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Effect of Nursing Interventions on Reducing Postoperative Complications among Children with Imperforate Anus and Mothers' Anxiety

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Abstract: **Child's hospitalization for imperforate anus surgery considered a source of anxiety for the children and the parents that persists for a long time after discharge. Therefore, involving mothers in treatment of their children are extremely required to decrease their anxiety and children's postoperative complications. Aim: The present study aimed to investigate the effect of nursing interventions on reducing postoperative complications among children with imperforate anus and mothers' anxiety. Design: A quasi experimental design [study and control groups], pre / post-tests were used. Setting: This study was carried out at pediatric surgical department and surgery outpatient clinic affiliated to Mansoura University Children's Hospital, Egypt. Sample: A purposive sampling composed of 70 mothers of children with imperforate anus, who were admitted to the previous setting, after fulfilling inclusion criteria. They were divided into 2 equal groups (study and control). Tools: 5 tools were used.1. A structured Interview Questionnaire [Socio-demographic characteristics of mothers and children, surgical history and mothers' knowledge]. 2. Performance Observational Checklists. 3. Postoperative Complications Assessment Questionnaire. 4. State-Trait Anxiety Inventory. 5. Zarit Psychosocial Burden Interview Scale. Results: The present study revealed that, there were high statistical significant differences between both groups (p <0.001) after intervention regarding studied mother's knowledge and practice. In addition, the children in study group have less postoperative complications than those children in control group post intervention. Also, about two third (60.0%) and three quarter (74.3%) respectively of mothers in study group had mild anxiety level post one week and one month, compared to about one quarter (20.0% & 28.6% respectively) of mothers in control group. Also, more than one third (37.1%) and about half (48.5%) of mothers in study group have little or no psychosocial burden level after one week and one month, compared to less than one quarter (14.3% & 20.0% respectively) of mothers in control group. There were statistical significant differences between both groups after intervention. Conclusion: Nursing interventions affected positively on mothers' knowledge, practice, decrease children's postoperative complications and decrease mothers' anxiety, psychosocial burden level. Recommendation: It was suggested replication of this nursing interventions on a larger sample and future research to monitor the long-term postoperative complications.**

Keywords: **Anxiety, Children, Imperforate anus, Mothers, Nursing interventions, Postoperative complications, Psychosocial burden.**

I. INTRODUCTION

Imperforate anus is a defect in which the anus is absent or malformed. Its incidence one in 5000 live births and affects girls and boys with a slightly more common in males[(1)].The accurate cause is not known, drugs exposure throughout pregnancy or/and environmental factors could play a role in some cases, however have still unclear [(2)].

Imperforate anus is a spectrum of different congenital anomalies that range from minor defects to a complex defects. The traditional classification [high, intermediate and low defects][(1)]. Imperforate anus sometimes needs immediate surgery after birth to open a passage for stool, unless a fistula may be relied on, or till corrective surgery takes place. Treatment based on the type of abnormality present, it's treated with perinealanoplasty alone or colostomy in the first stage and a definite repair later and anal dilatation to prevent anal stenosis [(3)].

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All children with imperforate anus require same surgery to correct the defect. According to the National Hospital of Pediatrics (NHP), for many of children, feces drainage is ensured by means of a colostomy as early step to enabling recovery from delivery and promote growth[2]. Colostomy is a surgical procedure which brings one end of the intestine throughout an opening in the abdominal wall, one from the challenges of care postoperatively, a colostomy might associated with many complications, as wound infection, skin excoriations, bleeding, stricture, prolapse, blockage, sepsis, fluids and electrolytes loses, which are poorly tolerated by young children. These challenges lead to the poor acceptance by mothers/caregivers, particularly in developing countries [1,4].

Anastomotic complications, especially leak or stricture, are not common, with an incidence of 4% to 22% in reportable cases. These complications will have devastating consequences and may impair the quality of life for these children, many surgeons traditionally needed diligent daily anal dilatation programs to prevent anastomotic stricture. The explanation for this practice has been to [stimulate the normal growth of the rectum muscles, which, in turn, can gently distend the muscles structures, avoiding their rupture]. Dilatations are often done with plastic or metal dilators or a mother's finger, generally once or twice daily. Several surgeons feel that the dilatations can help to prevent anal strictures and therefore prevent postoperative enterocolitis and constipation [5].

Child's illness and hospitalization is a source of anxiety and stress for both the child and the parents, which results in transfer of anxiety to the child [6]. Mothers' anxiety might increase as a results of insufficient information and knowledge regarding care of the child throughout hospitalization and after discharge, and may also lead to mother's evasion and insufficiency to support her child. Family member's anxiety will causes emotional, psychosocial burden, and physical problems delaying the child's recovery process [7, 8].

The role of pediatric nurse is educate the parents, especially the mothers to alleviate the anxiety, suggest preparation of parents for correct cares pre and post operation through different strategies. Mothers are normally not trained sufficiently for such care that leads to anxiety and long term behavioral disorders; hence, the treatment staff, especially the nurses, should intervene in continuous mothers preparation at the discharge process [9]. Even though training, developing specifications, and training material are fundamental in preparing child and mothers, they are not enough, children follow -up is also needed[10]. Mother's contact with health care centers, home visits by caregivers, and applying telecommunication methods are conventional follow-up methods [9].

Pediatric nurse plays an important role for supporting, educating, and empowering mothers to cope with their child's diseases and to care for their children at home. Currently, technological advances provide many different educational aids such as booklets and video clips which can facilitate the expansion of mothers' knowledge and practice. Nurses can use the booklets to educate the mothers of children undergoing colostomy. Nurses can inform mothers about the problems of their children and therapy, alleviate their stress and anxiety [11]. So that, when the mothers had good knowledge and satisfactory practice they would be provide good interventions for their children, this lead to decrease children's postoperative complications, reduce mothers' anxiety and psychosocial burden.

Significance of the study:

Imperforate anus is a complex congenital anomaly including the rectum and distal anus, the anus isn't perforated and the distal enteric part might end blindly "atresia". It's prognosis and quality of life for children with imperforate anus may based on the presence of associated congenital anomalies[12]. When a child is diagnosed with anal malformation, it always results in a traumatic period for a parents, particularly if they are young and new and it may be difficult for them to comprehend or accept the information. Involving mothers in treatment, decisions and care of their children are extremely suggested to encourage motherhood, increase attachment, improve mothers' knowledge, practice and improve the children recovery. Support and information from health caregivers need to be continuing as open communication between health caregivers and mothers is a crucial factor in children care. After discharged from hospital and colostomy operation, the mothers are responsible for the care of their children's colostomy. Throughout the hospitalization the mothers are shown how to do the care. Studies illustrate that providing educations to mothers in hospitals and emotional support not only help them cope with their children's hospitalization, but also help them to provide post-discharge care to their children's at homes [2].

Nursing interventions are crucial for mothers who provide care for their children with imperforate anus and pediatric nurses play a significant role in this regard. Therefore, this study aimed to investigate the effect of nursing interventions on reducing postoperative complications among children with imperforate anus and mothers' anxiety.

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Aim of the study:

This study aimed to investigate the effect of nursing interventions on reducing postoperative complications among children with imperforate anus and mothers' anxiety.

Research hypotheses:

The present study hypothesized that.

H1- The mean knowledge and practices scores of mothers in the study group after intervention will be higher than before intervention.

H2- Implementation of the nursing interventions for mothers of children with imperforate anus will reduce children's postoperative complications in the study group.

H3- Mothers in the study group will have decreased level of anxiety after implementation of the nursing interventions.

H4- Implementation of the nursing interventions will reduce mothers' psychosocial burden level in the study group.

H5- There will be a positive relationship between mothers' knowledge and their practice and anxiety level and children's postoperative complications post intervention.

II. SUBJECT AND METHODS

1- Research design

A quasi experimental research design [study and control groups] was used for this study, pre / post-tests for both groups were used.

2 - Setting

The study was carried out at pediatric surgical department and surgery outpatient clinic affiliated to Mansoura University Children's Hospital, Egypt.

3 – Sampling:- ***Sample size.***

Based on data from previous study [9], considering level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula:

$n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(SD)^2\}]/ (\text{mean difference between the two groups})^2$

where

SD = standard deviation

$Z_{\alpha/2}$*: This depends on level of significance, for 5% this is 1.96*

Z_{β}*: This depends on power, for 80% this is 0.84*

Therefore,

$n= [(1.96 + 0.84)^2 \times \{2(5.9)^2\}]/ (4)^2=34.1$

Based on the above statistical formula, the sample size required per each group is 35.

A purposive sampling composed of 70 mothers of children with imperforate anus, who were admitted to the previous setting. The sample was divided into 2 equal groups: [Study group (35); those mothers were exposed to nursing interventions and control group (35); those mothers were exposed to routine care according to surgery department policy]. Study sample was selected after fulfilling the following inclusion criteria: Mothers of children having high and/ or intermediate imperforate anus regardless the mothers' age and educational level, full term newborn, both gender, child age from birth up to 5 years old, children having colostomy and need anal dilatation regimen, and the children with low imperforate anus, presence of other congenital anomalies and high risk neonates were excluded from the study.

4- Tools:- Five tools were used to collect the necessary data.

***Tool (1):* A structured Interview Questionnaire:**

It was developed by researchers after reviewing related literatures (Jahanara Rahman ,(2015); Kwiatt & Kawata, 2013 and Salary Survey in Egypt, 2013) [13, 14, 15]. It was written in simple Arabic language and it includes the following parts:

Part 1: a- Socio-demographic characteristics and clinical data of children such as [age, gender, birth order and types of imperforate anus].

b- Surgical history of children and their sibling such as child's surgical history, and siblings' surgical history.

c- Socio-demographic characteristics of mothers as age, educational level, residence, mothers' job, family income, parents' consanguinity and family history for imperforate anus and others congenital anomalies.

Part 2: Knowledge questionnaire, it was composed of 34 open and closed ended, true and false and multiple choice questions to assess mothers' knowledge about imperforate anus, including definition, signs and symptoms, duration of disease, the necessity of colostomy and anal dilatation, control of stool odor, using and changing the colostomy bag, skin care and diaper care. Also, feeding the child, changing clothes, child activities postoperative, infection prevention and its management, child bath, the prognosis for colostomy, serious signs and symptoms for the surgeon call and consultation, postoperative complications and how mange it. Also mothers' knowledge regarding anal dilatation such as definition, frequency, time needed for it, distance of the dilator which should insert in the anus, problems for surgeon call and importance of follow‐ up care.

Scoring system

The scoring system for mothers' knowledge was developed; the correct and complete answer was given the score '1' and unknown or incorrect answer was given score 'zero'. The scores obtained for each question was summed up to get the total score (34 marks) for the mothers' knowledge, the total score was computed out and converted into percentage and categorized into: <50% was considered poor, 50% to < 65% was considered average and ≥65% was considered good.

***Tool (2):* Performance Observational Checklist**

This tool was adapted from the (Erin Larowe, 2013 and Bowden & Greenberg, 2012)[16, 17]**.** Some modifications were done by the researchers. It was used to assess the mothers care for their children and the effect of the nursing interventions on mothers' practice. It includes 41 steps, it were composed of three procedures about colostomy care consists of (15 steps), anal dilatation consists of (14 steps) and diaper care consists of (12 steps).

Scoring system

The total scores were calculated [41 marks]; each correct "Done" step of the procedure scored (1) and incorrect "Not done" step scored (0). The levels of mothers' practice were grouped into 2 groups according to total percent score, 60% and more was considered satisfactory practice and less than 60% was unsatisfactory practice.

***Tool (3):* Postoperative Complications Assessment Questionnaire.**

It was developed by the researchers after reviewing related literatures (Erin Larowe, 2013; Kwiatt & Kawata, 2013 and Sheikh et al., 2006) [16,14,18], it was composed of 14 yes or no questions which were examined occurrence of postoperative complications such as colostomy complications as (bleeding from stoma, change stoma skin colure, stoma prolapsed, stoma obstruction, necrosis and change stoma size, anal dilatation complications as (bleeding from anus, suture site infection and stricture of anal canal), gastrointestinal problems as (diarrhea, constipation, abdominal distention and vomiting) and hospital readmission due to complications after one month. It was written in Arabic language.

***Tool (4):* State-Trait Anxiety Inventory (STAI)**.

This tool was adopted from Spielberger et al., (1983) [19], it was aimed to assess the severity of mothers' anxiety. using items that measure subjective feelings of tension, apprehension, nervousness, worry. It consists of 20 statements, divided into two balance statements, 10 statements correct direct and the rest of statements correct adversely. The number of statements correct direct were 3, 4, 6, 7, 9, 12, 13, 14, 17, 18, the responses were rated from not at all, scored (one),

somewhat, scored (two), moderately so, scored (three) and very much so, scored (four). The adverse statements number were 1, 2, 5, 8, 10, 11, 15, 16, 19, 20, the responses for this statement were rated from not at all, scored (four), somewhat, scored (three), moderately so, scored (two), and very much so, scored (one).

Scoring system

The total marks of rating scale ranged from 20 – 80 marks, the higher score indicates severe anxiety, median score indicates moderate anxiety and low score indicates mild anxiety. The severity of anxiety level was categorized into three levels, mild anxiety (1<28) moderate anxiety (28<55), and severe anxiety (55≤ 80).

***Tool (5):* Zarit Psychosocial Burden Interview Scale.**

This tool was adopted from Yap, (2010) [20], it is five point likert scale containing a 22 items, to assess mothers' psychosocial burden and for every item, mothers were asked to respond regarding the impact of the children's disease on their life, through how always they felt in a particular way [never, rarely, sometimes, quite frequently, or nearly always). The questions concentrate on major areas like [mother's psychological well-being, mother's health, social life, finances and also the relationship between the mothers and their children].

Scoring system

The score of this tool ranging from never was scored zero to nearly always was scored four, [never, rarely, sometimes, quite frequently or nearly always were scored zero, one, two, three, or four respectively]. The total score was ranged from 0 to 88, with higher scores indicate severe burden, the psychosocial burden level was categorized to 4 levels, little or no burden if the mothers' score was "0 – < 21", mild to moderate burden if the mothers' score was "21 – 40", moderate to severe burden if the score was "41 – 60" or severe burden if the score was "61 – 88".

Validity and Reliability

The validity of tools were reviewed and tested by a panel of 5 experts in the pediatric nursing and pediatric surgeons and their comments were considered. The reliability of knowledge was tested giving Cronbach's α coefficient of 0.83, practice was tested giving Cronbach's α coefficient of 0.823, state-trait anxiety inventory was tested giving Cronbach's α coefficient of ranged from 0.91 to 0.93 Spielberger et al., (1983) [19] and zarit psychosocial burden interview was tested giving Cronbach's α coefficient of 0.93 Yap, (2010) [20].

5- Ethical Considerations

An official permission was obtained from the head of the pediatric surgical department to conduct the study after explaining the objective of the study. Additionally as oral consent was obtained from mothers after explaining the objective of the study. Confidentiality of data and anonymity, also mothers' right to withdraw from the study at any time was explained to every mother before obtaining information.

6- Pilot study

A pilot study was carried out on 7 mothers and their children to test the feasibility, applicability, clarity and time needed to filling every tool. Some modifications were done, mothers and their children who participated in the pilot study were excluded from the study.

7- Data collection

Data collection of this study was conducted from the beginning of June 2016 to the end of April 2017. The researchers were available in the study setting 3days per week from 9 A.m. to 12 p.m. The study was carried out through the following stages.

Preparatory and planning stage

The study subjects were divided into two groups, the study group was exposed to the nursing interventions postoperatively and the control group was exposed to the routine care of the surgery department. Data collection was the same for both groups. After explaining the objective of the study by simple and clear way to the mothers, the researchers were collected data about socio-demographic characteristics of children and mothers. Each mother in both groups was

individually interviewed using the previously mentioned study tools to fulfill the questionnaire " pre-post tests after one week and one month " to assess mothers' knowledge about the disease and postoperative care for their children with imperforate anus using tool 1 and mothers' practice was assessed by using observational checklists using tool 2, also assess mothers' anxiety level using tool 4 and mothers' psychosocial burden using tool 5. The questionnaire and the answers were marked by the researchers. The interview lasted for 20- 30 minutes for each mother to complete the questionnaire. The nursing interventions were developed by the researchers depending on the mothers' needs after reviewing the related literatures, it was given to the mothers and their children in study group. Then, the study group was divided into small groups (2-3 mothers) as mother class, according to number of mothers who available in the study setting. Several teaching methods were used such as [lectures, group discussion, demonstration and re- demonstration]. Teaching media such as real materials, power point, colored posters, video and hand out were used.

Implementation stage:

For mothers and their children in study group. The nursing interventions were include three sessions [one theoretical and two practical training] each of which lasting 30 - 45 minutes. The contents of the sessions were as follows:

Session 1: It was included health education for mothers about definition of imperforate anus, signs and symptoms, duration of illness, the necessity of colostomy and anal dilatation, complications of colostomy and anal dilatation such as skin inflammation, infection, necrosis, stoma prolapsed or retraction, stoma blockage, dehydration and risk of bleeding from stoma or anus. Additionally child care, using and changing the colostomy bag, skin care and diaper care. Also, feeding the child, changing child's clothes, child activities postoperative, infection prevention and its management, child bath, serious signs and symptoms for the surgeon call and consultation, postoperative gastrointestinal tract problems such as diarrhea, constipation and distension and its management. The researchers instruct the mothers regarding definition of anal dilatation, dilators sizes, frequency [twice a day], gently put the dilator about 2-3 cm into the anus, time needed for it [keep dilator in anus for thirty seconds], increase dilator size every week and explain serious signs for surgeon call and importance of follow-up care. The handout regarding imperforate anus and child care was written in Arabic language and given to mothers in study group.

Session 2: Colostomy care demonstration using role playing by the researchers and re-demonstration by the mothers and assessment of their ability to provide colostomy care by the researchers.

Session 3: Anal dilatation and diaper change demonstration using role playing by the researchers and re-demonstration by the mothers and assessment of their ability to provide anal dilatation and diaper change by the researchers.

For mothers and their children in control group. They were received routine care according to the policy of surgery department.

Evaluation stage. Posttest after one week and one month for mothers' knowledge, practice, anxiety level and mothers' psychosocial burden were done for both groups using the same assessment tools and assess the children's postoperative complications after one month. Comparison between both groups to evaluate the effect of nursing interventions on study group.

8- Statistical analysis

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). Continuous data were expressed in mean ±standard deviation (SD) while categorical data were expressed in number and percentage. The comparisons were determined using Student's t test for variables with continuous data. Chi-square test was used for comparison of variables with categorical data. Statistical significance was set at $p<0.05$.

III. RESULTS

Table (1) illustrates the socio-demographic characteristics and clinical data of studied children and their surgical history, it is clear from this table that, mean age of studied children in study and control groups were (6.5 ±4.4 & 5.9 ±3.2 respectively), and less than two third (54.3%&60.0% respectively) of them were male in both groups. Regarding birth order, less than half (40.0%&37.1% respectively) of children in both groups were third and second birth order. In addition, less than three quarter (71.4%&68.6% respectively) of children in both groups were high imperforate anus.

Concerning child's surgical history, more than half (54.3%&57.1% respectively) in both groups had surgical history and majority(80.0%&85.7% respectively) of children's sibling had not surgical history. There were no statistical significant differences between both groups (p>0.05).

Table (2) displays the socio-demographic characteristics of studied mothers and family history. It is obvious that, mean age of studied mothers in study and control groups were (27.2 ±7.0 &27.0 ±7.3 respectively), also more than half (54.3% & 60.0% respectively) of mothers in both groups were secondary educational level and from rural area. More than half (57.1%&51.4% respectively) of mothers in both groups were housewives, also more than half (51.4%&57.1% respectively) of mothers in both groups had median income and more than half (54.3%&62.9% respectively)of mothers in both groups have positive consanguinity. Majority (91.4%&94.3% respectively) and (88.6% &85.7% respectively) of mothers in both groups had no family history for imperforate anus and others congenital anomalies. There were no statistical significant differences between both groups (p>0.05).

Figure (1) shows mothers' knowledge level before, after one week and one month after nursing interventions, it is clear from this figure that, about two third(65.7% & 62.9% respectively) of mothers in both groups have poor knowledge before intervention, while after one week, majority (82.9%) of mothers in study group and more than three quarter (77.1%) of them after one month have good knowledge compared to minority of mothers in control group. This differences were highly statistical significant between both groups after intervention (p<0.001).

Figure (2) illustrates mothers' practice level before, after one week and one month after nursing interventions, it can be noted that, majority (80.0%&82.9% respectively) of mothers in both groups have unsatisfactory practice before intervention, while after one week after intervention, majority (91.4% &88.6% respectively) of studied mothers in study group after one week and one month had satisfactory practice compared to approximately one third (28.6% &34.4% respectively) of studied mothers in control group. There was high statistically significant difference between both groups post intervention (p<0.001).

Table (3) illustrates children's postoperative complications and hospital readmission in both groups after one month post intervention, it is obvious from this table that, less than three quarter (71.4%) of studied children in study group had not colostomy complications compared to less than one third (31.4%) of children in control group. Also, about three quarter(74.3%) of studied children in study group had not anal dilatation complications compared to more than one third (37.1%) of children in control group. In relation gastrointestinal problems, more than two third (68.6%)of children in study group had not gastrointestinal problems compared to about one third (34.2%) of children in control group. In addition, less than three quarter (71.4%) of studied children in study group had not hospital readmission due to postoperative complications compared to more than one third (40.0%) of children in control group. There were statistical significant differences between both groups after intervention (p0.025, p0.019, p0.034&p0.008 respectively).

Figure (3) illustrates mothers' anxiety level before, after one week and one month after nursing interventions, it is clear from this figure that, about two third(68.6%&60.0% respectively) of mothers in both groups have sever anxiety level before intervention, while post one week, about two third (60.0%) and after one month, approximately three quarter (74.3%) of mothers in study group had mild anxiety level compared to about one quarter (20.0%&28.6% respectively) of mothers in control group. There were highly significant differences between both groups post intervention (p<0.001).

Table (4) illustrates mothers' psychosocial burden level before, after one week and one month after nursing interventions, it is obvious that, less than half (40.0%&42.8% respectively) of mothers in study and control groups have moderate to severe psychosocial burden level before intervention, while after one week, more than one third (37.1%) and after one month, about half (48.5%) of studied mothers in study group have little or no psychosocial burden level compared to less than one quarter (14.3 & 20.0% respectively) of mothers in control group. There were statistically significant differences between both groups post intervention (p0.029& p<0.001 respectively).

Table (5) presents association between mothers' knowledge and children's postoperative complications in the study group post 1 month, it is clear from this table that, there was strong relationship between mothers' knowledge and children's postoperative complications post intervention, majority of mothers who had good knowledge their children had not postoperative complications regarding colostomy, anal dilatation and gastrointestinal problems and hospital readmission due to complications. This relation was highly statistical significant (p <0.001).

Table (6) displays association between mothers' practice and children's postoperative complications in the study group post 1 month, it is clear from this table that, there were positive relationship between mothers' practice and children's postoperative complications post intervention, more than three quarters of mothers who had satisfactory practice their children had not postoperative complications regarding colostomy, anal dilatation and gastrointestinal problems and hospital readmission due to complications. This relation was statistical significant (p <0.05).

Table (7) presents association between mothers' knowledge and their anxiety and practice in the study group post 1 month, it is clear from this table that, there were positive relationship between mothers' knowledge and their anxiety and practice, the majority (92.6%&96.3% respectively) of studied mothers which have good knowledge had mild anxiety level and satisfactory practice. This relation was highly statistical significant (p <0.001).

Table (8) shows association between mothers' anxiety level and their psychological burden level in the study group post 1 month**,** it is obvious that, there was strong relationship between mothers' anxiety and their psychological burden**,** more than half(57.7%) of studied mothers were mild anxiety had no / little psychological burden. This relation was highly statistical significant (p <0.001).

Table 1: Socio-demographic characteristics and clinical data of studied children and their surgical history (n=70)

Variables	Study (n=35)		Control (n=35)			
	N	%	N	%	X^2	P
Age						
< 6 months	21	**60.0**	23	**65.7**		
6months - < 1year	12	34.3	11	31.4		
1 -< 2years	1	2.9	1	2.9		
2 -< 5years	1	2.9	0	0.0	1.134	0.689
Mean ±SD (months)	***6.5 ±4.4***		***5.9 ±3.2***		***0.682***	***0.497***
Gender						
Male	19	**54.3**	21	**60.0**		
Female	16	45.7	14	40.0	0.233	0.629
Type of imperforate anus						
High	25	**71.4**	24	**68.6**		
Intermediate	10	28.6	11	31.4	0.068	0.794
Birth order						
First	6	17.1	7	20.0		
Second	11	31.4	13	**37.1**		
Third	14	**40.0**	12	34.3		
Fourth or more	4	11.4	3	8.6	0.54	0.910
Child's surgical history						
Yes	19	**54.3**	20	**57.1**		
No	16	45.7	15	42.9	0.058	0.810
Siblings' surgical history						
Yes	7	20.0	5	14.3		
No	28	**80.0**	30	**85.7**	0.402	0.526

Table 2: Socio-demographic characteristics of studied mothers and family history (n=70)

Variables	Study (n=35)		Control (n=35)			
	N	%	N	%	X^2	P
Mothers' age						
< 20 years	8	22.8	9	25.7		
20 - < 30 years	14	**40.0**	15	**42.8**		
30 - < 40 years	12	34.3	10	28.6		
> 40 years	1	2.9	1	2.9	0.594	0.898
Mean ±SD	***27.2 ±7.0***		***27.0 ±7.3***		***0.150***	***0.881***
Educational level						
Illiterate	2	5.7	5	14.3		
Primary	4	11.4	1	2.9		
Preparatory	3	8.6	3	8.5		
Secondary	19	**54.3**	21	**60.0**		

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High education	7	20.0	5	14.3	3.519	0.475
Residence						
Rural	19	**54.3**	21	**60.0**		
Urban	16	45.7	14	40.0	0.233	0.629
Mothers' job						
Housewife	20	**57.1**	18	**51.4**		
Employee	15	42.9	17	48.6	0.23	0.632
Family income/ *Egyptian pound*						
Average[6,860E.P]	10	28.6	7	20.0		
Median [5000 E.P]	18	**51.4**	20	**57.1**		
Minimum[1,100E.P]	7	20.0	8	22.9	0.701	0.704
Consanguinity						
Yes	19	**54.3**	22	**62.9**		
No	16	45.7	13	37.1	0.530	0.467
Family history for imperforate anus						
Yes	3	8.6	2	5.7		
No	32	**91.4**	33	**94.3**	0.215	0.643
Family history for others congenital anomalies						
Yes	4	11.4	5	14.3		
No	31	**88.6**	30	**85.7**	0.128	0.721

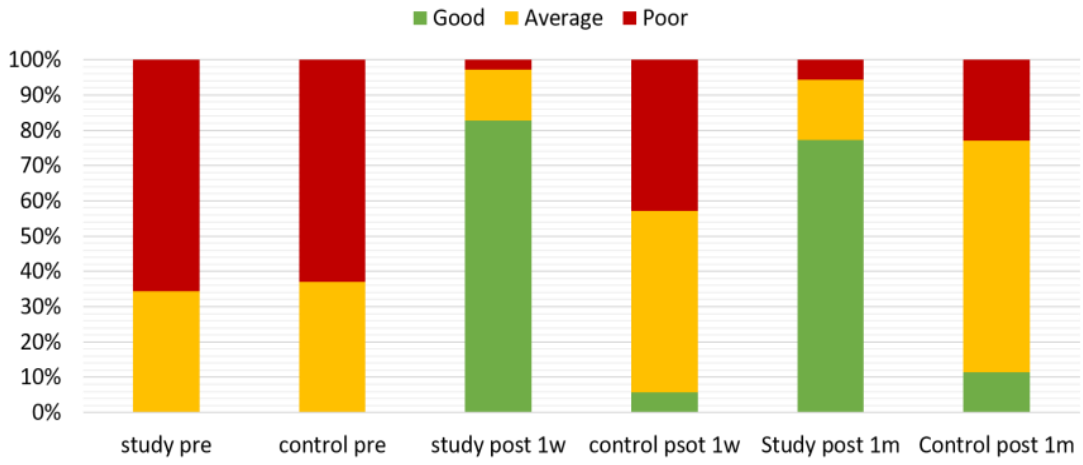

Figure 1: Mothers' knowledge level before, after one week and one month after nursing interventions in both study and control groups (n=70)

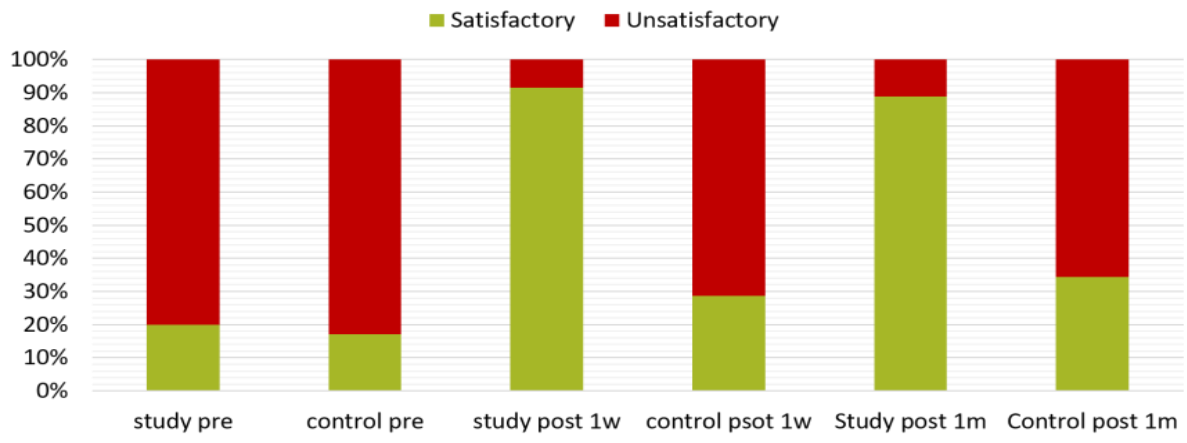

Figure 2: Mothers' practice level before, after one week and one month after nursing interventions in both study and control groups (n=70)

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Table 3: Children's postoperative complications regarding colostomy, anal dilatation and gastrointestinal problems and hospital readmission after one month post intervention in both groups (n=70)

Variables	Study (n=35)		Control (n=35)			
	N	%	N	%	X^2	P
Colostomy complications						
- *No complications*	25	**71.4**	11	**31.4**		
Bleeding from stoma	3	8.6	6	17.1		
Change stoma skin color	3	8.6	6	17.1		
Stoma blockage	0	0.0	4	11.4		
Stoma prolapsed	0	0.0	2	5.7		
Stoma necrosis	1	2.8	3	8.6		
Change stoma size	3	8.6	3	8.6	14.444	*0.025
Anal dilatation complications						
- *No complications*	26	**74.3**	13	**37.1**		
Bleeding from anus	5	14.3	10	28.6		
Suture site infection	3	8.6	9	25.7		
Tear in anal canal	1	2.8	3	8.6	10.000	*0.019
Gastrointestinal problems						
- *No problems*	24	**68.6**	12	**34.2**		
Diarrhea	3	8.6	9	25.7		
Constipation	1	2.8	3	8.6		
Abdominal distention	4	11.4	8	22.9		
Vomiting	3	8.6	3	8.6	10.416	*0.034
Hospital readmission due to complication						
- Yes	10	28.6	21	60.0		
- No	25	**71.4**	14	**40.0**	7.006	*0.008

** Statistical significant(p<0.05).*

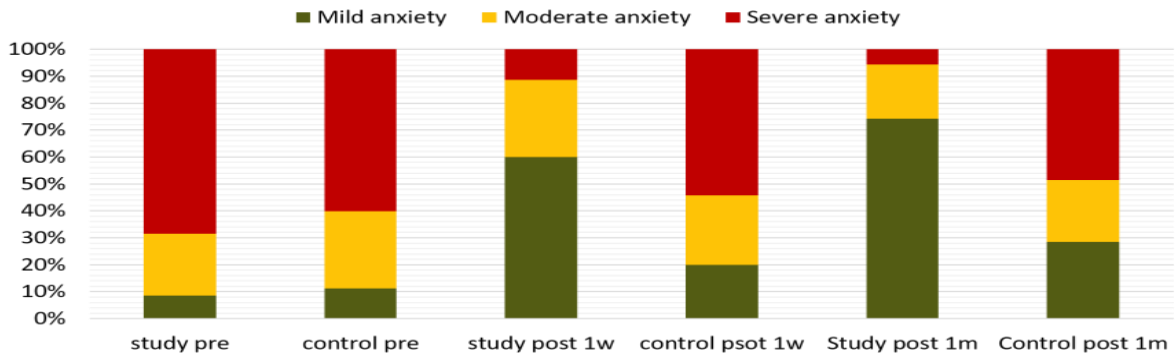

Figure 3: Mothers' anxiety level before, after one week and one month after nursing interventions in both study and control groups (n=70)

Table 4: Mothers' psychosocial burden level before, after one week and one month after nursing interventions in both groups (n=70)

Variables	Study (n=35)		Control (n=35)			
	N	%	N	%	X^2	P
Pre						
Little or no burden (0 - 20)	4	11.4	5	14.3		
Mild to moderate burden(21-40)	6	17.1	5	14.3		
Moderate to severe burden (41 - 60)	14	**40.0**	15	**42.8**		
Severe burden (61 - 88)	11	31.4	10	28.6	0.284	0.963
Post one week						
Little or no burden (0 - 20)	13	**37.1**	5	**14.3**		
Mild to moderate burden(21-40)	11	31.4	7	20.0		

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Moderate to severe burden (41 - 60)	7	20.0	12	34.3		
Severe burden (61 - 88)	4	11.4	11	31.4	9.027	*0.029
Post one month						
Little or no burden (0 - 20)	17	**48.5**	7	**20.0**		
Mild to moderate burden(21-40)	15	42.9	10	28.6		
Moderate to severe burden (41 - 60)	2	5.7	12	34.3		**
Severe burden (61 - 88)	1	2.9	6	17.1	15.881	<0.001

** Statistical significant(p<0.05).*

***Highly statistical significant(p<0.001).*

Table 5: Association between mothers' knowledge and their children's postoperative complications in the study group post 1 month post intervention (n=35)

Variables	Mothers' knowledge						P
	Poor (n=2)		Average (n=6)		Good (n=27)		
	N	%	n	%	N	%	
Colostomy complications							
No	0	0.0	1	16.7	24	**88.9**	
Yes	2	100.0	5	83.3	3	11.1	**<0.001
Anal dilatation							
No	0	0.0	2	33.3	24	**88.9**	
Yes	2	100.0	4	66.7	3	11.1	**<0.001
GIT complications							
No	0	0.0	1	16.7	23	**85.2**	
Yes	2	100.0	5	83.3	4	14.8	**<0.001
Hospital readmission due to complications							
No	0	0.0	1	16.7	24	**88.9**	
Yes	2	100.0	5	83.3	3	11.1	**<0.001

***Highly statistical significant(p<0.001).*

Table 6: Association between mothers' practice and their children's postoperative complications in the study group post 1 month post intervention (n=35)

Variables	Mothers' practice				P
	Unsatisfactory (n=4)		Satisfactory (n=31)		
	N	%	N	%	
Colostomy complications					
No	1	25.0	24	**77.4**	
Yes	3	75.0	7	22.6	*0.029
Anal dilatation					
No	1	25.0	25	**80.6**	
Yes	3	75.0	6	19.4	*0.017
GIT complications					
No	0	0.0	24	**77.4**	
Yes	4	100.0	7	22.6	*0.002
Hospital readmission due to complications					
No	1	25.0	24	**77.4**	
Yes	3	75.0	7	22.6	*0.029

**Statistical significant(p<0.05).*

Table 7: Association between mothers' knowledge and their anxiety and practice in the study group post 1 month post intervention (n=35)

Variables	Mothers' knowledge						P
	Poor (n=2)		Average (n=6)		Good (n=27)		
	N	%	N	%	N	%	
Mothers' anxiety							

Mild (n=26)	0	0.0	1	16.7	25	**92.6**	
Moderate (n=7)	1	50	4	66.7	2	7.4	
Severe (n=2)	1	50	1	16.7	0	0.0	**<0.001
Mothers' practice							
Satisfactory (n=31)	0	0.0	5	83.3	26	**96.3**	
Unsatisfactory (n=4)	2	100.0	1	16.7	1	3.7	**<0.001

***Highly statistical significant(p<0.001).*

Table 8: Association between mothers' anxiety level and their psychosocial burden level in the study group post 1 month post intervention (n=35)

Variables	Mothers' anxiety						P
	Mild (n=26)		Moderate(n=7)		Severe (n=2)		
	N	%	N	%	N	%	
Mothers' psychosocial burden							
No/little burden (n=17)	15	**57.7**	2	28.6	0	0.0	
Mild to moderate burden (n=15)	11	42.3	4	57.1	0	0.0	
Moderate to severe burden (n=2)	0	0.0	1	14.3	1	50.0	
Severe burden (n=1)	0	0.0	0	0.0	1	50.0	**<0.001

***Highly statistical significant(p<0.001).*

IV. DISSCUION

Imperforate anus is a malformation of the anorectum. It is comprise a large spectrum of congenital anomalies that affect the development of rectum and anus. Malformation range from minor easily treated defect that have good prognosis to complex defect that are difficult treated. **(Pruthi, & Mohta, 2010)** [21]. The mothers of children with imperforate anus needs to information about their children's diseases and home care after discharge due to children's disease can be associated with many problems and complications so that they are need help from health care staff to prevent such complications and reduce mothers stress through empowering the mothers of the children with imperforate anus **(Goudarzi, et al., 2016)** [11]. The ultimate objectives of treatment for children with imperforate anus, are to reduce postoperative complications and achieve a good quality of life, with normal levels of bowel control, reproductive capacities and normal sexual (**Alamo, 2013)**[12]. Therefore, the present study aimed to investigate the effect of nursing interventions on reducing postoperative complications among children with imperforate anus and mothers' anxiety.

The result of present study revealed that, mean age of studied children in study and control groups were (6.5 ±4.4 and 5.9 ±3.2 respectively), and less than two third of them were male in both groups **(Table 1)**. This due to imperforate anus present and diagnosed at birth and affects male more than female, it was considered urgent congenital anomalies that need early surgery. This finding was disagree with **Pruthi, & Mohta, (2010)** [21] whose studied [psychosocial burden and quality of life in parents of children with anorectal malformation] and reported that, majority of the children were in the age group of 2.5-5 years. Also this result similar with **Amanollahi, & Ketabchian, (2016)** [1] whose studied [one-stage three-stages repair in anorectal malformation with rectovestibular fistula] and stated that, imperforate anus is birth defects in which affects girls and boys with a slightly more common in males. Regarding child's surgical history, more than half of children in both groups had surgical history, this could be attributed to the newborn with high or intermediate imperforate anus, they need urgent surgical operation to open colostomy until the congenital anomalies will correct throughout many surgical operations, so that many children in this study have previous surgical history. This result was disagree with **Okhovat et al., (2017)** [9] whose studied (effect of implementation of continuous care model on mothers' anxiety of the children discharged from the pediatric surgical unit) and stated that, less than one third of studied children had surgical history.

Regarding the socio-demographic characteristics of studied mothers and family history **(Table 2)**. The findings of the present study showed that, the mean age of studied mothers in study and control groups were (27.2 ±7.0 and 27.0 ±7.3 respectively), also more than half of mothers in both groups had median income. This finding was disagree with **Pruthi,**

& Mohta, (2010) [21] they found that, the majority of parents in the age group 22-25 years. Most parents belonged to lower socioeconomic strata. Concerning mothers' educational level and mothers' job, the result of this study showed that, more than half of mothers in both groups were secondary educational level and housewives. This result was in disagree with **Okhovat et al., (2017)** [9] they stated that, less than half of mothers were secondary educational level and majority of them were housewife.

Regarding parent's consanguinity, family history for imperforate anus and others congenital defects, the finding of the present study showed that, more than half of studied mothers have positive consanguinity and majority of mothers in both groups had no family history for imperforate anus and others congenital anomalies. This could attributed to the most common predisposing factors for congenital anomalies are consanguinity and genetic disorder. This result was in agreement with **Shawky, & Sadik, (2011**) [22] they studied "Congenital anomalies prevalent among Egyptian children and associated risk factors" and stated that, approximately half of parents have consanguineous marriage and minority of affected families had family history of congenital malformations. Many of the genetic syndromes were due to high degree of consanguinity and autosomal recessive inheritance.

As regards the mothers' knowledge level before, after one week and one month after nursing interventions **(Figure 1)**, the result of this study revealed that, about two third of mothers in both groups have poor knowledge before intervention, while after one week, majority of mothers in study group and more than three quarter of them after one month have good knowledge compared to minority of mothers in control group. There was highly statistically significant difference between both groups post intervention ($p<0.001$). This could attributed to lack mothers' knowledge before intervention due to lack of training program for mothers of children with imperforate anus, which improved after intervention. This result was in the same line with **Chu, & Duong, (2015)**[2] whose studied " education of parents when a child born with an imperforate anus; Does it improve the health of the child? " and found that, the mothers in the intervention group felt confident and were satisfied with the health education. They knew the definition of anal rectal malformation and how to do care for their children at home; additionally they knew about colostomy care, children's feeding, prevention of complications and how to treat it if happened. The same finding was in agreement with **Ahmed et al., (2013)** [23] whose studied [self management program for mothers of children with stoma] and stated that, mothers' total knowledge mean scores during pre, immediate post and after two months was changed, a high statistically significant difference between mothers' knowledge as pre and post program implementation($P<0.000$). Hence the hypothesis 1 was supported by this result.

Concerning mothers' practice level before, after one week and one month after nursing interventions **(Figure 2)**, this study illustrated that, majority of mothers in both groups have unsatisfactory practice before intervention, while after one week and one month after intervention, majority of studied mothers in study group had satisfactory practice compared to approximately one third of studied mothers in control group. There were highly statistically significant differences between both groups post intervention ($p<0.001$). This due to positive effect of the researchers interventions and repeated colostomy care, anal dilatation and diaper change demonstration by the researchers and re-demonstration by the mothers this result in increases mothers' confidence and skills to apply this procedures at home. This result was congruent with **Ahmed et al., (2013)** [23] whose reported that, there were statistically significant differences in mothers' reported practice regarding preparation stage and actual stoma care as pre, immediate post and post two months after discharge guide program implementation. Hence the hypothesis 1 was supported by this result.

Concerning children's postoperative complications regarding colostomy, anal dilatation and gastrointestinal problems and hospital readmission after one month post intervention **(Table 3)**, the result of the present study illustrated that, less than three quarter of studied children in study group had not colostomy complications compared to less than one third of children in control group, this due to skillful mothers which able to perform colostomy care to their children accurately result in few colostomy complications such as bleeding from stoma, change in stoma color or size….etc, this finding was in agreement with **Chu, & Duong, (2015)** [2] whose showed that, the babies in the intervention group had fewer colostomy complications including fewer costs after implementing of guidelines educational program for parents. In relation anal dilatation complications, the finding of this study showed that, about three quarter of studied children in study group had not anal dilatation complications compared to more than one third of children in control group. This could attributed due to the researchers were performed anal dilatation for children and they explained to the mothers in study group how perform it and ask them to repeat this procedure for their children before discharge, also the researchers

explain how perform it at home accurately to prevent complications as bleeding, suture site infection and stricture of anal canal. This finding was in the same line with **Temple et al, (2012))** [5] they studied [Is daily dilatation by parents necessary after surgery for hirschsprung disease and anorectal malformations?] and stated that, the postoperative complications of hirschsprung disease and anorectal malformations, anastomotic leak or stricture is one of the most difficult to manage. To prevent these anastomotic complications, most pediatric surgeons have suggested daily dilatation of the anastomosis by the mothers and educate the mothers how perform it at home.

In addition, gastrointestinal problems, more than two third of children in study group had not gastrointestinal problems compared to about one third of children in control group. Also less than three quarter of studied children in study group had not hospital readmission due to complications compared to more than one third of children in control group. This due to increase mothers' knowledge and confidence which help them to overcome postoperative problems, all of this result in decrease hospital readmission due to postoperative complication. This result was congruent with **Chu, & Duong, (2015)** [2] whose found that, the babies in the intervention group had less gastrointestinal complications than those in the control group. The intervention group children were healthier and had grown more quickly compared to the children in the control group which usually returned to hospital before scheduled follow up time due to bleeding, diarrhea, or absence of stool movement. Moreover, the hypothesis 2 was supported by this result.

Regarding mothers' anxiety level before, after one week and one month after nursing interventions **(Figure 3)**, the result of this study revealed that, about two third of mothers in both groups have sever anxiety level before intervention, this result was improved post one week, about two third and after one month, approximately three quarter of mothers in study group had mild anxiety level compared to about one quarter of mothers in control group. There were highly statistically significant differences between both groups after intervention ($p<0.001$), this may due to improved mothers' knowledge and practice result in improve mothers' ability to provide the needed home care to their children, this lead to decrease mothers' anxiety level in study group more than mothers in control group. This result was similar with **Okhovat et al., (2017)**[9] who found that, average of mothers' anxiety score, the independent t-test indicated no significant difference in anxiety score of the both groups before the intervention ($P = 0.6$), and the mean score at 1 week and at 1 month after the intervention in the experimental group was significantly less than those of the control group ($P < 0.001$). Also this result was in the same line with **Goudarzi, et al., (2016)** [11] whose studied " the effects of an empowerment program on the stress among mothers of neonates undergoing colostomy" and found that, one month after the study intervention, mothers' stress levels were significantly lower than their baseline stress levels. Hence the hypothesis 3 was supported by this result.

As regard mothers' psychosocial burden level before, after one week and one month after nursing interventions **(Table 4)**, the finding of this study revealed that, less than half of studied mothers in both groups have moderate to severe psychosocial burden level before intervention, while after one week, more than one third and after one month, about half of studied mothers in study group have little or no psychosocial burden level compared to less than one quarter of mothers in control group. There were statistical significant differences between both groups after intervention, this could attributed to after implementing of nursing intervention for mothers in study group this result in increase of mothers' knowledge and awareness , also lead to enhance home management to their children this lead to decrease mothers' anxiety level and psychosocial burden level. This finding was in harmony with **Smriti, and Nabanika, (2015)** [24] whose studied [psychosocial burden in parent of children with anorectal malformation] and found that, the parents of child with anorectal malformation perceived some amount of burden, this result in increases psychological distress which easily to communicate to their children with negative impact on their children management and health outcome. Hence the hypothesis 4 was supported by this result.

Regarding association between mothers' knowledge and their practice and children's postoperative complications in the study group post 1 month **(Table 5, 6)**, the result of this study revealed that, there were significant relationship between mothers' knowledge and their practice and children's postoperative complications post intervention. This due to the mothers who had enough knowledge and satisfactory practice, they are able to provide needed care for their children which result in fewer postoperative complications. These results were in agreement with **Chu, & Duong, (2015)** [2] whose found that, The postoperative complications might probably have all been prevented if the mothers had adequate skills and knowledge to do the colostomy care and anal dilatation successfully, also health education step by step by the staff resulted in increases mothers' knowledge, confidence and competence to provide care of their children and a healthier children with significantly fewer complications. The hypothesis 5 was supported by this result.

Regarding association between mothers' knowledge and their anxiety and practice in the study group post 1 month **(Table 7)**, the result of this study revealed that, there were highly significant relationship between mothers' knowledge and their anxiety and practice, the majority of studied mothers which have good knowledge had mild anxiety level and satisfactory practice, this may be due to availability of booklet containing information which result in increases mothers' knowledge lead to improve in their practice, in addition mothers' understand of disease and how they deal with their children this result in decrease their anxiety. This result was supported with **Goudarzi, et al., (2016)** [(11)] who showed that, the empowerment program was effective in increases mothers' knowledge, practice and alleviating mothers' stress. The hypothesis 5 was supported by this result.

In relation association between mothers' anxiety level and their psychological burden level in the study group post 1 month **(Table 8)**, the finding of this study showed that, there was positive relationship between mothers' anxiety and their psychological burden**,** more than half of them were mild anxiety had no / little psychological burden, this due to mothers whose have mild anxiety level after intervention this lead to decrease psychological burden level. This result was an agreement with **Pruthi, & Mohta, (2010)** [(21)] whose reported that, caregivers were more strained and stressed about their child's disease and regarding their financial condition and means of transport, the intervention is important to provide psychosocial support, including promotion of a clear information about the disease and home care result in decreases anxiety and psychological burden.

Finally, by evaluating the effect of nursing interventions for mothers of children with imperforate anus on children's postoperative complications and mothers' knowledge, practice and anxiety an improvement was observed regarding the health of the children and reduce postoperative complications, also improve the mothers' knowledge, practice , and decrease anxiety level and psychosocial burden.

V. CONCLUSION

The present study concluded that, nursing interventions for mothers of children with imperforate anus affected positively on mothers' knowledge, practice, decrease children's postoperative complications. Also, decrease anxiety level and psychosocial burden level. There were strong relationship between the mothers' knowledge, practice and their anxiety level and children's postoperative complications, also there were relationship between anxiety and psychosocial burden level. These results were supported the proposed study hypotheses.

VI. RECOMMENDATION

1. Replication of this nursing interventions on a larger sample size.
2. Empowering mothers so they can care for their children in the hospital and at home.
3. Implementation of the educational program for nurses in surgery outpatient clinic and in the surgery inpatient ward to improve their knowledge and performance toward providing care for children with imperforate anus and their parent.
4. Future researches to monitor the long-term postoperative complications and evaluate the effect of imperforate anus on bowel control.

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