

Effectiveness of an Educational Program on Nurse's Knowledge toward Children with Meningitis at Pediatric Teaching Hospitals in Baghdad City

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Abstract- Background: Meningitis is a kind of Central nervous system infections that can be associated with high morbidity and mortality rates. The complications of meningitis include brain abscess, deafness, blindness, respiratory failure, seizures, and brain stem herniation due to intracranial hypertension, cortical vein phlebitis, hydrocephalus, coma, and developmental delay. The study **aims:** Assess the level of nurse's knowledge toward children with meningitis, Find out effectiveness of an educational program on nurse's knowledge toward children with meningitis, Find out the relationship between nurse's knowledge toward children with meningitis and their demographic characteristic.

Methodology: Quasi - experimental study is designed to assess nurses' knowledge toward children with meningitis at Pediatric Teaching Hospitals in Baghdad City and the effectiveness of an educational program which had been constructed and applied with an approach of pre-test and post-test for both study and control groups. The study has been carried out from 11th November 2015 to 25th July 2016. Non-probability (purposive) sample of (40) nurses are selected from Pediatric Teaching Hospitals (14 males and 26 females). They are divided into two groups; (20) nurses have been exposed to the health education program and (20) nurses have control group. The data were collected through the use of designed questionnaire, which consisted of (2) major parts (socio-demographic characteristics, and the knowledge towards meningitis). The validity of the questionnaire is determined through an expert panel of (16) specialists. Reliability is determined through a pilot study which is carried out through the period from 8th March up to the 20th March 2016. Descriptive and inferential statistical analysis is applied for the results.

Results: The findings of the study indicate that nurses have fair knowledge about meningitis for both groups (50%) at pre-test results. The post-test results indicate that all nurses in the study group have very good level of knowledge about meningitis (100%), while the nurses in control group keep holding fair level of knowledge (50%). The mean of pre-test was (2.25) with standard deviation (0.639), while the mean of post-test was (4.00) with standard deviation (0.001) for study group.

Recommendations: The study highlights the necessity on developing training sessions inside and sharing outside the country to improve knowledge and skills of nurses. This also will allow for more individual consideration for this specialty and may direct future research on this matter.

Index Terms- Effectiveness, Educational Program, Nurse's Knowledge

I. INTRODUCTION

Meningitis is a term refers to an inflammation of the meninges that surrounding the brain and the spinal cord. Meningitis is possibility life-threatening condition that can rapidly progress to enduringly brain damage, neurologic problems, and until death of children (Mahmoud and Abd-ElSadik, 2013). Meningitis requires immediate medical attention. Even with convenient treatment, morbidity and mortality can be substantial. It is essential for clinicians to recognize the signs and symptoms of meningitis and understand its management and prevention. (Swanson, 2015) Nearly 30% of newborn infants die from bacterial meningitis, even with treatment but the Viral meningitis is rarely fatal and usually resolves without medications, Fungal meningitis can be fatal without treatment, and the treatment is not without its own risk to the child, parasitic infections can be treated with some specific medications, such as anti-malarial drugs as well as some antibiotics. (Rudd and Kocisko, 2014) The World Health Organization beckons that each year records about half a million new cases suffering from meningitis. (WHO, 2012) Common cases of meningitis are infectious and result from widely range of bacterial and viral pathogens. Meningitis is a syndrome of fever, headache and meningismus with inflammation, in the subarachnoid space as evidenced by CSF pleocytosis. (Bartt, 2012)

II. METHODOLOGY

Objectives of the study: The study aims to:

1. Assess the level of nurse's knowledge toward children with meningitis.
2. Find out effectiveness of an educational program on nurses knowledge toward children with meningitis.
3. Find out the relationship between nurses knowledge toward children with meningitis and their demographic characteristic.

Study Design: Quantitative research uses quasi-experimental design to assess nurses' knowledge towards children with meningitis at Pediatric Teaching Hospitals in Baghdad City. An educational program has been constructed and applied with an approach of pre-test and post-test for the study and control groups. The study is carried out from 11 th November 2015 to 27th June 2016.

Sample of the Study: Non-probability (purposive) sample of (40) nurses were selected from pediatric teaching hospitals (14 males and 26 females), was equally distributed among the hospitals in Baghdad City. The study sample in this research was divided into two groups; (20) nurses for the study, which was exposed to the health education program, and (20) nurses for control group. The groups were almost matched relative to their characteristics.

Study Instrument: Through review of the related literature and studies, the questionnaire is constructed as a mean of data collection. It was consisted of (2) major parts ;the first part is concerned with nurse's socio-demographic characteristics of age, gender, level of education, years of experience in nursing and pediatric nursing, participation in training courses, number of training courses, direct contact with affected patient, protective procedures . The second part is concerned with nurse's knowledge towards meningitis that includes general nurse's knowledge towards meningitis (19) items, Nurse's knowledge towards medical diagnosis of meningitis (3) items, Nurse's knowledge towards medical treatment (2) items, and Nurse's knowledge towards caring of children with meningitis (6) items.

Validity and Reliability: The content validity of the instrument was established through a panel of (16) experts, A cluster sample of (6) nurses is selected from pediatric teaching hospitals in Baghdad City. It is applied on nurses who had the same criteria of the original study sample to determine the Alpha Correlation (r) reliability the questionnaire related to nurses knowledge towards children with meningitis.

Statistical analysis: For this study, data are analyzed through the application of statistical procedures and by using (SPSS) version (23) which may assist to determine the study results. A descriptive statistical data analysis approach used to describe the study variables: frequencies, mean of scores (MS), standard deviation and Percentages. Inferential statistical data analysis approach: used by application of T-test, coefficient alpha correlation, ANOVA.

III. RESULTS

Table 1: Distribution of the Sample According to their Demographic Characteristics

No.	Characteristics	Study group		Control group		
		F	%	F	%	
1	Gender:	Male	7	35	7	35
		Female	13	65	13	65
		<i>Total</i>	20	100	20	100
2	Age group:	20 – 29 year	9	45	9	45
		30 – 39 year	6	30	8	40
		40 – 49 year	4	20	3	15
		50 ≤ year	1	5	0	0
		<i>Total</i>	20	100	20	100
3	Nursing educational	Course	0	0	0	0
		School	2	10	0	0

	level:	Secondary	10	50	10	50
		Institution	4	20	2	10
		College +	4	20	8	40
		<i>Total</i>	20	100	20	100
4	Years of experience in nursing:	1 – 3 years	7	35	7	35
		4 – 6 years	6	30	7	35
		7 ≤ years	7	35	6	30
		<i>Total</i>	20	100	20	100
5	Years of experience in pediatric nursing:	1 – 3 years	9	45	9	45
		4 – 6 years	7	35	8	40
		7 ≤ years	4	20	3	15
		<i>Total</i>	20	100	20	100
6	Participation in training course:	Yes	4	20	1	5
		No	16	80	19	95
		<i>Total</i>	20	100	20	100
7	Number of Training course:	None	16	80	19	95
		One	3	15	1	5
		Two	1	5	0	0
		<i>Total</i>	20	100	20	100
8	Place of Training course:	None	16	80	19	95
		Inside	4	20	1	5
		Outside	0	0	0	0
		<i>Total</i>	20	100	20	100
9	Direct contact with affected patients:	Yes	17	85	15	75
		No	3	15	5	25
		<i>Total</i>	20	100	20	100
10	Is your job causes you to get infection?	Yes	1	5	3	15
		No	19	95	17	85
		<i>Total</i>	20	100	20	100
11	Do you get protective procedures?	Yes	20	100	15	75
		No	0	0	5	25
		<i>Total</i>	20	100	20	100

No: Number, F: Frequency, %: Percentage

The descriptive analysis of the sample in table (1) for both groups shows that more than half of the sample were females with equal percentage for the study and control group (65%) , and 45% of the nurses were in age group of 20-29 years old. Regarding educational level, 50% of the nurses for both groups were graduated from the secondary nursing school. In spite of convergent percentage relating to years of experiences in nursing, the table refers that 35% of the nurses were working in nursing for the period of 1-3 years and 45% of them were working in pediatric nursing wards and hospitals for the same period. The only 20% of the sample in the study group and 5% in the control group were participated in one training courses about meningitis (15%, 5%) which was inside country (20%, 5%). More of the nurses were in direct contact with affected children (85%, 75%), the most of them didn't get infection because of their job (95%, 85%) and only one nurse in study group and three in control group got the infection due to their job. Regarding protective procedures, the majority of the nurses took different protective procedures in workplace to prevent infection (100%, 75%).

Table 2: General Nurses' Knowledge towards Meningitis for both Study and Control Group

No.	Knowledge	Study group (N=20)								Control group (N=20)							
		Pre-test				Post-test				Pre-test				Post-test			
		Yes	No	M.	Level	Yes	No	M.	Level	Yes	No	M.	Level	Yes	No	M.	Level
1	Meningitis is:	13	7	0.65	Good	19	1	0.95	Very good	8	12	0.40	Fair	12	8	0.60	Good
2	Among children, meningitis is considered:	8	12	0.40	Fair	18	2	0.90	Very good	11	9	0.55	Good	11	9	0.55	Good
3	The most important types of meningitis:	3	17	0.15	Poor	18	2	0.90	Very good	1	19	0.05	Poor	5	15	0.25	Poor
4	Meningitis is caused by many factors such as:	7	13	0.35	Fair	19	1	0.95	Very good	5	15	0.25	Poor	13	7	0.35	Fair
5	Children at risk of meningitis are:	7	13	0.35	Fair	19	1	0.95	Very good	8	12	0.40	Fair	10	10	0.50	Fair
6	The most dangerous type of meningitis:	3	17	0.15	Poor	20	0	1.0	Very good	5	15	0.25	Poor	12	8	0.60	Good
7	Meningitis occurs more frequently among children at age:	8	12	0.40	Fair	16	4	0.80	Very good	6	14	0.30	Fair	9	11	0.45	Fair
8	Incidence of meningitis increases in:	7	13	0.35	Fair	17	3	0.85	Very good	5	15	0.25	Poor	6	14	0.30	Fair
9	Bacterial meningitis among age under 2 months is caused by:	6	14	0.30	Fair	19	1	0.95	Very good	1	19	0.05	Poor	4	16	0.20	Poor
10	Bacterial meningitis among age mont-18 year is caused by:	6	14	0.30	Fair	20	0	1.0	Very good	3	17	0.15	Poor	6	14	0.30	Fair
11	Viral meningitis, the most common among children is caused by:	5	15	0.25	Poor	19	1	0.95	Very good	4	16	0.20	Poor	6	14	0.30	Fair
12	The parasitic meningitis among children is caused by:	7	13	0.35	Fair	20	0	1.0	Very good	3	17	0.15	Poor	6	14	0.30	Fair
13	The fungal meningitis among children is caused by:	7	13	0.35	Fair	16	4	0.80	Very good	8	12	0.40	Fair	6	14	0.30	Fair
14	The most important signs & symptoms among infants are:	11	9	0.55	Good	18	2	0.90	Very good	7	13	0.35	Fair	8	12	0.40	Fair
15	Associated signs & symptoms with meningitis among children above 1 year are:	7	13	0.35	Fair	17	3	0.85	Very good	7	13	0.35	Fair	9	11	0.45	Fair
16	The most important complications of meningitis are:	6	14	0.30	Fair	19	1	0.95	Very good	4	16	0.20	Poor	7	13	0.35	Fair
17	It can prevent some types of meningitis by using protective procedures through caring the	17	3	0.85	Very good	20	0	1.0	Very good	13	7	0.65	Good	14	6	0.70	Good

	children:																
18	It can prevent some types of meningitis by using the following immunizations:	9	11	0.45	Fair	20	0	1.0	Very good	9	11	0.45	Fair	10	10	0.50	Fair
19	The most important antibiotics that are used as chemical prevention and can administer for individual who contact directly to affected child are:	9	11	0.45	Fair	15	5	0.75	Very good	7	13	0.35	Fair	14	6	0.70	Good
Total				0.38	Fair			0.92	Very good			0.30	Fair			0.43	Fair

This table represents the mean of score for general knowledge's items among nurses about meningitis which indicated that the study group had fair knowledge in the more of items (pre-test) except items (1, 14, 17) which indicated good to very good and item (3, 6, 11) indicates poor knowledge, while they got very good knowledge in all items at post-test. The control group indicates poor to fair level of knowledge in the most of items pre and post- test.

Table 3: Nurses' Knowledge towards Medical Diagnosis of Meningitis for Study and Control Group

No.	Knowledge	Study group (N=20)								Control group (N=20)							
		Pre-test				Post-test				Pre-test				Post-test			
		Yes	No	M.	Level	Yes	No	M.	Level	Yes	No	M.	Level	Yes	No	M.	Level
1	The most important signs & symptoms that help in diagnosing meningitis are:	14	6	0.70	Good	20	0	1.0	Very good	9	11	0.45	Fair	12	8	0.60	Good
2	The most important physical examinations that help in diagnosing meningitis are:	11	9	0.55	Good	18	2	0.90	Very good	12	8	0.60	Good	13	7	0.65	Good
3	The most important laboratory tests that help in diagnosing meningitis are:	2	18	0.10	Poor	18	2	0.90	Very good	6	14	0.30	Fair	8	12	0.40	Fair
Total				0.45	Fair			0.93	Very good			0.45	Fair			0.55	Good

No: Number, M: Mean, Poor = 0-0.25, Fair = 0.26-0.51, Good = 0.52-0.77, Very good = 0.78-1

This table reveals the mean of score for knowledge's items among nurses regarding medical diagnosis of meningitis, the study group shows fair knowledge toward medical diagnosis at pre-test results while shows very good knowledge at

post-test results. The control group shows fair knowledge at pre-test results and good knowledge at post-test results.

Table 4: Nurses' Knowledge towards Medical Treatment of Meningitis for Study and Control Group

No.	Knowledge	Study group (N=20)								Control group (N=20)							
		Pre-test				Post-test				Pre-test				Post-test			
		Yes	No	M.	Level	Yes	No	M.	Level	Yes	No	M.	Level	Yes	No	M.	Level
1	The type of treatment is depends on:	14	6	0.70	Good	18	2	0.90	Very good	11	9	0.55	Good	10	10	0.50	Fair
2	Medical treatment has major role in decreasing death rate and complications of the disease through:	9	11	0.45	Fair	20	0	1.0	Very good	8	12	0.40	Fair	10	10	0.50	Fair
Total				0.58	Good			0.95	Very good			0.48	Fair			0.50	Fair

No: Number, M: Mean, Poor = 0-0.25, Fair = 0.26-0.51, Good = 0.52-0.77, Very good = 0.78-1

This table indicates that the nurses of the study group had good knowledge towards medical treatment of meningitis at pre-test and very good knowledge at post-test results. While the nurses in the control group were having equal fair level of knowledge at pre and post- test results.

Table 5: Nurses' Knowledge towards Caring of Children with Meningitis for Study and Control Group

No.	Knowledge	Study group (N=20)								Control group (N=20)							
		Pre-test				Post-test				Pre-test				Post-test			
		Yes	No	M.	Level	Yes	No	M.	Level	Yes	No	M.	Level	Yes	No	M.	Level
1	Monitoring of vital signs regularly which are:	14	6	0.70	Good	19	1	0.95	Very good	15	5	0.75	Good	15	5	0.75	Good
2	Monitoring the signs & symptoms of intracranial pressure which are:	4	16	0.20	Poor	20	0	1.0	Very good	9	11	0.45	Fair	10	10	0.50	Fair
3	The most important things to be checked and documented are:	11	9	0.45	Fair	20	0	1.0	Very good	8	12	0.40	Fair	9	11	0.45	Fair
4	The most important preventive methods through contact with children	17	3	0.85	Very good	20	0	1.0	Very good	15	5	0.75	Good	15	5	0.75	Good
5	Providing full comfort for children with meningitis through:	11	9	0.55	Good	20	0	1.0	Very good	9	11	0.45	Fair	10	10	0.50	Fair
6	Supporting family of children with meningitis through:	15	5	0.75	Good	20	0	1.0	Very good	14	6	0.70	Good	14	6	0.70	Good
Total				0.58	Good			0.98	Very			0.58	Good			0.60	Good

						good								
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No: Number, M: Mean, Poor = 0-0.25, Fair = 0.26-0.51, Good = 0.52-0.77, Very good = 0.78-1

This table indicates that average mean of score for knowledge's items regarding care of patients with meningitis is good for both groups at pre and post- results.

IV. DISCUSSION

Part I: Discussion of the Nurses' Socio-Demographic Characteristics:

Gender of Nurses: The analysis of findings in table (1) reveals that more than half of both groups (control and study) were female. These results agree with findings of Abbas (2012), who found the high percentage of his study sample were female nurses. Additional support is found by Al-Wily (2015) who found that the majority of his samples were females also. **Age of Nurses:** Based on the study results (table 1), nurses are at the age (20-29) years old for both groups. These findings are supported by a study conducted by Alsa'idi (2006) which stated that half of his sample were nurses with age (23-32) years old. The current finding is also supported with findings of Al-Wily (2015) who reported that more of the sample was at age group of (26-35) years old. **Nurses' Level of Education:**

The results reveal that the majority of the nurses for both groups (study group and control group) were graduated from the secondary nursing school. These findings agree with a study of Salih (2006) who stated in his study that nurses were graduated from the secondary nursing school. Additional support is found by the findings of Alsa'idi (2006) who observed that majority of the sample were graduated from the secondary nursing school.

Years of Experience in the Hospitals and Pediatric Wards: The results in table (1) reveal that the third of the nurses are working in nursing for the period of (1-3) years and more than a third of them are working in pediatric nursing wards and hospitals for the same period. The current finding is consistent with the study of Al-Wily (2015) who reported a similar results that (59.4) in general years of experience and (78.1%) of experience in pediatric, had experience of (< 5) years. **Nurses' Training Course:** Based on the study results in table (1), (20%) of the sample in the study group and 5% in the control group are participated in one training courses about meningitis (15%, 5%) which was inside country (20%, 5%). This finding agree with a study done by Al-Wily (2015) who showed that his sample had training courses inside Iraq with highest percentage at (94.4%), and (5.6%) outside Iraq.

Nurses Direct Contact with Affected Patients: The results revealed that most of the nurses were in direct contact with affected children for both group. This finding agreed with a study established by Tuvadimbwa (2005) who stated that (74%) of nurses were in direct contact with affected patients.

Nurses Get the Infection due to their Job: Based on the study results, most of nurses do not get infection because of their job for both groups. This finding agree with a study done by Mohammed and Hassan (2015) who indicated (100%) of nurses didn't get infection because of their job. **Nurses' Protective Procedures Applications:** The current results reveal that (100%, 75%) nurses took different precautions and apply protective procedures in workplace to prevent infection. This finding agree with a study done by Tuvadimbwa, (2005) who showed that (42%) of nurses took different protective procedures in workplace to prevent infection.

Part II: Discussion of the Effectiveness of Educational Program on Nurses' Knowledge towards Meningitis for Study and Control Group in pre-test and post-test:

The results of this study indicates the levels of total knowledge among nurses toward meningitis which are fair for

both groups (50%) at pre-test results with Mean of score (2.25) for study group and (1.95) for control group. The post-test results indicate that all nurses in the study group had very good level of knowledge (100%), with Mean of score (4.00) , while the nurses in control group kept holding fair level (50%), with Mean of score (2.35) . These results are supported by Al-Wily, (2015) who reported in his study that in the pre-test knowledge assessment, the mean percentage of response was (78.1%) (Not Acceptable) for the study group, while in the post test was (59.4%) (Good) for study group. The differences between the pre-test and post-test about Meningitis in general domains were fair in knowledge in the more of items (pre-test) except items (1, 14, and 17) which indicate good to very good and items (3, 6, and 11) indicate poor knowledge with mean (0.38), while they get very good knowledge in all items at post-test with mean (0.92). The control group indicates poor to fair level of knowledge in the most of items pre and post- test with mean (0.30 and 0.43). The differences between the pre-test and post-test about medical diagnosis of meningitis for study and control group are; the study group show fair knowledge toward medical diagnosis at pre-test results with mean (0.45),while show very good knowledge at post-test results with mean (0.93). The control group show fair knowledge at pre-test results with mean (0.45) and good knowledge at post-test results with mean (0.55). Medical treatment of meningitis for study and control group differences between the pre-test and post-test indicat that the nurses of the study group have good knowledge toward medical treatment of meningitis at pre-test with mean (0.58) and very good knowledge at post-test results with mean (0.95). While the nurses in the control group have equal fair level of knowledge at pre and post- test results with mean (0.48 and 0.50). The study and control group differences between the pre-test and post-test in caring of children with meningitis indicate an average mean of score for knowledge items good for both groups at pre-test with mean (0.58). While the nurses in the study group have very good knowledge with mean (0.98) and the control group has good knowledge with mean (0.60) at post-test.

Part III: Comparative Differences in Nurses' Knowledge towards Meningitis Pre & Post- Test for Study and Control Groups:

The effectiveness of educational program on knowledge towards meningitis show, as seen in table (8), that the results refer to highly significant differences among nurses' knowledge in the study group at p-value=0.001 respectively. There is significant difference among nurses' knowledge in the control group at p-value= 0.05 respectively. The mean of pre-test for study group is (3.50) while the mean in post-test is (28.10) with T-test (- 53.348). The mean of pre-test for control group was (11.55), while the mean in post-test is (14.35) with T-test (- 2.193). The results above agree with study done by Al-Wily (2015) who showed that high significant relationship concerning the nurses responses for knowledge between the pre and post program, and showed that mean of pre-test was (1.9) of the study group while the mean of post-teat was (2.59) with T-test (- 11.958) and P-value (0.001).

Part IV: Association between Nurse's Knowledge toward Children with Meningitis and their Socio-Demographic Characteristics:

The findings which reveal in table (9) indicate that there are no significant differences among nurses' knowledge with regard to their gender for both groups for all domains except general knowledge which is significantly associated with female gender at $p\text{-value} \leq 0.05$ respectively. Such results are consistent with the study of Al-Wily (2015) who found that no significant association between gender of nurses and nosocomial infection domains at $p \leq 0.05$ value. The present study finds that there is significant relationship between nurses' knowledge toward medical treatment and years of experience in nursing for the study group at $p\text{-value} = 0.05$, while there are no significant relationships between years of experience in nursing with other domains of at $p\text{-value} = 0.05$. This result agrees with study done by Alsa'idi (2006) who indicated a significant relationship between nurse's knowledge and their years of employment in nursing. The findings indicate that there are highly significant relationship between nurses' knowledge toward medical treatment and direct contact with affected patient for the study group at $p\text{-value} \leq 0.005$, and there is significant relationship between nurses' knowledge toward caring and direct contact with affected patient for the control group at $p\text{-value} \leq 0.05$, while there is no significant relationships among other at $p\text{-value} \leq 0.05$. This result was consistent with the finding that found by Tuvadimbwa (2005) which showed significant association between nurses' knowledge and their direct contact with patients.

V. CONCLUSIONS

The majority of the study samples are female. Most of study samples are within age group (20-29) years. Most of study samples graduated from the secondary nursing school. Most of study samples have experiences in nursing and pediatric nursing wards for the period of (1-3) years. The majority of the study samples do not participate in training courses about meningitis. The majority of the study samples is in direct contact with affected children and do not get infection because of their jobs. There is a significant relationship between the pre-test and post-test result of the educational program about nursing response concerning meningitis knowledge. Effectiveness of the educational program is proved through the high significant relationship of the nurses' knowledge concerning the meningitis knowledge from pre-test and post-test. There is a significant association between nurses' knowledge toward general knowledge and medical treatment and years of experience in general and pediatric nursing. There is highly significant association between nurses' knowledge toward medical treatment and direct contact with affected patients.

VI. RECOMMENDATIONS

1. Providing educational guidelines, posters, pamphlets and manuals about meningitis and should be available at each nursing stations in wards and encourage nurses to get use from them.
2. Evaluate the level of nurse's knowledge working in the field must be conducted periodically to monitor the level of nurses' knowledge and practice too.
3. Global educational standards should be applied to develop the nurses' skills by giving chance to nurses to

participate with training sessions in developed country to improve nursing skills and receiving updates concerning care.

4. Encourage the nurses to participate in training courses and congresses held by specialists in meningitis to update their knowledge.

5. The educational program can be designed and constructed for nurses through the program; an emphasis can be directed and oriented in management of patient with meningitis should include continuous training to all nursing staff who works in pediatric units.

6. Further studies can be carried out in other settings and places with consideration to wide – range sample characteristics to be more representative and to get extra results.

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