Assessment of Mothers' Knowledge, Attitudes and Practices Regarding Care of their Infants with Hydrocephalus

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Abstracts: Background: Hydrocephalus considered a long- term condition normally identified in early childhood. Aim: This study aimed to assess mothers' knowledge, attitudes and practices regarding care of their infants with hydrocephalus. Design: A descriptive research design was utilized in this study. Setting: This study was conducted at Outpatient Clinic and Inpatient Neurosurgery unit at Abo El rish- El Monira affiliated to Cairo University Hospitals and Mustafa Hassan Pediatric Hospital affiliated to Fayoum University Hospitals. Subject: A purposive sample that composed of (90) mothers accompanying their infants with hydrocephalus. Tools: Two tools were used to collect data, 1st tool : a structured interviewing questionnaire to assess knowledge of studied mothers and 2nd tool : observational checklist to assess actual reported practices of studied mothers regarding care of their infants with hydrocephalus Results: more than half of studied mothers can't read and write and residence of them were urban areas, majority of them were house wife and married, and there was statistical significant positive correlation between total knowledge and practice scores. Conclusion: it can be concluded that more than half of the studied mothers had unsatisfactory knowledge, more than one third of them had mild burden and moderated burden and while more than two third of studied mothers had inadequate practices regarding care of their infants with hydrocephalus. There was a statistically significant relation between mothers' total level of knowledge and their educational level, more over there was a statistically significant relation between mothers' total level of attitudes and their occupation and there was a statistically significant relation between mothers' total level of reported practices and their age and educational level. Recommendations: Continuous educational program for mothers having infants with hydrocephalus to increase their knowledge and practices regarding care of their infants.

Keywords: Mother's knowledge, Attitudes, Practices, Infants, Hydrocephalus.

1. INTRODUCTION

Hydrocephalus is defined as a mismatch between cerebro spinal fluid (CSF) production and absorbtion, often leading to an abnormal accumulation of fluid within the ventricular system and an increase in intra cranial pressure (ICP). This must be contrasted with ventriculomegally, or simple enlargement of the ventricles, which can occur in case of decreased brain volume from atrophy and brain injury or may be normal variation in some children **(Felten et al., 2021).**

The incidence of congenital hydrocephalus was estimated to affect 1,1 in 1000 infants was highest in Africa and latin America (145 to316 per 100,000 births). The incidence was higher in low and middle income countries (123 per 100,000 births) than in higher income countries (79 per 100,000). While representing under estimates of this disease nearly400,000 new cases of pediatric hydrocephalus will develop worldwide ***(Shawky & Sadik ., 2019)***.

Hydrocephalus has occurred as a result of a physical obstruction of the ventricular system. In infants, this is usually due to a neoplasm, congenital closure of portions of the ventricular system, or an intraventricular hemorrhage. The foramina of Monro are small and located immediately above the suprasellar area. Tumors in this region are common in infants and, if large enough, will obstruct the outflow of the lateral ventricles leading to their enlargement. The aqueduct of Sylvius connects the third and fourth ventricles and is normally about 1 mm in diameter. The aqueduct can fail to form or close in utero, leading to massive hydrocephalus that is readily apparent at birth **(Hubert & VanMeter., 2022).**

The clinical manifestation of infants with hydrocephalus develop progressive head enlargement, a bulging fontanelle, distended scalp veins, the scalp skin appeared thin and shiny, “setting -sun sign”, splitting of the cranial sutures, projectile vomiting, irritability, diplopia, poor feeding, visual loss, or behavioral changes. More acutely infants present with signs of ICP such as bradycardia, lethargy and apnea are absent. Central brain herniation is preceded by the so-called Cushing’s triad of bradycardia, hypertension and decreased respiratory rate (**National Institute of Neurological Disorders and Stroke., 2022).**

Management of infants with hydrocephalus is demanding task for both family, health professionals, and helping a family to cope with the infant condition is a nursing responsibility. It is important to emphasize that hydrocephalus is a lifelong problem and that the infant will require evaluation on a regular basis, the overall aim is to establish realistic goals and an appropriate caring, and educational program that will help infants to achieve his or her optimal potentials ***(Hockenberry& Wilson., 2021)***.

Mothers can play an important role in management and care infant with hydrocephalus which needs daily effort to deal with the infant needs. Successful management of hydrocephalus requires a team effort from health care providers team and their family especially mother. So the pediatric nurses have a vital role toward helping parents to gain knowledge and confidence in their abilities to care for their infant through giving him appropriate guidance, positive reinforcement and psychological support ***(kyle ., 2020)***.

1.1. 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 has estimated that one to two in every 1000 children are born with hydrocephalus/year. Approximately 7500 00 infants suffer from hydrocephalus worldwide, and 160 000 ventricular peritoneal shunts are implanted each year worldwide. There is 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. The estimated incidence of hydrocephalus is 0, 2 - 0,8/ 1000 live births in USA ***(Jean et al., 2017).*** *while the estimated incidence of hydrocephalus in infants in Egypt is 3,7 to6,9 per 1000 live birth* ***(Melese et al., 2022).***

Bedside, mothers of hydrocephalus infants have an important role in home care for infants with shunt. For this reason, this study was conducted to assess Mothers’ knowledge, attitudes and practices regarding care for their infants with hydrocephalus.

1.2. Aim Of the Study

This study aimed to assess mothers’ knowledge, attitudes and practices regarding care of their infant with hydrocephalus.

1.3. Research Question

-What is the level of mothers’ knowledge, attitudes and practices regarding care of their infants with hydrocephalus.

-Is there a relation between studied mothers’ knowledge, attitudes and practices toward care of their Infants with hydrocephalus and their characteristics.

1.4. Research design

A descriptive study was used to conduct the study.

1.5. Research Settings

The study was carried out at outpatient clinic and Inpatient Neurosurgery unit in Pediatric Hospitals including Abo El rish- El Monira affiliated to Cairo University Hospitals and Mustafa Hassan Pediatric Hospital affiliated to Fayoum University Hospitals.

1.6. Research Subjects

A purposive sample that composed of (90) mothers accompanying their infants with hydrocephalus that was admitted to the previous mentioned setting based on certain inclusion criteria as the follows:

1.6.1. I*nclusion criteria for mothers;* *It included*

-Mothers having children diagnosed with hydrocephalus regardless (age, level of education, occupation, marital status, residence, and family history of hydrocephalus*)*

1.6.2. I*nclusion criteria for infants;* *It included*

-Infants age from one month to 12 months.

-Infants diagnosed with congenital or acquired hydrocephalus in outpatient clinic and Inpatient neurosurgery unit in pediatric hospital.

-Infants free from any other physical or mental diseases.

2. TOOLS OF THE STUDY

Two tools were used in this study and were developed by the researcher after reviewing the related literature: -

2.1. Tool (I): A structured Interviewing Questionnaire: -

The questionnaire was based on an up-to-dated review of related literature. It was adapted from **(Wong., 2020)** and was written in a simple Arabic Language. It consisted of four parts.

2.1.1. Part I**: Characteristics of studied mothers:** such as (age, level of education, occupation, marital status, residence, and family history of hydrocephalus).

2.1.2. Part II**: Infant medical history:** past, and present medical history about health condition of studied infant, it also included prenatal history, onset and duration of disease, family history, and previous history of hospitalization.

2.1.3. Part III: Mothers' Knowledge Regarding Hydrocephalus: such as (definition, causes, signs and symptoms, complication, diagnosis and surgical treatment of hydrocephalus including types of shunts).

2.1.4. Scoring System

According to the responses obtained from the studied mothers. Each question scored **(1)** for correct and complete answer, and each incorrect answer scored **(Zero)**. The total degree was **(27)** and then converted into percentage and categorized as the following:

-Satisfactory level ≥ 65% (Less than **18** scores).

-Unsatisfactory level ≤ 65% (More than **18** scores).

2.1.5. Part IV: Mothers' Attitudes Regarding Care of Their Infants With Hydrocephalus.

It was adapted from ***Seng et al., (2018)*** and modified by the researcher as rephrased of the statement and translated into simple Arabic language to assess the needs and stressors on the studied mothers according to their infants' condition. It was composed of (12) statements.

2.1.6. Scoring System

The scoring system for each item was scored according to mothers' response as if it is; never response = (0), rarely response = (1), sometimes response = (2), quite frequently = (3), and nearly always = (4). The total score was 48 grades and categorized as following: little or no burden = Zero- 11 grades, mild burden = 11- 22 grades, moderate burden = 22- 33 grades, severe burden= 33- 48 grades.

2.1.7. Tool (II): Observational Checklist: - it was adapted from **wong (2020), Wikinson and treas (2021).** To evaluate the mothers'reported practices regarding care of their infants with hydrocephalus. Checklists were modified and simplified by the research to fit the practices of studied mothers. It included procedures such as (measurement of head circumference, measurement of abdominal girth, wound care, measurement of axillary temperature, fever management, positioning the infant, feeding the infant).

2.1.8. Scoring System

According to the responses obtained from studied mothers, a scoring system was followed to assess the mothers' repoted practices regarding care of their infants with hydrocephalus. Each done step scored **(1)** and each not done step scored **(Zero).** The total degree of mothers' repoted practices was **55** (5 scores for assessing infant head circumference, 6 scores for assessing infant abdominal girth, 7 scores for assessing infant wound care, 7 scores for assessing infant axillary temperature, 8 scores for assessing infant fever management, 11 scores for assessing infant Positioning and 11 scores for assessing infant feeding) and then converted into percentage and categorized as the following:

-Adequate practices ≥ 65% (Less than **36** Scores).

-Inadequate practices ≤ 65% (More than **36** Scores).

2.2. Tool Validity

Data collection tools were developed after extensive reviewing of literature. The tools were reviewed by five experts in pediatric nursing to test the content of the tools. The tools were examined for content coverage, clarity, relevance, applicability, wording, length, format, and overall appearance. Based on experts comments and recommendations; minor modifications had been made such as rephrasing and rearrangement of some sentences.

2.3. Tool Reliability

Reliability of the tools was tested by using Cronbach's Alpha which detected excellent internal consistency of the tools was performed. Where the Cronbach's alpha was 0.683 for knowledge, 0.823 for practice and 0.813 for attitude, and 0.806 for whole questionnaire.

2.4. Ethical Considerations

An official permission to conduct the proposed study was obtained from the Scientific Research Ethical Committee at Helwan University. Participation in the study was voluntary and subjects were given complete full information about the study and their role before signing the informed consent. The ethical considerations were included explaining the purpose and nature of the study, stating the possibility to withdraw at any time,

confidentiality of the information where it was not be accessed by any other without taking permission of the participants. Ethics, values, culture, and beliefs were respected.

2.5. Pilot Study

A pilot study was carried out at October 2022 before starting the data collection, to test the applicability, validity and time consuming to fill in the study tools. It was applied on 10% equal (9) mothers with their infants suffering from hydrocephalus of the total study sample (n=90) at previously mentioned setting. The result of the pilot study helped to make some modifications on the tools were some questions and items omitted, added or rephrased such as infant medical history and mothers' knowledge about hydrocephalus. Mothers and their infants included in the pilot study were excluded from the main study sample.

2.6. Field Work

The actual field work was carried out over a period of 6 months started from beginning of November 2022 to beginning of April 2023 for data collection from previously mentioned settings. The researcher was available at morning shift two days weekly from 8:00 a.m. to 2:00 p.m. in Mostafa Hassan Pediatric Hospital and the second week (two days) from 8:00 a.m. to 2:00 p.m. in Abo- El- Rish El-Monira affiliated to Cairo University Hospitals then shifting on regular rotation weekly by alternatively between the study settings over (6) months for data collection. The researcher explained the aim of the study for studied mothers having infants with hydrocephalus to gain their cooperation before starting interviewing and data gathering, and taken written consent from mothers to participate in the study. The researcher filled the questionnaire through ask questions in interviewing with all studied mothers. The average time needed for the completion or filling all items of questionnaire that started with (Tool I): it took nearly 10-15 minutes, and (Tool II): took about 10 minutes.

2.7. Administrative Design

A written approval letter was being issued from Dean of Faculty of Nursing-Helwan University. The letter was being directed to the general managers of Mostafa Hassan Pediatric Hospital and Abo-Elrish- Elmonira Hospital asking for cooperation and permission to conduct this study. After explanation of the study aim, an official permission was obtained from Dean of Faculty of Nursing and the General Manager of Mostafa Hassan Pediatric Hospital and Abo-Elrish-Elmonira Hospital. Consent was obtained from mothers ensuring complete privacy and total confidentiality.

2.8. Statistical Design

Data was computed and analyzed using statistical package for social science (SPSS)), version 24 for analysis. The P value was used set at 0.05. Descriptive statistics tests as numbers, percentage, mean and standard deviation (Mean ± SD), were used to describe the results. Appropriate inferential statistics such as ''F'' test or ''t'' test were used as well. When p-value<0.05, is considered that there is statistically significant difference. And When p-value<0.01, is considered that there is highly statistically significant difference.

3. RESULTS

Table (1): Distribution of the studied mothers according to their characteristics (n=90).

Mothers characteristics	Frequency	
	No.	%
Age/ Years:		
20<25 yrs	**40**	**44.4%**
25<30yrs	24	26.8%
30<40 yrs	22	24.4%

>40yrs	4	4.4%
Mean ±SD	28.6±5.4	
Educational level:		
Can't read and write.	16	17.8%
Read & write	8	8.9%
Basic & Secondary education	**54**	**60%**
University education	12	13.3%
Mother occupation:		
Housewife	**76**	**84.4%**
Working	14	15.6%
Marital status:		
Married	**72**	**80%**
Divorced	12	13.3%
Widow	6	6.7%
Residence:		
Rural	38	42.2%
Urban	**52**	**57.8%**
Family history of hydrocephalus:		
No	**84**	**93.3%**
Yes	6	6.7%

Table (1): clarified that 44.4% of the studied mothers were in the age group 20<25 years with mean 28.6±5.4, about 60% of them were educated till basic and secondary education, more over 84.4% of them were housewife. As regarding marital status 80% of studied mothers were married, 57.8% of them were inhabitant urban areas, as well as 93.3% of studied mothers hadn't family history of hydrocephalus.

Table (2): Distribution of the studied infants according to their characteristics (n=90).

Infant characteristics	Frequency	
	No.	%
Age/months		
1<4	**34**	**37.8%**
4<8	32	35.6%
8 ≤12	24	26.7%
Mean ±SD	7.5±2.3	
Gender		
Male	**65**	**72.2%**
Female	25	27.8%
Head circumference		
More than Normal	**76**	**84.4%**
Normal	14	15.6%

Child ranking		
1st	18	20%
2nd	**50**	**55.5%**
3rd	12	13.3%
4th	10	11.1%

Table (2): illustrated that 37.8% of studied infants aged between less than 4 months with mean age of 7.5±2.3 months. About 72.2 of studied infants were males. Regarding head circumference 84.4%of studied infants show more than normal and 55.5% of them were 2nd child ranking in his family.

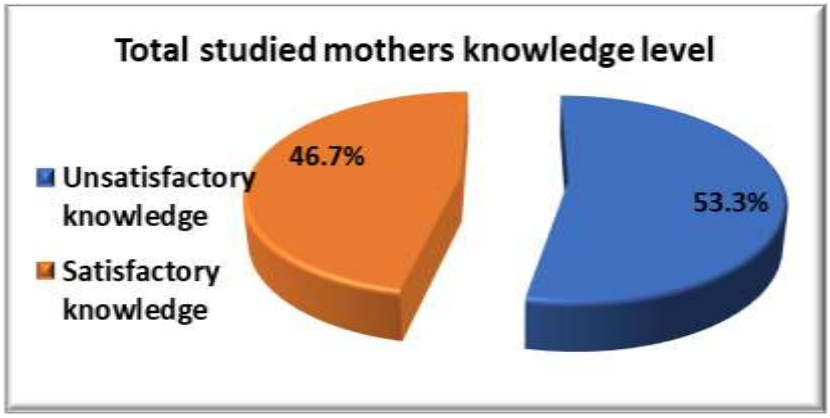

Figure (1): Percentage distribution of the studied mothers total level of knowledge regarding hydrocephalus (n=90)

Figure (1): this figure clarified that more than half (53.3%) of studied mothers had unsatisfactory total level of knowledge regarding hydrocephalus, while 46.7% of them had satisfactory total level of knowledge regarding hydrocephalus.

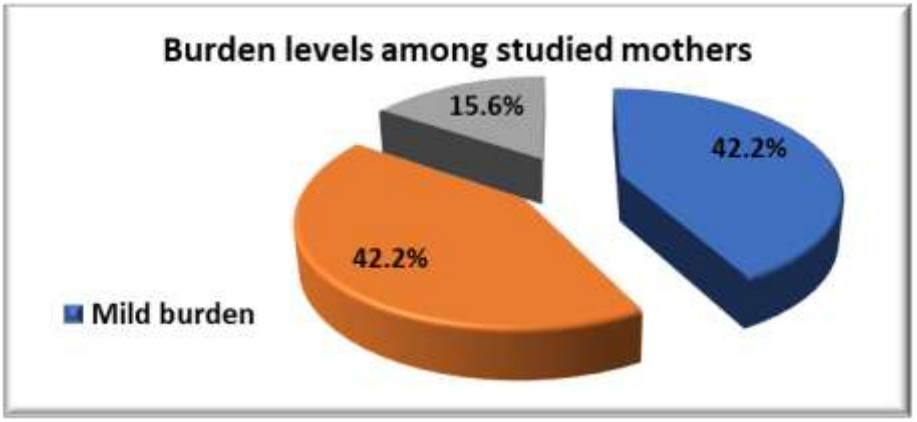

Figure (2): Percentage distribution of burden level for studied mothers having infants with hydrocephalus (n=90).

Figure (2): this figure cleared that less than half (42.2%) of studied mothers feel mild burden, and moderated burden regarding care of their infants with hydrocephalus and (15.6%) of them feel high burden.

Figure (3): Percentage distribution of studied mothers total level of practices regarding care of their infants with hydrocephalus (n=90

Figure (3): this figure clarified that (68.9%) of studied mothers had inadequate reported total level of practices regarding care of their infants with hydrocephalus, While 31.1% of them had total adequate reported total level of practices regarding care of their infants with hydrocephalus.

Table (3): Relation between total level of studied mothers knowledge and their characteristics (n=90).

Mothers characteristics	Knowledge level				X 2	p-value
	Unsatisfactory N=(48)		Satisfactory N=(42)			
	No.	%	No.	%		
Age / years						
20<25 yrs	22	45.8%	18	42.9	4.8	0.2
25<30yrs	10	20.8%	14	33.3		
30<40 yrs	12	25%	10	23.8		
>40yrs	4	8.3%	0	0		
Educational level						
Can't read and write.	14	29.2%	2	4.8	18.01	**<0.001***
Read & write	2	4.2%	6	14.3		
Basic& Secondary education	30	62.5%	24	50%		
University education	2	4.2%	10	23.8		
Mother occupation						
House wife	40	83.3%	36	85.7	0.09	0.8
Working	8	16.7%	6	14.3		
Residence						
Rural	20	41.7%	18	42.9	0.01	0.9
Urban	28	58.3%	24	57.1		

X^2: Chi Square Test. *** p<0.05: Statistically significant.**

**** p < 0.001: Highly significant.** **p >0.05: No significant.**

Table (3): this table showed that; there was a statistically significant relation between studied mothers total level of knowledge and their educational level where (p<0.05). While there was no statistically significant relation between studied mothers total level of knowledge and their age, residence, and occupation where (p>0.05).

Table (4): Relation between total attitude level of studied mothers and their characteristics (n=90).

Mothers characteristics	Attitude level						X 2	p-value
	Mild N=(38)		Moderate N=(38)		High N=(14)			
	No	%	No	%	No.	(%)		
Age / years								
20<25 yrs	18	47.4	16	42.1	6	42.9	8.1	0.2
25<30yrs	12	31.6	10	26.3	2	14.3		
30<40 yrs	6	15.8	12	31.6	4	28.6		
>40yrs	2	5.3	0	0	2	14.3		
Educational level								
Can't read and write.	4	10.5	12	31.6	0	0	17.9	**0.02***
Read & write	2	5.3	2	5.3	4	28.6		
Basic& Secondary education	28	73.7	18	47.3	8	57.1		
University education	4	10.5	6	15.8	2	14.3		
Mother occupation								
House wife	36	94.7	28	73.7	12	85.7	**6.4**	**0.04***
Working	2	5.3	10	26.3	2	14.3		
Residence								
Rural	16	42.1	16	42.1	6	42.9	0.003	0.9
Urban	22	57.9	22	57.9	8	57.1		

X^2: Chi Square Test. * p<0.05: Statistically significant. ** p < 0.001: Highly significant. p >0.05: No significant.

Table (4): this table demonstrated that; there was a statistically significant relation between studied mothers total level of attitude and their occupation where (p<0.05). While there was no statistically significant relation between studied mothers total level of attitude and their age, residence and level of education where (p>0.05).

Table (5): Relation between total level of studied mothers reported practices and their characteristics (n=90) .

Mothers characteristics	Practice level				X 2	p-value
	Inadequate N=(62)		Adequate N=(28)			
	No.	%	No.	%		
Age / years						
20<25 yrs	30	48.4%	10	35.8 %	**14.6**	**0.002***
25<30yrs	10	16.1%	14	50%		
30<40 yrs	20	32.3%	2	7.1%		
>40yrs	2	3.2%	2	7.1%		
Educational level						
Can't read and write.	16	25.8%	0	0%	10.9	**0.02***
Read & write	6	9.7%	2	7.1%		
Basic& Secondary education	34	54.8%	20	71.4%		

University education	6	9.7%	6	21.4%		
Mother occupation						
House wife	54	87.1%	22	78.6%	1.1	0.4
Working	8	12.9%	6	21.4%		
Residence						
Rural	28	45.2%	10	35.7%	0.7	0.5
Urban	34	54.8%	18	64.3%		

X^2: Chi Square Test. * p<0.05: Statistically significant. ** p < 0.001: Highly significant. p >0.05: No significant.

Table (5): this table reported that; there was a statistically significant relation between

between studied mothers' total level of practices and their age and educational level

where (p<0.05). While there was no statistically significant relation between studied mothers' total level of practices and their residence and occupation where (p>0.05).

4. DISCUSSION

Hydrocephalus is defined as dilatation of the ventricular system of brain resulting from an imbalance between the production and absorption of cerebral spinal fluid (CSF). This imbalance results in an increased volume of CSF, dilation of the ventricular system, and often increased intracranial pressure (ICP). Hydrocephalus onset can be acute and occur over hours or days. It may also be chronic and occur over months or years. Hydrocephalus can occur as an isolated condition or associated with numerous other neurological conditions and diseases **(Orrego et al., 2020).**

Regarding characteristics of the studied mothers, the present study clarified that less than half of the studied mothers were in the age group 20 < 25 years with mean 28.6 ± 5.4. This result was in agreement with a study conducted at Puskesmas by **Prathiwindya et al., (2022),** which entitled (Description of hydrocephalus knowledge in pregnant woman) and stated that half of the studied mothers aged 19-25 years. On the other hand, this result is in disagreement with **Rozensztrauch et al., (2021),** who conducted a cross-sectional preliminary study in Poland, titled (The quality of life of children with myelomeningocele) and found that parent's age ranged from 22–58 years with a mean age 35.5 $\pm$ 7.2.

Regarding to educational level of the studied mothers, the present study illustrated that about less than two thirds of the studied mothers were educated till basic and secondary education and the majority of them were housewife. These study results were consistent with findings of **Abd-EL Baky et al., (2023),** who carried out a study in Cairo, Egypt, entitled (Effect of educational intervention on quality of life for mothers' having children with ventriculoperitoneal shunt) and reported that less than two-thirds of the studied mothers had secondary educations and were housewives. While, these findings mismatch with **Prathiwindya et al., (2022),** who mentioned that about half of the studied mothers had college educational level.

The current study results revealed that more than half of the mothers were inhabitant in urban areas. From the investigator point of view, the incidence increase in urban area due to life style and environmental pollutants. This findings was in the same line with **Rozensztrauch et al., (2021),** who stated that more than half of the mothers were living in urban areas. As well, this result was supported by a qualitative study done by **Gürol et al., (2018)**, titled (the experienced problems of mothers having children with hydrocephalus), they found that half of mothers lived in urban areas.

Additionally, the most of them hadn't family history of hydrocephalus. This result is supported by **Abd Elaziz et al., (2017),** who carried out a study in Benha, Egypt, titled (Nursing management protocol for mothers of children

having ventricular peritoneal shunt) and their results concluded that the most of mothers had no family history of hydrocephalus.

Regarding to characteristics of studied infants, this study finding documented that more than one third of studied infants aged less than 4 months with mean age of 7.5±2.3 months and the majority of them were males. From the researcher point of view, this result may be due to the increased incidence of hydrocephalus among the infancy population than adult or elderly population.

The present study results were supported by **Elmaghrabia et al., (2023),** who conducted a study in Benha, Egypt, which entitled (Management of Encephalocele in Infants: A 5-Years retrospective study), and their findings documented that the age of the studied infants ranged from 1 to 345 days with a mean age of 8.1 ± 1.4 months and more than half of them were males. Conversely, these results were discordant with **Mitchell et al., (2021)** who conducted a study in Boston, which entitled (The impact of hydrocephalus shunt devices on quality of life) and reported that the minority of patients were aged 1 year or younger with a predominance of female among them.

As regarding head circumference, the majority of studied infants show more than normal. From the researcher point of view, this can be interpreted by increased head circumference is one of the major signs of hydrocephalus in infants secondary to the accumulation of fluid in the brain causing increased pressure inside the skull.

This result agreed with **AbdelFatah et al., (2022),** who conducted a study in Cairo,, Egypt, titled (Clinical predictors of the need for ventriculoperitoneal shunt placement in myelomeningocele patients), and their study indicated that the head circumference of the infants ranged from 34.5 – 45.5 with a mean 40.62 $\pm$ 2.91. In the same direction, the result finding of **Khalafallah et al., (2017),** who conducted a study in Cairo,, Egypt, entitled **(**The Impact of protocol of care for mothers of children with ventriculoperitoneal shunt on occurrence of postoperative complications) and concluded the highest percentage of children had increased head circumference related to congenital hydrocephalus.

Regarding to child ranking of studied infants. The current study findings revealed that more than half of them were 2nd child ranking in his/her family. Contrawise, **Abd Elaziz et al., (2017),** found that about one third of the infants had the 1st or 2nd ranking in their families. From the researcher point of view, this could be due to the difference between two samples characterstics.

Concerning total studied mothers knowledge regarding care of their infants with hydrocephalus, the current study demonstrated that more than half of studied mothers had unsatisfactory knowledge regarding care of their infants with hydrocephalus. While less than half of them had satisfactory knowledge. From the researcher point of view, this result may be owed to lack of studied mothers education about hydrocephalus and home care management.

This result was in agreement with **Kafi, and Mohamed, (2020),** who reported that less than two thirds of the studied mothers had insufficient level of knowledge about hydrocephalus and the majority of them had insufficient level of knowledge regarding home-care of VP shunt. On other hand, this result is dissimilar with **Prathiwindya et al., (2022),** who mentioned that about two thirds of the studied mothers had good level of knowledge about hydrocephalus.

Regarding burden level for studied mothers having infants with hydrocephalus, less than half of the studied mothers had either mild or moderate burden level. This result was in the same line with **Zimmerman et al., (2022),** who conducted a qualitative study, which titled (Post-traumatic stress symptoms in caregivers and children with hydrocephalus) and documented that burden experiences of parents caring for children with hydrocephalus had a low mean score.

In relation to studied mothers main item of practices, the current study results illustrated that the adequate level of practice ranged between 20% for feeding practices, and the highest level of adequate practice was noticed in wound care (77.8%) with a total adequate practice of 31.1%. From the researcher point of view, this could be due to more than half of studied mothers had unsatisfactory knowledge regarding care for their infants with hydrocephalus. So, they had inadequate practices. This study result was congruent with **Abd-EL Baky et al., (2023),** whose results

showed that the majority of the mothers had inadequate reported practices regarding care of their children with ventriculoperitoneal shunt.

Regarding relations between studied mothers' total knowledge and their characteristics, there was a statistically significant relation between mothers' total level of knowledge and their educational level, while, there was no statistically significant relations between mothers' knowledge and their age, residence and occupation. From the researcher point of view, educational level affects mothers understanding of their children condition and care. This result was confirmed by **Morgan et al., (2020),** who stated that there was a statistically significant relationship between respondents' knowledge of congenital hydrocephalus and their level of education.

The current study results showed that there was a statistically significant relation between studied mothers' total level of attitudes and their occupation. As well, there was a statistically significant positive correlation between total knowledge and practice scores. On the other hand, there was no statistically significant correlation between total knowledge and attitude scores and also between total practices and attitude scores. From the researcher point of view, as knowledge level of studied mothers increase, this will enhance level of their practices.

Concerning relations between studied mothers' total practices and their characteristics, there was a statistically significant relation between mothers' total level of practices and their age and educational level, while, there was no statistically significant relations between studied mothers total level of practices and their residence and occupation. These findings were supported by **Murali et al., (2019),** who reported a statistically significant association between mothers' demographic characteristics as age and educational level and their practices regarding home care management.

These results were in agreement with **Abd-EL Baky et al., (2023),** who reported that there was a high statistically positive correlation between total level of the mothers' knowledge and their reported practices. As well, **Abd Elaziz et al., (2017),** stated that there was a high statistically significant positive correlation between the studied mothers' total knowledge and total practice scores regarding shunt infection.

CONCLUSION

In the light of the present study findings. It can be concluded that

-More than half of studied mothers had unsatisfactory total level of knowledge regarding hydrocephalus. About less than half of studied mothers attitudes regarding care of their infants with hydrocephalus had a mild burden, and moderated burden, and also more than two third of studied mothers had inadequate total level of reported practices regarding care of their infants with hydrocephalus. Meanwhile there was a statistically significant relation between studied mothers total level of knowledge and their educational level, as well as there was a statistically significant relation between studied mothers total level of attitudes and their occupation. Also there was a statistically significant relation between studied mothers total level of reported practices and their age and educational level. Also there was statistical significant positive correlation between studied mothers total level of knowledge and their total level of reported practices.

Recommendation

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

- Provide continuous education and training sessions for mothers having infants with hydrocephalus to increase their knowledge and practices regarding care of their infants.

- Emphasis on the availability of printed and illustrated booklet regarding care of infants with hydrocephalus that presented simply in posters and colored pictures for guiding mothers' practices in inpatient unit and Outpatient Neurosurgery Clinic.

-Integration of the designed protocol of care for infant with hydrocephalus and undergoing ventriculo-peritoneal shunt in pediatric neurosurgery units is essential.

- Further study can be replicated on other setting using a large sample size to generalize the findings.

REFERENCES

[1] Abd Elaziz M., Abd Elaal E., Abd El-Sadik, B. and Said K., (2017): Nursing management protocol for mothers of children having ventricular peritoneal shunt. Egyptian Nursing Journal, 14 (1):226–234.

[2] Abd-EL Baky S., Al Sharkawi S., Mahmoud F. and Abdelaziz S., (2023); Effect of educational intervention on quality of life for mothers' having children with ventriculoperitoneal shunt. Journal of Nursing Science, 4 (1): 1030.

[3] AbdelFatah M., Mamdouh M., Ibrahim H., Abdelbar A. and et al., (2022): Clinical predictors of the need for ventriculoperitoneal shunt placement in myelomeningocele patients. Ain Shams Medical Journal, 73 (4): 861-865.

[4] Elmaghrabia M., Araba A., Elawadyb M., Mourada M., (2023): Management of Encephalocele in Infants: A 5-Years Retrospective Study in Benha, Egypt. Benha medical journal, 40, special issue (surgery): 235-245.

[5] Felten D., Banion M. and Maida M., (2021): Netter's Atlas of Neuroscience E-Book Hydrocephalus Chapter Kennedy Blvd, Phildelphia PP: 85:94

[6] Gurol A., Erdem Y. and Tasbasi F., (2018): The experienced problems of mothers having children with hydrocephalus: a qualitative study. International Journal of caring sciences, 8 (2): 435-442.

[7] Hockenberry M. and Wilson D., (2020) :Essentials of pediatric Nursing . 9th ed., USA,Mosby,PP: 1019-1020.

[8] Hubert R. and VanMeter K.,(2022): Pathophysiology for the Health Professions E-Book 7th edition.Elsevier, Riverportlane.pp;365.

[9] Seesanor, T. ., Phakdeekul, W., & Kedthongma, W. . (2023). Factors Related to Hemoglobin levels among Infants Aged 6-12 Months After the COVID-19 Outbreak . International Journal of Membrane Science and Technology, 10(2), 969-976. https://doi.org/10.15379/ijmst.v10i2.1400

[10] Jea A., Kulkrani A. and Constantini S., (2017): Epidemology of Hydrocephalus in children. Available at: http://ispn. Guide/book/. European geriatric medicine.

[11] Kafi, R., & Mohamed, M., (2020): Maternal Knowledge and Practices regarding Home-Care Management of their Hydrocephalic Children with Ventriculoperitoneal Shunt". IOSR Journal of Nursing and Health Science (IOSR-JNHS), 9 (1):30-37.

[12] Kyle T., (2020): Essential of pediatric nursing, 1sted., Philadelphia , Lipincott Company, Pp: 31;302;311.

[13] Mitchell M., Zelko I., Shay T., Horen S. and et al., (2021): The impact of hydrocephalus shunt devices on quality of life. The Journal of Craniofacial Surgery, 32 (5): 1746-1750.

[14] Morgan E., Agbeboh P., Poluyi C., Ikwuegbuenyi, C. and et al., (2020): Assessment of the Knowledge of Risk Factors of Congenital Hydrocephalus among Mothers Attending Antenatal Clinics in a Rural Tertiary Hospital Irrua, Edo State, Journal of Neurosci Rural Practice,11 (1): 45–52.

[15] Murali A., Job K. and Udayakumaran S., (2019); Effectiveness of structured teaching program on knowledge regarding home care management of children with hydrocephalus and shunt among their parents. Journal of Pediatric Neurosciences, 14 (3): 114-119.

[16] National Institute of Neurological Disorders and Stroke., (2022):

Hydrocephalus Fact Sheet. Available at: https://www.ninds.nih.gov/

[17] Orrego E., Enriquez A., Ascanio L., Jordan N. and et al., (2020): A cohort comparison analysis of fixed pressure ventriculoperitoneal shunt valves with programmable valves for hydrocephalus following non traumatic sub arachnoid hemorrhage. Operative neurosurgery, 18 (4): 374-383.

[18] Khan, T. I., Jam, F. A.., Anwar, F., Sheikh, R. A., & Kaur, S. (2012). Neuroticism and job outcomes: Mediating effects of perceived organizational politics. African Journal of Business Management, 6(7), 2508-2515.

[19] Prathiwindya M., Niryana W., Mahadewa T., & Maliawan S., (2022): Description of hydrocephalus knowledge in pregnant woman at Puskesmas Denpasar Utara. Intisari Sains Medis, 13 (1): 367-370.

[20] Rozensztrauch A., Iwanska M. and Bagłaj M., (2021): The Quality of Life of Children with Myelomeningocele: A Cross-Sectional Preliminary Study. International Journal of Environmental Research and Public Health, 18 (1):10756.

[21] Shawky R. and Sadik D., (2019): Congenital malforma -tion prevalent among Egyptian Children and associated risk factors. The Egyptian Journal of medical human Genetics; 12(1):69-78.

[22] Zimmerman K., May B., Barnes K., Arynchyna A., and et al., (2022): Post-traumatic stress symptoms in caregivers and children with hydrocephalus. World neurosurg, 148(1): 66-73.

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