

The Effect of School Based Intervention for Adolescents and School Nurses on Reducing Bronchial Asthma among Adolescents

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Abstract: Asthma is a serious challenge to public health. The Egyptian guidelines for asthmatic child documented that, asthma is being increasingly diagnosed among Egyptian children. Aim of the study: is to examine the effect of school based intervention for asthmatic adolescents and school nurses in reducing bronchial asthma among adolescents. Study design: A quasi experimental design (pre-post test) was used. Setting: the study was done in Shebin El-Kom district public schools. Study sample: A convenience sample of 67 asthmatic adolescents and all the school nurses (18) of the selected public schools (35). Tools: Asthma Knowledge Questionnaire used to assess the adolescents and school nurses asthma knowledge and assessed the school nurses' asthma practices. Results: the knowledge score of the adolescents and school nurses about asthma pre-intervention was highly improved post-intervention. Regarding the school nurses' asthma practices, the mean score of post-intervention was significantly higher than pre-intervention mean scores. The rates of adolescents' school absenteeism, visits of out chest clinics or emergency department and hospitalization were significantly decreased post intervention. Conclusion; Implementation of school-based intervention of asthma succeed in making improvement in adolescents and school nurses' asthma knowledge and in school nurses' asthma practices. Adolescent' rates of school absenteeism, visits of out chest clinics or emergency department and hospitalization were significantly decreased. Recommendation; implementation of asthma interventions continuously for asthmatic adolescents and school nurses can have a significant positive impact on asthmatic adolescents.

Keywords: asthma knowledge, asthmatic adolescents, school nurses.

1. INTRODUCTION

Asthma is a heterogeneous disease. It is the most common chronic disease among children. It begins in childhood and develops before age 5 years, it affects boys more than girls and the median age of onset is 4 years but more than 20% of children develop symptoms within the first year of life. Asthma is more severe in young children because, they are more prone to viral infections as cold and smaller airway size increases airway resistance [2]. There are five types of asthma: allergic asthma, non- allergic asthma, late-onset asthma, asthma with fixed airflow limitation, and asthma with obesity. Allergic asthma is the most recognized this asthma type accounts for nearly 60 % of all asthma [5]. Patients with asthma have airways that are inflamed. Inflamed airways are very sensitive, so they tend to react strongly to things called "triggers".

Asthma affects as many as 334 million people of all ages in all parts of the world. 14% of the world's children experience asthma symptoms. 8.6% of young adults (aged 18-45) experience asthma symptoms, 4.5% of young adults have been diagnosed with asthma and/or are taking treatment for asthma [25]. Asthma is expected to increase to 400 million worldwide by 2025. Child-hood asthma prevalence ranged from 2.1% in developing to 32.2% in developed countries [2]. Asthma is a rare cause of mortality, contributing to less than 1% of all deaths in most countries worldwide. Rates of death

from asthma rise almost exponentially from mid-childhood to old age, so the majority of asthma deaths occur after middle age [25]. Most asthma deaths are related to lack of access to health care and insufficient knowledge of proper management techniques. Approximately 80% of the deaths from asthma are preventable with proper education and management [12]. The asthma annual mortality rate among all ages in Egypt 2013 is 2.3/ 100,000 people. The asthma annual mortality rate in 2013 among students with age 10-19 years is 0.1/100,000 people [15].

Triggers are either allergy-causing substances, such as dust mites, mold, and pollen; or irritants, such as cigarette smoke and fumes from paint and cleaning fluid [21]. Studies through puberty have shown a greater incidence of asthma among adolescent and young adult females and a greater proportion of males with remission of asthma. Before age 12, boys have more severe asthma than girls, with higher rates of admission to hospital [24]. Children and adults who are overweight or obese are at a greater risk of asthma. Obese patients often use more medications, suffer worse symptoms and are less able to control their asthma than patients in a healthy weight range [3]. Many students perceive symptoms of asthma only when exercising, EIA in the absence of other triggers is rare, and most commonly the student may have chronic airway inflammation and the "EIA" is evidence of poor control [4]. Various dietary antioxidant deficiencies increase susceptibility to asthma. Low vitamins intake has been associated with a greater decline in lung function in response to allergic triggers [13]. Premenstrual and menstrual exacerbations are well recognized. Asthma may improve, worsen or remain unchanged during pregnancy [14].

During an asthma attack, the airways become twitchy and sensitive. Three things occur: bronchoconstriction: the smooth muscle bands around the airways squeeze the airways, inflammation: the walls of the airways swell up and become more pink, mucus: viscous liquid clogs up the airways [4]. The person with asthma may experience wheezing, difficulty breathing, coughing, chest tightness or other symptoms. If severe, these symptoms can lead to low blood oxygen and even, in rare cases, death [22]. A clinical diagnosis of asthma is often prompted by symptoms such as: the classical symptoms are: recurrent episodes of wheezing ,troublesome cough at night, cough or wheeze after exercise, cough, wheeze or chest tightness after exposure to airborne allergens or pollutants and colds "go to the chest" or take more than 10 days to clear. Physical examination: asthma symptoms are variable; therefore physical examination of the respiratory system may be normal. Wheezing on auscultation is the most common finding, but may only be detected when the person exhales forcibly, even in the presence of significant airway limitation [14].

Essential Investigations Spirometry is necessary to confirm airflow obstruction, assess severity and demonstrates significant reversibility. It may help identify other diagnoses, for example, upper airway obstruction. Chest X-ray is not routinely recommended unless the diagnosis is in doubt, when symptoms are not typical, or suggest other diagnoses. Skin testing and radioallergosorbent test (RAST) may be helpful in identifying allergens to which the patient has been sensitized and in developing a strategy for avoiding allergen exposure. The majority of asthma can be classified as mild, these patients remain at risk of an asthma exacerbation. In contrast, severe uncontrolled asthma occurs in about 5–10% of patients but drives about 50% of the cost of asthma. An asthma control survey of patients showed that only 5% of the patients were controlled, 31% were partially controlled, and 64% were uncontrolled [26].

Each person's asthma is unique. Some people with asthma take medicine daily. Others take it only as needed [27]. Treatment of asthma has changed to focus on "control" of symptoms rather than "management" of severity [4]. The primary therapies for exacerbation to relieve airflow obstruction and hypoxemia are: repetitive administration of rapid-acting inhaled β_2 - agonist bronchodilator, early introduction of systemic glucocorticosteroids, oxygen supplementation and (in the school) use of rescue inhalers (Albuterol). The clinician can decide if antibiotic therapy is appropriate [14].

School nurses are often 'first responders' on the front lines of children's health when children enter the school system and throughout their school years. The National Association of School Nurses NASN has defined school nursing as follows "a specialized practice of public health nursing that protects and promotes student health, facilitates normal development, and advances academic success[18]. Students with asthma who attend school require a thorough nursing assessment of their health needs to enable them to attend school regularly and to fully participate in educational programs. The school nurse is often the case manager for the student with asthma [19]. As a champion of a "healthy environment," the school nurse can assemble an advisory team to plan and implement a coordinated Environmental program for the school-based management of asthma. Ideally, the advisory team members should include the school nurse, a school administrator, a custodian, community members/parents, an education staff member, a nutrition service member, a health care provider, and representatives from other relevant community organizations [18].

The school nurse has an instrumental role in addressing the components of asthma education through interactions with students, school staff, and families. School nurse is in a unique position to identify gaps in asthma care and knowledge and to address these needs through referral and education [18]. The school nurse can assist the rural adolescent in discerning asthma symptoms that are not acceptable and refer the student to a health care provider when necessary. Without a written asthma action plan, this collaborative partnership between the school nurse, the health care provider and the rural adolescent with asthma is difficult to both obtain and sustain [23].

Significant of study:

The asthma annual mortality rate among all ages in Egypt 2013 is 2.3/ 100,000 people. The asthma annual mortality rate in 2013 among students with age 10-19 years is 0.1/100,000 people [15]. The Egyptian guidelines for asthmatic child documented that, asthma is being increasingly diagnosed among Egyptian children. Few studies were done to explore and manage this problem in Egypt [1]. So this study was done to examine the effect of implementing a school-based intervention for adolescents and school nurses to reduce asthma among Egyptian asthmatic adolescents.

Aim of the study:

The aim of this study is to examine effect of school based intervention for asthmatic adolescents and school nurses on reducing bronchial asthma among adolescents.

Research Hypothesis:

1. Asthma knowledge of asthmatic adolescents and school nurses who will receive school based intervention may be improved post intervention.
2. The school nurses' practices related to asthma management may be improved post intervention.
3. The rates of; school absenteeism, visits of out chest clinics or emergency department and hospitalization of the participated adolescents may be decreased post intervention.

2. METHODOLOGY

Design: -A quasi experimental design (pre-post test) was used.

Settings: The study was conducted at Shebin El-Kom district public schools in Menoufia Governorate, thirty five public schools (twenty three urban & twelve rural).

Sample: A convenience sample of 67 asthmatic adolescents and all the school nurses (18) of the selected public schools (35).

Inclusion criteria:

- The adolescents were diagnosed with bronchial asthma.
- Aged 12 – 17 years.

Data collection instrument:**Asthma Knowledge Questionnaire (AKQ):-**

The tool has been adopted from Newcastle Asthma Knowledge Questionnaire (NAKQ). It includes three parts:

Part one: the socio demographic data of adolescences and school nurses such as (sex, age, residence, school place and ect.....).

Part two: include the following:

1. The adolescents' medical history such as (duration of suffering from bronchial asthma, other family member sick with bronchial asthma and family member smoking)
2. The characteristics of bronchial asthma:
 - a. School absenteeism.
 - b. Out chest clinic or emergency department visits.

- c. Hospitalization rate.
- d. Severity of asthma: Symptom-Based Classification of Asthma Severity according to modified Global Initiative for Asthma GINA, (2016) was used for evaluating the asthma severity level of the participated adolescents.

Part three: it include:

- a) Questions to assess the adolescents and school nurses knowledge about bronchial asthma as (asthma nature & definition, asthma causes and triggers, asthma signs & symptoms and ect).

Scoring:

- The questionnaire contained knowledge assessment items each was three points Liker scale (0 – 2) as (0) for “don’t know”, (1) for “incorrect answer”, and (2) for correct answer. The total score of each adolescents and school nurse was categorized arbitrary into “inadequate knowledge” when the participant achieved less than or equal $\leq 50\%$, and adequate knowledge was considered when the participant achieved more than $> 50\%$.
- b) Questions were added to school nurses' questionnaire to assess school nurses' asthma practices such as (health education for teachers and students about asthma, the correct way to use the inhaler, make individual asthma plan and ect).

Scoring:

- The questions of nurses' practices, were examined in a two points Liker scale (0 - 1) as (0) for “No” and (1) for “Yes”. The questions were evaluated giving a score of 0- 10. The total score of each nurse was categorized arbitrary into “poor practice” when the nurse achieved less than or equal $\leq 50\%$ of the total score (0 – 5), and good practices was considered when the nurse achieved more than $> 50\%$ of the total score (6 - 10).

3. METHOD

Approval:

- The researcher contacted undersecretary of the Ministry of Education at Menoufia Governorate and sent a formal letter and a copy of the research's tools, to obtain the agreement to conduct the research. The agreement was obtained. Before starting the data collection, the agreements and the aim of the study were explained to each school manager.
- School nurses and adolescents parents' consent obtained before starting collecting data. Approval from the ethics committee also was obtained to carry out this study.

Reliability of the tool :

Reliability was applied by the researcher for testing the internal consistency of the tool by administration of the tool to the same subjects before collecting the data actually to assess clarity and simplicity of the questions. Reliability was estimated among 15 participants by using test retest method with two weeks apart between them .The correlation coefficient was calculated between the two scores. Then correlation coefficient was calculated between the two scores for each of the three types of participants. Correlation coefficient was 0.76 for students' questionnaire and 0.85 for school nurses, which indicate that the questionnaires are reliable to detect the objectives of the study.

Validity the Tool:

The questionnaire was tested for its content by jury of two experts in the field of Community Health Nursing to ascertain relevance and completeness. Validity of the questionnaire was assessed using content validity by an Expert. The relevancy, clarity, fluency and simplicity of each component in the questionnaire were examined by the expert and she found the questionnaire is useful and helpful.

Pilot study:

A pilot study was carried out on (10 school nurses and 5 adolescents) to test the content of the questionnaire as well as to estimate the time needed for data collection and the necessary modifications was done. Those who shared in the pilot study were excluded from the study sample.

Ethical consideration:

Protection of human rights was maintained to all subjects that the participation in research is voluntary. Anonymity and confidentiality of the responses were respected. All subjects have a freedom to refuse participating in the research and to withdrawing at any time.

Procedure and data Collection:

- Data Collection started on September 2016 and lasted until May 2017.
- Before starting the data collection, the agreements and the aim of the study were explained to each school managers to gain their cooperation.
- The school based intervention was done by development and implementation of asthma educational sessions for the participants (adolescents and school nurses). The materials for these sessions were taken from national guidelines.
- The researcher initiated data collection by interviewing each participant for assessing adolescents and school nurses' socio-demographic data and the adolescents' asthma characteristics. The researcher distributed and filled the pre-intervention AKQ to the entire adolescent and school nurses. Most of time, the participants filled the questionnaire by themselves.
- Filling in the pre intervention questionnaire took about 20-30 minutes.
- After 3 months; a copy of AKQ was filled by each participant for assessing the effectiveness of the developed educational intervention on asthma knowledge of all the participants and on school nurses' asthma practices.

Statistical analysis:-

Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 22. Graphics were done using Excel program. Quantitative data were presented by mean (X) and standard deviation (SD). It was analyzed using student t-test for comparison between two means. Qualitative data were presented in the form of frequency distribution tables, number and percentage. It was analyzed by chi-square (χ^2) test. However, if an expected value of any cell in the table was less than 5, Fisher Exact test was used. Level of significance was set as P value <0.05 for all significant tests.

4. RESULTS

Table (1): showed the distribution of socio-demographics and medical history of studied adolescents. The table revealed that, 50.7 % of adolescents were aged from 15 to 17 years, 61.2 % were females and 59.7% of the studied adolescents were from the urban regions, 40.3% of the adolescents' fathers and 46.3% of their mothers had diploma or above, followed by 26.9% of the fathers with university education and 22.4% were illiterate mothers with respectively. The adolescents' fathers 41.8% were hand workers, 46.3% of the studied adolescents suffered from bronchial asthma (0-5 years), followed by 35.8% of adolescents who suffered from bronchial asthma (6-10 years), 55.2% of the studied adolescents had not other family member sick with asthma and 65.7% of the studied adolescents had a smoker family member

Table (2): showed the distribution of socio demographic data of studied school nurses. The table showed that, 55.6% of school nurses who participated in the present study were working in urban schools, 72.2% of them had nursing diploma and 61.1% of school nurses were employed by Health Insurance, 50% school nurses had experience 11 to 20 years, followed by 38.9% of school nurses who had experience 21 to 25 years or more, 55.6% of the school nurses served only one school, 56.6 % school nurses were full time work at their schools.

Table (3): showed the distribution of the adolescents' correct answers about asthma pre and post- intervention. The table revealed that, there was an improvement in asthma knowledge of the studied adolescents post intervention. The highest percentages of correct answers in pre intervention were of the questions: "cold weather changes and sports make the child asthma worse" followed by "asthma is caused by common cold" " inhaler is effective during asthma attacks" " the severity of the asthma increasing during night" (86.6%, 77.6%, 76.1%, 74.6%) respectively. In post intervention, the highest percentages of correct answers were of the questions: "asthma is caused by common cold" followed by " inhaler is effective during asthma attacks" 95.5%, 92.5% respectively.

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Table (4): showed the distribution of the school nurses' correct answers about asthma pre and post- intervention. The table revealed that, there was an improvement in asthma knowledge of the studied school nurses post intervention. The highest percentages of correct answers in pre intervention were of the questions: "asthma is caused by common cold" by " the main symptoms of asthma are: cough, wheeze and breathlessness" "high proportion of children may have asthma during childhood " (88.9%, 77.8%, 66.7%) respectively.

Table (5): showed mean score of school nurses' asthma practices pre and post-intervention. The table revealed that, the mean score of the school nurses' asthma practices post –intervention was significantly higher than the asthma practices mean score 7.3 ± 1.5 vr 2.3 ± 1.1 pre-intervention ($P=0.000$).

Figure (1): This figure showed percent distribution of school absenteeism rate of the studied adolescens in the last 4 weeks pre & post- intervention. The figure illustrated that, in the last 4 weeks , pre intervention 33% of the studied adolescents absented 5 days or more which decreased to 11% post intervention followed by 28% of the adolescents absented 2-4 days pre intervention which increased to 40% post intervention and 28% of the adolescents who not absented from their schools pre intervention and increased to 36% post intervention.

Figure (2): This figure showed percent distribution of adolescents' rates of: visits of out chest clinic or emergency department and hospitalization rates in the last 4 weeks pre & post- intervention. In pre intervention 73.1% of the studied adolescents visited the chest clinic and decreased to 68.6% post intervention. Hospitalization rate pre intervention was 58.2 % of the studied adolescents which, decreased to 38.8% post intervention.

Figure (3): This figure showed percent distribution of adolescents' asthma severity levels / last 3 months pre and post intervention. Post intervention, asthma severity levels in the last 3 months (light, medium and sever) were (16.4%, 35.8%, 28.4%) respectively.

Table (1): Distribution of socio-demographic data and medical history of studied adolescents

The socio-demographic data	freguancy	percent
Gender:		
Male	26	38.8
Female	41	61.2
Age group:		
12-	33	49.3
15-17 years	34	50.7
Residence:		
Rural	27	40.3
Urban	40	59.7
Types of school:		
Elementary school	9	13.4
Preparatory school	32	47.8
Secondary school	26	38.8
Father education:		
Illiterate	9	13.4
Basic education	13	19.4
Diploma or above	27	40.3
University education	18	26.9
Mother education:		
Illiterate	15	22.4
Basic education	10	14.9
Diploma or above	31	46.3
University education	11	16.4
Father work:		
Does not work	6	9
Hand work	28	41.8
Office work	17	25.4
Others	16	23.9

Duration of suffering from bronchial asthma:		
0 - 5 years	31	46.3
6- 10 years	24	35.8
11 years Or more	12	17.9
Other family member sick with asthma:		
No	37	55.2
Yes	30	44.8
Family member smoking:		
No	23	34.3
Yes	44	65.7
Total	68	100

Table (2): Distribution of socio-demographic data of the studied school nurses

The socio-demographic data	Frequency	Percent
School place:		
Rural	8	44.4
Urban	10	55.6
Educational level:		
Nursing diploma	13	72.2
Health visitors diploma	5	27.8
Which health Sector?		
MOHP	7	38.9
Health Insurance	11	61.1
Experience years:		
less than 5- 10 years	2	11.1
11-20 years	9	50
21- 25 years	7	38.9
No. of schools served:		
One	10	55.6
Two	2	11.1
Three	3	16.7
Four	3	16.7
Full time work at school:		
No	8	44.4
Yes	10	55.6
Total	18	100

Table (3): Distribution of the adolescents' correct answers of bronchial asthma pre and post- intervention (n = 67)

The adolescents' correct knowledge of bronchial asthma	Pre		Post	
	No.	%	No.	%
<u>Nature and definition of asthma:</u>				
- Asthma is an inherited disease.	8	11.9	51	76.1
- Asthma is infectious disease.	9	13.4	42	62.7
- Most of children may have asthma in childhood.	16	23.9	45	67.2
- Asthma is a chronic disease and can not be cured.	18	26.9	54	80.6
- Brothers & sisters of the asthmatic student certinly have asthma .	13	19.4	53	79.1
- Asthmatic children will have stunted growth.	14	20.9	33	49.3
<u>Asthma'causes:</u>				
- Asthma is caused by sensitive air passages of the lungs.	29	43.3	60	89.6
- Patient with asthma usually have “nervous problems”	18	26.9	44	65.7
- The wheeze is due to swelling in the lining of the lung air passage.	11	16.4	45	67.2
- Asthma is caused by common cold.	52	77.6	64	95.5
- Cold weather changes and sports make the child asthma worse.	58	86.6	60	89.6

<u>Asthma' triggers:</u>				
- Patient with asthma should not eat dairy products.	23	32.8	37	55.2
- Asthmatic patients are allowed to raise birds and animals.	22	32.8	28	41.8
- Parents smoking may make the child asthma worse.	36	53.7	57	85.1
- Asthmatic students can participate in all type of sport.	6	9	13	19.4
<u>Asthma sign & symptoms:</u>				
- The main symptoms of asthma are: cough, wheeze and breathlessness.	43	64.2	58	86.6
- The severity of the asthma increasing during night.	50	74.6	60	89.6
- Asthma occur without warning sings.	34	50.7	36	53.7
<u>Asthma medications</u>				
- Inhaler is effective during asthma attacks.	51	76.1	62	92.5
- Some asthma medications damage the heart.	7	10.4	27	40.3
- With appropriate treatment, patient can live a normal life.	32	47.8	42	62.7
- The treatment can be stopped when patient feel better.	19	28.4	21	31.3
- Patient with asthma become addicted to their asthma drugs.	10	14.9	14	20.9

Table (4): Distribution of the school nurses correct answers of asthma pre and post intervention (N = 18)

School nurses correct knowledge of asthma	Pre		post	
	No.	%	No.	%
<u>Definition & nature of asthma:</u>				
- Asthma is an inherited disease.	7	38.9	17	94.4
- Asthma is infectious diseases.	3	16.7	14	77.8
- High proportion of children may have asthma during childhood.	12	66.7	18	100
- Asthma is a chronic disease & can not be cured.	6	33.3	18	100
- Brothers & sisters of asthmatic student certinly have asthma.	4	22.2	15	83.3
- Asthmatic attackes can damage the heart.	1	5.4	8	44.4
- Children may die from asthma.	3	16.7	12	66.4
- Most children with asthma will have stunted growth.	1	5.6	12	66.7
<u>Asthma' causes:</u>				
- Asthma is caused by cold weather, dust, mold & animals' fur.	11	61	18	100
- Asthma is caused by sensitive air passages of the lungs.	16	88.9	18	100
- The wheeze is due to swelling in the lining of the lung air passage.	4	22.2	18	100
<u>Asthma' triggers:</u>				
- Smoking may make the child asthma worse.	9	50	15	83.3
- Asthmatic students can participate in all type of sports.	3	16.7	7	38.9
- Patient with asthma should not eat dairy products.	6	33.3	14	77.8
- patient with asthma usually have "nervous problems"	2	11.1	15	83.3
<u>Asthma sign & symptoms:</u>				
- The mian symptoms of asthma are: cough, wheeze and breathlessness	14	77.8	17	94.4
- Asthmatic students often complian of headache & drowsiness.	8	44.4	14	77.8
- Asthma is usually more of a problem at night.	8	44.4	17	94.4
<u>Asthma medications</u>				
- Antibiotics an important part of the asthma treatment.	3	16.7	9	50
- Antihistamines are treatment of asthma.	0	0	6	33.3
- Some asthma medications can damage the heart.	0	0	12	66.7
- Death from asthma attack, may due to lacke of time to take any medication.	0	0	11	61.1
- Inhaler is effective during asthma attackes.	8	44.4	14	77.8
- The side effects of inhaler usage: headache , drowsiness and heart palpitations .	1	5.6	3	16.7
- Patient with asthma become addicted to their asthma drugs.	1	5.6	14	77.8
- With appropriate treatment patient with asthma can live a normal life.	8	44.4	16	88.9

Table (5): Mean score of school nurses' asthma practices pre and post-intervention (N=18)

Nurses' asthma practices	Pre -intervention		Post-intervention		P value
	Mean ±SD (range)	No.	Mean ±SD (range)	No.	
Poor practice	1.7±0.6 (0 - 4)	17	2.4±1.5 (1-5)	5	tp=9.2, P=0.000 HS
Good practice	6	1	7.8±1.3 (6-10)	13	
Total	2.3 ±1.1 (0-12)	18	7.3 ±1.5 (1-10)	18	

Paired t test (t_p) = comparison between total mean score of nurses' practice, pre and post intervention = (P=0.000 HS).

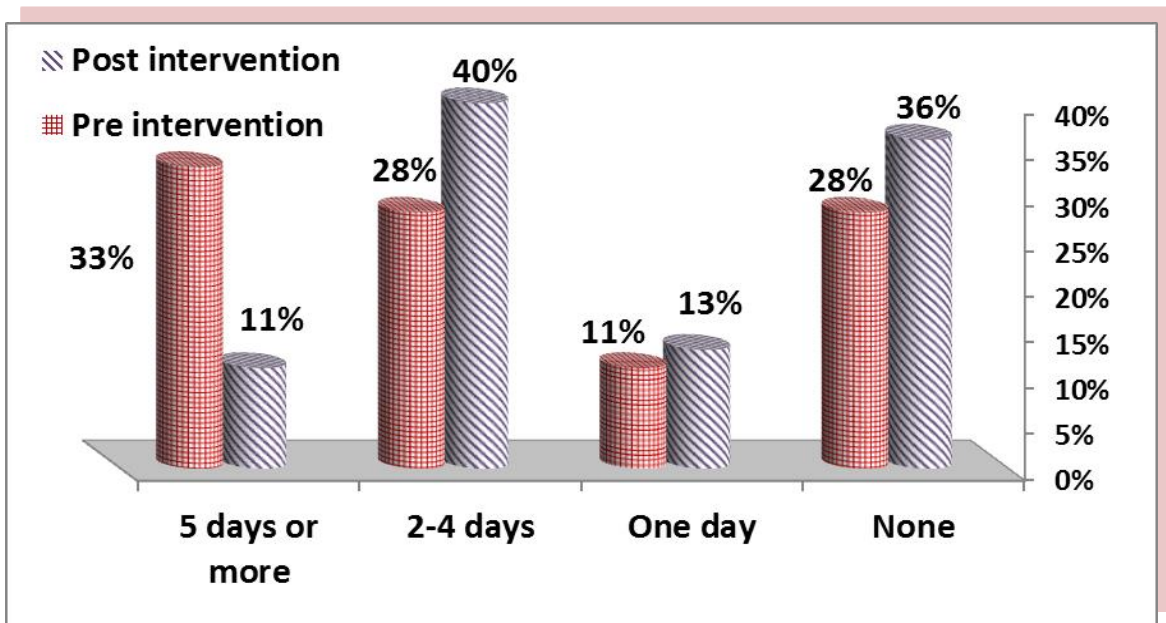


Figure (1) Percent distribution of school absenteeism rate of the studied adolescents of the last 4 weeks pre & post- intervention

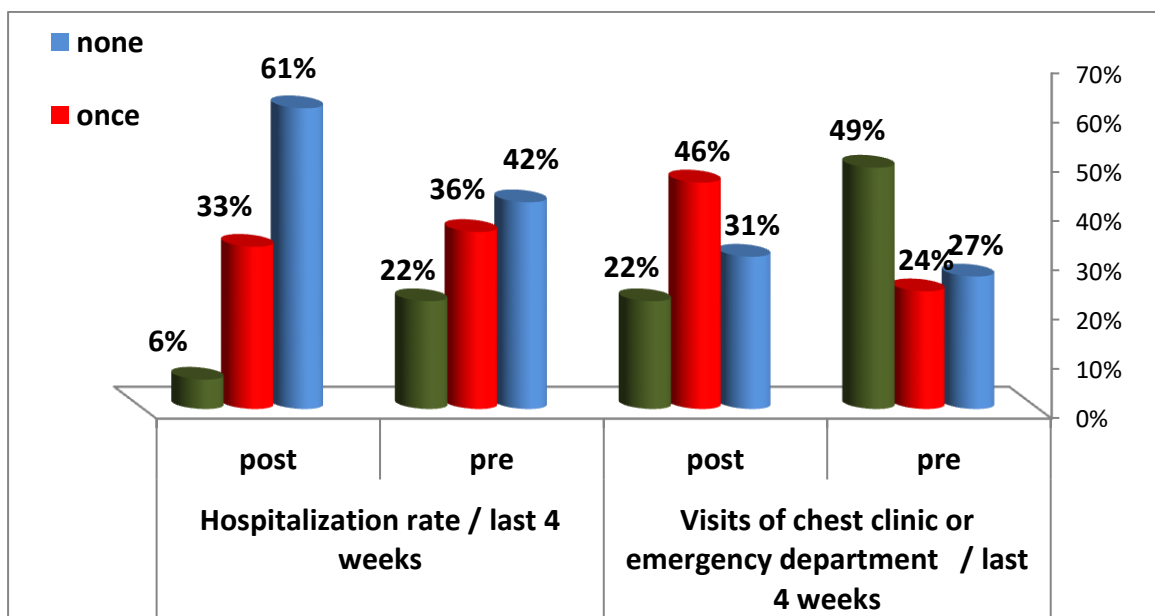


Figure (2) Percent distribution of adolescents' rates of: visits of out chest clinic or emergency department and hospitalization rates of the last 4 weeks pre & post- intervention

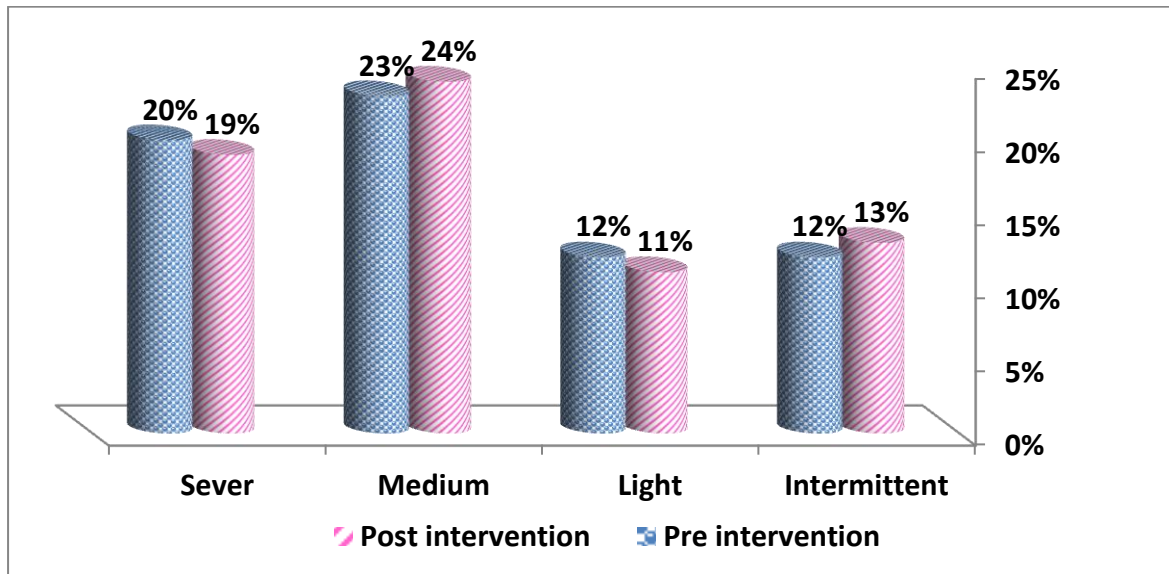


Figure (3) Percent distribution of adolescents' asthma severity level /last 3 months

5. DISCUSSION

Asthma is one of the most common chronic diseases in the world. Factors responsible for increasing asthma rates are not fully understood, but environmental and lifestyle changes play the key roles [11]. School nurses should identify asthmatic student as they are primarily responsible for supervising school children with asthma during school hours, and they take decisions regarding physical activities and both emergency and regular drug treatment [17]. School-based asthma interventions are shown to positively impact adolescents with asthma by raising academic grades, reducing missed school days, improving daytime asthma symptoms, and increasing asthma self-management knowledge [9]. So the aim of this study was to examine the effectiveness of school based intervention for adolescents and school nurses in reducing bronchial asthma among adolescents.

Answer research hypothesis number 1:

Asthma knowledge of asthmatic adolescents and school nurses who will receive school based intervention may be improved post intervention.

The present study' findings supported the study hypothesis that, the adolescents' asthma knowledge was highly improved post-intervention. The present study result was supported by [28] who studied " asthma school program in children and their parents" in Serbia. They reported that "adolescents in the intervention group presented with sufficient asthma knowledge score after the education". And also, this study finding was supported by [9] who studied "curricular intervention increases adolescents' knowledge about asthma: a randomized trial" in Northeastern Brazil. They mentioned that "there was an improvement in knowledge about asthma after intervention in the study' groups". While, [6] who studied " school-based asthma education program: a research translation project" in Henrico, Virginia, illustrated that "a minimal improvement for specific objectives was not attained". This discrepancy may be due to the small sample size of the adolescents of this study.

The present study' findings supported the study hypothesis that, all school nurses had adequate asthma' knowledge post-intervention. The improvement was highly significant statistically. The present study result was in agreement with the study finding of [10] who evaluated the level of knowledge of asthma and inhaler techniques among post basic nursing students in Ilorin, Nigeria. They reported that "the school nurses' knowledge of asthma was significantly improved after educational intervention". The present study finding was inconsistent with a study conducted in three South African districts by [20] who studied "nurses' knowledge of chronic disease management". They documented that "the asthma knowledge percentage scores post training, was poor". This discrepancy may be due to, the study sample of the school nurses was small, which may be affected the study' results.

Answer research hypothesis number 2:

The school nurses' practices related to asthma management may be improved post intervention.

The present study's findings supported the study's hypothesis that, the majority of school nurses' asthma practices were promoted after teaching the nurses the correct asthma practices. This study's findings highlighted that, regarding the school nurses' asthma practices, the mean score of post-intervention was significantly higher than the corresponding pre-intervention scores. The study finding of [10] was in accordance with the current study finding as "the mean score of asthma nurses' skills significantly increased post intervention."

Answer research hypothesis number 3:

The rates of; school absenteeism, visits of out chest clinics or emergency department, hospitalization of the participated adolescents may be decreased post intervention.

The present study's findings supported the study hypothesis that, post-intervention the adolescents' school absenteeism rate was significantly decreased. The present study finding was compatible to the study done by [7] who studied "effects of a School-based Intervention for Urban Adolescents with Asthma". They found that "asthma-related school absences rate was decreased after intervention".

The present study's findings supported the study hypothesis that, in post intervention the adolescents visits of out chest clinics or emergency department rate was significantly decreased. The present study result was in agreement with [7] who mentioned that "the intervention reduced unscheduled medical visits to a medical provider". While, [9] were not supported the present study's result, who stated that "there were no reductions in visits to emergency services after the intervention". This discrepancy may be due to the adolescents were more interested in applying what they were learned in the educational intervention.

The present study's findings supported the study hypothesis that, adolescents who received school based intervention had a significant decreased hospitalization rate. The present study's results was in agreement with the result of study conducted by [16] who conducted a study titled "asthma control in london secondary school children" in London.

They reported that "there were reductions in hospitalizations after intervention". The results of this study demonstrate that, in pre & post- intervention the highest percent of the participated adolescents were with medium asthma level followed by severe asthma level. This finding weren't in accordance with the conclusions drawn by [8]. They reported that "in the actual evaluation for asthma control after intervention, the majority presented intermittent or light asthma". This discrepancy may be due to the study was conducted during winter and spring, which may had an impact on the students' asthma level.

6. CONCLUSION

- The adolescents and school nurses asthma knowledge was highly improved post-intervention.
- Regarding the school nurses' asthma practices, the mean score of post-intervention was significantly higher than the corresponding pre-intervention scores.
- The rates of adolescents' school absenteeism, visits of out chest clinics or emergency department and hospitalization were significantly decreased post intervention.

7. RECOMMENDATION

1. Implementation of school based intervention of asthma continuously for asthmatic adolescents and school nurses can have a significant positive impact on the asthmatic adolescents.
2. Promoting communication between school nurses, students and families may improve asthma management in schools.
3. Further research studies are recommended to be carried out among school nurses for improved asthma care and its management within schools.

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