessions). Each session took about 30- 45 minutes individually and sometimes for a group of mothers ranging from 2 to 5 mothers. The first theoretical session encompassed knowledge related to the program's aim, the digestive system's function, the defecation process, definition of colostomy, types, indications, importance, and steps of colostomy care in case of colostomy bag with or without a bag. This was followed by the second theoretical session, which contained knowledge related to diaper care, hygiene care, feeding, allowed activities, colostomy-related complications, dangerous signs of colostomy, the prognosis for colostomy, and psychosocial issues related to colostomy. Then, the practical sessions started at the first session by applying colostomy care steps, assembling related equipment, normal colostomy, and dander signs. Finally, the second practical session emphasized hygienic care, diaper care, and re-demonstration of care related to the infant with a colostomy. Aided by using an instructional Arabic booklet and videos developed by the research investigator and utilized at CUPSH, then distributed to each mother, a demonstration of colostomy care on a doll by the research investigator, and re-demonstration performed the mothers.

The evaluation phase

After completion of mothers' teaching sessions, they were exposed to knowledge and reported practice assessment sheet posttest and observational checklist to evaluate the impact of the empowerment program on mothers' knowledge, reported practice, and skills regarding colostomy care. The Control group was exposed to knowledge and reported practice assessment sheet and observational checklis at the mothers' first visit while they did not receive the empowerment program. In the follow-up for mothers in both groups after one week and after one month of the surgical operation at out-patient clinic, the research investigator will assess the knowledge and reported practice assessment sheet and observational checklist. Similarly, in the follow up for infants in both groups after one week and after one month, the researcher will assess the colostomy site in infants to detect any peristomal skin complications using the postoperative complications recording sheet.

Results

Figure (1) illustrated that 43.3% of the mothers in the study group who shared in the current study had basic education, whereas 26.7% of mothers in the control group were not read or write. There was a statistically significant difference between mothers in both groups regarding the level of education (X^2= *36.51, p<0.05*). Figure (2) revealed that two-thirds (66.7%) of mothers in the study group live in rural areas, and more than half (53.3%) of mothers in the control group live in urban areas. There was a statistically significant difference between mothers in both groups regarding the place of residence (X^2= *4.28, p<0.05*). Table (1) reflected that the mean age of infants who participated in the current study was 3.18 ± 1.77 in the study group and 3.62 ± 1.4 in the control group. Concerning their length of hospitalization, it was 4.67 ± 3.03 days in the study group and 4.4 ± 2.74 in the control group. There was no statistically significant difference between both groups regarding infants' age and length of hospitalization (*t= -1, p>0.05* & *t= -0.34, p>0.05,* in that order).

Figure (3) represented that the highest percentage (60% & 66.7%, respectively) of infants were males in both groups. There was no statistically significant difference between mothers in both groups regarding infants' gender (X^2*=0.00, p>0.05*). Figure (4) disclosed that the highest percentages (56.7% & 60%, respectively) of infants diagnosed as IA in both groups, and there was no statistically significant difference between children in both groups regarding infants' diagnosis (X^2= *0.53, p>0.05*). It was verified from the table (2) that there was no statistically significant difference between the total mean scores of mothers' knowledge and reported practices of the mothers in both groups before implementing the CEP (*p >0.05*). In contrast, both groups showed statistically significant differences regarding the total mean score of mothers' knowledge and reported practice after one week and one month of implementing the CEP (*p<0.05*).

Figure (5) asserted that before implementing CEP, 86.7% and 90% respectively of mothers in both groups had an unsatisfactory level of knowledge and reported practice. While after one week and a month of implementing CEP, in the study group, 93.3% of mothers had a satisfactory level of knowledge and reported practice compared to 60% after week and 63.3% after a month of mothers in the control group. Table (3) demonstrated that there were statistically significant differences between the total mean scores of mothers in both groups concerning their skills in colostomy care after one week and a month of implementing the CEP (p <0.05). Figure (6) clarified that after implementing CEP, all mothers in the study group had satisfactory skills level of colostomy care compared to 20% of mothers after week and 46.7% of mothers after a month in the control group.

Apparently, from the figure (7), after a week of CEP, 16.7% of infants in the study group experienced erythematic peristomal skin, and 6.7% experienced flaccid peristomal skin, then increased at infants in the control group to 93.3% and 20%, respectively. Moreover, none of the infants in the study group had firm peristomal skin compared to 33.3% of infants in the control group. There was no statistically significant difference between both groups regarding erythema *(p>0.05*). Although, there were statistically significant differences between both groups regarding flaccid and firm peristomal skin (*p<0.05*). After a month of CEP, infants in the

study group were less exposed to peristomal skin complications than infants in the control group. There was a statistically significant difference between infants in both groups regarding firm peristomal skin (*p<0.05*).

Figure (8) revealed that after one week and one month from the application of CEP, infants in the study group were exposed to peristomal skin integrity complications less than infants in the control group. There were no statistically significant differences between infants in both groups regarding peristomal skin integrity complications as irritation, rash, ulcer, erosion, and skin breakdown after one week or one month (*p>0.05*). Table (4) revealed that after a month, there was a statistically significant positive correlation detected between the mothers' total post-test mean scores of knowledge and skills in the study group (*r= 0.53, p<0.05*). Table (5) verified that after month, there were statistically significant negative correlations detected between the mother's total post-test mean score of knowledge and occurrence of peristomal skin erythema, rash, ulcer, erosion, breakdown and firmness (*p<0.05).* Moreover, there were statistically significant negative correlations detected between the mother's total post-test mean score of skills in the study group and occurrence of peristomal skin erythema, ulcer, erosion, flaccidity and firmness (*p<0.05).* It was evident from the current study results that after one month from the application of CEP, there there were no statistically significant correlations detected between infants' age, gender, diagnosis and length of hospitalization with the occurrence of almost all of the peristomal skin complications among infants in the study group (*p>0.05).*

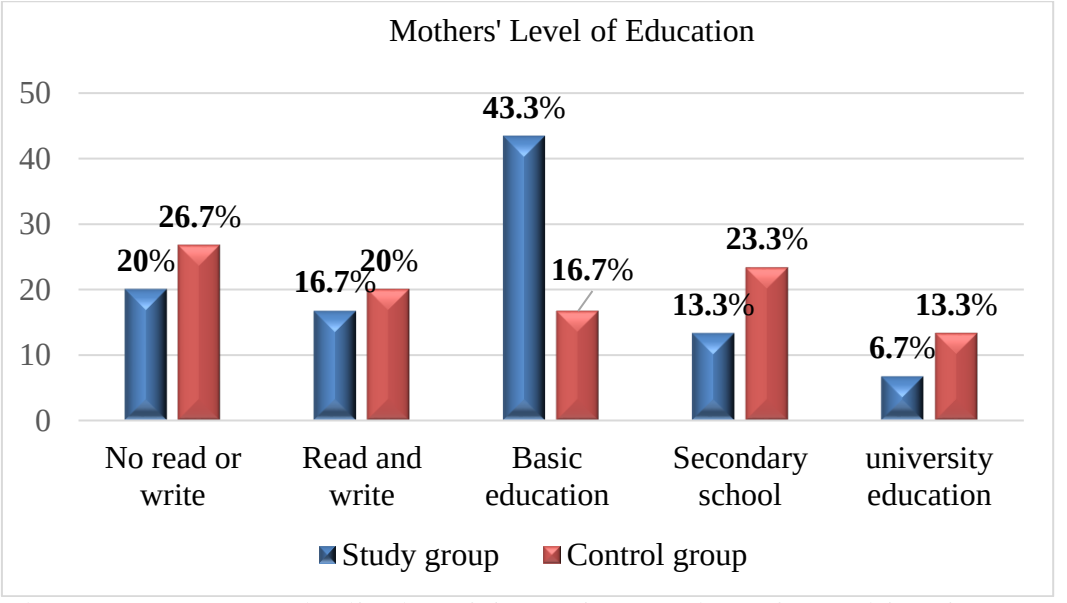

Figure 1. Percentage Distribution of the Mothers Having Infants with Colostomy Regarding Their Level of Education in the Study and Control Group

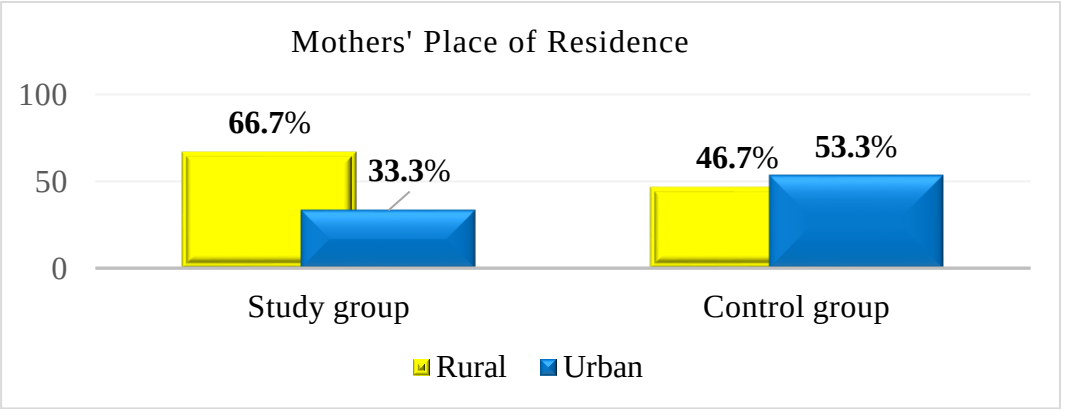

Figure 2. Place of Residence of Studied Mothers in the Study and Control Group

Table 1
Age and Length of Hospitalization of infants with Colostomy in The Study and Control Group

Personal data	Study group (n=30)	Control group (n=30)	t	P
Infants' age/ months:-				
Mean ± SD	3.18 ± 1.77	3.62 ± 1.4	-1	0.35
Length of hospitalization/ days: -				
Mean ± SD	4.67 ± 3.03	4.4 ± 2.74	-0.34	0.73

* Significant at p < 0.05

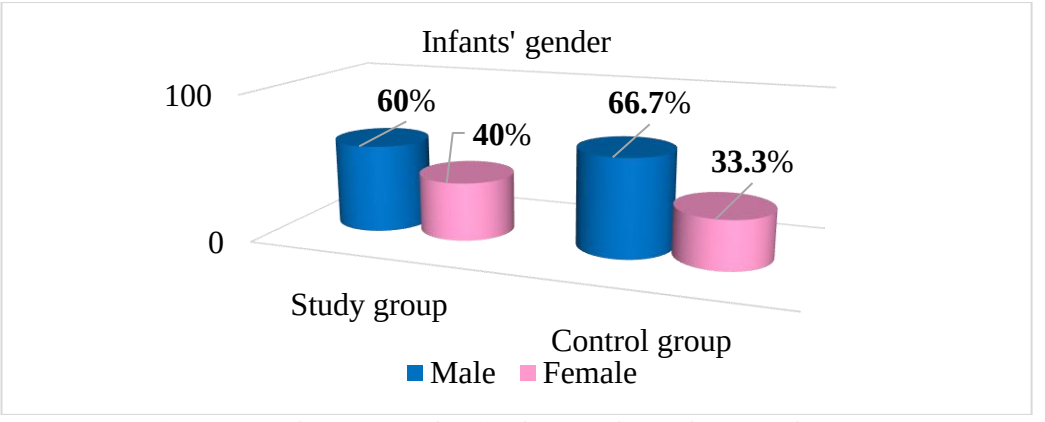

Figure 3. Infants' Gender in the Study and Control Group

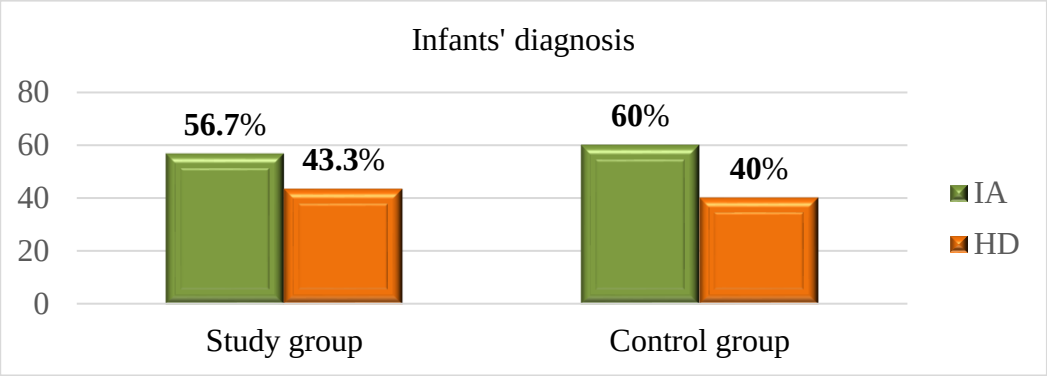

Figure 4. Infants' Diagnosis in the Study and Control Group

Table 2
Comparison between Total Mean Score of Mothers' Knowledge and Reported Practices Before, After Week and After Month of Implementing CEP in The Study and Control Group

The total mean score of mothers' knowledge	Study group (n=30)	Control group (n=30)	t	P
Before implementing CEP				
Mean ± SD	40.13 ± 7.43	37.8 ± 5.66	1.22	0.23
After a week of implementing CEP				
Mean ± SD	85 ± 12.67	54.4 ± 10.73	-11.09	0.00*
After a month of implementing CEP				
Mean ± SD	85 ± 12.69	55.47 ± 12.60	-9.9	0.00*

*Significant at $p < 0.05$

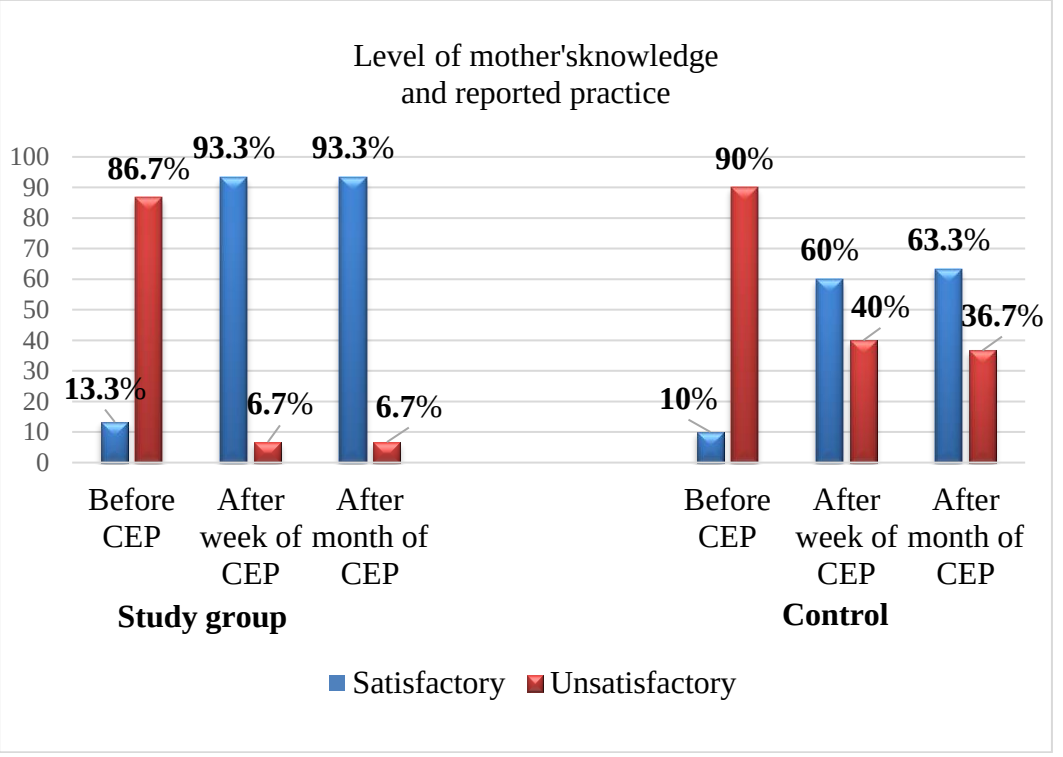

Figure 5. Level of Mothers' Knowledge and Reported Practice Before, After Week, and After Month of Implementation CEP in the Study and Control Group

Table 3
Comparison between Total Mean Score of Mothers' Colostomy Care Checklist Before, After Week, and After Month of Implementing CEP in the Study and Control Group

The total mean score of mothers' knowledge	Study group	Control group	t	P
Before implementing CEP				
Mean ± SD	4.53 ± 1.65	3.97 ± 2.67	0.97	0.33
After a week of implementing CEP				
Mean ± SD	16.33 ± 1.84	7.17 ± 3.35	15.71	0.00*
After a month of implementing CEP				
Mean ± SD	16.4 ± 1.85	8.67 ± 3.16	13.58	0.00*

*Significant at p < 0

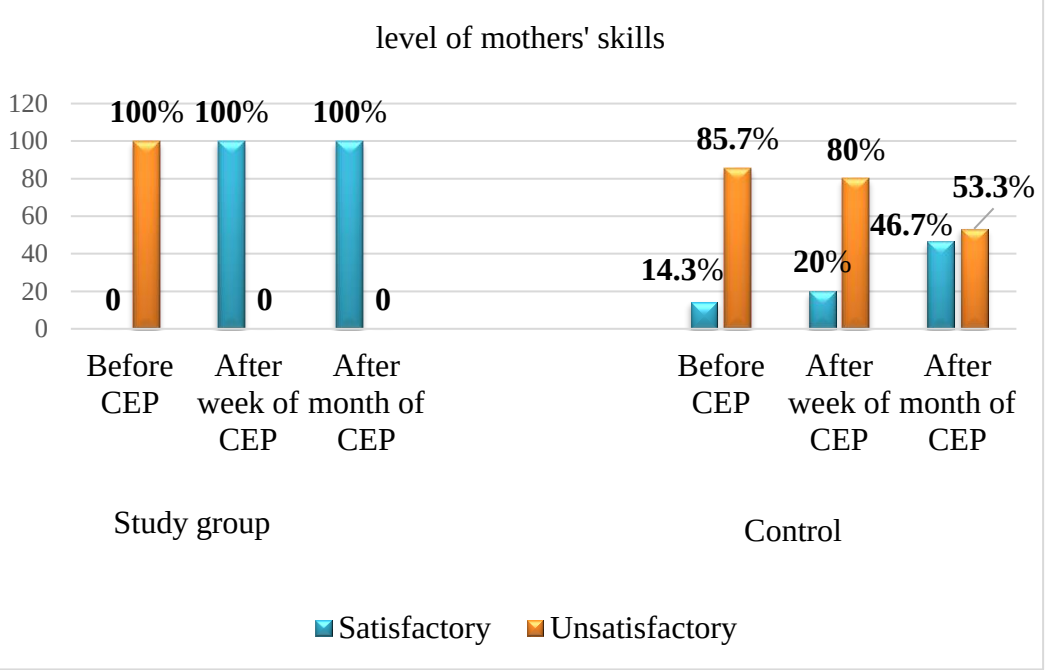

Figure 6. Level of Mothers' Colostomy Care Skills Before, After Week, and Month of Implementation CEP in The Study and Control Group

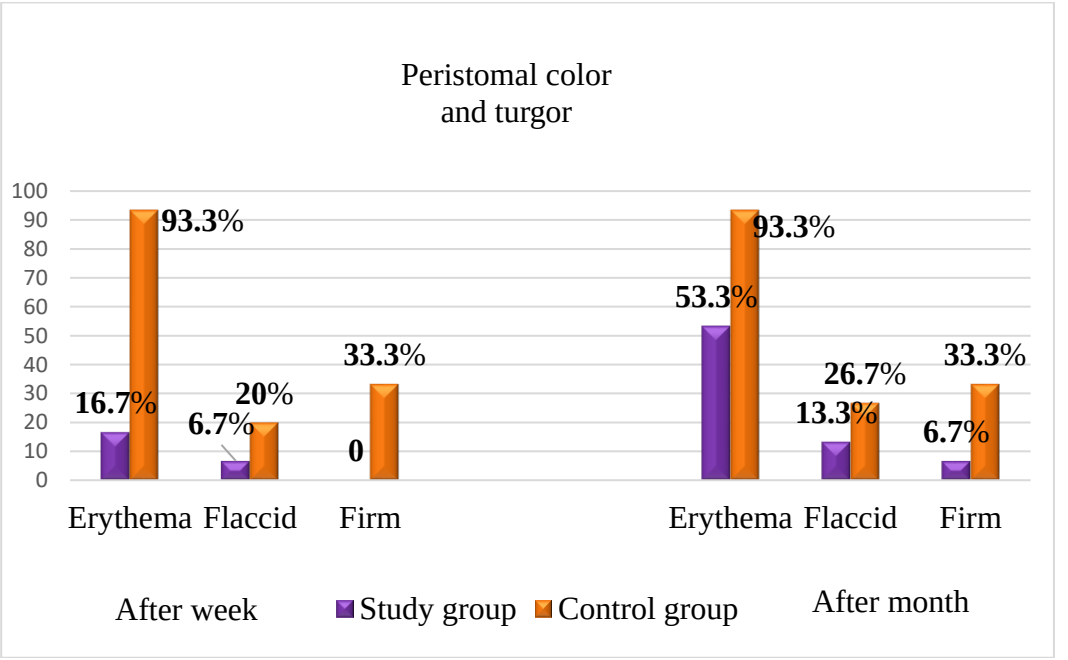

Figure 7. Occurrence of Complications in Peristomal Skin Color and Turgor among Infants in The Study and Control Group

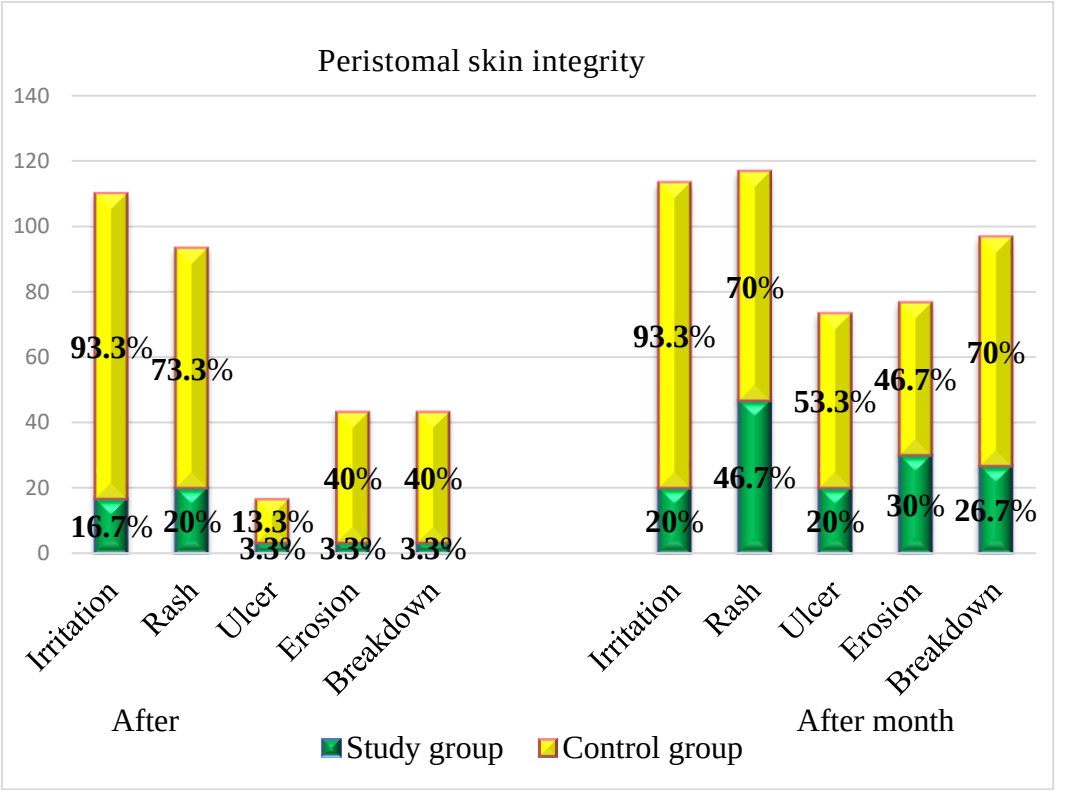

Figure 8. Occurrence of Peristomal Skin Integrity Complications among infants in The Study and Control Group

Table 4
Correlation Between the Total Mean Scores of Post-test of Knowledge and Skills After Month among Mothers in the Study Group

Item	The total mean score of post-test of mothers' knowledge	
	r	P
Total posttest mean score of mothers' skills	0.53	0.00*

* Significant at $p < 0.05$

Table 5
Correlation Between Total Mean Scores of Posttest Knowledge and Skills after One Month among Mothers in the Study Group with the Occurrence of Peristomal Skin Complications among their Infants

Peristomal Skin Complications	The total post-test mean score of mothers' knowledge		The total post-test mean score of mothers' skills	
	r	P	r	P
Erythematic peristomal skin	-0.56	0.001*	-.486	.006*
Irritation peristomal skin	-0.22	0.241	-.208	0.27
Rash peristomal skin	-0.43	0.01*	-0.25	0.18
Ulcer peristomal skin	-0.57	0.00*	-0.6	0.00*
Eroded peristomal skin	-0.41	0.02*	-0.71	0.00*
Peristomal skin breakdown	-0.54	0.00*	-0.72	0.14
Flaccid peristomal skin	-0.15	0.4	-0.62	0.00*
Firm peristomal skin	-0.66	0.00*	-0.47	0.00*

* Significant at $p < 0.05$

Discussion

As regard to studied mothers' level of education, it was illustrated that more than two fifth (43.3%) of mothers in the study group had basic education, whereas more than one fifth (26.7%) of mothers in the control group were not read or write. On the same context, Dehsorkhi et al., (2020) found that 63.3% of mothers in the study group and 66.7% of mothers in the control group had level of education less than high school. In contrast, Robatmily, Anboohi, Farahani and Nasiri (2018) revealed no significant difference between the two study groups in terms of the mothers' education. However, mothers' level of education could affect their perception regarding their children' health care. The current study findings revealed that two-thirds (66.7%) of the mothers in the study group live in rural areas, and more than half (53.3%) of mothers in the control group live in urban areas. While, an Egyptian study held by Abd- Elhay, Osman, Gadallah and Sayed (2019) aimed to assess post-operative peristomal skin complications in children with colostomy, found that more than two thirds of children came from the rural areas.

The current study findings reflected that the mean age of the studied infants was 3.18 ± 1.77 months in the study group and 3.62 ± 1.4 months in the control group. These findings nearly close to; Abd El Aziz and Sheir (2020) found that the mean age of the studied children in study and control groups were (6.5 ±4.4 & 5.9 ±3.2 respectively). Concerning the length of current hospitalization of the studied infants, it was 4.67 ± 3.03 days in the study group and 4.4 ± 2.74 in the control group. While, Mallik, Pal and Mohanta (2019) studied pediatric colostomies and indicated that, the patients were discharged usually on the 7th or 10th postoperative day. Regarding the studied infants' gender, the current study decleared that the highest percentage of infants were males in both groups. Similarly, in Egypt, Hagras, Mansour, Shalaby, El-Attar and Abdalla (2019) found

that there was no significant difference between both groups as regards to demographic data and male were higher than female in both groups.

Concerning the studied infants' diagnosis; The study findings disclosed that the highest percentages of infants diagnosed as IA in both groups. These findings correspond to Shalaby (2021) who found that, over three years in Egypt, high ARM (90%) and HD (5%) were the most common causes of creation of neonatal colostomy. The current study findings proved that, that there was no statistically significant difference between the total mean scores of mothers' knowledge and reported practices in both groups before implementing the CEP. In contrast, both groups showed statistically significant differences regarding the total mean score of knowledge and reported practice after one week and one month of implementing the CEP ($p<0.05$). These results were parallel in the same line with the Egyptian study held by Mohamed and Mahmoud (2021) and indicated that there were positive highly statistically significant differences between the total mean scores of mothers' knowledge post and following the program of control and study groups. While there was no statistically significant difference between the control and study group pretest total mean scores.

The current study findings asserted that before implementing CEP, the vast majority of mothers in both study and control groups had an unsatisfactory level of knowledge and reported practice. While after one week and a month of implementing CEP, the study group, most of mothers had a satisfactory level of knowledge and reported practice compared to less than two thirds after one week and after a month of mothers in the control group. In compatible with, El Mwafie and Abduallah (2021) who found that, 72.5% and 82.5% of the studied mothers in both study and control groups had unsatisfactory level of knowledge pre-discharge instructions implementation with no significant differences. In contrast, post implementation of discharge instructions, there was a highly statistically significant difference between study and control groups, where 80.0% of the study group had satisfactory level of knowledge compared to 22.5% of the control group.

On investigating mothers' skills of colostomy care, the current study results demonstrated that there were statistically significant differences between the total mean scores of mothers in both groups concerning their skills in colostomy care after one week and a month of implementing the CEP. In accordance, Rashed et al., (2020) illustrated that caregivers had higher mean score of performance posttest in the study group compared to control group (28.33 ±1.01vs. 4.06 ±2.5 respectively). Moreover, there were highly statistically significant differences between caregivers' practices in the study group pre, post and follow-up test at 1 % level of statistical significance. The current study results confirmed that after implementing CEP, all mothers in the study group had satisfactory skills level of colostomy care compared to one fifth of mothers after week and more than two fifths of mothers after one month in the control group. In cohort, Abd El Aziz and Sheir (2020) assessed the mothers care for their children and the effect of the nursing interventions on mothers' practice. It can be noted that, the majority of mothers in both groups have unsatisfactory practice before intervention, while after one week after intervention, the majority of the studied mothers after one week and one month had satisfactory practice compared to approximately one

third of the mothers in control group. There was high statistically significant difference between both groups post intervention.

As regards to peristomal skin complications, infants in the study group were less exposed to peristomal skin complications than infants in the control group were. Correspondingly, Dehsorkhi et al. (2020) observed that one month after the intervention of colostomy empowerment program, 81.7% and 54% of neonates in the control and intervention groups had skin complications, respectively. Furthermore, 2 months after the intervention, 66.6% and 29.7% of the cases and 3 months after the intervention, 49.8% and 19.8% of these subjects respectively in the control and intervention groups developed skin complications. Based on the findings, the mean score of skin complication in the studied newborn was lower in the intervention group than in the control group in all three stages.

In the light of previously mentioned results, the current study findings denoted the positive effect of colostomy empowerment program on mothers' knowledge, reported practice and skills, achieving the first hypothesis of the study. Moreover, definitely the results achieved the second study hypothesis as infants in the study group exposed to less peristomal skin complications than infants in the control group. The current study findings asserted that, there was a statistically significant positive correlation detected between the mothers' total post-test mean scores of knowledge and skills in the study group. This finding supported by many previous Egyptian studies in (2020) such as, Rashed et al., Abd El-Rahman et al. and Hassan and Mahmoud, Likewise, Kamal, Ibrahim, Amin and Ahmed (2021) and Elzeky et al., (2022) who found that there was statistically significant positive correlation between mothers' total knowledge scores and total practice scores regarding stoma care at 1 % level of statistical significance after implementation.

As regards peristomal skin complications after month of CEP, the current study verified that, there were statistically significant negative correlations detected between mother's total post-test mean score of knowledge and skills with the occurrence of most of peristomal skin complications. On the same context, He et al. (2021) found that, Univariate analysis was performed to estimate the related factors of occurrence of peristomal dermatitis. The results showed that the stoma education class was the only significantly factor associated with the decrease in the rate of peristomal dermatitis. The current study detected that, there were no statistically significant correlations between infants' characteristics and the occurrence of almost all postoperative complications. Compatible with Salvadalena, Colwell, Skountrianos and Pittman (2020) who found that there were no statistical differences in the measured participants' demographics between those who sustained peristomal skin complications and those who did not. On the same line, Zamil, Radhi and Hasan (2018) illustrated that regardless the indications of colostomy, associated with high rate of complications.

Conclusion

The current study results concluded that after the implementation of CEP, there was a significant improvement in the level of knowledge, reported-practices, and skills among mothers in the study group. Infants in the study group were exposed

to less postoperative complications regarding colostomy-related complications and peristomal skin complications than infants in the control group. As well as, durations of postoperative complications were lesser in the study group.

Recommendations

Based on the results of the current study, it was recommended that:

- Integration of the colostomy empowerment program for mothers in the pediatric surgy ward and incorporated into the discharge plan.
- Training sessions and educational classes should be planned for mothers from admission to being adopted by mothers after discharge.
- A simple Arabic illustrated booklet about colostomy care should be available in every pediatric surgical ward to guide mothers on correct knowledge and practices.
- A multidisciplinary team should develop, implement, and evaluate educational sessions for mothers of children with a colostomy to achieve better post-discharge self-care behaviors and outcomes.
- Raising the awareness of pediatric surgical nurses through in-service training sessions about the benefits of empowering mothers having children with a colostomy.
- Communication with the national nursing authorities and recommend the need to train a specialized ostomy nurse to be available at every pediatric surgery ward.
- Apply the innovative trend of telenursing for follow-up of mothers having children with a colostomy.
- Longitudinal studies are necessary to monitor late postoperative colostomy complications.

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