

Educational Program to Reduce the Risk of Musculoskeletal Problems among School Children

Hanaa A. A. Yossif & Asmaa A. M. Helmy

Assistant Professor of Community Health Nursing, Faculty of Nursing, Benha University, Lecturer of Pediatric Nursing, Faculty of Nursing, Helwan University.

Abstract: This study aimed to evaluate the effect of educational program on reducing the risk of musculoskeletal problems among school children. **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 203 school children and all teachers in both selected schools who constitute 140 teachers. Data were collected through **two main tools:** I-An interviewing questionnaire to assess general characteristics of school children and teachers, school children' weight, school children' history of musculoskeletal problems, school children' and teachers' knowledge regarding musculoskeletal problems. II- Observational checklist to assess performance 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 program regarding to school children' and teachers' knowledge about musculoskeletal problems and their health practices regarding its' prevention. **Conclusion:** The educational program enhances school children' and teachers' knowledge and change positively their health practices regarding reducing the risk of musculoskeletal problems among school children. **Recommendation:** Dissemination of educational program to reduce the risk of musculoskeletal problems among children and their teachers.

Key Words: Musculoskeletal problems, Educational program, School children

Introduction:

Musculoskeletal problems are common in 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 [1].

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 [2].

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 in 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 [3], [4].

The early detection of musculoskeletal problems can prevent the progression and emergence of intense deformations. Educational program 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 [5].

School nurse must acquire up to date 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 them [6].

Significance of the study:

The total population of children under 10 years in the beginning of 2010 in Egypt is 27.0 million, the total numbers of students enrolled in preparatory schools were 4,978,032 students [7], [8]. 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 [9], [10].

Preventive measures for musculoskeletal problems are strongly recommended to protect children. Thus, this study aims to evaluate the effect of educational program on reducing the risk of musculoskeletal problems among children

Aim of the study:

This study aimed to evaluate the effect of educational program on reducing the risk of musculoskeletal problems among school children through:

- ١) Assessing teachers' and children' needs of knowledge and practices regarding musculoskeletal problems among school children.
- ٢) Developing and implementing educational program according to teachers' and children' needs.
- ٣) Evaluating the effect of educational program outcome

Hypothesis:

Educational program will improve children and teachers' knowledge, and practices regarding to musculoskeletal problems among school children which result in reducing the risk of this 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-Maasera, 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 ١: The total number of governmental preparatory schools in El Massera are ١٥ schools, two were chosen randomly for the conduction

of this study called El Kolfaa El Rashdean preparatory school for boys and El Shahid Ahmed Hamdy preparatory school for girls.

Stage ٢: One class from first grade and one from second grade were selected randomly from each school.

Stage ٣: All school children in the selected ٤ classes were taken, the total number of children for the two schools were ٢٥٣.

Second sample: All the teachers in both selected schools were be chosen (١٤٥)

Tools:

Two tools were used in this study

First tool:

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

Part ١: School children' and their teachers' general characteristics, as, school name, child's age, child's school grade, teachers' age, gender, and educational level

Part ٢: a-School children' weight measures.

Part ٣: 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 ٤: School children' and teachers' knowledge regarding four main areas. ١- Musculoskeletal problems which include meaning of musculoskeletal problems, types, meaning of spine curvature, treatment of spine curvature, and preventive measures of musculoskeletal problems. ٢-Body mechanics include three items, ideal sitting, ideal lifting heavy objects and ideal standing. ٣-Exercises include two items importance of exercises, and types of exercises. ٤- School bag include 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 implementation of the program in order to evaluate school children' and teachers' acquisition of knowledge.

Knowledge scoring system:

The knowledge score was classified to correct answer scored as 3 for each item, 2 for correct and incomplete answer, zero for each incorrect answers. The total knowledge possible score for teachers ranged from 0 to 36 and means and standard deviations were calculated. The higher scores reflect higher levels of knowledge regarding reducing musculoskeletal problems among school children

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 implementation of the program in order to evaluate school children' and teachers' acquired practices.

Practices' scoring system:

Every skill scored 3 grade if it done completely, done incompletely response scored 2 grade and not done scored 1 grade. The total score was evaluated in three categories as follows: Good: 80% or more was graded as good practice. Average: 60% -< 80% was graded as average practice. And poor: < 60% was graded as poor 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 5 experts from the Community and Pediatric specialties of Faculty Staff Nurses.

Ethical Considerations:

Permission for conducting the study was obtained from administrative authority of the school. All relevant ethical aspects were considered for ensuring students' 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 ٢٠ students at El- Maasera preparatory school in Helwan district to test the content clarity and applicability. There is no modifications were done.

Field Work:

- 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 program was developed based on reviewing of related literature and assessment tools (pretest).
- Data were collected during the academic year ٢٠١٥/٢٠١٦ from beginning of October, ٢٠١٥, to end March ٢٠١٦,
- 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 ٦ groups (٢٠-٢٥ students). But each teacher treated individually according to their free time during school day.
- The program in a school day starts from ٩ .١١ a.m. to ١ .١١ p.m. Each group of students attended ٧ sessions. The duration of each session was ٣٠-٤٥ minutes according to the presented items.

Educational program construction:

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

Assessment phase:

A pre-program 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 and 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 program of musculoskeletal problems among preparatory school children according to their needs to reduce risk of musculoskeletal problems.

The general objective of the program: To improve teachers' and school children knowledge regarding musculoskeletal problems and their practices to prevent it among school children.

This program was involved 6 sessions where (3) and (3) of them were devoted to theoretical and practical contents by using simple Arabic language to suit children level of understanding. Each session took 30-40 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

Program 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 program implementation, the effect of the educational program was evaluated by using the same format of pre-test to constitute the post-test and follow up test

Results:

Table (١) shows that ٥٤.١% of studied children were from El Shahid Ahmed Hamdy preparatory school for girls, ٥٩.٧% of them aged ١٣ years old or more, and ٥٦.٥% were enrolled in first school grade preparatory school. Regarding teachers general characteristics, this table shows that, ٦٠.٧% were male, and ٦٨.٩% had university education.

Figure (١) reveals that ٣٣.٠% of teachers aged ٣٥ to less than ٤٥ years old.

Figure (٢) clarifies that ٥٩.٧% of studied children had back pain, ٤٥.٩% shoulder pain, followed with ٤٠.٧% had fatigue and ٢٩.٦% had spine curvature.

According to the research hypothesis: This results showed that there was a statistically significant improving in studied participants' knowledge and practices regarding musculoskeletal problems after implementation of program (table ٢, ٣, ٤, and ٥)

Table (٢) shows that, ٨٤.٦%, ٨٠.٢%, ٧٤.٣%, ٧٤.٧%, ٩٠.١% and ٦٠.٥ 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 program implementation which decreased ٧٠.٤%, ٧٧.١%, ٦٠.٩%, ٦٦.٨%, ٨٦.٦% and ٤٧.٤% during follow up after ٢ months of program implementation compared by ١.١%, ١.١%, ١.١%, ٥.١% and ١.١% respectively preprogram. Also this table shows that, there were statistically significant differences between all items pre, post program and pre, and follow up after ٢ months of program. However, there was a statistically insignificant difference between post and follow up after ٢ months of program regarding meaning of spine curvature, preventive measures of musculoskeletal problems, importance of exercises, types of exercises, and complication of heavy school bag.

Table (٣) displays that, there were statistically significant differences between mean scores of total knowledge regarding of studied

teachers and their mean scores of post program implementation as well as their mean scores of follow-up.

Figure (٣) reveals that ٦٣.٧ % of studied children carried a heavy school bag weight, ٢٨.٤% of them wearing a school bag heavier than ١٠% of their body weight and only ٧.٩% carried ideal school bag weight. However, after program implementation and follow up phase after two months ٦٩.٥%, ٦٢.١% of studied children carried ideal school bag weight in relation to their body weight ($\leq 10\%$) respectively.

Table (٤) illustrates that, ٨٤.٦% of studied children didn't perform correct lifting and carrying technique of heavy things, ٨٩.٧% didn't set or stand in proper position preprogram. However, post program this percent decreased to ٠% as well as during follow up after two months (١٧.٤%, ١٨.٦%, and ١٩.٠% respectively)

Table (٥) clarifies that, there were statistically significant differences between mean scores of total practices of studied teachers and their mean scores of post program implementation as well as their mean scores of follow-up.

Table (١): Distribution of studied children according to their general characteristics (n= ٢٥٣)

General characteristics items	No	%
School name		
El Kolfaa El Rashdean Preparatory School for boys	١١٦	٤٥.٩
El Shahid Ahmed Hamdy Preparatory School for girls	١٣٧	٥٤.١
Child age		
١٢-	١٠٢	٤٠.٣
١٣+	١٥١	٥٩.٧
Child school grade		
١	١٤٣	٥٦.٥
٢	١١٠	٤٣.٥
Teacher's gender		
Male	٨٨	٦٠.٧
Female	٥٧	٣٩.٣
Teacher's educational level		
University Degree	١٠٠	٦٨.٩٧
Technical Diploma certificate	١٥	١٠.٣٤
Secondary certificate	٣٠	٢٠.٦٩

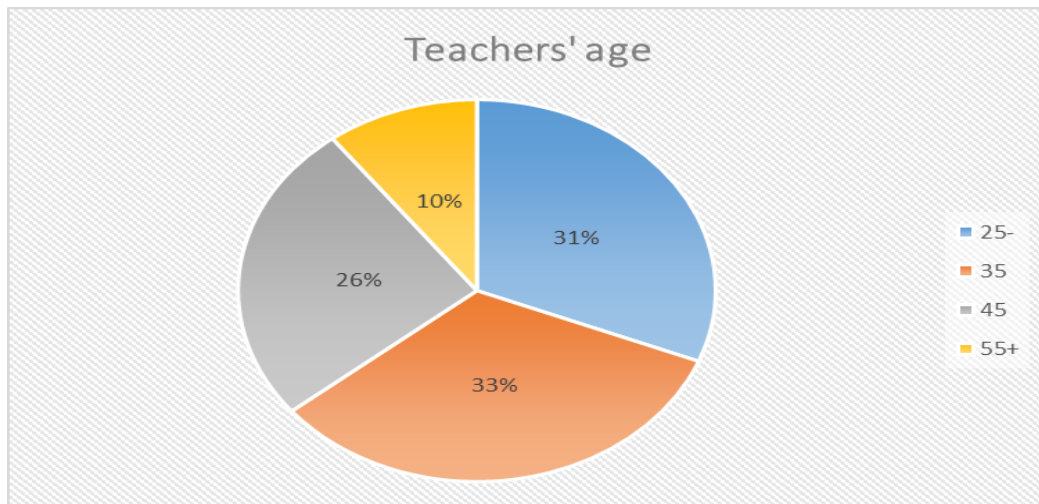


Figure (١): Distribution of studied teachers according to their general characteristics.

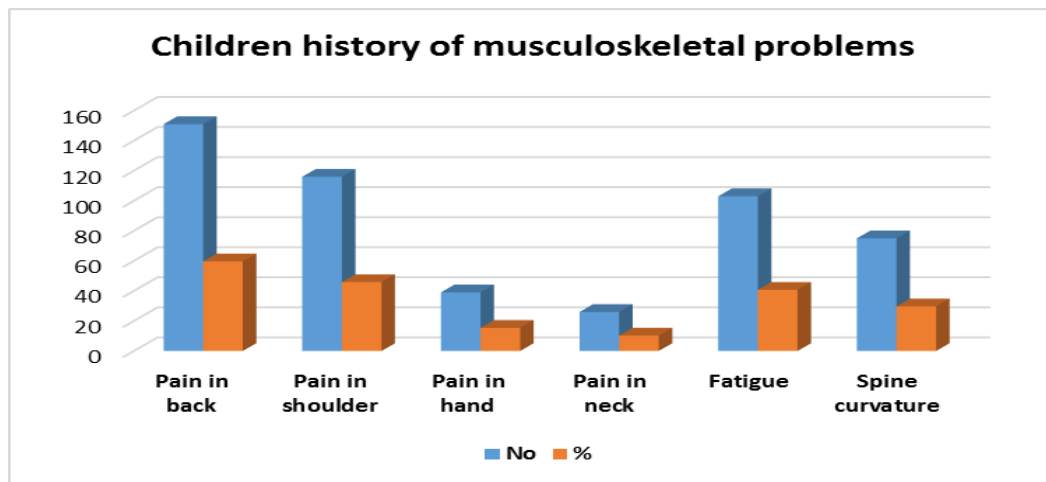


Figure (٢): Distribution of studied children according to their history of musculoskeletal problems from the beginning of this academic year (n=٢٥٣)

Table (٢) Percentage distribution of studied children according to their knowledge regarding musculoskeletal problems, body mechanics, exercises, and school bag, pre, post and follow up program implementation (n=٢٥٣)

Knowledge items	Pre			Post			Follow up			Chi-square (P-value)		
	Incorrect	Correct and incomplete	Correct	Incorrect	Correct and incomplete	Correct	Incorrect	Correct and incomplete	Correct	Pre-Post	Pre-Follow up	Post-Follow up
Musculoskeletal problems												
Meaning of musculoskeletal problems	٧٥.١	٢٤.٩	٠.٠	٠.٠	١٥.٤	٨٤.٦	١٦.٦	١٣.٠	٧٠.٤	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
Types of musculoskeletal problems	٥٠.٢	٤٩.٨	٠.٠	٥.١	٢٤.٩	٧٠.٠	١٦.٦	٢١.٣	٦٢.١	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
Meaning of spine curvature	٧٩.٤	١٠.٢	١.٠	١.٠	٩.٥	٨٠.٢	١٤.٢	٧.٩	٧٧.٩	٠.٠٠٠	٠.٠٠٠	٠.٣٥٦
Treatment of spine curvature	٨٤.٦	١٥.٤	٠.٠	٥.١	١٩.٨	٧٥.١	١٦.٢	١٧.٠	٦٦.٨	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
Preventive measures of	١٠٠.٠	٠.٠	٠.٠	٩.٩	٩.٩	٨٠.١	١٤.٦	٨.٣	٧٧.١	٠.٠٠٠	٠.٠٠٠	٠.٢٤٣

musculoskeletal problems						٢			١			
Body mechanics												
Ideal sitting	٥٤.٥	٤٥.	٠.٠	٠.٠	٢٥.	٧٤.	١٧.٤	٢١.٧	٦٠.	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
Ideal lifting heavy objects	٨٠.٦	١٩.	٠.٠	٠.٠	٤٠.	٥٩.	١٩.٠	٣٤.٨	٤٦.	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
Ideal standing	٧٥.٥	٢٤.	٠.٠	٥.١	٢٠.	٧٤.	١٦.٢	١٧.٠	٦٦.	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
Exercises												
Importance of exercises	٧٥.٥	١٩.٤	٥.١	٩.٩	٠.٠	٩٠.١	١٣.٤	٠.٠	٨٦.٦	٠.٠٠٠	٠.٠٠٠	٠.٢١٣
Types of exercises	١٠٠.٠	٠.٠	٠.٠	١.٠	١٩.٤	٧٠.٤	١٥.٤	١٦.٦	٦٨.٠	٠.٠٠٠	٠.٠٠٠	٠.١٩٨
School bag												
Ideal weight in relation to child weight	٧٤.٧	٢٥.٣	٠.٠	٠.٠	٣٩.٥	٦٠.٥	١٩.٠	٣٣.٦	٤٧.٤	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
Characteristics and standard	٥٥.٣	٤٤.٧	٠.٠	٠.٠	١٥.٠	٨٥.٠	١٦.٦	١٢.٧	٧٠.٧	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
Complication of heavy school bag	٧٥.١	٢٤.٩	٠.٠	١.٠	٤.٧	٨٥.٠	١٣.٨	٤.٠	٨٢.٢	٠.٠٠٠	٠.٠٠٠	٠.٤٤٤

Table (٣) Mean scores of the studied teachers regarding their total knowledge pre, post and follow up program implementation

	Total knowledge of teachers		Comparison	Difference		Paired T-test	
	Mean	± SD		Mean	SD	t	P-value
Pre	٢٨.٦٦٤	± ٢.٤٢٠	Pre-Post	-٩.٣٧٨	٤.٤٧٣	-٢٥.٠٦٨	٠.٠٠٠
Post	٣٨.٠٤٢	± ٣.٦٥٦					
Follow up	٢٩.٨٦٠	± ٢.٩٤٧	Post-Follow up	٨.١٨٢	٤.٧٣٢	٢٠.٦٧٨	٠.٠٠٠

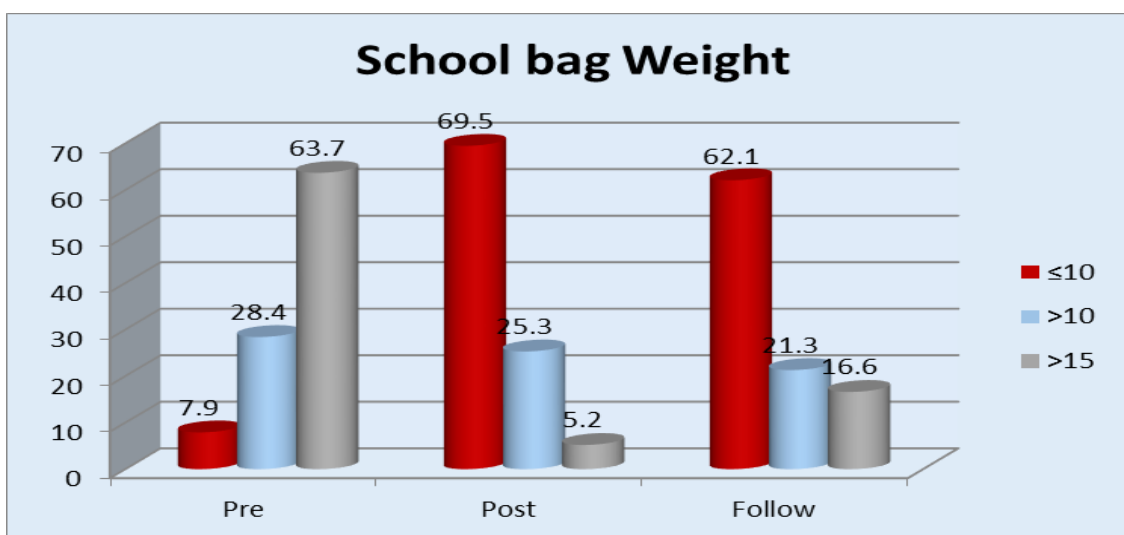


Figure (٣): Distribution of studied children according to their practice regarding body weight percentage represented by their school bag weight pre, post and follow-up of program implementation (n=٢٥٣)

Table (٤) Distribution of studied children according to their practices regarding body mechanics (n=٢٥٣)

Body mechanics practice items	Pre			Post			Follow up			Chi-square(P-value)		
	Poor	Average	Good	Poor	Average	Good	Poor	Average	Good	Pre-Post	Pre-Follow up	Post-Follow up
Correct lifting and carrying technique of backpack	٨٤.٦	١٥.٤	٠.٠	٠.٠	٢٥.٧	٧٤.٣	١٧.٤	٢١.٧	٦٠.٩	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
A proper sitting position	٨٩.٧	١٠.٣	٠.٠	٠.٠	٣٥.٦	٦٤.٤	١٨.٦	٣٠.٤	٥١.٠	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠
A proper standing position	٨٩.٧	١٠.٣	٠.٠	٠.٠	٤٠.٣	٥٩.٧	١٩.٠	٣٤.٤	٤٦.٦	٠.٠٠٠	٠.٠٠٠	٠.٠٠٠

Table (٥) Mean scores of the studied teachers regarding their total practices pre, post and follow up program implementation

	Practices	Comparison	Difference		Paired T-test	
	Mean ± SD		Mean	SD	t	P-value
Pre	٣.٢١٧ ± ١.٢٠٥	Pre-Post	-٣.٥٦٦	٢.٢٦٩	-١٨.٧٩٥	٠.٠٠٠
Post	٦.٧٨٣ ± ١.٨٥٤	Pre-Follow up	-٢.١٤٠	١.٧٥١	-١٤.٦١٧	٠.٠٠٠
Follow up	٥.٣٥٧ ± ١.٥٣٦	Post-Follow up	١.٤٢٧	٢.٣٦٠	٧.٢٢٨	٠.٠٠٠

Discussion

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 ١٣ years old or more. These findings were in agreement with **Arghavani et al.** [١١] who studied the relationship between carrying school bags and the prevalence of musculoskeletal pains among ١٢-١٥ 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 ٣٥ to less than ٥٥ years old, more than three fifths of them were male, and more than two thirds had university education. These findings agreed with **Kumer et al.** [١٢] who studied the perception and practices regarding first-aid among school

teachers in Mysore, revealed that 49.7% 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.** [13] studied the impact of a disaster educational program on knowledge and practices of teachers among primary governmental schools, in Egypt, who found that, 64% of studied sample aged 30-50 years with a mean age 40.74 ± 7.46 . However, they finding related to gender didn't match with this finding (90% 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.** [14] 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 **Ibrahim** [15] 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, preprogram implementation 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 program. Also this table shows that, there were statistically significant differences between all items pre, post program and pre, and follow up after 3 months of program. However, there was a statistically insignificant difference between post and follow up after 3 months of program regarding importance of exercises, type of exercises, and meaning of spine curvature. According **Kambi et al.** [16] who studied the effectiveness of structured teaching program 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 program implementation which decreased to

less than three quarters during follow up after program implementation. Meanwhile, their follow up score still high compared by preprogram.

Moreover, there were statistically significant differences between all items pre, post program and pre, and follow up after 3 months of program. These findings agreed with **Foltran et al.** [17] who studied the effects of an educational back care program on Brazilian school children's 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 program implementation 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 preprogram implementation. 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 **Ibrahim** [18] 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 **Neuschwander et al.** [19] 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 program 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 preprogram. This may be due to success and positive effect of educational program 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 preprogram. However, post program 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 **Hakimi et al.** [19] 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 **Neuschwander et al.** [18] 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 **Syazwan et al.** [20] who studied the relation between musculoskeletal pain in children, poor sitting posture and a heavy schoolbag: an ergonomic school education intervention program, 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 program 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. However, the majority of studied children and teachers their knowledge scores improved immediately and after 3 months of educational program. Highly statistically significant differences were found between all knowledge items scores of studied children and teachers about musculoskeletal problems, pre, immediately and 3 months after educational program. The majority of studied children and teachers had poor practices scores about musculoskeletal problems preprogram which improved post program to be good practice scores immediately and 3 months after the educational program. This study concluded that the educational program 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 program to reduce the risk of musculoskeletal problems among children and their teachers.
- Periodic training program for all the teachers in schools to reduce the risk of musculoskeletal problems among school children.
- Further future researches are needed to generalize the use of preventive measures of musculoskeletal problems among school children.

References:

- [١] Hulsegge G., Oostrom, S., Picavet; S., Twisk, J., Postma;D., Smit; M., and Wijga, A. (٢٠١١): Musculoskeletal Complaints among ١١-Year-Old Children and Associated Factors, American Journal of Epidemiology, Am J Epidemiol. ١٧٤(٨):٨٧٧-٨٨٤.
- [٢] Zakeri, Y., Baraz, S., Gheibizadeh, M., Nejad, D., and Latifi, S. (٢٠١٦): Prevalence of Musculoskeletal Disorders in Primary School Students in Abadan-Iran, Int J Pediatr, ٤(١): ١٢١٥- ١٢٢١.
- [٣] Farhood, H. (٢٠١٣): Low back pain in schoolchildren: The role of school bag weight and carrying way, Journal of Natural Sciences Research, ٣(٨):١٥٦-١٦٥.
- [٤] Zaidi, S., Ansari, F., Waseem, H., Fahim, S., and Irfan, M. (٢٠١٦): Association of musculoskeletal pain with heavy bag packs among school children, ١٤th International Conference on Statistical Sciences, Karachi, Pakistan, ٢٩ (١): ٢٢٩-٢٣٨.
- [٥] Heyman, E. and Dekel, H. (٢٠١٥): Ergonomics for children: An educational program for physical education students, available at: www.iea.cc/ECEE/pdfs/art٠٢١٥.pdf

- [٦] **Edwards, L. (٢٠٠٨):** Research priorities in school nursing, *Journal of School health*; ٧٢: ١٧٣-١٧٧.
- [٧] **Central Agency for Public Mobilization and Statistics (CAPMAS) (٢٠١٥):** Population estimates by age and gender group ١/١/٢٠١٥ Ministry of Planning, Egypt Vision ٢٠٣٠.
- [٨] **UNICEF Egypt, (٢٠١٥):** Children in Egypt ٢٠١٥, a statistical digest, Available at: https://www.unicef.org/egypt/eg_Education_٢٠١٥.pdf.
- [٩] **Ismail, S., Tamrin, S., and Hashim, Z. (٢٠٠٩):** The association between ergonomic risk factors and musculoskeletal pain among school children: a preliminary result, *Global Journal of Health Science*, ١ (٢):٧٣-٨٤.
- [١٠] **Mohamed, S., (٢٠١٣):** Incompatibility between Students' Body Measurements and School Chairs, *World Applied Sciences Journal*, ٢١(١): ٦٨٩-٦٩٥.
- [١١] **Arghavani, F., Zamanian, Z., Ghanbary, A., and Hassanzadeh, J.(٢٠١٤):** Investigation of the relationship between carrying school bags and the prevalence of musculoskeletal pains among ١٢-١٥ years old students in Shiraz, *Pakistan Journal of Biological Sciences*, ١٧(٤):٥٥٠.٥٥٤.
- [١٢] **Kumar ,S., Kulkarni, P., Srinivas, N., Prakash, B., , Hugara,S.,, and Ashok,C.(٢٠١٣):** Perception and practices regarding first-aid among school teachers in Mysore, *National Journal of Community Medicine*, ٤(٢): ٣٤٩- ٣٥٦.
- [١٣] **Hegazy, M., Shounoda, M., and Ismail, G. (٢٠١٤):** Impact of a disaster educational program on knowledge and practices of teachers among primary governmental schools, Cairo Governorate, *Journal of Education and Practice*, ٥ (٢٩):١٧٥-١٨٢.
- [١٤] **Mwaka, E., Munabi, I., Buwembo, W., Kukkiriza, J., and Ochieng, J.(٢٠١٤):** Musculoskeletal pain and school bag use: a cross-sectional study among Ugandan pupils, Available at: <http://www.biomedcentral.com/١٧٥٦-٠٥٠٠/٧/٢٢٢>
- [١٥] **Ibrahim, A. (٢٠١٢):** Incidence of back pain in Egyptian school girls Effect of school bag weight and carrying way, incidence of back pain in Egyptian school girls: Effect of school bag weight and

carrying way, available at:
<https://www.researchgate.net/publication/282493603>

- [16] **Kambi, S. (2010):** Effectiveness of structured teaching program on knowledge and practice of body mechanics among school children in schools, University of Health Sciences, Karnataka, Bangalore, Available at:
www.rguhs.ac.in/cdc/onlinecdc/uploads/00_N224_18227.doc
- [17] **Foltran, F., Moreira, R., Komatsu, M., Falconi, M., and Sato, T. (2012):** Effects of an educational back care program on Brazilian school children's knowledge regarding back pain prevention, Brazilian Journal of Physical Therapy, 16(2): 128-133.
- [18] **Neuschwander, T. Cutrone, J., Macias, B. Cutrone, S., Murthy, G., Chambers, H., and Hargens, A. (2010):** The effect of backpacks on the lumbar spine in children: a standing magnetic resonance imaging study, California-San Diego, PubMed, 30(1): 83-88.
- [19] **Hakimi, S. Akbarpour, H., Vahidi, H., Shahnazy, R., Birami, J and Mohammad, A. (2008).** Assessment of low back pain and musculoskeletal disorders risk factor in regard to postural behaviour among teenagers, East Azerbaijan, Iran. Research Journal of Biological Sciences, 3 (1): 80-87.
- [20] **Syazwan, A., Azhar, M., Anita, A., Azizan, H., Shaharuddin, M., Hanafiah, J., Muhaimin, A., Nizar, A., Rafee, B., Ibthisham, A. and Kasani, A. (2011):** Poor sitting posture and a heavy schoolbag as contributors to musculoskeletal pain in children: an ergonomic school education intervention program, Malaysia, Journal of Pain Research 4(1): 287- 290.