Nursing Management Protocol for Mothers of Children Having Ventricular Peritoneal Shunt

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Abstract

Ventricular peritoneal shunts are considered to be permanent catheters with long-term complications. Its management presents major challenges later in children and their parents' life, requiring multidisciplinary care from the nurses. **Aim** of this study was undertaken to evaluate the effect of nursing management protocol for mothers with child having ventricular peritoneal shunt. **Research design**: AQuasi-experimental design was used in carrying out the study. **Setting**: The study was conducted at Neurology Outpatient Clinic in Benha University Hospital . **Sample**: Purposive sample of children attended to Neurology Outpatient Clinic with ventricular peritoneal shunt through six months it includes 39 children. **Tools:** one tool was used for data collection; I): A structured interview questionnaire was designed and consisted of five parts; Part one: Mothers and child socio-demographic characteristics. Part two: Past and present medical history of the child; Part three: Mothers' knowledge regarding ventricular peritoneal shunt as meaning, signs of infection, complication, prevention, and treatment. Part four: Mothers practices regarding ventricular peritoneal shunt care. **Results:** Studied mothers' knowledge and practices regarding ventricular peritoneal shunt improved after implementing the nursing management protocol with statistically significant difference between pre and post test ($P < 0.001$).**Conclusion:** The mothers' level of knowledge was increasing after implementing nursing management protocol and their practices were improved**.** There were positive statistically correlation between total knowledge score and total practices score regarding ventricular peritoneal shunt. **Recommendation:** The study recommended providing continuous education and training sessions for mothers having children suffering from ventricular peritoneal shunt to prevent and decreases recurrence of infection to ensure enough knowledge and practices.

Key words: Ventricular Peritoneal Shunt, Nursing Management Protocol.

Introduction:

Hydrocephalus considered a long-term condition, normally identified in early childhood, where there is excessive Cerebro Spinal Fluid (CSF) in the ventricular system within the brain. The increased level of CSF cause ventricular enlargement resulting in compression and destruction of adjacent structures which affects brain growth and development. Seventy percent of children with hydrocephalus are managed by the insertion of a ventricular shunt, which diverts excessive fluid from the ventricles to another body compartment, commonly the peritoneum***(Smithetal.,2013).***

Cerebrospinal shunts are considered to be permanent catheters in which the proximal end of the shunt is in the cerebral ventricle, an intracranial cyst, or the lumbar subarachnoid space; the distal end usually terminates in the peritoneal, pleural, or vascular space***(Bhimraj et al., 2015).***

A ventricular shunt is a small tube that has been placed in the child's head in which the shunt carries extra fluid from the head to the abdomen, where it is absorbed. A ventricular-Peritoneal (VP) shunt is a medical device that relieves pressure on the brain caused by CSF accumulation. Normally, CSF passes through the brain's ventricles to the base of the brain. The fluid then bathes the brain and spinal cord before it's reabsorbed into the blood. When this normal flow is disrupted, the buildup of fluid can create harmful pressure on the brain's tissues, which can damage the brain***(Roth 2016&Margules and Jallo,2010).***

Ventricular peritoneal shunting is the standard therapy for management of hydrocephalus and 47% from the obstruction and infection are the most common causes of shunt malfunction ***(Ali et al, 2013).*** Shunt malfunction is still an existing problem for neurosurgeons which is associated with high incidence of complications ***(Mostafa, 2010).***It was estimated that 50% of ventricular peritoneal shuntsin the pediatric population fail within two years of placement and repeated neurosurgical surgery are often required for management of shunt obstruction or malfunction ***(American Academy of neurological 2016).***

Hydrocephalus can be classified into communicating and non-communicating. Communicating (non-obstructive) hydrocephalus occurs when the flow of CSF is blocked after it exits the ventricles. Non-communicating (obstructive) hydrocephalus occurs when the flow of CSF is blocked along one or more of the narrow pathways connecting the ventricles ***(Kulkarni, 2008).***Children with hydrocephalus could also be classified as; technology dependent because the majority of children require a permanent shunt to manage the condition. However, a shunt is an internal device and once inserted does not require ongoing maintenance unless it malfunctions***(Margules&Jallo, 2010).***

The most common shunt complications are malfunction and infection.Shunt malfunction is a partial or complete blockage of the shunt that causes it to function intermittently or not at all. When a blockage occurs, CSF accumulates and can result in symptoms of untreated hydrocephalus, which accounts for approximately 50% of all shunt failures in children. Signs and symptoms of shunt malfunction in infants include; enlargement of the infant's head, fontanels is full and tense when the infant is upright and quiet, prominent scalp veins, swelling along the shunt tract, vomiting, irritability, sleepiness, downward deviation of the eyes and seizures. Meanwhile, in toddler, the manifestations include: head enlargement, vomiting, headaches, irritability and/or sleepiness and seizures. Additionally, signs increase intra

cranialpressure, vision problems, personality change, seizures and difficulty in waking up or staying awake in older children***(Reddy etal.,2014).***

Shunt infections manifested by tiredness, irritability, poor appetite, various aches and pains, skin rashes. Also, it can present with signs of meningitis and ventriculitis. In addition, signs of septicemia or peritonitis can be seen, depending on the type of shunt. The skin may redden over the area of the shunt and tubing, or the wounds may be reddened and/or draining pus. Most commonly the bacteria responsible are those that reside normally in the skin of the child. Distal shunt malfunctions frequently accompany shunt infections***(Güroletal., 2015).***

Parents of children with a long-term condition have identified the needs to develop the skills to ensure their child's education and development needs are met, and to deal with challenging behavior. Parenting responsibilities including illness specific demands such as maintaining treatment and care regimes, social and financial constraints and maintaining relationships with siblings and family members***(Alnimr2012&Khan etal., 2013).***

During neurological assessment of the child with hydrocephalus, it is necessary to obtain accurate vital and neurologicsigns before and after surgery. Measurement of the child's head is essential. If the fontanels are not closed, carefully observe them for any signs of bulging. Nurses must observe, report and document all signs of increased Intra Cranial Pressure (ICP). If the child has returned for revision of an existing shunt, obtain a complete history before surgery from the family caregivers to provide a baseline of the child's behavior ***(Klossner& Hatfield, 2006).***

Nursing responsibilities in the care and management of children with aventricular shunt are adhere to strict hand hygiene, provide safe and effective care environment at all times for the child,closely observe for deviations from normal behaviors, monitor body temperature,be alert to any changes in physical status, check skin for redness along shunt site on bony prominences andcheck hydration status,and fluid consumption**(Campbell,2008).** Also nurses must employing aseptic technique when handling shunt, minimizingshunt manipulation and length of time catheter is in place, use of a bio-occlusive dressing, changing dressing***(Smith etal.,2016).***

Significance of the study:

Hydrocephalus is one of the most frequently seen problems in pediatric neurosurgical practice. The National Institute of Neurological Disorders and Stroke (NINDS) estimate that 1 to 2 of every 1,000 was born with hydrocephalus/year.An estimated 750,000 child suffer from hydrocephalus worldwide and 160,000 ventricular peritoneal shunts are implanted each year worldwide. There are no robust population-based statistical data worldwide and it is conceivable that the prevalence of this condition is much higher as ready access to diagnosis and treatment is not available in certain parts of the world ***(Johnson & Virgo, 2006).***The estimated incidence of hydrocephalus is 0.2 to 0.8/1000 live births in the United States***(Jea et al., 2017).***Besides, nurses have an important role in teaching home care for children with shunts. For this reason, this study will be conducted to evaluate the nursing management protocol for mothers with children having ventricular peritoneal shunt

Aim of the study:

The study aimed to evaluate the nursing management protocol for mothers with children having ventricular peritoneal shunt through;

1- Assessing mothers' knowledge and practices regarding ventricular peritoneal shunt.

2- Developing nursing management protocol for mothers about ventricular peritoneal shunt.

Research hypothesis:

Mothers' total knowledge and practices score regarding ventricular peritoneal shunt will be higher after implementing nursing management protocol.

Research design:

A quasi-experimental design was used in carrying out the study.

Setting:

The study was conducted at Neurology Outpatient Clinic in Benha University Hospital in which there was a special room for conducting nursing management protocol, and then followed by home visits.

Sample

A purposive sample of mothers having children with hydrocephalus attended to treat and follow-up at the previously mentioned setting after shunt surgery through six months it includes 39 children and their mothers.

Tools of data collection: One tools was being used for data collection as follow;

A structured Interviewing Questionnaire Sheet: This tool was designed and utilized by the researchers in a simple Arabic language based on the scientific literatures, textbooks, articles, websites and magazines. It is divided into four parts and entailed the following items:

Part one:

a) Personal characteristics for mothers as; mother's age, education, occupation, family income, and residence.

b) Personal characteristics for children as; age, gender, and ranking.

Part two: Past and present medical history of the child as onset of insertion shunt, recurrence of infection, recurrence of hospitalization, and causes of hospitalization.

Part three: Mothers' knowledge regarding ventricular peritoneal shunt as sources of mothers' information, meaning of ventricular peritoneal shunt, reasons for ventricular peritoneal shunt, signs of infection, care of shunt, warning signs, complications, prevention of complications, and treatment

Scoring system: For knowledge items, a correct complete answer was scored two points while a correct incomplete answer was scored one point and the wrong answer or don't know was scored zero, according to mothers' answers, the total knowledge scored was categorized into:

- Good knowledge ≥ 75%,
- Average knowledge if it scored ≥50% to >75% and
- Poor knowledge< 50%.

Part four: Mothers' practices regarding ventricular peritoneal shunt as; protection of shunt area, prevention of infection, activity, nutrition as increasing vitamins, treatment as regular follow-up, and giving medications thoroughness.

Scoring system for mothers' practices:

Measuring the score of mothers' practices toward ventricular peritoneal shunt was calculated as: done regularly item was scored 2 points, while done irregularly was scored one point and not done was scored zero.

The total score of mothers' practices was considered as the following:

- Good if the score was ≥ 75%,
- Average if equal ≥50% to >75% and
- Poor if equal< 50%.

Content validity: Tools were revised by seven expertises from Faculty Members of Community Health Nursing Department, Pediatric Nursing Department and Neurology Department from Benha University hospital.

Reliability: Reliability coefficients were calculated for questionnaire items. The coefficient alpha was 0.81.

Ethical considerations

All ethical consideration into account were taken as; oral consent from each mother, the general and specific objectives of study were clarified, mothers were informed that the data collected was used for the research purposes only in confidentiality manner and having the right to withdrawal at any times without giving any reasons.

Pilot study:

A pilot study was carried out on 10% of mothers having children with ventricular peritoneal shunt (4 mothers and their children) to identify the clarity of the tools' items, and the estimated time needed for applicability of the tools, and they excluded from the main study sample.

Data Collection Procedures:

- Preparation of data collection tools was carried out from the beginning of May 2015 to the end of August 2015 and data collection from beginning of September 2015 to end of February 2016.
- An official letter was issued from the Dean of the Faculty of Nursing to the Directors of Benha University Hospital including the aim expected outcomes of the study to get their approval to carry out the study.
- Approval taken from the Directors, an oral consent was also taken from each mother for participation.
- The researchers conducted the program twice/week (Saturdays and Thursdays), from 10.00 a.m. to 1.00 p.m. in the Neurology Outpatient Clinic in Benha University Hospital.
- The mothers were interviewed individually by the researchers to implement the program in the Neurology Outpatient Clinic.
- Handouts were provided for mothers having child with ventricular peritoneal shunt regarding care of these shunts.

Nursing Management Protocol Construction:

The program was conducted at four phases:

1- Preparatory phase: A review of recent, current, national and international literature in various aspects of the problem. The tools questionnaire was designed

to assess the mothers' knowledge and practices regarding the ventricular peritoneal shunt before and after implementing the program.

2- **Assessment phase:** The pretest questionnaire was implemented to identify the mothers' knowledge about ventricular peritoneal shunt and their practices for caring of the child.

3- **Planning and implementation phase:**The program was designed, with general objective to evaluate the effect of nursing management protocol for mothers with children having ventricular peritoneal shunt.

The nursing management protocol contents included:

- Mothers' knowledge as: Meaning of ventricular peritoneal shunt, signs and symptoms of infection, nutrition, complications, prevention of complications, treatment, high risk persons, prognosis, and diagnosis.
- Mothers' practices for providing care of their children as taking drug regularly, making follow-up regularly, taking healthy diet, and avoiding overcrowding places using especial equipment, prevent droplet infection, nutrition as increasing vitamins, decreasing tea and coffee drinking, and treatment as regular follow-up, giving medication thoroughness

The program includes 6 sessions 2 for theory and 4 for practices.

Each session takes from 20-30 minutes for theory and practice.

The nursing management protocol was implemented over 10 months, it was carried out in 6 sessions; 2 sessions for theory and 4 sessions for practices. The duration of each session ranged between 20-30 minutes. The nursing management protocol was implemented either individually or in groups from 2 to 4 mothers and their children. At the beginning of each session, the researchers started by a summary about what was given through the previous session ,aims and objectives of the current session, taking into consideration using simple and clear language to suite the mothers' as well as the children's educational level. Different methods of teaching were used including small group discussion, brainstorming and demonstration. The teaching aids used were brochures, colored posters, real model and laptop screen show. At the end of each session, the mothers were informed about the content of the next session and its time.

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- At the end of the program implementation, a booklet of the program was given to each mother as a reference.
- A post test was done to evaluate the effect of the nursing management protocol on increasing mothers' knowledge and improving their practices.
- The teaching methods used were discussions, brainstorming, demonstration and re-demonstration. Booklets were distributed as a teaching media.

4- **Evaluating Phase:** To evaluate the effect of the nursing management protocol of mothers' knowledge and practices regarding ventricular peritoneal shunt through using posttest that similar to the pretest was applied.

Statistical Design

The collected data were analyzed and tabulated using "chi square" for number and percentage distribution, and correlation coefficient (r); t test for comparison of means was used by using the Statistical Package for Social Sciences (SPSS), version 20 to determine if there are statistically significance difference. A statistically significant difference was considered at $p \leq 0.05$, and a highly statistically significant difference was considered at $p \leq 0.001$.

Results:

Table (1) shows that 59% of the studied mothers aged from 25 to 35 years old, with a mean age 32.97±6.6 years. Regarding educational level, 64.1%of them had secondary education. As regards to marital status, 89.7%of them were married about 79.5% were housewives and 79.5% hadn't enough income.

Table (2): Reveals that 51.3% of studied children aged less than five years. As regard gender 76.9% of them were female; and 30.8% of them ranked as the first child.

Table (3):Demonstrates that 94.9% of the studied children had no family history of hydrocephalus, and 56.4% have previous ventricular peritoneal shunt.

Table (4): Elaborates that the studied mothers' knowledge regarding ventricular peritoneal shunt (Meaning, causes,signs of increased intracranial pressure, care of the child and compilations) were improved after implementing the nursing management protocol with statistically significant difference between pre and posttest($P < 0.001$).

Figure (1): Illustrates that all of the studied mothers had reported that source of information regarding hydrocephalus was from health team while 28.8% of them reported family and friends and 18.4% of them reported that mass media.

Table (5): Shows that the studied mothers' knowledge regarding shunt (meaning of shunt, efficiently of tube working, complications of shunt, signs of shunt infection, signs of shunt blockage or and dangerous signs which require hospitalization) were improved after implementing the nursing management protocol with statistically significant difference between pre and post test($P < 0.001$).

Figure (2): Illustrates that 64.1% of the studied mothers had poor level of total knowledge score about hydrocephalus before nursing management protocol. Meanwhile after nursing management protocol, 66.7% of them had a good level of total knowledge score and there was a highly statistically significant difference ($p<0.001$).

Table (6): Clarifies that the studied mothers' practices regarding care of shunt area as protection, avoid infection, activity, nutrition, treatment, follow up and prevent constipation were improved after implementing the nursing management protocol with statistically significant difference between pre and post ($P < 0.001$).

Figure (3):Illustrates that total practices score of the studied mothers were improved regarding after implementing the nursing management protocol to 46.2% post compared by 7.7% pre implementing nursing management protocol.

Table (7) reveals that there was a highly statistically significant positive correlation between the studied mothers ' total knowledge score and total practices score regarding shunt infection (P < 0.001).

Table (1): frequency distribution of studiedmothersregarding their personal characteristics (n=39)

Items	No.	%
Age:		
- 20 - < 25	3	7.7
- 25 – < 30	11	28.2
- 30 - < 35	12	30.8
- 35 and more	13	33.3
Mean ± SD	32.97±6.6	
marital status		
- Married	35	89.7
- Not married (divorced-winded)	4	10.3
Mothers' education		
- Read and write	9	23.1
- Intermediate education	25	64.1
- Higher education	5	12.8
Mothers' occupation		
- Employee	8	20.5
- House wife	31	79.5
Income		
- Enough	8	20.5
- Not enough	31	79.5
Home place		
- **Rural**	20	51.3
- Urban	19	48.7

Table (2): Frequency distribution of studied children regarding their personal characteristics (n=39)

Items	No.	%
Child age		
- One year	8	20.5
- Year - <5 years	20	51.3
- -5 years - <10 years	8	20.5
- 10 years and more	3	7.7
Mean ± SD	5.92±4.8	
Gender		
- Male	9	23.1
- Female	30	76.9
Child ranking		
- The first	12	30.8
- The second	11	28.2
- The third	10	25.6

- Fourth and more	6	15.4

Table (3): Frequency distribution of studied children regarding medical history (n=39).

Medical history	no	%
Family history of hydrocephalus		
- Yes	2	5.1
- No	37	94.9
Previous Shunt		
- Yes	22	56.4
- No	17	43.6
Prognosis		
- good	35	89.7
- poor	4	10.3
Complication		
- Yes	35	89.7
- No	4	10.3

Table (4): frequency distribution of studied mothers'knowledge regarding hydrocephalus pre and post program (n=39)

Items	pre		post		x^2	P value
	no	%	no	%		
Definition of Hydrocephalus:						
- Poor	17	43.6	4	10.3	23.1	0.000
- Average	17	43.6	10	25.6		
- Good	5	12.8	25	64.1		
Causes of Hydrocephalus:						
- Poor	25	64.1	5	12.8	32.04	0.000
- Average	11	28.2	8	20.5		
- Good	3	7.7	26	66.7		
Signs of increased Intracranial pressure						
- Poor	13	33.3	6	15.4	29.3	0.000
- Average	23	59.0	7	17.9		
- Good	3	7.7	26	66.7		
Early signs of Hydrocephalus						
- Poor	23	59.0	3	7.7	32.8	0.000
- Average	12	30.8	9	23.1		
- Good	4	10.2	27	69.2		
Late sings of Hydrocephalus						

- Poor	6	15.4	6	15.4	22.2	0.000
- Average	28	71.8	9	23.1		
- Good	5	12.8	24	61.5		
Treatment of Hydrocephalus:						
- Poor	18	46.2	7	17.9	23.22	0.000
- Average	18	46.2	9	23.1		
- Good	3	7.6	23	59.0		
Complications of Hydrocephalus:						
- Poor	6	15.4	5	12.8	26.42	0.000
- Average	30	76.9	10	25.6		
- Good	3	7.7	24	61.6		

Figure (1): Frequency distribution of studied mothers regardingtheir sourcesof information

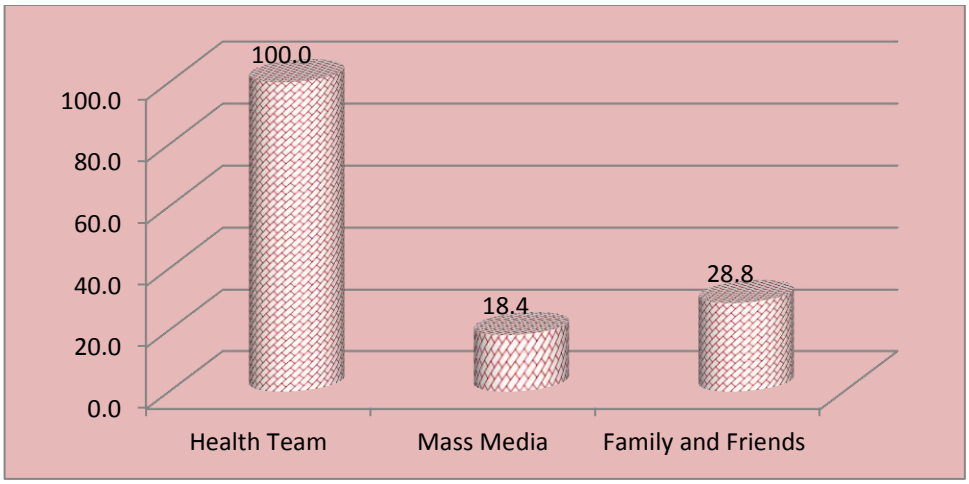

Table (5): Frequency distribution of studied mothers' knowledge regarding ventricular peritoneal shunt pre and post program (n=39)

Items	pre		post		x^2	P value
	no	%	no	%		
Definition of hydrocephalus shunt:						
- Poor	20	51.3	6	15.4	20.3	0.000
- Average	13	33.3	8	20.5		
- Good	6	15.4	25	64.1		
Efficiently of tube working						
- Poor	20	51.3	4	10.2	26. 6	0.000
- Average	16	41.0	12	30.8		
- Good	3	7.7	23	59.0		
Complication of shunt						
- Poor	7	17.9	3	7.7	33.6	0.000

- Average	29	74.4	8	20.5		
- Good	3	7.7	28	71.8		
Signsof shunt infection:						
- Poor	11	28.2	3	7.7	16.85	0.000
- Average	22	56.4	13	33.3		
- Good	6	15.4	23	59.0		
Sings in shunt blockageor not working probably						
- Poor	8	20.5	6	15.4	25.88	0.000
- Average	27	69.2	8	20.5		
- Good	4	10.3	25	64.1		
Dangerous signs which require go to hospital:						
- Poor	17	43.6	4	10.3	23.55	0.000
- Average	15	38.5	7	17.9		
- Good	7	17.9	28	71.8		

Figure (2): Frequency distribution of studied mothers regarding total knowledge score pre and post program

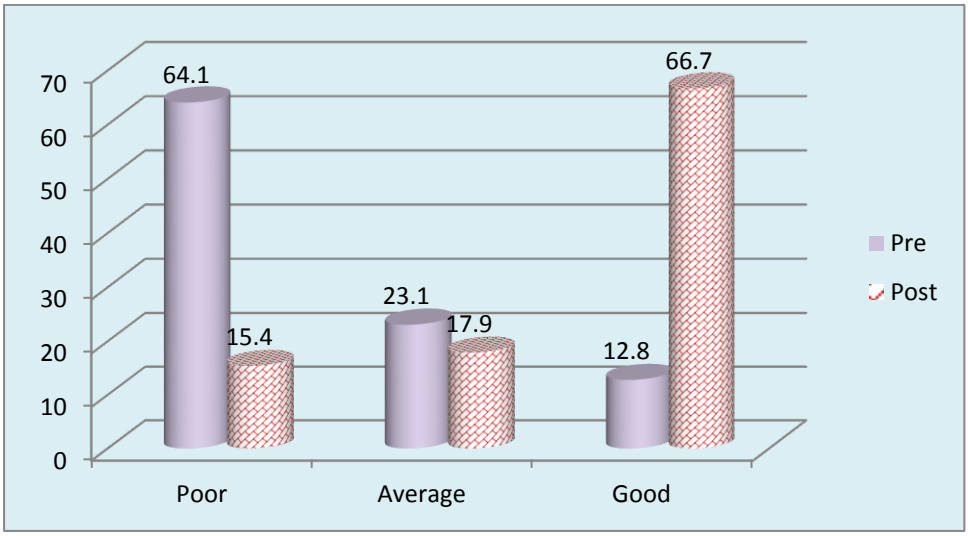

Table (6): Frequency distribution of studied mothers' practicesregarding care of their children with ventricular peritoneal shunt pre and post program (n=39)

Items	pre		post		x^2	P value
	no	%	no	%		
Protection of the shunt area						
poor	11	28.2	6	15.4	13.42	0.000
average	18	46.2	7	17.9		
good	10	25.6	26	66.7		
Avoid infection						
poor	10	25.6	6	15.4	17.52	0.000
average	21	53.8	7	17.9		

good	8	20.5	26	66.7		
Activity						
poor	16	41.0	4	10.3	39.3	0.000
average	23	59.0	9	23.1		
good	0	0.0	26	66.7		
Nutrition						
poor	12	30.8	4	10.3	38.1	0.000
average	22	56.4	3	7.7		
good	5	12.8	32	82.1		
Therapy						
poor	6	15.4	2	5.1	41.3	0.000
average	33	84.6	10	25.6		
good	0	0.0	27	69.2		
Follow-up						
poor	8	20.5	4	10.3	39.2	0.000
average	27	69.2	4	10.3		
good	4	10.3	31	79.5		
Constipation						
poor	6	15.4	4	10.3	28.87	0.000
average	27	69.2	6	15.4		
good	6	15.4	29	74.4		

Figure (3): Frequency distribution of studied mothers regarding total practices score pre and post program

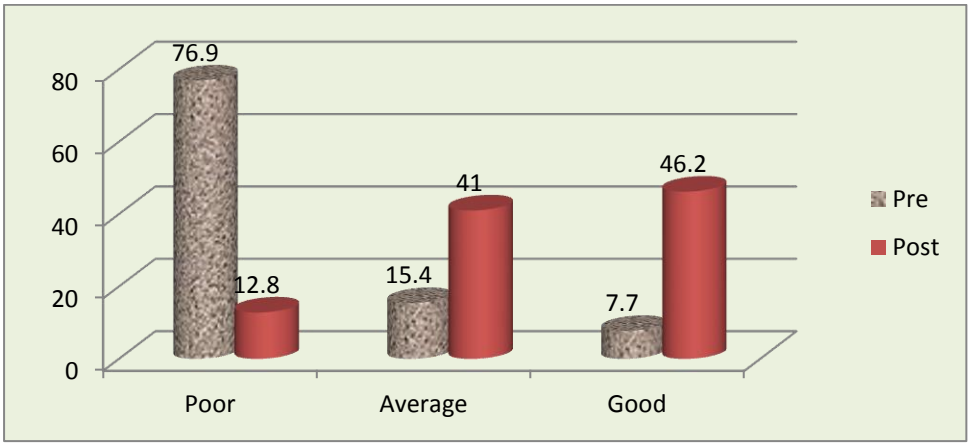

Table (٧): Correlation between studied mothers' total knowledge score and total practices score(n=39).

	Total Knowledge Score			
	pre		post	
	r	p-value	r	p-value
Total practices score	0.50	0.001	0.6	0.000

Discussion

Hydrocephalus can cause permanent brain damage, so it's important that you recognize symptoms of this condition and seek medical attention. The condition is more common in children, but it can happen at any age. The main treatment for hydrocephalus is Shunts. When shunts malfunction the consequences are serious and can be life threatening. Parents need to recognize and respond appropriately to the symptoms of shunt malfunction in their child ***(Bouras&Sgouros, 2012).***So, the aim of this study was to evaluate the effect of nursing management protocol for mothers with child having ventricular peritoneal shunt.

Regarding personal data of the studied mothers, the results of the present study revealed that slightly less than three fifths of the studied mothers aged from 25 to 35 years with a mean age 32.97±6.6 years (table 1). This result was similar to the results of study done by ***Smith and Firth (2011),*** who found in their study that age groups of mothers were between25 to 35 years, also this finding disagreed with ***Gurolet al., (2015)***who reported that mean age of the studied mothers was 42.8+9.4 years according study done in Turkey titled "the experienced problems of mothers having children with hydrocephalus". Regarding residence, half of the studied mothers living in rural areas, this result was similar to the results of study by ***Smith and Firth(2011),*** who found that half of the study mothers living in rural areas.

Concerning mothers occupation the present study revealed that, more than three quarters of them were house wives and not enough income(table 1); this finding supported by the study done by ***Smith et al.,(2008),***who found that in study titled 'parents' management of their child's hydrocephalus and shunt' three quarters of study mothers were house wives .This may be due to the economic condition of country there is no work for many women also mothers usually came from the lower socioeconomic country.

As regards to age of the studied children, the present study revealed that, the prevalence of the ventricular peritoneal shunt was found to be highest in the age group one year(table 2).This finding was supported by a study done by ***Smith (2009),***titled parent participation in the context of diagnosing shunt malfunction in children and found that the highest prevalence of ventricular peritoneal shunt was found in the first year of life .The current study revealed more than three quarters of study children were female; this finding was similar to results of study done by ***Garne et al., (2010)*** who found that, more two thirds of studied children were female. These results also supported by a study carried out on Egypt about "Effect of a protocol of immediate pre and post operative nursing interventions on the occurrence of shunt infection in children with shunted hydrocephalus" who found that, more than one third of children were from one day to one month (37.5%) and from one month to one year (47.5%).Also, more than half of them were males (62.5%). This due to the more incidence of the hydrocephalous in first year of life and also increase incidence of female more than male in country.

On investigating the studied mothers' knowledge regarding hydrocephalus, the current study found that more than half of the studied mothers had poor level knowledge regarding causes and early signs of hydrocephalus (table 4). This finding was supported by ***Hummelink and Pollock(2006)*** done study about knowledge, of hydrocephalus who found that more than half of the parents" experiences of living with a child with shunted hydrocephalus showed knowledge deficits with regard to causes and early signs of hydrocephalus. However after implementing the nursing

management protocol there were statistically significant difference between pre and post ($P < 0.001$). This indicated the positive effect of the nursing management.

Regarding the studied mothers' knowledge about shunt; the current study revealed that half of them had poor level of knowledge regarding meaning of shunt, efficiently of tube working and dangerous signs which require hospital (table 5). However after implementing the nursing management protocol there was statistically significant difference ($P < 0.001$). This may be due to mothers hadn't any awareness about disease but after nursing management increase mothers awareness.

Regarding to mothers' practices of children with ventricular peritoneal shunt the current study found that more than three quarters of mothers having poor practices pre program compared to less than half of them having good practices post nursing management protocol(table 6). These results were supported by ***Smith and Firth(2011),*** in a study about "Parents' management of their child's hydrocephalus and shunt" who found that parents having poor practice and they requiring educational program for better dealing with their children. Moreover this finding supported by ***Gurol et al., (2015),*** who found that the responsibility of nurses is very important in helping mothers receive social support. Nurses should be aware of the concern of mothers and solve this problem with their educative, counseling and supportive roles.

Moreover, the findings of the current study indicated that there was a highly statistically significant positive correlation between the studied mothers ' total knowledge score and total practices score regarding shunt infection ($P < 0.001$).This may be due to the increasing knowledge of mother leads to improving their care and practices for children. These results were supported with ***Khalafallah et al., (2017)*** in a study carried out in Egypt about "the impact of protocol of care for mothers of children with ventriculo peritoneal shunt on occurrence of postoperative complications" who found that there was statistically significant positive correlation between the total mean scores in the study group of mothers' knowledge and practice

Conclusion

The mothers' level of knowledge was increasing after implementing nursing management protocol and their practices were improved**.** There were positive statistically correlation between total knowledge score and total practices score regarding ventricular peritoneal shunt.

Recommendations:

In the light of the findings of the current research, the following recommendations are suggested:

- Provide continuous education and training sessions for mothers having children suffering from ventricular peritoneal shunt to prevent and decreases recurrence of infection to ensure enough knowledge and practices.
- Emphasis on the availability of printed and illustrated booklet regarding care of children suffering from ventricular peritoneal shunt that presented simply in posters and colored pictures for guiding mothers' practice.
- Further study can be replicated on other setting using a large sample size to generalize the findings.

Reference

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