

# Knowledge and Practices of School Children and Teachers Regarding Musculoskeletal Problems: An Educational Intervention

Asmaa Awad Helmy<sup>(1)</sup>, Amira Adel Mohammed<sup>(2)</sup>, Hnaa Abd El- Gawad Yossif<sup>(3)</sup>

(1) Lecturer of Pediatric Nursing, Faculty of Nursing, Helwan University, Egypt

(2) Lecturer of Pediatric Nursing, Faculty of Nursing, South Valley University, Qena, Egypt

(3) Professor of Community Health Nursing, Faculty of Nursing, Benha University, Egypt

## Abstract

The present study **aimed** to evaluate knowledge and practices of school children and teachers regarding musculoskeletal problems. **Design:** A quasi experimental design was used. **Setting:** This study was carried out at two preparatory schools, Al Kholfaa Al Rashdean, and Al Shahid Ahmad Hamdy in El-Massera district, Helwan, Cairo Governorate. **Sample:** A stratified multi-stage cluster random sample was used for selection of 253 school children and all teachers in both selected schools who constitute 145 teachers. Data were collected through **two main tools:** I-An interviewing questionnaire to assess general characteristics of school children and teachers, school children weight, and history of musculoskeletal problems, school children and teachers' knowledge regarding musculoskeletal problems. II-Observational checklist to assess practice of school children and teachers regarding to school bag weight, lifting, carrying and favorable postures techniques during standing and sitting. **Results** of this study showed that there was highly statistically significant difference between pre, post and follow up after two months of implementation of an educational intervention on school children and teachers' knowledge and health practices regarding musculoskeletal problems and its' prevention. **Conclusion:** An educational intervention is positively improved school children and teachers' knowledge and health practices regarding musculoskeletal problems among school children. **Recommendation:** Dissemination of an educational intervention improves school children and teachers' knowledge and health practices regarding musculoskeletal problems

**Keywords:** Musculoskeletal problems, Educational intervention, School children, Knowledge and practice

## Introduction:

Musculoskeletal problems are common among school age children. It has been suggested that approximately 40% of children with musculoskeletal problems still have complaints four years later and substantially increases the risk of musculoskeletal problems in adulthood which is a major public health problem with a high economic burden (**Banibrata Das, 2018**).

Musculoskeletal deformities progress over time and cause several complications in individuals if not corrected timely. Consequences of incorrect posture are broad. School children with musculoskeletal deformities does not enjoy with school activities or other life activities. In addition to an undesirable appearance, incorrect posture

can impair other organs of the body such as circulatory and nervous systems (**Zakeri et al. 2016**).

Musculoskeletal symptoms in school children are multi-factorial in origin. Recent studies have shown that prevalence of musculoskeletal problems is increasing in school children and adolescents. Back pain may be a sign of a more concerning problem. The most common cause of low back pain among children is muscle sprain and strain. One factor which might contribute to musculoskeletal pain in children is overloaded schoolbags. There is evidence that heavy backpacks carried by students can cause altered gait and bad posture from carrying a heavy backpack. The recommended guideline related to safe school bag weight is 10% of students'

body weight (Saltikov, et al. 2019 and Zaidi, et al. 2016).

The early detection of musculoskeletal problems can prevent the progression and emergence of intense deformations. Educational intervention is effective for educating school children preventive measures of musculoskeletal problems regarding proper posture, body mechanics, proper movement patterns, and ideal school bag information. Teachers must also be trained accordingly, teachers frequently observe students perform different types of activities and can train them proper movement patterns, which they will carry with them through their life (Heyman, & Dekel, 2015).

School nurse is the primary care giver for school age children , and must acquire up to knowledge and new trends in practices related to school students' health to improve their health through the school settings, providing opportunities of designed school programs for promoting health and preventing problems among children (Kolbe, 2018). In addition teacher stay a long time with children in school and had a chance to observe children during their playing time , and provide teachers with knowledge and practice toward musculoskeletal problems will help in early detection and proper management

### Significance of the study:

The total population of children under 15 years in the beginning of 2015 in Egypt is 27.5 million, the total numbers of students enrolled in preparatory schools were 4,978,032 students (CAPMAS, 2015 and UNICEF Egypt, 2015). Egyptian students consume a great time sitting in a classroom comprising the normal school hours, school students usually sit in improper positions with chest, back and neck bent or rotated even for long time. When posture of the students were compromise with awkward body position when sitting adding with the regular use of heavy school bags and inappropriate carrying methods can put children at the risk of negative consequences such as spinal pain, changes the body posture, and muscle imbalance that could turn into chronic back and neck problems later in life (Perrone, et al. 2018 and Spiteri, 2017).

Preventive measures for musculoskeletal problems are strongly recommended to protect children. Thus, this study aims to improve

knowledge and practices of school children and teachers regarding musculoskeletal problems through an educational intervention.

### Aim of the study:

This study aimed to evaluate knowledge and practices of school children and teachers regarding musculoskeletal problems through:

- 1) Assessing children and teachers' needs of knowledge and practices regarding musculoskeletal problems.
- 2) Developing and implementing educational intervention according to children and teachers' needs.
- 3) Evaluating the effect of educational intervention outcome.

### Hypothesis:

Educational intervention will improve school age children and teachers' knowledge, and practices regarding to musculoskeletal problems.

### Subjects and Methods

#### Research design:

A quasi-experimental design was used in order to meet the aim of the study.

#### Technical Design:

#### Setting:

The study was conducted at preparatory school in El-Masera, Helwan district, Cairo Governorate. This setting was chosen for its high density of school children.

#### Sample:

**Two samples were used to select (children and teachers)**

**First sample:** A stratified multi-stage cluster random sample was used for selection of school children.

**Stage 1:** The total number of governmental preparatory schools in El Massera is 15 schools, two were chosen randomly for the conduction of this study called El Kolfaa El Rashean preparatory school for boys and El Shahid Ahmed Hamdy preparatory school for girls.

**Stage 2:** One class from first grade and one from second grade were selected randomly from each school.

**Stage 3:** All school children in the selected 4 classes were taken, the total number of children from the two schools was 253.

**Second sample:** All the teachers in both selected schools were be chosen, the total

number of teachers from the two schools was 145.

#### **Tools:**

Two tools were used in this study

#### **First tool:**

An interviewing questionnaire was prepared by the researchers in simple Arabic language based on reviewing of recent literature related to musculoskeletal problems in order to assess children and teachers' demographic characteristics, and their knowledge, including the following parts:

**Part 1:** School children and their teachers' general characteristics, as, school name, child's age, child's school grade, teachers' age, gender, and educational level.

**Part 2:** A School children bag weight measurements.

**Part 3:** School children history of musculoskeletal problems which included three questions (do you suffer from neck/ shoulder / hand/ and back pain, do you suffer from fatigue, and there was spine curvature appear on the child or not)

**Part 4:** School children and teachers' knowledge regarding four main areas. 1- Musculoskeletal problems which included meaning of musculoskeletal problems, types, meaning of spine curvature, treatment of spine curvature, and preventive measures of musculoskeletal problems. 2- Body mechanics included three items, ideal sitting, ideal lifting heavy objects and ideal standing. 3-Exercises include two items importance of exercises, and types of exercises. 4- School bag included three items, ideal weight of school bag in relation to child's weight, characteristics and standard of school bag and complication of heavy school bag. This tool was used before and after educational intervention in order to evaluate school children and teachers' acquisition of knowledge.

#### **Knowledge scoring system:**

The knowledge score was classified to correct answer scored as 2 for each item, 1 for correct and incomplete answer, zero for each incorrect answers. The total knowledge possible score for teachers ranged from 0 to 26 and means and standard deviations were calculated. The higher scores reflect good levels of knowledge the total score was evaluated in three categories as follows: 75% or more was graded as good

knowledge. , 50% - < 75% was graded as fair knowledge, and < 50% was graded as poor knowledge.

**Second tool:** Observational checklist, it included two sections:

Sections (1): Pertained to assess school children practices regarding school bag weight in relation to their body weight, correct lifting and carrying techniques of heavy things, biomechanical favorable postures during sitting and standing.

Sections (2): Pertained to assess teachers' practices regarding correct lifting and carrying techniques of heavy things, biomechanical favorable postures during sitting and standing.

This tool was used before and after educational intervention in order to evaluate school children and teachers' acquired practices.

#### **Practices scoring system:**

Every skill scored 2 grades if it done completely, done incompletely response scored 1 grade and not done scored 0 grades. The total score was evaluated in three categories as follows: 75% or more was graded as high satisfactory practice. 50% - < 75% was graded as satisfactory practice, and < 50% was graded as unsatisfactory practice. The total practices score for teachers were calculated and converted to means and standard deviations. The higher scores reflect higher levels of practices.

#### **Content validity:**

The tools were revised by three experts from the Community health nursing and Pediatric nursing from academic staff of Nursing Faculties.

#### **Tool reliability:**

The reliability test of the proposed tools was done to assure the consistency, determine how strongly the attributes were related to each other and to the composite score. The reliability test was used in this stage for tools for data collection using Cronbach's' Alpha test. Cronbach's alphas were (0.896) and (0.897 for knowledge questionnaire, and observation checklist, respectively

#### **Ethical Considerations:**

Permission for conducting the study was obtained from administrative authority of the school. All relevant ethical aspects were considered for ensuring children privacy and confidentiality of the collected data throughout the study as the purpose of the study was

explained to each student, voluntary participation and right to withdraw from the study at any time, it was emphasized to subjects and an oral consent for participation in the study was obtained from each one of them.

#### **Pilot Study:**

It was carried out on 20 students at El-Maasera preparatory school in Helwan district to test the content clarity and applicability. There is no modifications were done.

#### **Field Work:**

- An official letters from the Dean of Nursing Faculty, Helwan University were forwarded to the Ministry of Education with the aim of the study to obtain their permission to visit the schools and conduct the study.
- After approval of the Ministry of Education, official permissions were obtained from the administrator of the school (at El- Maasera preparatory Schools) Helwan district, Cairo Governorate. Each director was informed about the time and date of data collection.
- Each school child and teacher was interviewed individually after explaining the purpose and method of the study and obtaining his / her approval to participate in the study with confidentiality.
- Content validity of the tools was tested by a panel of five experts in community health nursing field, and pediatric health nursing staff.
- The educational intervention was developed based on reviewing of related literature and assessment tools (pretest).
- Data were collected during the academic year 2018/2019 from beginning of October, 2018, to end March 2019,
- Data collection for assessment was done by the researchers; three days/week (Sunday, Monday and Tuesdays)
- Time plan was established and the students were organized into 6 groups (20-25 students). But each teacher treated individually according to their free time during school day.
- The educational intervention done in a school day starts from 9 .00 a.m. to 1 .00 p.m. Each group of students attended 7 sessions. The duration of each session was 20-30 minutes according to the presented items.

#### **Educational intervention construction:**

This educational intervention was conducted on three consecutive phases, assessment, developing, implementing and evaluating.

#### **Assessment phase:**

The researches made a pre-intervention assessment tool, using the previous interviewing questionnaires for data collection from preparatory school students. This phase aimed at identifying the school children and teachers (male & female) learning needs towards musculoskeletal health problems. At this phase the researchers measure each child body weight and their school bag by using a standardized scale.

#### **Planning and implementation phase:**

Developing and implementing the educational intervention of musculoskeletal problems among preparatory school children according to their needs regarding musculoskeletal problems.

**The general objective of the educational intervention:** To improve school children and teachers' knowledge and practice regarding musculoskeletal problems.

This educational intervention was involved 7 sessions where (3) and (4) of them were devoted to theoretical and practical contents respectively, by using simple Arabic language to suit children level of understanding. Each session took 20-30 minutes. At the end of each session, the participants were informed about the content of the next session and its time. Different teaching methods were used including, lecture, small group discussion, brain storming, demonstration and re-demonstration. The teaching aids used were, real materials, brochures, and colored posters. Handout distributed to all studied sample to achieve its objective

#### **Educational intervention content:**

- Anatomy and structure of spine. The anatomy and spinal structure was presented through a skeleton.
- Musculoskeletal problems, meaning, and types
- Meaning of spine curvature and its treatment
- Preventive measures of musculoskeletal problems

- Importance of exercises, and different types of exercises
- Body mechanics, principles of sitting, standing posture, body posture while lifting, pushing and pulling.
- Ideal weight of school bag in relation to child weight, normal contents of a bag, ideal characteristics and standard of schoolbag, wearing and carrying backpacks with different features was shown to the students practically and complication of heavy school bag.

#### **Evaluation phase:**

Immediately and after two months of educational intervention, the effect of it was evaluated by using the same format of pre-test to constitute the post-test and follow up test

#### **Results:**

Table (1) shows that 54.1% of studied children were from El Shahid Ahmed Hamdy preparatory school for girls, 59.7% of them aged 13 years old or more, and 56.5% were enrolled in first school grade preparatory school. Regarding teachers general characteristics, this table shows that, 60.7% were male, and 68.9% had university education.

Figure (1) reveals that 33.0% of teachers aged 35 to less than 45 years old.

Figure (2) clarifies that 59.7% of studied children had back pain, 45.9% shoulder pain, followed with 40.7% had fatigue and 29.6% had spine curvature.

According to the research hypothesis: These results showed that there was a statistically significant improving in studied participants' knowledge and practices regarding musculoskeletal problems after educational intervention (table 2, 3, 4, and 5)

Table (2) shows that, 84.6%, 80.2%, 74.3%, 74.7%, 90.1% and 60.5 of studied children had correct knowledge regarding meaning of musculoskeletal problems, its' preventive measures, ideal sitting, ideal standing, importance of exercises, and ideal school bag weight in relation to child weight respectively post educational intervention it

decreased 70.4%, 77.1%, 60.9%, 66.8%, 86.6% and 47.4% during follow up after 2 months of educational intervention compared by 0.0%, 0.0%, 0.0%, 5.1% and 0.0% respectively pre educational intervention. Also this table shows that, there were statistically significant differences between all items pre, post educational intervention and pre, and follow up after 2 months of educational intervention. However, there was a statistically insignificant difference between post and follow up after 2 months of educational intervention regarding meaning of spine curvature, preventive measures of musculoskeletal problems, importance of exercises, types of exercises, and complication of heavy school bag.

Table (3) displays that, there were statistically significant differences between mean scores of total knowledge regarding of studied teachers and their mean scores of post educational intervention as well as their mean scores of follow-up.

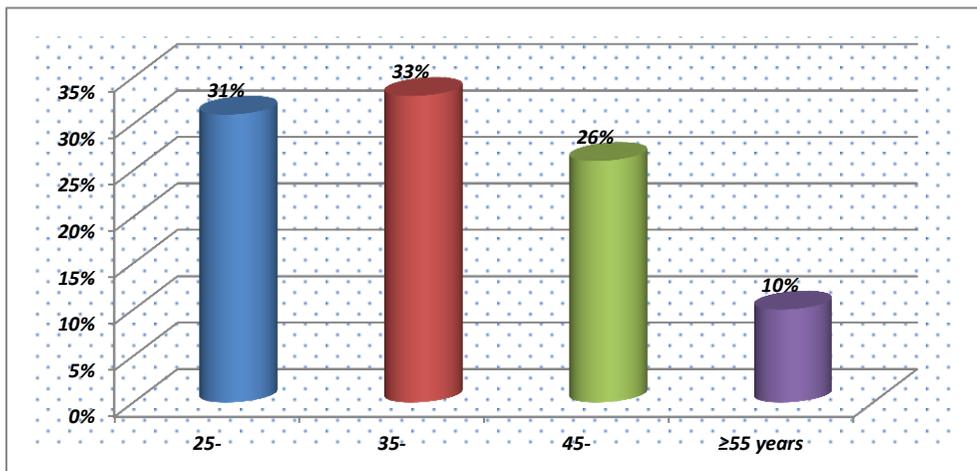
Figure (3) reveals that 63.7% of studied children carried a heavy school bag weight, 28.4% of them carried a school bag heavier than 10% of their body weight and only 7.9% carried ideal school bag weight. However, after educational intervention and follow up phase after two months 69.5%, 62.1% of studied children carried ideal school bag weight in relation to their body weight ( $\leq 10\%$ ) respectively.

Table (4) illustrates that, 84.6% of studied children didn't perform correct lifting and carrying technique of heavy things, 89.7% didn't set or stand in proper position pre educational intervention. However, post educational intervention this percent decreased to 0% as well as during follow up after two months (17.4%, 18.6%, and 19.0% respectively)

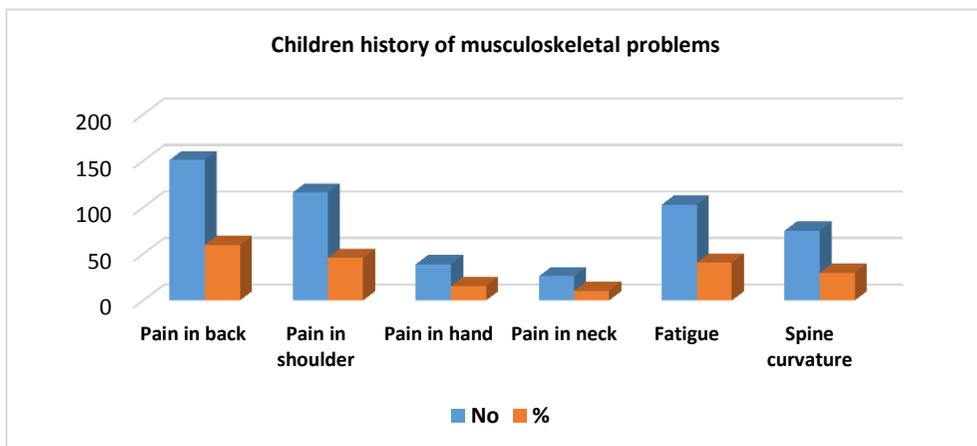
Table (5) clarifies that, there were statistically significant differences between mean scores of total practices of studied teachers and their mean scores of post educational intervention as well as their mean scores of follow-up.

**Table (1):** Distribution of studied children according to their general characteristics (n= 253)

General characteristics items	No	%
<b>School name</b>		
El Kolfaa El Rashdean Preparatory School for boys	116	45.9
El Shahid Ahmed Hamdy Preparatory School for girls	137	54.1
<b>Child age</b>		
12-	102	40.3
13+	151	59.7
<b>Child school grade</b>		
1	143	56.5
2	110	43.5
<b>Teacher's gender</b>		
Male	88	60.7
Female	57	39.3
<b>Teacher's educational level</b>		
University Degree	100	68.9
Technical Diploma certificate	15	10.5
Secondary certificate	30	20.6



**Figure (1):** Distribution of studied teachers according to their age.



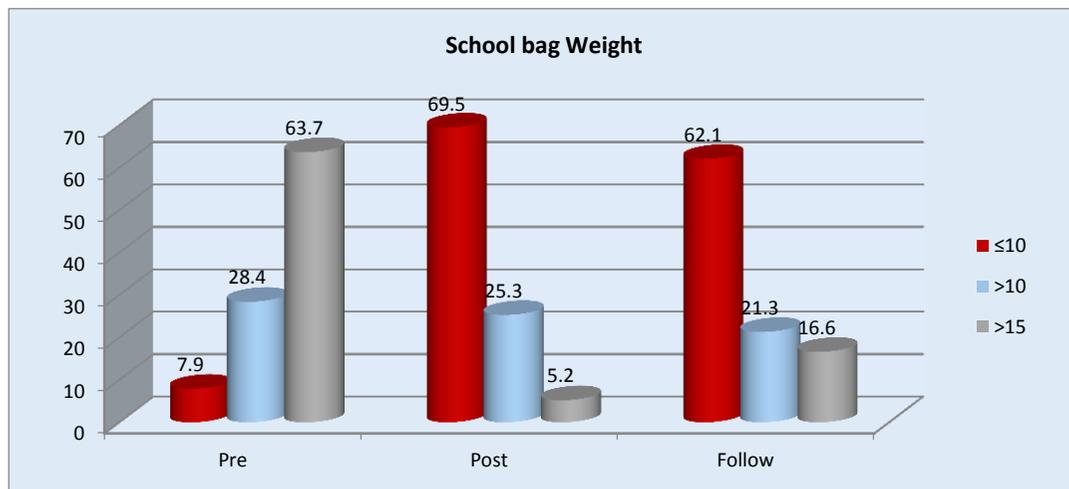
**Figure (2):** Distribution of studied children according to their history of musculoskeletal problems from the beginning of this academic year (n=253)

**Table (2):** Percentage distribution of studied children according to their knowledge regarding musculoskeletal problems, body mechanics, exercises, and school bag, pre, post and follow up educational intervention (n=253)

Knowledge items	Pre			Post			Follow up			Chi-square (P-value)		
	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good	Pre-Post	Pre-Follow up	Post-Follow up
<b>Musculoskeletal problems</b>												
Meaning of musculoskeletal problems	75.1	24.9	0.0	0.0	15.4	84.6	16.6	13.0	70.4	0.000	0.000	0.000
Types of musculoskeletal problems	50.2	49.8	0.0	5.1	24.9	70.0	16.6	21.3	62.1	0.000	0.000	0.000
Meaning of spine curvature	79.4	10.3	10.3	10.3	9.5	80.2	14.2	7.9	77.9	0.000	0.000	0.356
Treatment of spine curvature	84.6	15.4	0.0	5.1	19.8	75.1	16.2	17.0	66.8	0.000	0.000	0.000
Preventive measures of musculoskeletal problems	100.0	0.0	0.0	9.9	9.9	80.2	14.6	8.3	77.1	0.000	0.000	0.243
<b>Body mechanics</b>												
Ideal sitting	54.5	45.5	0.0	0.0	25.7	74.3	17.4	21.7	60.9	0.000	0.000	0.000
Ideal lifting heavy objects	80.6	19.4	0.0	0.0	40.7	59.3	19.0	34.8	46.2	0.000	0.000	0.000
Ideal standing	75.5	24.5	0.0	5.1	20.2	74.7	16.2	17.0	66.8	0.000	0.000	0.000
<b>Exercises</b>												
Importance of exercises	75.5	19.4	5.1	9.9	0.0	90.1	13.4	0.0	86.6	0.000	0.000	0.213
Types of exercises	100.0	0.0	0.0	10.3	19.4	70.4	15.4	16.6	68.0	0.000	0.000	0.198
<b>School bag</b>												
Ideal weight in relation to child weight	74.7	25.3	0.0	0.0	39.5	60.5	19.0	33.6	47.4	0.000	0.000	0.000
Characteristics and standard	55.3	44.7	0.0	0.0	15.0	85.0	16.6	12.7	70.7	0.000	0.000	0.000
Complication of heavy school bag	75.1	24.9	0.0	10.3	4.7	85.0	13.8	4.0	82.2	0.000	0.000	0.444

**Table (3):** Mean scores of the studied teachers regarding their total knowledge pre, post and follow up educational intervention.

Times of assessment	Total knowledge of teachers			Comparison	Difference		Paired T-test	
	Mean	±	SD		Mean	SD	t	P-value
Pre	28.664	±	2.420	Pre-Post	-9.378	4.473	-25.068	0.000
Post	38.042	±	3.656	Pre-Follow up	-1.196	3.596	-3.976	0.000
Follow up	29.860	±	2.947	Post-Follow up	8.182	4.732	20.678	0.000



**Figure (3):** Distribution of studied children according to their practice regarding body weight percentage represented by their school bag weight pre, post and follow-up of educational intervention (n=253)

**Table (4):** Distribution of studied children according to their practices regarding body mechanics (n=253)

Body mechanics practice items	Pre			Post			Follow up			Chi-square(P-value)		
	Unsatisfactory	Satisfactory	High satisfactory	Unsatisfactory	Satisfactory	High satisfactory	Unsatisfactory	Satisfactory	High satisfactory	Pre-Post	Pre-Follow up	Post-Follow up
Correct lifting and carrying technique of backpack	84.6	15.4	0.0	0.0	25.7	74.3	17.4	21.7	60.9	0.000	0.000	0.000
A proper sitting position	89.7	10.3	0.0	0.0	35.6	64.4	18.6	30.4	51.0	0.000	0.000	0.000
A proper standing position	89.7	10.3	0.0	0.0	40.3	59.7	19.0	34.4	46.6	0.000	0.000	0.000

**Table (5):** Mean scores of the studied teachers regarding their total practices pre, post and follow up educational intervention measures:

Times of assessment	Practices			Comparison	Difference		Paired T-test	
	Mean	±	SD		Mean	SD	t	P-value
Pre	3.217	±	1.205	Pre-Post	-3.566	2.269	-18.795	0.000
Post	6.783	±	1.854	Pre-Follow up	-2.140	1.751	-14.617	0.000
Follow up	5.357	±	1.536	Post-Follow up	1.427	2.360	7.228	0.000

## Discussion

The finding of the current study supported the stated hypothesis, and indicates that the educational intervention is positively improved studied children and teachers' knowledge and practice regarding musculoskeletal problems. The findings of the current study illustrated that more than half of participants were from El Shahid Ahmed Hamdy preparatory school for girls, and enrolled in first school grade preparatory school. Concerning children age, nearly three fifths aged 13 years old or more. These findings were in agreement with **Arghavani et al. 2014** who studied the relationship between carrying school bags and the prevalence of musculoskeletal pains among 12-15 years old students in Shiraz, who found that more than half of the participants were female, and nearly one third were enrolled in first school grade.

More than half of teachers aged 35 to less than 55 years old, more than three fifths of them were male, and more than two thirds had university education. These findings agreed with **Abo Elsoud, et al 2018** who studied the perception and practices regarding first-aid among school teachers in Mysore, revealed that 49.6% of studied teachers were more than 40 years old and 49.2% had studied up to post graduation. On the same line **Hegazy et al 2014** studied the impact of a disaster educational program on knowledge and practices of teachers among primary governmental schools, in Egypt, who found that, 54% of studied sample aged 35-55 years with a mean age  $40.74 \pm 7.46$ . However, they educational intervention educational intervention finding related to gender didn't match with this finding (70 % of studied teachers were females).

In relation to studied children history of musculoskeletal problems from the beginning of this academic year, nearly two fifths of studied children had back pain, less than half had shoulder pain, followed with more than one third had fatigue and more than one quarter had abnormal body posture. This may be due to the most of children carry a heavy school bag weight and sitting with poor posture. These findings agreed with **Mwaka et al 2014** who studied the musculoskeletal pain and school

bag use: a cross-sectional study among Ugandan pupils, clarified that nearly one quarter of pupils suffering from pain in the neck, more than two fifths in shoulders, more than one third in upper back and the lower back. Also **Mustafa, & Ibrahim 2018** who studied then effect of school bag weight, carrying way and incidence of back pain in Egyptian school girls, reported that, almost half of studied sample suffered from back pain.

The present study results also confirmed that, pre educational intervention the studied children had incorrect knowledge regarding meaning, types, and preventive measures of musculoskeletal problems, body mechanics items as ideal sitting, ideal standing and importance of exercises which improved post educational intervention. Also this table shows that, there were statistically significant differences between all items pre, post educational intervention and pre, and follow up after 2 months of educational intervention. However, there was a statistically insignificant difference between post and follow up after 2 months of educational intervention regarding importance of exercises, type of exercises, and meaning of spine curvature. According **Miñana-Signes et al. 2019** who studied the effectiveness of structured teaching educational intervention on knowledge and practice of body mechanics among school children in schools, emphasized that, the knowledge regarding body mechanics can aid the school children to understand the proper posture and bag carrying method which prevent musculoskeletal disorders among them in future.

Most of studied children had correct and complete knowledge regarding ideal weight of school bag in relation to child weight, characteristics and standard of school bag and complication of heavy school bag immediately post educational intervention which decreased to less than three quarters during follow up after educational intervention. Meanwhile, their follow up score still high compared by pre educational intervention.

Moreover, there were statistically significant differences between all items pre, post educational intervention and pre, and follow up after 2 months of educational

intervention. These findings agreed with **Miñana-Signes & Monfort-Pañego 2015** who studied the effects of an educational back care program on Brazilian school children knowledge regarding back pain prevention, found that there was a significant increase knowledge score of studied sample between pre and post intervention and a significant decrease in the follow-up score. However, the follow-up score was still significantly higher than the pre-intervention score.

The findings of the current study illustrated that, there were statistically significant differences between mean scores of total knowledge regarding of studied teachers and their mean scores of post educational intervention as well as their mean scores of follow-up. This may be attributed to the ability of studied teachers to acquire knowledge easily so they can educate the school children about how to reduce musculoskeletal problems.

Less than two thirds of studied children carried a heavy school bag weight, and only few of them carried ideal school bag weight in relation to their body weight pre educational intervention. This may be due to the teachers force the school children to fetch objects like books, homework note, sport clothes additionally to the necessity of child to fetch food and water bottle. This finding supported by **Mustafa & Ibrahim 2018** who reported that, the weight of backpack carried by school girls was considerably high in relation to their body weight. Furthermore this finding agreed with **Khalil & Alrubaey 2019** who studied the effect of backpacks on the lumbar spine in children: a standing magnetic resonance imaging study in California, found that, Children usually carry school bag equal to 10% to 22% of their body weight rises in thoracic kyphosis, heavier school bag loads result in back pain. However, post educational intervention there were more than two thirds of studied children carried ideal school bag weight in relation to their body weight and slightly decreased during follow up reached to less than two thirds of them. Meanwhile, their follow up score still high compared by pre educational intervention. This may be due to success and positive effect of educational intervention on school children.

Additionally, the majority of studied children didn't perform correct lifting and carrying technique of heavy things, sitting or standing in proper position pre educational intervention. However, post educational intervention this percent decreased to 0% as well as during follow up after two months reached to less than one fifth. This may be due to that studied children have not received any information or training regarding how to do this safely. According to **Natashaa et al. 2018** who assess low back pain and musculoskeletal disorders risk factor in regard to postural behavior among teenagers, East Azerbaijan, Iran, found that, 62% of school children had improper sitting posture during writing or reading. Moreover **Khalil, & Alrubaey 2019** emphasized that it is important to train the school children in appropriate exercises, posture, body mechanics, and to be informed of healthy alternatives for carrying their supplies. Also these findings supported by **Duc Luan et al. 2018** who studied the relation between musculoskeletal pain in children, poor sitting posture and a heavy schoolbag: an ergonomic school education intervention educational intervention, in Malaysia, reported that, after implementing ergonomic intervention there were statistically significant improvements in school children sitting posture.

There were statistically significant difference between mean scores of total practice of studied teachers and their mean scores of post educational intervention implementation as well as their mean scores of follow-up. This may be due to that school teachers convinced that they have important role in maintaining students health. So they need to be acquired all practices related to child health problems which can be prevented as musculoskeletal problems.

### **Conclusion:**

Based on the results of the present study and research hypothesis this study brings out important information about poor knowledge regarding musculoskeletal problems among teachers and school children at the pre-intervention phase. However, the majority of studied children and teachers their knowledge scores improved immediately and after 2 months of educational intervention. Highly

statistically significant differences were found between all knowledge items scores of studied children and teachers about musculoskeletal problems, pre, immediately and 2 months after educational intervention. The majority of studied children and teachers had poor practices scores about musculoskeletal problems pre educational intervention which improved post educational intervention to be good practice scores immediately and 2 months after the educational intervention. This study concluded that the educational intervention enhances students' and teachers' knowledge and change positively their practices regarding reducing risk of musculoskeletal problems among school children.

### Recommendations:

Based on the findings of the study, the following recommendations can be made:

- Emphasize the availability of well oriented teachers with, child ideal school bag weight, exercises, body mechanics, ideal sitting or standing in schools.
- Dissemination of educational intervention to improve knowledge and practice among children and their teachers regarding musculoskeletal problems
- Further future researches are needed to generalize the use of preventive measures of musculoskeletal problems among school children.

### References:

- Abo Elsoud, M., S., Ahmed, H., A., Ahmed, M., A., A., Farg, H., K., (2018): Assessment Knowledge of Primary Schools Teachers About First Aid At Ismailia City, Volume (7) 4 PP 79-85 [www.iosrjournals.org](http://www.iosrjournals.org) DOI: 10.9790/1959-0704097985.
- Arghavani, F., Zamanian, Z., Ghanbary, A., and Hassanzadeh, J. (2014): Investigation of the relationship between carrying school bags and the prevalence of musculoskeletal pains among 12-15 years old students in Shiraz, Pakistan Journal of Biological Sciences, 17(4):550.554.
- Banibrata Das, (2018): Health Hazards and Risks for Musculoskeletal Problems among Child Labourers in the Brickfield Sector of West Bengal, India, International Health, Vol. (11) 4, 17 October 2018, Pages 250–257, <https://doi.org/10.1093/inthealth/ihy071>.
- Central Agency for Public Mobilization and Statistics (CAPMAS) (2015): Population estimates by age and gender group 1/1/2015 Ministry of Planning, Egypt Vision 2030.
- Duc Luan, V., H., Hai N., T., Thu Xanh, P., Thi Giang, H., Van Thuc, Mai Hong, N., Minh Khue, P., (2018): Musculoskeletal Disorders: Prevalence and Associated Factors among District Hospital Nurses in Haiphong, Hindawi BioMed Research International Volume 2018, Article ID 3162564, 9 pages <https://doi.org/10.1155/2018/3162564>.
- Hegazy, M., Shounoda, M., and Ismail, G. (2014): Impact of a disaster educational program on knowledge and practices of teachers among primary governmental schools, Cairo Governorate, Journal of Education and Practice, 5 (29):175-182.
- Heyman, E. and Dekel, H. (2015): Ergonomics for children: An educational program for physical education students, available at: [www.iea.cc/ECEE/pdfs/art0215.pdf](http://www.iea.cc/ECEE/pdfs/art0215.pdf).
- Khalil, N., S., Alrubaey, M., G., J., (2019): Impact of Schoolbag Use on Back Pain among Primary School Children in Baghdad City, Biochem. Cell. Arch. Vol. 19, No. 1, pp. 869-874, DOI : 10.35124/bca.2019.19.1.869.
- Kolbe, L., J., (2018): School Health as a Strategy to Improve Both Public Health and Education, Annual Review of Public Health, P 40:443–63 [doi.org/10.1146/annurev-publhealth040218-043727](https://doi.org/10.1146/annurev-publhealth040218-043727).
- Miñana-Signes, V., & Monfort-Pañego, M., (2015): Knowledge on Health and Back Care Education Related To Physical Activity and Exercise in Adolescents,

- European Spine Journal, April 2015, DOI 10.1007/s00586-015-3953-7.
- Miñana-Signes, V., Monfort-Pañego, M., Rosaleny-Maiques, S. (2019): Improvement of Knowledge and Postural Habits after An Educational Intervention Program in School Students. *Journal of Human Sport and Exercise*, 14(1), doi:<https://doi.org/10.14198/jhse.2019.141.04>.
- Mustafa, Kh., I., Ibrahim, S., (2018): Influence of The Weight of A School Backpack on Backache among Secondary School Students at Koya Province, Iraq, 9th International Visible Conference on Educational Studies & Applied Linguistics, pp 180-186, doi: 10.23918/vesal2018.a13.
- Mwaka, E., Munabi, I., Buwembo, W., Kukkiriza, J., and Ochieng, J.(2014): Musculoskeletal pain and school bag use: a cross-sectional study among Ugandan pupils, Available at: <http://www.biomedcentral.com/1756-0500/7/222>.
- Natashaa, A., A., Syukria, A., A., Diana M., K., S., Ima-Nirwana S., (2018): The Association between Backpack Use and Low Back Pain among Pre-University Students, *Journal of Taibah University Medical Sciences*, Vol. (13) 2, April 2018, P 205-209.
- Perrone, M., Orr, R., Hing, W., Milne, N., and Pope, R., (2018): The Impact of Backpack Loads on School Children: A Critical Narrative Review, *Int J Environ Res Public Health*. 2018 Nov; 15(11): 2529, doi: 10.3390/ijerph15112529.
- Saltikov, J., B., McSherry, R., van Schaik, P., Kandasamy, G., Hogg, J., Whittaker, V., Racero, G., A., Arnell, T.,(2019): School-Based Education Programmes for Improving Knowledge of Back Health, Ergonomics and Postural Behaviour of School Children Aged 4–18: A Systematic Review, *Campbell Systematic Reviews*. 2019;15:e1014, DOI: 10.1002/cl2.1014.
- Spiteri, K., Busuttill, M., Aquilina, S., Gauci, D., Camilleri, and Victor Grech, E., (2017): Schoolbags and Back Pain in Children between 8 and 13 Years: a national study, *Br J Pain*. 2017 May; 11(2): 81–86, doi: 10.1177/2049463717695144.
- UNICEF Egypt, (2015): Children in Egypt 2015, a statistical digest, Available at:[https://www.unicef.org/egypt/eg\\_Education\\_2015.pdf](https://www.unicef.org/egypt/eg_Education_2015.pdf).
- Zaidi, S., Ansari, F., Waseem, H., Fahim, S., and Irfan, M. (2016): Association of musculoskeletal pain with heavy bag packs among school children, 14<sup>th</sup> International Conference on Statistical Sciences, Karachi, Pakistan, 29 (1): 229-238.
- Zakeri, Y., Baraz, S., Gheibizadeh, M., Nejad, D., and Latifi, S. (2016): Prevalence of Musculoskeletal Disorders in Primary School Students in Abadan-Iran, *Int J Pediatr*, 4(1): 1215- 1221.