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Effect of an Intervention Educational Program on Improving Nursing Care Given for Pediatric Patients with Orthopedic Problems

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Abstract: **Pediatric orthopedics is a subspecialty of medicine that deals with the prevention and treatment of musculoskeletal disorders and correcting deformities and congenital anomalies in children by different methods. Aim: The study aimed to assess nurses' knowledge and practices regarding care of pediatric patients with orthopedic problems, design, implement & evaluate the effect of the intervention educational program on nurses' knowledge and practices regarding care of pediatrics patients with orthopedic problems. Design: A quasi -experimental study was utilized. Settings: the study was conducted in Orthopedic Departments at Ain-Shams University Hospital, Benha University Hospital, and Benha Educational Hospital affiliated to the Ministry of Health. Subjects: A convenient sample of nurses (number = 45) who work in the previous mentioned settings. Tools of the study: Interview questionnaire sheet was used to assess nurses' knowledge regarding orthopedic problems in pediatric and observational checklist to assess nurses' practices regarding care of pediatric patients with orthopedic problems. Results: The present study indicated that, the majority of nurses had unsatisfactory knowledge and incompetent practices pre-program intervention. While the majority of them had satisfactory knowledge and competent practices post program intervention respectively also, there was positive correlation between total level of knowledge and total level of practices, in pre/ post a program intervention and at follow up, Conclusion: It was concluded that, there were statistical significant improvements of nurses' knowledge and practices post a program intervention concerning with the effect of educational intervention program regarding care of pediatric with orthopedic problems. Recommendation: It was recommended that, continues educational program for nurses to update their knowledge and practices regarding care of pediatric patients with orthopedic problems.**

Keywords: **Orthopaedic problems, pediatric, orthopaedic nurses.**

I. INTRODUCTION

Musculoskeletal disorders in children may occur as a queried problems which result from inflammatory, infectious, metabolic and neoplastic pathologies or trauma, older school age children and adolescents often participate in sports may resulting in an increased risk to injuries such as sprains, fractures, and torn ligaments. Congenital malformation that is present from birth but may not be identify until late in childhood or adolescence. The immobility associated with most musculoskeletal disorders may affect the child's development and acquisition of motor skills, leading to motor dysfunction. Understanding the most common responses to these disorders gives the nurse the foundation required to plan care for children with any musculoskeletal disorder **(Carmichael, etal., 2016) and (Wilson, 2016)**.

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According to World Health Organization **(WHO**) **(2016)**, musculoskeletal defects are considered the second most common birth defect after central nervous system anomalies with a prevalence of 51.12/1000. Global report on birth defects, worldwide, 7.9 million births occur annually with serious birth defects and 94% of these occur in the middle and low income countries. While, birth defects account for 7% of all neonatal mortality and 3.3 million under five deaths.

Nurses have a great role and many responsibilities while giving care to pediatric patient with orthopedic problems. Maintaining skin care is needed to reduce the risk of pressure ulcers and turning, movement. Monitoring and maintaining the neurovascular status in the affected part, exercise, assessing pain, pressure area, wound care and nursing measure promote adequate circulation in the affected part **(Judge**, **2017)**. Significance of the study:

Children with orthopedic problems are requiring the integration of skills and requiring early detection and appropriate management of musculoskeletal condition. Congenital musculoskeletal anomalies have a prevalence of 7.01 per 1000 live births. Lower limbs anomalies (69%) are more common than upper limb **(Kumari and Singh, 2018**).Orthopedic nurse play a major role in the care of children with orthopedic problems includes assessment, nursing diagnosis, planning, interventions, and evaluation. Lack of knowledge may lead to misconception about complication prevention, good care based on best knowledge and an understanding of problems. Therefore, the nurses play a critical role required enhancing of knowledge and skills to ensure improve practice regarding care of pediatric patients with orthopedic Therefore, the application of an intervention educational program, it provides opportunities for enhance knowledge and practice that can maximize of caring regarding orthopedic problems in pediatric**.**

II. SUBJECT AND METHODS

Ami of the study

The current study aimed to

- Assess nurses' knowledge and practices regarding care of pediatric patients with orthopedic problems,
- Design, implement & evaluate the effect of the intervention educational program on nurses' knowledge and practices regarding care of pediatric patients with orthopedic problems

Research hypothesis

Implementing of an educational program for nurses will improved their knowledge and practices concerning care of pediatric patients with orthopedic problems.

Research design:

A quasi -experimental study was utilized in conducting the study

Research settings:

This study was carried in Orthopedic Departments at Ain-Shams University Hospital, Benha University Hospital, and Benha Educational Hospital affiliated to the Ministry of Health.

Subjects:

A convenient sample of nurses (n=50 nurse) caring for pediatric patients with orthopedic problems at the previously mentioned settings at each hospital there are (15) nurses regardless of their age, educational qualification, years of experience and attendance of previous training program related to the orthopedic problems,

Tools of data collection:

A predesigned intervention questionnaire sheet: (pre/ post/ and follow up**)**:

1.This tools were designed by the researcher after review of the related literature and guidance of the supervisors, it was include three parts:

Part I: Characteristic of the studied nurses included: Age, level of education, years of experience, and attendance of previous training program related to orthopedic problems among pediatrics patients.

Part II: Nurses' knowledge regarding to acquired orthopedic problems such as: Fracture, joint inflammation, rickets, bone tumor and congenital orthopedic problems such as: Club foot, hip displasia, vertebral Colum malformation and care of children with orthopedic problems include (definition, causes, types, and complications) and nurses' knowledge about cast care, traction care, internal fixation and prevention of infection to paediatric patients with orthopaedic problem.

Part III: Characteristics of pediatric patients with orthopedic problems included age, gender and diagnosis.

Scoring System:

Knowledge obtained from the nurses was scored and calculated, according to their answers, it was evaluated using the model key answer sheet which prepared by the researcher. Each question was scored 1 grade for the correct answers, and scored zero for unknown or incomplete or incorrect answer. The total score of nurses' knowledge answers was categorized into two levels:

- Satisfactory (≥ 60%)
- Unsatisfactory (<60%**)**

Tool II: Observational checklist sheets. **Lynn, (2011) and Mohsin, Atiyah, (2016) and Schreiber, (2016)** to assess the actual nurses' practices related to care of pediatric patients with orthopedic problems. It was consisted of ten main procedures as consisted of:

Cast care (15 steps),

Traction care (15 steps),

Skin care (12 steps),

Wound care &assessment (15 steps),

Pain assessment (12 steps),

Neurovascular monitoring (8 steps),

Fracture assessment (12 steps),

Skin assessment (8 steps),

Leg exercise (11 steps),

Breathing exercise (10 steps).

Scoring System:

A score of evaluation for each step in the checklist was checked if done correct and complete scored 1 grade, and score zero if not done or done incorrectly or in complete. According to the total score of nurses' practices, it was categorized into two levels

- Competent (≥ 85%)
- Incompetent (< 85%)

Tool Validity:

The developed tools were reviewed for appropriateness of items, and ascertained by three experts in the pediatric Nursing and Pediatric Medicine fields to assure content and validity its format, layout, consistency, accuracy and relevance. Some questions were then rephrased accordingly. Reliability: Alpha Cronbach test was used to measure the internal consistency of all the tools used in the study. Overall test and retest reliability coefficient was alpha Cronbach values was (0.87).

Operational Design:

Preparatory phase:

This phase started with a review of current and past, national and international related literature concerning the subjects of the study, using textbooks, articles, journals, and websites. This review was helpful to the researcher in reviewing and developing the data collection tools, and then the researcher tested the validity of the tool through jury of expertise to test the content, knowledge, accuracy, and relevance of questions for tools.

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The pilot study

A pilot study was conducted on 10% (5 nurses) of total sample to evaluate the clarity and applicability of the study tools and to estimate the time needed for data collection. Also to identify obstacles and problems that might be faced during data collection. According to the results obtained from the pilot study, the necessary modifications were done. These modifications included changing in questions style from the list to multiple choices and added questions to assess nurses' knowledge about immobility problems, all modifications are reviewed by the researcher' supervisors. The subjects of pilot study were excluded from the study subjects.

Field work

The actual field work was carried out from November 2018 up to November 2019 for data collection. The researcher explained the aim of the study for studied nurses to gain their cooperation, and then written agreement to participate in the study was taken. The researcher was available at morning and afternoon shifts by rotation 3days weekly in the study settings.

Phase 1:

The researcher started to fill the interview questionnaire sheet to assess nurses‟ Characteristic of the studied samples, nurses' knowledge regarding to orthopedic problems and document all the data in the questionnaire sheet and ensure confidentiality of data. It was filled by the nurses within 20 to 30 minutes. The researcher observed nurses‟ practice during care of pediatric patients with orthopedic problems by observing nurses in their departments during ordinary work. Each observation checklist was given a code number. The observation was filled within 20 to 35 minutes. This phase took two weeks.

Phase 2:

The implementation of education program:

1 - Pre-planning phase:

a) The framework of the educational program.

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Phase 2:

The implementation of education program:

1 - Pre-planning phase:

a) The framework of the educational program.

b) Setting the educational program general and specific objectives.

c) Allocation of the educational program resources and facilities (setting and printed materials).

d) Construction of evaluation tools to measure the program effectiveness (pre/ post and follow up of questionnaire sheet and observation checklist).

General objectives:

Theoretical: - Acquire satisfactory knowledge about orthopedic problems and nursing intervention regarding to care of pediatric patients with orthopedic problems**. Practical: -** Apply proper nursing intervention regarding to care of pediatric patients with orthopedic problems.

Specific objectives:

At the end of the program implementation the nurses should be able to:

a) Recognize the types of orthopedic problems in pediatrics (acquired and congenital)

b) Identify the potential complications related to orthopedic problems in pediatric patients.

c) Apply proper nursing role for care of pediatric patients with orthopedic problems.

2- Planning phase:

a) Determining the program strategy (time table of session, teaching methods, media used, learners' activities and evaluation methods).

b) Selecting the teaching places to conducting the educational program.

3- Implementation phase:

The program consisted of (8) sessions planned along (8) weeks. The times for each session range from 40 -70 mints, divided into (4, 15) hours for theoretical times and (3, 45) hours for practical times. In addition two weeks for pretest before program by using two tools and two weeks for the evaluation posttest immediately program intervention by the same tools, then evaluation after three months of implement the program using same tools. The total number of nurses 45, they were divided into (9) groups and each group had 5 nurses.

Teaching methods included lectures, group discussion, modified lecture/ small group discussion brainstorming, power point presentation, demonstration and re demonstration, and media used include posters, videos and **hand out** which gave to studied nurses after pretest using simple Arabic language and different illustrative pictures in order to facilitate understanding its content. It consisted of three parts, **part 1** contained knowledge about acquired orthopedic problems e.g. (Definition, sings, symptoms, causes, types, and complications. **Part 2** contained knowledge about congenital orthopedic problems e.g. (Definition, sings, symptoms, causes, types, and complications. **Part 3** contained the nursing care for pediatric patients with orthopedic problems. At the end of each session the researcher summarizes the key topics and verifies that the nurses understand the information presented.

Each session was started by a summary about what has been discussed in the previous session and the objectives of the new session, using a simple Arabic language, also the session ended by a summary of its content and feedback from the nurses to ensure that the nurses got the maximum benefits.

The first session the study subject identify the program objectives, identify the types and causes of acquired orthopedic problems in pediatric, define fracture in pediatrics, list the types of fracture and forms in pediatric, explain the clinical pictures of fracture for pediatric patients, identify the complications of fractures, and identify the immobility problems and how to prevent.

The second session the study subjects define joint inflammation in pediatric, list the causes of joint inflammation in pediatric, list the types of joint inflammation in pediatric, identify the clinical pictures of joint inflammation in pediatric, define of rickets in pediatric, recognize the common causes of rickets in pediatric, explain the clinical pictures of rickets in pediatric, explain bone tumor in pediatric.

The third session, recognize the types and causes of congenital orthopedic problems in pediatric patients, describe the club foot congenital anomalies in pediatric, describe the hip displays' in pediatric**,** explain the vertebral colum malformation in pediatric**.**

The fourth session, identify purpose of cast, identify the indications of cast, list the types of cast for pediatric patients with orthopedic problems, identify the cast problems in pediatric patients with orthopedic problems, perform the steps of cast care for pediatric patients with orthopedic problems.

The fifth session, identify purpose of traction the nurses, identify the indications of traction, list the types of traction in pediatric patients with orthopedic problems, perform the steps of traction care for pediatric patients with orthopedic problems, identify the traction problems in pediatric patients with orthopedic problems.

The sixth session, identify purpose of neurovascular assess, perform assess the neurovascular state for pediatric orthopedic problems, assess the pain for pediatric patients with orthopedic problems, describe the steps of fractures assessment for pediatric patients with orthopedic problems.

The seventh session, perform the steps of skin care for pediatric patients with orthopedic problems, perform the steps of wound care for pediatric patients with orthopedic problems and **The eighth session**, recognize infection control precaution for pediatric patients with orthopedic problems.

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4-Evaluation phase:

Evaluation of this program was done through:

a) Evaluation of nurses' knowledge by using pre and post and follow up questionnaire sheet.

b) Evaluation of nurses' practices by using observational checklist based on needs assessment.

c) Evaluation was done immediately after the implementation of the program intervention, then after three months of implementing the program as follow up by using same tools.

Ethical consideration

Ethical approval granted from the Scientific Research Ethical Committee of the Faculty of Nursing at Ain Shams University before starting the study. Clarifying the objectives and aim of the study to the studied nurses and obtaining a written informed consent from each. They were assured about confidentiality of data collected that were used for the purpose of the study only. They were informed that they have the rights to withdraw from the study at any time without giving any reason.

Statistical Design:

The data collected were organized, tabulated and presented using descriptive statistics in the form of frequencies and percentage for qualitative variables. Chi- square test was used for comparing the frequency and percentages of qualitative variables, independent t-test were used for founding the relation between one or two variable. For all the threshold of significance test was used at (P-value < 0.05)

III. RESULTS

Table (1): Number and percentage distribution of the studied nurses according to their characteristics (n=45)

Characteristics	No.	%
Age (years):		
<25 years	13	28.9
25<30 years	17	**37.8**
≥30 years	15	33.3
Mean±SD	**30.91±5.87**	
Gender:		
Male	2	4.4
Female	43	**95.6**
Education at level:		
Bachelor	5	11.1
Technical	9	20.0
Diplom	31	**68.9**
Years of experience:		
<1 years	5	11.1
1 :< 5 years.	17	**37.8**
5 :< 10 years.	15	33.3
≥10 years	8	17.8
Mean±SD	**6.20±2.42**	
Previous program related to clinical pathway		
• Yes	**0**	**0**
• N0	**45**	**100**

Table (1): This table reveals that, slightly more than one third (37.8%) of the studied nurses their age ranged from 25 to 30 years with mean age (30.91±5.87). Regarding their marital status it was found that, majority of them (88.9%) were married. As regarding their gender that majority of them (95.6%) were females. It is clear from this table that, more than two thirds (68.9%) of the studied nurses had a Diplom (secondary school nurse). In relation to the years of experience it was found that, (37.8%) of the studied nurses had years of experience ranged from1-<5 years with mean (6.20±2.42). It is also indicated from this table that, all nurses (100%) did not attend the previous program related to.

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Table (2): Number and percentage distribution of the studied nurses regarding to their knowledge about fracture in pediatric (n=45).

Knowledge about fracture	Pre (n=45)		Post (n=45)		Follow Up (n=45)		Pre vs. Post		Post vs. Follow Up	
	No.	%	No.	%	No.	%	X^2	*p-value*	X^2	*p-value*
Definition	20	**44.4**	38	84.4	41	91.1	15.711	<0.001**	0.932	0.334
Common age of occur fracture	14	**31.1**	38	84.4	40	88.9	26.235	<0.001**	0.385	0.535
Classification	21	**46.7**	37	82.2	39	86.7	12.414	<0.001**	0.338	0.561
Types of fracture	20	**44.4**	40	88.9	41	91.1	20.000	<0.001**	0.123	0.725
Forms of fractures	26	57.8	38	84.4	40	88.9	7.788	0.005*	0.385	0.535
Clinical pictures	19	**42.2**	36	80.0	38	84.4	13.512	<0.001**	0.304	0.581
Complication	14	**31.1**	29	64.4	36	80.0	10.020	0.002*	2.714	0.099
Total	19	42.2	37	82.2	39	86.7	**13.656**	**<0.001****	**0.385**	**0.535**

*P-value>0.05NS; *p-value <0.05 S; **p-value <0.001 HS*

Table (2): It is clear from this table that, 44.4%, 31.1%, 46.7% and 42.2%, of the studied nurses had satisfactory level of knowledge about definition, common age of fracture, classification, types of fracture clinical pictures and complication pre intervention respectively, while the studied nurses' knowledge improved immediately post intervention regarding the same items.

This table also shows that, a high statistically significant difference was observed regarding nurses' knowledge about fracture in pediatric pre/post. Program intervention, where (X^2=13.656 and P-<0.001), while there was no statistically significant difference was observed between post and at follow up where (X^2=0.385 and P-0.535).

Table (3): Number and percentage distribution of the studied nurses regarding to their knowledge about scoliosis in pediatric pre, post program intervention and at follow up (n=45).

Knowledge	Pre (n=45)		Post (n=45)		Follow Up (n=45)		Pre vs. Post		Post vs. Follow Up	
	No.	%	No.	%	No.	%	X^2	*p-value*	X^2	*p-value*
Age	18	**40.0**	35	**77.8**	36	80.0	13.264	<0.001**	0.067	0.796
Causes	16	**35.6**	34	**75.6**	35	77.8	14.580	<0.001**	0.062	0.803
Types of scoliosis	28	62.2	39	86.7	40	88.9	7.067	0.008*	0.104	0.748
Clinical pictures	23	51.1	35	77.8	37	82.2	6.983	0.008*	0.278	0.598
Total	21	46.7	36	80.0	37	82.2	9.360	0.002*	**0.062**	**0.803**

*P-value>0.05NS; *p-value <0.05 S; **p-value <0.001 HS*

Table (3): This table shows nurses' knowledge regarding scoliosis pre/post and at follow up. It was found that, more than one third 40.0% and 35.6%, of studied nurses had satisfactory level of knowledge regarding age and causes pre intervention respectively, while the studied nurses had more than three quarters 77.8% and 75.6% regarding age and causes post intervention, while there was no statistically significant difference was observed between post and at follow up where (X^2=0.062 and P-0.803).

Table (4): Number and percentage distribution of the studied nurses regarding to their knowledge about traction care pre, post program intervention and at follow up (n=45).

knowledge	Pre (n=45)		Post (n=45)		Follow Up (n=45)		Pre vs. Post		Post vs. Follow Up	
	No.	%	No.	%	No.	%	X^2	*p-value*	X^2	*p-value*
Purpose of traction	21	46.7	35	77.8	36	80.0	9.265	0.002*	0.067	0.796
Types of traction	19	42.2	35	77.8	35	77.8	11.852	<0.001**	0.000	1.000
Traction care	25	55.6	35	77.8	36	80.0	5.000	0.025*	0.067	0.796
Complications of traction	13	**28.9**	32	**71.1**	34	75.6	16.044	<0.001**	0.227	0.634
Total	19	42.2	34	75.6	35	77.8	9.035	0.003*	**0.067**	**0.796**

*P-value>0.05NS; *p-value <0.05 S; **p-value <0.001 HS*

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Table (4): This table clarified that, a high statistically significant difference was observed between pre/ post program intervention regarding nurses' knowledge about traction care. It is also clear from this table that, more than one quarter (28.9%) of the studied nurses had a satisfactory level of knowledge about complications of traction pre intervention, while more than two thirds (71.1%) of them had a satisfactory level of knowledge regarding complications post intervention respectively, while there was no statistically significant was observed between post and follow up where (X^2 =0.067 and P-0.796).

Figure (1): Number and percentage distribution of the studied nurses regarding to their total level of knowledge about orthopedic problems in pediatric pre, post program intervention and at follow up (n=45)

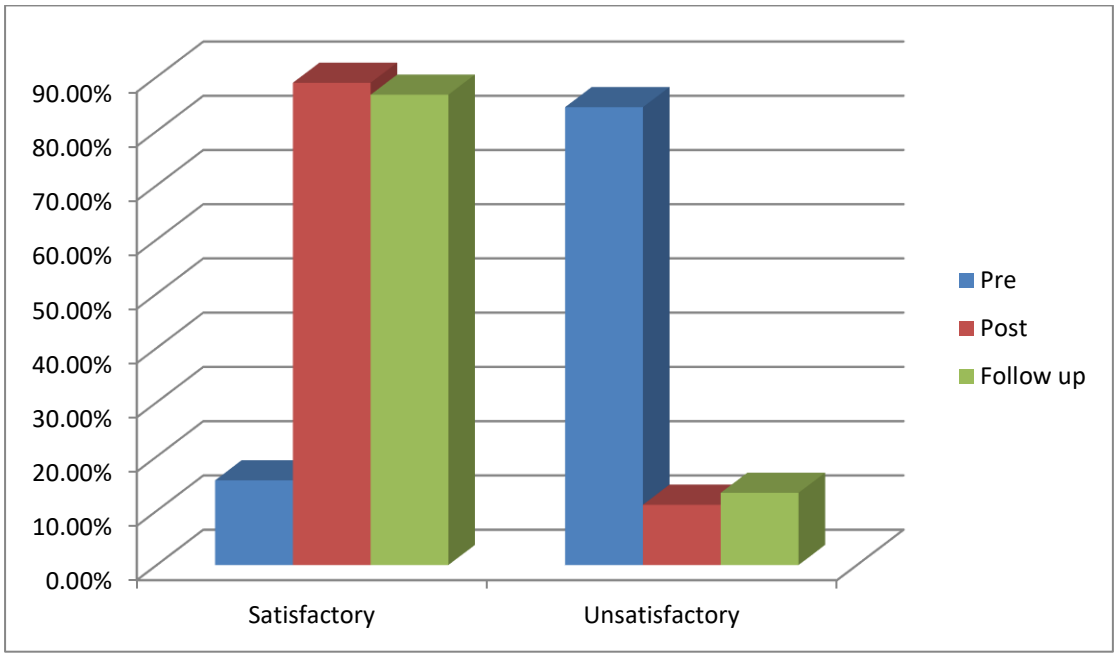

Figure (1): It is clear from this figure that, a high statistically significant difference was observed between pre/ post program intervention regarding total level of nurses' knowledge about pediatric orthopedic problems, where ($\mathbf{X^2}$ =48.496 and P < 0.001).While there was no statistically significant difference was observed between post and follow up with (p-value 0.748).

Table (5): Mean score descriptive of the studied nurses according to their practice regarding care of pediatric patients with orthopedic problems pre, post program intervention and at follow up

(n=45). Total level of practice regarding care of orthopedic problems	Pre		Post		Follow Up		Pre vs. Post		Pre vs. Follow Up		Post vs. Follow Up	
	Mean	±SD	Mean	±SD	Mean	±SD	t-test	*p-value*	t-test	*p-value*	t-test	*p-value*
Cast care	8.24	2.64	13.02	1.78	13.38	1.23	-10.075	<0.001**	-11.465	<0.001**	-1.104	0.273
Traction care	7.44	3.04	13.24	1.73	13.49	1.32	-11.112	<0.001**	-12.645	<0.001**	-0.751	0.454
Neurovascular check	4.18	1.70	7.31	1.02	7.40	0.89	-10.624	<0.001**	-12.090	<0.001**	-0.441	0.660
Skin care	6.82	2.36	10.56	1.53	10.73	1.36	-8.909	<0.001**	-10.138	<0.001**	-0.583	0.561
Pain assessment	1.18	0.75	1.76	0.43	1.73	0.45	-4.483	<0.001**	-5.102	<0.001**	0.239	0.812
Wound assessment	5.29	2.31	8.60	1.12	8.69	1.02	-8.651	<0.001**	-9.845	<0.001**	-0.395	0.694
Skin assessment	4.29	1.75	7.20	0.99	7.18	1.03	-9.697	<0.001**	-11.035	<0.001**	0.104	0.917
Fracture assessment	6.62	2.42	10.73	1.27	10.89	1.21	-10.080	<0.001**	-11.471	<0.001**	-0.595	0.553
Leg exercise	6.20	2.06	9.71	1.56	9.89	1.28	-9.105	<0.001**	-10.361	<0.001**	-0.590	0.557
birthing exercise	5.31	2.12	8.84	1.04	8.93	1.03	-10.033	<0.001**	-11.418	<0.001**	-0.406	0.685

*P-value>0.05NS; *p-value <0.05 S; **p-value <0.001 HS*

Table (5): It is clear from this table that, a high statistically significant difference was observed between pre/ post program intervention regarding total nurses practice in all items about care of pediatric patients with orthpedic problems with (p value < 0.001) while there was no significant difference was observed between post and follow up with (p value 0.617)

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Table (6): Relation between characteristics of studied nurses and their knowledge regarding pediatric patients with orthopedic problems (n=45)

characteristics	Pre				post				Follow Up			
	Satisfactory *(n=7)*		Unsatisfactory *(n=38)*		Satisfactory *(n=40)*		Unsatisfactory *(n=5)*		Satisfactory *(n=39)*		Unsatisfactory*(n=6)*	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age (years)												
<25 years	1	14.3	12	31.6	12	30.0	1	20.0	11	28.2	2	33.3
25-30 years	3	42.9	14	36.8	15	37.5	2	40.0	15	38.5	2	33.4
>30 years	3	42.9	12	31.6	13	32.5	2	40.0	13	33.3	2	33.3
Chi-square test	1.824				0.075				0.372			
p-value	0.768				0.963				0.830			
Gender												
Male	1	14.3	1	2.6	1	2.5	1	20.0	1	2.6	1	16.7
Female	6	85.7	37	97.4	39	97.5	4	80.0	38	97.4	5	83.3
Chi-square test	0.630				0.470				0.101			
p-value	0.730				0.790				0.751			
Level of education												
Bachelor	4	57.1	1	2.6	5	12.5	0	0.0	5	12.8	0	0.0
Technical	2	28.6	7	18.4	8	20.0	1	20.0	8	20.5	1	16.7
Diploma	1	14.3	30	78.9	27	67.5	4	80.0	26	66.7	5	83.3
Chi-square test	0.989				12.906				9.008			
p-value	0.320				0.017*				0.013*			
Years of experience												
<1 years	0	0.0	5	13.2	2	5.0	3	60.0	1	2.6	4	66.7
1-5 years	1	14.3	16	42.1	15	37.5	2	40.0	15	38.5	2	33.3
5-10 years	1	14.3	14	36.8	15	37.5	0	0.0	15	38.5	0	0.0
>10 years	5	71.4	3	7.9	8	20.0	0	0.0	8	20.5	0	0.0
Chi-square test	8.864				11.354				6.857			
p-value	0.003*				0.010*				0.009*			

*P-value>0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*

Table (6): This table shows that, there were statistically significant relations between the studied nurses level of knowledge and their level of education and years of experience, at pre/post program intervention and at follow up, with (p-value <0.05).

Table (7): Relation between characteristics of the studied nurses and their practice regarding care of pediatric patients with orthopedic problems (n=45)

characteristics	Pre total score of practices				Post total score of practices				Follow Up total score of practices			
	Competent *(n=9)*		Incompetent *(n=36)*		Competent *(n=37)*		Incompetent *(n=8)*		Competent *(n=41)*		Incompetent *(n=4)*	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age (years)												
<25 years	1	14.3	12	31.6	11	30	2	20	12	28.2	1	33.3
25<30 years	4	42.9	13	36.8	14	37.5	3	40	15	38.5	2	33.4
>30 years	4	42.9	11	31.6	12	32.5	3	40	14	33.3	1	33.3
Chi-square test	2.337				1.497				1.497			
p-value	0.505				0.683				0.683			
Gender												
Male	1	14.3	1	2.6	0	2.5	2	20	1	2.6	1	16.7
Female	8	85.7	35	97.4	37	97.5	6	80	40	97.4	3	83.3
Chi-square test	0.440				0.232				0.429			
p-value	0.507				0.630				0.513			
Level of Education												
Bachelor	3	57.1	2	2.6	5	12.5	0	0	5	12.8	0	0

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Technical	4	28.6	5	18.4	7	20	2	20	8	20.5	1	16.7
Diploma	2	14.3	29	78.9	25	67.5	6	80	28	66.7	3	83.3
Chi-square test	0.362				5.962				7.176			
p-value	0.872				0.022*				0.015*			
Years of experience												
<1 years	0	0	5	13.2	0	5	5	60	2	2.6	3	66.7
1-5 years	2	14.3	15	42.1	14	37.5	3	40	16	38.5	1	33.3
5-10 years	2	14.3	13	36.8	15	37.5	0	0	15	38.5	0	0
>10 years	5	71.4	3	7.9	8	20	0	0	8	20.5	0	0
Chi-square test	11.795				12.509				14.277			
p-value	0.004*				<0.001**				<0.001**			

*P-value>0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*

Table (7): This table shows that, there were statistically significant relations between the studied nurses practice and their education level and experience, at pre/post program intervention and at follow up, with (p-value<0.05).

Table (8): The relation between total level of knowledge and total practice in pre, post program intervention and at follow up (n=45)

Total level of practice	Total level of knowledge						Chi-square test	
	Satisfactory		Unsatisfactory		Total			
	No.	%	No.	%	No.	%	X^2	p-value
Pre								
Competent	7	100.0%	2	5.3%	9	20.0%	33.158	<0.001**
Incompetent	0	0.0%	36	94.7%	36	80.0%		
Total	7	100.0%	38	100.0%	45	100.0%		
Post								
Competent	37	92.5%	0	0.0%	37	82.2%	26.016	<0.001**
Incompetent	3	7.5%	5	100.0%	8	17.8%		
Total	40	100.0%	5	100.0%	45	100.0%		
Follow Up								
Competent	39	100.0%	2	33.3%	41	91.1%	28.537	<0.001**
Incompetent	0	0.0%	4	66.7%	4	8.9%		
Total	39	100.0%	6	100.0%	45	100.0%		

*P-value>0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*

Table (8): It is clear from this table that, a high statistically significant relation was observed regarding total level of nurses' knowledge and total practice pre/post program intervention and at follow up, with (P- value < 0.001).

Table (9): Correlation between total level of knowledge and total practice in pre/ post program intervention and at up follow (n=45).

Items	Pre		Post		Follow Up	
	r	p-value	r	p-value	r	p-value
Total score of knowledge Total score of practices	0.850	<0.01**	0.755	<0.01**	0.802	<0.01**

*P-value>0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*

Pearson's correlation coefficient (r)

Table (9): It is clear from this table that, positive correlation and significant between total level of knowledge and total practices, in pre, post program intervention and at follow up, with (p-value <0.05).

IV. DISCUSSION

Regarding the characteristics of the studied nurses, the present study revealed that, more than one third of the studied nurses' age was ranged from 20- < 30 years old with the mean age of the studied nurses 30.91±5.87years. These results were supported with ***Ahmed and Mohsin, (2016)*** who conducted a study with title "Nurse's knowledge toward cast complications in

orthopaedic ward and found that, all of nurses whose age from 23 to less than 29 years are the most capable group of understanding and applying what they have been taught as compared with nurses whose age from nurses 25 to 30 years**.** These results disagreement with ***Sathiya etal., (2015)*** who conducted a study with title "Assessment of the effectiveness of lap top assisted nursing strategies on knowledge regarding prevention of complications of immobility among patients with major orthopedic trauma" who found that the highest rate of the nurses (53%) were in the age group of (21-30) years old.

The results of the present study revealed that, more than two thirds of the studied nurses had nursing diplom. This may due to the fact that, secondary nursing school provides the community with larger number of graduate diplom than other institutions such as faculties of nursing and technical nursing institute. This result is in agreed with ***Abdel khalik, (2017)*** who conducted a study with title "Nurses' Performance for Orthopedic Patients with Traction or Internal Fixation" and found that, more than half of nurses had nursing diplom. This findings disagreement with ***Bader(2012),*** who conducted a study with titled "Evaluation of nurses' practices toward orthopedic wound infection" and showed that the higher percentage of the educational level were institute graduate.

As regards the years of experience of the studied nurses, the result of the present study revealed that, more than one third of studied nurses had (1-< 5) years of experience with mean 6.20±2.42. This finding was in agreed with ***Ibrahim, (2005)*** who conducted a study with title the Evaluation of knowledge and practices of nurses in orthopedic wards concerning femur fractures " and found that, more than half of the staff nurses years of experiences were of the nurses had (1-5) years of experience in orthopedic wards. This findings was in agreed with ***Agrawal, etal., (2008)***, who conducted a study with title "the Pathogenic Bacteria in an Orthopedic Hospital" and found that, orthopedic nurses experience in nursing field (1-5 years). These finding may reflect the importance of raising nurse knowledge through the educational program to update their knowledge regarding care for pediatric orthopedic problems.

Regarding to the attendance of previous training courses, it was found that, all nurses not received training courses for pediatric orthopedic problems. The researcher mentioned that training courses play an important role in enhancing, updating nurses' knowledge and practice besides improving quality of care given to the pediatric. This result was supported by ***Abd el khalik, (2017***), who indicated that, all nurses did not attend any previous training courses**.**

In relation to total nurses' knowledge regarding to fracture in pediatric pre/post intervention, and at follow up that, less than half of studied nurses had a satisfactory knowledge pre intervention while, the majority of them had satisfactory knowledge post intervention. These results agree with ***Ahmed & Mohsin (2016),*** who found that, highly significant improvement of knowledge of the studied nurses post intervention. This lack of awareness in nurses' knowledge pre intervention could be due to that, the nurses not received training courses about fracture. Whereas training courses play an important role in enhancing, updating nurses' knowledge, and performance. The nurses should be aware of their responsibility to prevention from fracture.

The present study shows that, less than half of studied nurses had a satisfactory knowledge about scoliosis pre intervention. This is because many nurses believed that knowledge essentially for physician and not nursing aspect and there was no motivation for the nurses to update and improve their knowledge. While after program more than three quarter of studied nurses had satisfactory knowledge.This lack of awareness in nurses' knowledge pre intervention could be due to that, the nurses not received training courses about scoliosis.

Scoliosis is the most common back deformity, is a lateral curvature of the spine that exceeds 10 degrees. It may be congenital results from anomalous vertebral development, idiopathic the etiology is not known, or neuromuscular associated with other disorders such as genetic factors and growth abnormalities of bone, muscle, disc, or central nervous system disorders may contribute to development ***(Williams, et al., 2016).***

In relation to nurses' knowledge about traction care, the results of the current study indicated that, the majority of nurses had a satisfactory knowledge post intervention related to purpose, type, complication and traction care. These results may be due to lack of basic knowledge about traction care and lack of nurses' knowledge pre intervention with emphasize on the importance of raising nurses' awareness through educational program to develop their knowledge regarding traction. This finding agreement with **Al-Barwari, (2006),** who conducted a study with title **"**Evaluation of nursing knowledge and practices concerning nursing care of patient with skin traction in orthopedic units" and found that, the studied nurses had poor knowledge regarding care of patients with skin traction. The researcher may believe good knowledge important for

improving practices. On the other hand **El- Dakhakhny, (2010),** who conducted a study with title "Impact of educational program on Nurses' performance toward children in Thomas traction" and reported that, the majority of the studied nurses had inadequate knowledge scores related to nursing care of patient with Thomas traction, Moreover, this result disagree with **Elhakeem et al. (2014),** who conducted a study with title "Standards of Nursing Care for Patients Undergoing External Fixation in Trauma Unit" and reported that, more than two thirds of nurses had a sufficient knowledge regarding care of patients with external fixation.

Furthermore, the finding of the present study revealed that, preprogram the majority of nurses were unsatisfactory knowledge about pediatric orthopedic problems. Whereas, immediately post program intervention and at follow up majority of nurses knowledge were improved. This result agreement with **Mahmoud, (2004**) who conducted a study with title "Effects of implementing educational program about pressure ulcer control on nurses' knowledge and safety of immobilized patients" and reported that teaching programs for nursing an important part to assist staff nurses in developing and enhancing their skills needed to provide high standards practice. The researcher clarified that, this lack of the present study may be due to lack of guidance and supervision from orthopedic wards head nurse. In addition, the results may be due to lack of nurses' awareness of care beside the care which given to in a form of traditional, routine daily care of orthopedic problems and increased work load and lack of in- service training courses as well as experience where all nurses didn't attend training courses related to care of pediatric patients with orthopedic problems. This may be attributed to the absence of resources which help nurses to get the required knowledge whenever they need. As well as there was no motivation for the nurses to update and improve their knowledge. It was noticed that, most of nurses knowledge were improved after implementation of educational program from the researcher point view giving training program to the nurses in clinical area supported with booklets to were necessary to improved their knowledge and practice . It could be attributed also to the fact that, nurses are liable to learn and acquired knowledge throughthe training program. On the same line with ***Saed,(2012)***, who conducted a study with title "Nursing management of children with hemophilia according to basic standards" and found that, almost of nurse knowledge before stander application were poor while immediately and after three month all nurses were good.

Before program implementation, the total level of practice for nurses either in competent. Whereas, immediately and follow up post program, the total level of practice were competent regarding care of pediatric patients with orthopedic problems. This finding in the same line with **Kirsch et al., (2014)** who conducted a study with title "Nurses' Practice Patterns in Relation to Adherence Enhancing Interventions in Stem Cell Transplant Care" and reported that, educational interventions are considered most effective for nurses. This may be due to the care which given to pediatric pre intervention in a form of traditional, routine and daily care while, post implementing the activities of educational program regarding care of orthopedic problems the nurses' acquire a newly scientific and organized approach that allows them to modify nurses' pitfalls in caring of pediatric orthopedic regarding cast, traction, assessment of neurovascular, wound and skin assessment. According to the researcher views, the training ongoing program are essential to nurses and helps them in taking the responsibility of working in orthopedic words to identify the rules and responsibilities because those in services training programs and workshops has a positive reflect on nurses practice.

The present study reveals that, there was a significant relation between nurses' knowledge and level of educational post program intervention. This finding agree with **Ibrahim, (2005),** who stated in their study that there was significant relationship between their knowledge and education level only, but that there was no significant between nurses knowledge and years of experience, and training courses. Level of education had positive effect on the quality and quantity of knowledge and practices. This finding agree with ***Bader (2012),*** who found that, the nurses in orthopedic ward must take in services education to motivate them and increasing their knowledge regarding nursing management of the orthopedic ward. The researcher believes that, level of educational and years of experience may reflect on nurses' knowledge.

The current finding study indicated that, there were significant relation between the nurse's knowledge and the years of experience immediate and three month post program compared to preprogram. These findings agree with **Al-Jazai'ri**, (**2007**) who conducted a study with title "Assessment of nurses' knowledge concerning children with cleft palate at pediatric" and mentioned that, there was a significant relation between nurses' knowledge and years of experience.

On the other hand the finding is in congruent with ***Ahmed & Mohsin(2016),*** he found there is moderate positive relationship between nurses' knowledge with years' experience in the orthopedic wards.

The present study reveals that, there was a significant relation between nurses' practice and their educational level. This result agrees with **AL *Sultani (2006)*** who conducted a study with title "Evaluation of the nurses' practices toward coronary artery" and found that, there was statistically relation between nurses' practices and level of education, this result agrees with ***Moosa Sadiq, (2012)*** who conducted a study with title "Assessment of nurses' practices toward the care of children with febrile convulsion" and mentioned that, there was a relation between nurses' practices and their level of education. The researcher believes educational level may reflect on nurse's knowledge and practice.

The present study reveals that there was significant relation between nurse's practice and the years of experience post program intervention. At the same line with ***Moosa Sadiq, (2012)*** who found that, there was highly significant relation between nurses' practices and the years of experience. The researcher believes the years of experience may reflect on nurse's knowledge and practice.

The current study indicated that, there a positive correlation between the nurse's knowledge and practice, at pre, immediate post and follow up phase of program implementation. This result was supported with **Eskander, etal, (2013)** who conducted a study with title "Intensive Care Nurses' Knowledge & Practices Regarding Infection Control Standard Precautions" and revealed that statistically significant positive correlation between knowledge and practice of universal precautions and show that with improving knowledge and nurses practice. The researcher believes that good knowledge leads to competent level of practice. These findings were agreement with **Sadek, (2010)** who conducted a study with title "Evidence based practice for care of neonates with respiratory distress and showed that, there was positive correlation (pre/post program) with statistically significance difference. The researcher may believe that good knowledge leads to competent level of practice.

V. CONCLUSION

Upon the results of this study it can be concluded that, nurses were improved in their knowledge and practice after the program intervention concerning with the effect of educational intervention program regarding care of pediatric patients with orthopedic problems.

VI. RECOMMENDATIONS

- Continues educational program for nurses to update their knowledge and skills about orthopedic nursing.
- Further studies need to be carried out in order to assess the effectiveness of educational program regarding care of pediatric orthopedic problems.
- A policy should be initiated for increasing the number of nursing staff in orthopedic wards.

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