

Assessment of Mothers' Knowledge and Practices regarding Care of their Children having Ventricular Peritoneal Shunt

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Abstract

Background Ventricular peritoneal (VP) shunt is the most common shunt placement in contrast with other shunt placements for treatment of hydrocephalus in children.

Aim of the study: to assess mothers' knowledge and practices regarding care of their children having VP shunt.

Design: A descriptive research design was utilized to conduct this study.

Subject: All available mothers(60) accompanying their children diagnosed with hydrocephalus and having VP shunt.

Setting: The study was conducted at neurosurgery inpatient units and neurosurgery outpatient clinic affiliated to Ain-Shams University Hospitals over a period of six months.

Tools: A structured interviewing questionnaire tool was used to assess personal characteristics and the level of mothers' knowledge and an observational checklist tool was used to assess mothers' reported practices regarding the care of their children having VP shunt.

Results: The study findings revealed that **more than two-thirds** of the studied mothers had an unsatisfactory level of knowledge about VP shunt care. **The majority** of them had incompetent levels of reported practices. Also, there was a positive highly statistically significant correlation between the total level of mothers' knowledge score and their total levels of reported practices score regarding the care of their children having VP shunt. **Conclusion:** The studied mothers had insufficient levels of knowledge and incomplete reported practices level regarding the care of their children having VP shunt.

Recommendation: Conduct educational programs based on actual need assessment of mothers to improve their knowledge and practices regarding the care of their children having ventricular peritoneal shunt.

Introduction:

Hydrocephalus is considered a long-term and complex medical condition characterized by an unnecessary accumulation of Cerebrospinal Fluid (CSF) in the brain ventricles that might be produced by CSF overproduction, obstruction of the ventricular structure, or decreased CSF absorption (*Sobana et al., 2021*). If left untreated will rapidly cause brain damage, severe neurological and developmental disorders, and even death. While the global health burden of infant hydrocephalus is substantial for rich and poor countries alike, it is especially prominent in sub-Saharan Africa (SSA), where approximately 180,000 new cases arise each year (*Vadset et al., 2022*).

Hydrocephalus can be congenital or acquired; generally associated with other diseases so, the cause must be sought. The congenital causes of hydrocephalus include neural tube defects(NTDs), arachnoid cysts, Dandy-Walker syndrome, and Arnold-Chiari malformations. On the other hand, the etiology of acquired hydrocephalus includes brain tumors, head injuries, meningitis, brain abscess and non-traumatic intracranial bleeding (*Caudron et al., 2022*).

Key Words:

Hydrocephalus, Mothers' Knowledge and Practices, Children, Ventricular Peritoneal Shunt

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Ventricular Peritoneal (VP) shunt is the most commonly inserted shunt system in infants and adults that involves the insertion of a tube inside the brain ventricles and tunnels underneath the skin through the abdominal cavity to facilitate CSF re absorption (*Wubie et al., 2021*). There are many rationales for this the surface area of the peritoneal cavity is large and easily accommodates the daily volume of CSF that flows via the shunt, the abdomen can also accommodate the insertion of several extra-centimeters of tubing that allows for children's growth, easily and low risk during insertion of VP shunt, and most complications from surgical insertion are managed with low morbidity (*Whitehead, 2019*).

Globally, the survival rate of children at 2-5 years after insertion of a VP shunt procedure ranges from 67.6 % - 79.14%. Despite the undeniable improvement in the coverage of shunting treatment for children with hydrocephalus, the survival of children remains a major challenge for both clinical and public health aspects. Because of the association with potential complications that may require multiple clinical interventions throughout the children's lifetime, with reported frequency ranging from 45 %-59% in the pediatric population (*Wubie et al., 2021*).

The most common complications of VP shunt are mechanical malfunction, placement failure, infection, and cerebral spinal fluid leak. In pediatric surgical series, shunt failures occur in 14% of patients just within the first month after shunt placement and it is estimated that 4%-50% of shunts will fail within the first year. Long-term studies suggest that 45% to 59% of patients will require a shunt revision regardless of age. Multiple shunt failure and infections are common, and revisions account for 48% of all shunt-related procedures (*Khan et al., 2021*).

The factors that contribute to shunt failure in infants and subsequently to poor outcomes. Firstly, several factors predispose to shunt failure before shunt insertion including prematurity, low birth weight (< 1,500 g), infection, abnormal levels of total leukocyte count, red blood cells, proteins, and glucose in the CSF. Secondly, after shunt implantation, failure can result from infection, obstruction of the ventricular or peritoneal end of the shunt, shunt fracture, shunt migration, or over-drainage (*Hasanain et al., 2019*). As well as socioeconomic conditions and ignoring signs and symptoms of increased the ICF (*Haq et al., 2022*).

Pediatric nurses play a vital role in the early postoperative care of VP shunt children by sharing significant responsibility for surgical wound care and recognizing VPshunt-related complications. As well as, the responsibility for maintaining an effective healthcare environment and informing and educating the parents of such children about appropriate daily care. Regarding the long-term care of children with VP shunts, nurses play important roles in educating the parents and escalating the quality of life, recognizing the early

symptoms of infections and VPshunt-related complications are of paramount importance in pediatric VP shunt children as it affects the long-term well-being of the child as well as avoidable revision surgeries, long hospital stays, and increased health costs (*Ünver et al., 2020*).

Significance of the study

Hydrocephalus is one of the most frequent problems seen in pediatric neurological practice. The National Institute of Neurological Disorder and Stroke has estimated that one to two of every 1,000 was born with hydrocephalus every year. Approximately 750,000 children suffer from hydrocephalus worldwide, and 160,000 ventricular peritoneal shunts are implanted each year worldwide. The estimated incidence of hydrocephalus is 0.2-0.8\1000 live births in the United States (*Joseph et al., 2017*). According to Egyptian study, the incidence of Ventricular Peritoneal shunts about 300 cases at Ain Shams-University Hospital and 240 cases at the Benha University Hospital in 2017-2018 (*Mohamed et al., 2023*).

In Egypt, the investigator observed that there are scarce studies conducted and focused on assessing the knowledge and practices of mothers having children undergoing ventricular peritoneal shunt and increased admission to hospital due to ventricular peritoneal shunt complication. Therefore, the current study is undertaken to assess mothers' knowledge and practices about care for their children having ventricular peritoneal shunt. Wishing results of this study can improve the mothers' knowledge and practices about ventricular peritoneal shunt care and achieve better outcomes for children and decrease ventricular peritoneal shunt complications.

Aim of the Study

This study aimed to assess mothers' knowledge and practices regarding care of their children having ventricular peritoneal shunt.

Research Questions:

The following research questions were formulated to achieve the aim of the study:

- 1-What are levels of mothers' knowledge regarding care of their children having ventricular peritoneal shunt?
- 2-What are mothers' practices regarding care of their children having ventricular peritoneal shunt?
- 3-Is there a relationship between mothers' knowledge and practices and their characteristics?

Subject and Methods:

I-Technical design:

The technical design included research design, setting, subjects as well as tools of data collection.

Research design:

A descriptive research design was utilized to conduct the study.

Research setting:

The study was conducted at inpatient neurosurgery units and neurosurgery outpatient clinics affiliated to A in-Shams University Hospitals. The inpatient neurosurgery units were composed of two floors with total 49 beds.

The outpatient pediatric unit was composed of one room in ground floor (one bed).

Subject:

A convenient sample was used in this study included all the available mothers that accompanying their children diagnosed with congenital or acquired hydrocephalus and having ventricular peritoneal shunt (60 mothers, 47 of them from the inpatient unit at the neurosurgery department and 13 mothers from an outpatient clinic affiliated to Ain-Shams University Hospitals) attended for treatment and follow-up at the previously mentioned setting through a period of study (6 months).

Tools for data collection:

Data was collected through the following two tools:

Tool (I): Structured interview questionnaire:

It was developed by the investigator in the light of the relevant literature and studies. It was written in simple Arabic language to suit the understanding level of mothers who have children undergoing ventricular peritoneal shunt. It consisted of six parts to gather data in relation to:

Part (1): Mothers' characteristics: age, marital status, educational level, occupation, consanguineous marriage, residence and monthly income.

Part (2): Children's characteristics: age, gender, gestational age, children's rank, number of siblings and educational level.

Part (3): Medical history of children with hydrocephalus: etiology of the diseases, the onset of hydrocephalus occurrence, presence of other congenital diseases, history of seizure, first intervention for hydrocephalus, frequency of insertion of VP shunt, causes of hospitalization after VP shunt insertion and complication from VP Shunt.

Part (4): Mother's knowledge about hydrocephalus in children, including, definition of hydrocephalus, its causes, types, signs and symptoms of both congenital and acquired hydrocephalus, complication and surgical treatment.

Part (5): Mother's knowledge about VP shunt for children, including definition, the aim of VP shunt, its complications, signs and symptoms of shunt infection, signs and symptoms of shunt malfunction and disturbance in conscious level and danger signs that require hospitalization, signs of wound healing, manifestation of abdomen swelling, Medication and source of their knowledge about VP shunt.

Part (6): Mother's knowledge regarding care for their children having VP shunt care, including care of head shunt site, care of abdomen shunt site, prevention of infection, bathing technique, an effective function of VP shunt, follow up, sleep issues, measurement of head and abdomen circumference, manage high temperature, follow up and nutritional status).

Scoring system of mothers' knowledge regarding care of their children having VP shunt:

Questions were in the form of Multiple-Choice Questions (MCQ), according to mothers' answers, a scoring system was followed to obtain the outcome of the mothers'

knowledge, where each question had two grade was given for correct & complete answer, one grade was given for correct & incomplete answer, and zero grade for wrong answer or don't know. The total number of questions was (35) with total score of the knowledge (70grade) (equal 100%).

The studied mothers' answers were checked using a model key answer and according to their knowledge were classified into either:

- **Satisfactory knowledge:** if the total score was equal or more than 42 grade ($\geq 60\%$).

- **Unsatisfactory knowledge:** if the total score was less than 42 grade ($< 60\%$).

Tools II: Observational checklists:

The checklists were adapted from **Bowden & Greenberg, (2016)** to assess mothers' reported practices regarding the care of children with VP shunt. It contained eight procedures: namely hand washing (8 steps), measurement of head circumference (7 steps), measurement of abdomen circumference (10 steps), wound care (8steps), measurement of axillary temperature (9 steps), cold compresses (7steps), care for children during a seizure (10 steps) and care for children after seizure (5steps).

The scoring system of mothers' reported practices regarding care of their children having VP shunt.

The total grade was 64 grade. Where one grade was given for each step reported correctly done and zero grade for each step reported incorrectly done or not done. Then the total reported practices were classified into either:

▪ **Adequate level:** if the total score was equal to or more than 39 grade ($\geq 60\%$).

▪ **Inadequate level:** if the total score was less than 39 grade ($< 60\%$).

II- Operational Item:

The operational design included the preparatory phase, content validity, reliability, ethical consideration, pilot study and fieldwork.

Preparatory phase:

The investigator reviewed past, current, national and international related literatures to cover various aspects of the current research problem and to develop the tools of data collection using books, articles, periodicals, magazines and websites.

Content Validity and Reliability:

The tools of the study were revised for clarity, relevance, understanding and applicability by a panel of pediatric nursing experts in the field of the study to assess the face and content validity of the study tools. The opinions of the experts were elicited regarding the format, layout, consistency, accuracy and relevancy of the tools and the necessary modifications were done accordingly.

Reliability of the tools was tested using Alph Cronbach test equal (**0.854**) for Knowledge regarding care of children with VP shunt and (**0.854**) for reported

practices regarding care of their children having VP shunt which means that the tools were reliable.

Ethical considerations:

The study was approved by the Scientific Research Ethical Committee of the Faculty of Nursing - Helwan University before starting the study. An oral approval was obtained also from the children's mothers prior to data collection. The mothers were informed about the purpose of the study and assured that the study is harmless and their participation is voluntary and have the right to withdraw from the study at any time without any reason. The mothers also were assured that all data treated with anonymity and confidentiality for the research purpose only. Ethics, values, culture and beliefs were respected.

Pilot study:

The pilot study was carried out on 10% of the total sample size (6 mothers) to examine the clarity, applicability, feasibility and to estimate the time needed to fill each tool. No radical modification was required. So mothers included in the pilot study were not excluded from the study later.

Fieldwork:

Data were collected over a period of six months starting from the first of June 2022 to the end of November 2022. The data were collected from the previously mentioned setting. The investigator was available two days/week (Sunday and Wednesday) during the morning and afternoon shifts to collect the data using the previously mentioned tools. Data were collected by the investigator through interviewing each mother individually to fill the questionnaire, regarding reported practices (Checklists) each mother was given a measurement tape to apply growth measurement and measure axillary temperature and regarding the other procedures, the studied mothers were asked how these procedures were applied in the home. The time needed for completing the tools was about 30 minutes for each mother.

III- Administrative design:

Prior to data collection, a written permission to carry out the study was obtained from the hospital administrator of Ain Shams University Hospital and the head of the department from the previously mentioned setting. After submitting an official letter from the Dean of Faculty of Nursing - Helwan University explaining the purpose of the study, methods of data collection and the expected outcomes.

IV-Statistical Design:

Data entry and analysis were performed using SPSS statistical package version 26. Categorical variables were expressed as number and percentage while continuous variables were expressed as ($\bar{x} \pm SD$). For comparison of categorical data, the χ^2 -test was performed. The fisher exact test was used with small, expected numbers. Comparison of quantitative variables between the study groups was carried out using the student t-test for independent samples to compare two groups when normally distributed. Pearson correlation

was done to measure correlation between quantitative variables.

For all tests, a two-tailed p-value ≤ 0.05 was considered statistically significant, P-value ≤ 0.01 was considered highly statistically significant. While p-value > 0.05 was considered not significant.

Results:

Table (1) illustrated the characteristics of the studied mothers. It was evident that nearly half (**48.3%**) of them were in the age group between 20< 30 years old, ($\bar{x} \pm SD$ was **31.28 \pm 7.16** years) and the majority (**90%**) of them were married. Additionally, less than two-thirds (**63.3%**) of them were housewives and **83.3%** reported not consanguineous marriage.

Figure (1) illustrated that less than two-thirds (61.7%) of the studied mothers graduated from secondary school education, while, less than one-fifth (16.7%) of them with university education.

Table (2) clarified the family characteristics of the studied mothers. It was evident that **96.7%** of them didn't have a family history of hydrocephalus and nearly two-thirds (**65%**) of them had from 3<5 siblings. Additionally, more than two-thirds (**66.7%**) of them lived in rural areas and three-fifths (**60%**) of them didn't have enough family income monthly.

Figure (2) represents the percentage distribution of the studied mothers' total level of knowledge regarding care of their children having VP shunt. It was clear that more than two-thirds (**78.3%**) of them had an unsatisfactory knowledge regarding care of children having VP shunt.

Figure (3) showed that the majority (**91.7%**) of the studied mothers had an in-adequate level of total reported practice regarding care of their children having VP.

Table (3) presented that, there were highly statistically significant relation between total level of mothers' knowledge regarding care of their children having ventricular peritoneal shunt according to their age, educational level, occupation, family monthly income, residence and consanguineous marriage at (**P \leq 0.001**). Also, there were statistically significant difference between total level of knowledge and their family history of hydrocephalus (**P \leq 0.05**). While, there were no statistically significant difference between total level of knowledge and their marital status (**P $>$ 0.05**).

Table (4) presented that, there were highly statistically significant relation between total level of mothers' reported practices regarding care of their children having ventricular peritoneal shunt and their age, educational level, occupation, family monthly income, residence, consanguineous marriage and their family history of hydrocephalus (**P \leq 0.001**). Also, there were statistically significant relation between total level of knowledge and their marital status (**P \leq 0.05**).

Table (5) clarified that there was a positive highly statistically significant correlation between total level of the mothers' knowledge and reported practices regarding care of their children having VP shunt, (**r= 0.830 & P= 0.000**).

Part (I): Characteristics of the studied sample:

Table (1): Distribution of the studied mothers regarding their characteristics

Mothers' Characteristics	No.	%
Age (year)		
20 <30	29	48.3
30<40	22	36.7
40 ≤50	9	15
$\bar{x}\pm SD$	1.28 ± 7.16	
Marital status		
Married	54	90.0
Divorced	3	5.0
Widow	3	5.0
Occupation		
Work	22	36.7
Housewife	38	63.3
Consanguineous marriage		
Yes	10	16.7
No	0	3.3

Figure (1): Percentage distribution of the studied mothers regarding their educational level (n=60)

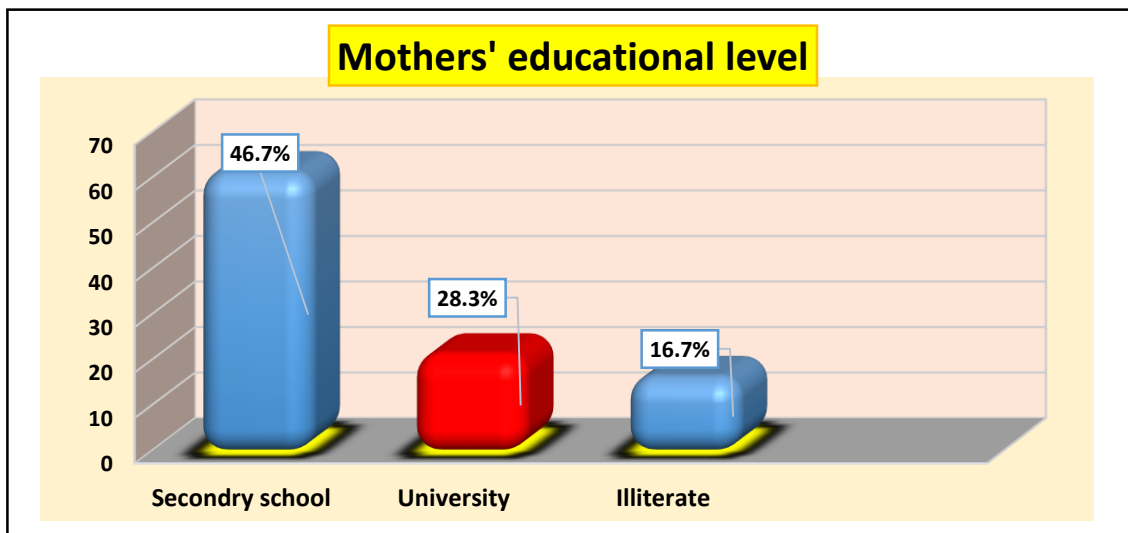
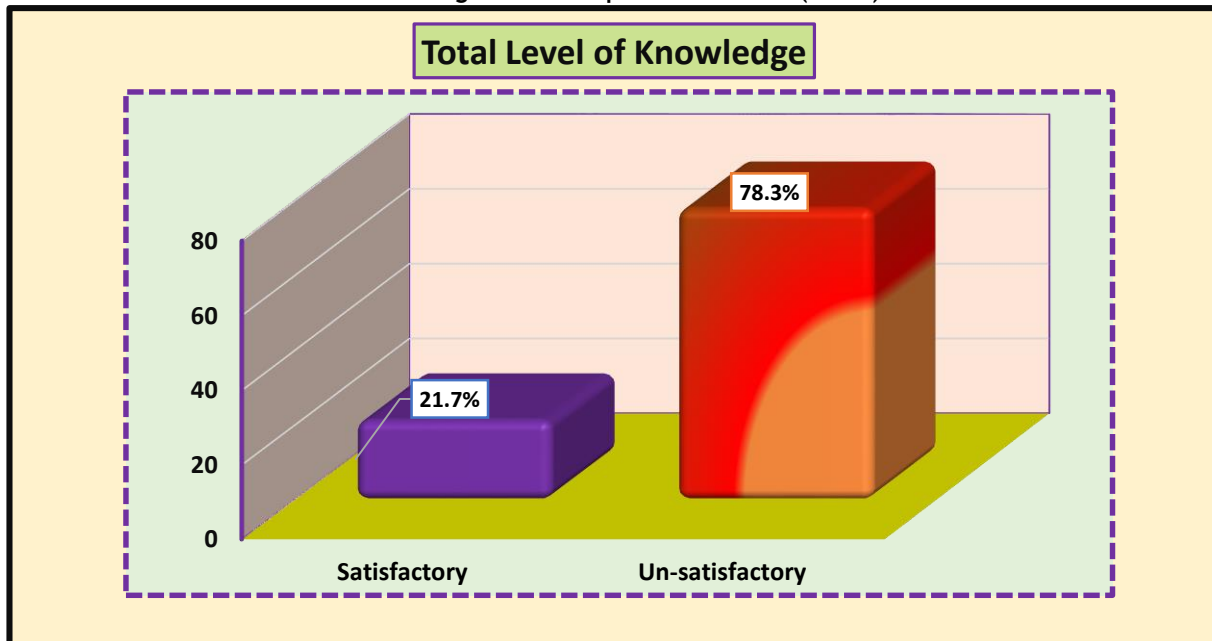


Table (2): Distribution of the studied mothers regarding their family characteristics (n= 60)

Family characteristics	No.	%
Family history of hydrocephalus		
Yes	2	3.3
No	58	96.7
Number of siblings		

<3	11	18.3
3<5	39	65.0
5≤7	10	16.7
Residence		
Rural	40	66.7
Urban	20	33.3
Family income (month)		
Enough	5	8.3
Moderate	19	31.7
Not enough	36	60.0

Figure (2): Percentage distribution of the studied mothers' total level of knowledge regarding care of their children having ventricular peritoneal shunt (n= 60)



Satisfactory to Unsatisfactory ratio= 0.3:1
 $\chi^2=19.2$, $P=0.002^*$

Figure (3): Percentage distribution of studied mothers' total level of reported practices regarding care of their children having VP shunt (n=60)

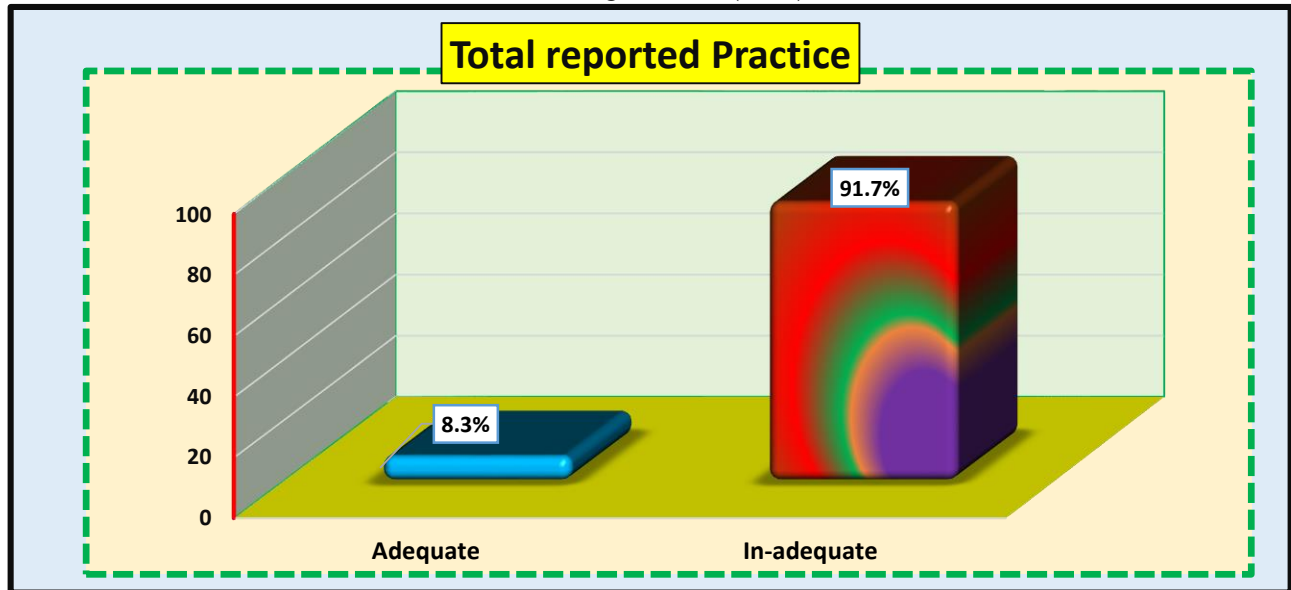


Table (3): Relation between mothers' characteristics and their total level of knowledge regarding care of their children having ventricular peritoneal shunt(n= 60)

Personal characteristics:		No	Total level of knowledge				x ²	P-Value
			Satisfactory		Unsatisfactory			
			13	21.7	47	78.3		
			No	%	No	%		
Age (year)	▪ 20<30	9	0	0.0	29	48.3	25.1	0.000**
	▪ 30<40	2	6	10	16	26.7		
	▪ 40 ≤50		7	11.7	2	3.3		
Marital status	▪ Married	4	10	16.7	44	73.3	4.13	0.126 ^{NS}
	▪ Divorced		1	1.7	2	3.3		
	▪ Widow		2	3.3	1	1.7		
Educational level	▪ Illiterate	0	0	0.0	10	16.7	22.66	0.000**
	▪ Secondary school	7	4	6.7	33	55.0		
	▪ University	3	9	15.0	4	6.7		
Occupation	▪ Work	2	12	20.0	10	16.7	22.1 _F	0.000**
	▪ Housewife	8	1	1.7	37	61.7		
Family monthly income	▪ Enough		4	6.7	1	1.7	15.4	0.000**
	▪ Moderate	9	8	13.3	21	35.0		

	▪ Not enough	6	1	1.7	25	41.7		
Residence	▪ Rural	0	2	3.3	38	63.3	19.6 F	0.000**
	▪ Urban	0	11	18.3	9	15.0		
Consanguineous marriage	▪ Yes	0	6	10.0	4	6.7	10.3 F	0.004 ^{NS}
	▪ No	0	7	11.7	43	71.7		
Family history of hydrocephalus	▪ Yes		2	3.3	0	0.0	7.48 F	0.044 ^{NS}
	No	8	1	8.3	7	8.3		

*Significant $p \leq 0.05$

**Highly significant $p \leq 0.01$ NS: Not significant at $P > 0.05$

F: Fisher Exact Test

Table (4): Relation between mothers' characteristics and their total level of reported practices regarding care of their children having ventricular peritoneal shunt (n= 60)

Personal characteristics:	No	Total level of reported practices				χ ²	P-value	
		Adequate		Inadequate				
		5	8.3	55	91.7			
		No	%	No	%			
Age (year)	▪ 20<30	29	0	0.0	29	48.3	8.4	.000**
	▪ 30<40	22	1	1.7	21	35		
	▪ 40 ≤50	9	4	6.7	5	8.3		
Marital status	▪ Married	54	3	5.0	51	85.0	.45	.065 ^{NS}
	▪ Divorced	3	1	1.7	2	3.3		
	▪ Widow	3	1	1.7	2	3.3		
Educational level	▪ Illiterate	10	0	0.0	10	16.7	1.0	.004**
	▪ Secondary school	37	1	1.7	36	60.0		
	▪ University	13	4	6.7	9	15.0		
Occupation	▪ Work	22	5	8.3	17	28.3	.42	.005**
	▪ Housewife	38	0	0.0	38	63.3		
Family monthly income	▪ Enough	5	3	5.0	2	3.3	9.0	.000**
	▪ Moderate	19	1	1.7	28	46.7		
	▪ Not enough	36	1	1.7	25	41.7		
Residence	▪ Rural	40	0	0.0	40	66.7	0.9	.003**
	▪ Urban	20	5	8.3	15	25.0		
Consanguineous marriage	▪ Yes	10	5	8.3	5	8.3	7.2	.000*
	▪ No	50	0	0.0	50	83.3		
Family history of hydrocephalus	▪ Yes	2	2	3.3	0	0.0	2.7	.006 ^{NS}
	▪ No	58	3	5.0	55	91.7		

*Significant $p \leq 0.05$

**Highly significant $p \leq 0.01$; NS: Not significant at $P > 0.05$

F: Fisher Exact Test

Table (5): Correlation between the studied mothers' total levels of knowledge and reported practices regarding care of their children having VP shunt (n= 60)

Item	Total level of knowledge	
	r	P
Total level of reported practice	0.830	0.000**

*Significant $p \leq 0.05$

**Highly significant $p \leq 0.01$

Discussion

Hydrocephalus is one of the most common clinical conditions in pediatrics affecting the CNS with an incidence of 0.2-0.5 per 1000 birth. The VP shunt is the most frequently utilized diversion procedure preferred to treat pediatric hydrocephalus but there are many complications associated with VP shunt and may require multiple surgical procedures (*Hamid et al., 2023*). Providing mothers with knowledge about shunt care help in the improvement of children outcome, early detection of complication, and prevention of deterioration of a child's condition (*Caus et al., 2021*). So, the aim of this study was to assess of mothers' knowledge and reported practices regarding care of their children having ventricular peritoneal shunt.

According to the studied mothers' characteristics, the results of these study showed that nearly half of them were in the age group 20<30 years, less than two-thirds of them were housewives, the majority of them didn't have a history of hydrocephalus and more than two-thirds lived in the rural area.

Concerning the mother's total knowledge regarding the care of children having VP shunts, figure (2) the findings of this study clarified that more than two-thirds of them had an unsatisfactory total knowledge regarding the care of children having VP shunts. These results were in an agreement with a study carried out in Egypt by *Abd Elaziz et al., (2017)* who entitled "Nursing Management Protocol for Mothers of Children having Ventricular Peritoneal Shunt" and found that 64% of the studied mothers had a poor total level of knowledge about VP shunt.

The investigator believes that this may be related to a lack of knowledge and training courses about care of children having VP shunt that affected the level of mothers' knowledge and care of their children.

In relation to the total level of mothers' reported practices regarding care of their children having VP shunt, figure (3), illustrated that the majority of the studied mothers had inadequate reported practices regarding care of their children having VP shunt. These findings are supported with *Smith et al., (2015)* study

which entitled 'Parents' Experiences of Living with a Child with Hydrocephalus' and reported that the studied parents had poor practices regarding the management of hydrocephalic children with VP shunt.

From the investigator's point of view, these findings emphasize the importance of making an educational program for mothers to empower them with the skills and practices that are needed to deliver proper care of their children having VP shunt.

As regards the relation between the studied mothers' characteristics and their total knowledge and reported practices regarding care of their children having VP shunt, there was a highly statistical significant relation between personal characteristics (age, educational level, occupation, family monthly income and residence) and their total level of knowledge and reported practices regarding care for children with VP shunt.

These results were resembling with a study carried out in India by *Murali et al., (2019)* entitled "Effectiveness of Structured Teaching Program on Knowledge regarding Home Care Management of Children with Hydrocephalus and Shunt among their Parent" and reported that there was a statistically significant positive correlation between the demographic characteristics of the studied mothers (age, educational level, and occupation) and their knowledge and reported practices regarding home care management for children having VP shunt.

From the investigator's point of view, these results proved that mothers' satisfactory knowledge and good practices are linked to their age, educational level and family monthly income. Since both knowledge and practices level become better with the increase in age, level of education and family monthly income.

As regards to correlation between total mothers' levels of knowledge and their reported practices regarding care of their children having VP shunt table (5), demonstrated that there was a positive highly statistically significant correlation between their total knowledge and reported practices regarding care of their children having VP shunt ($r = 0.830$ & $P = 0.000$).

These result was corresponding with a study carried out in Egypt by *Kafil & Mohamed, (2020)* entitled "Maternal

Knowledge and Practices regarding Home-Care Management of Children with Hydrocephalic and Ventricular Peritoneal Shunt" who found that there was a significantly positive correlation between total maternal knowledge and their reported practices regarding home care management of VP shunt ($r=0.945$ & $P=0.000$). This may be due to that the total level of mothers' reported practices could be increased parallel with their total level of knowledge regarding VP shunt care.

Conclusion

Based on the findings of this study, it can be concluded that more than two-thirds of the studied mothers had unsatisfactory levels of knowledge and incomplete level of reported practices regarding care of their children having ventricular peritoneal shunt, with highly significant statistical relation between the total level of mothers' knowledge and their total level of reported practices and their personal characteristics. In addition, there was a positive highly significant statistical correlation between the total level of mothers' knowledge and their total level of reported practices regarding the care of their children having ventricular peritoneal shunt.

Recommendations

In light of the findings of the present study, the following recommendations are suggested:

- Periodic assessment of mothers' knowledge and practices regarding care of their children having VP shunt.
- Providing continuous education programs and training sessions based on actual need assessment to improve mothers' knowledge and practices regarding the care of children having VP shunt and decrease the frequency of shunt complications.
- Developing a simplified, comprehensive, and clarified Arabic-guided pictures booklet about hydrocephalus and VP shunt must be introduced for all mothers caring for their having VP shunt.

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