

Primary Prevention For Musculoskeletal Disorders Among School Age Students In Ismailia City

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Abstract

Background: Musculoskeletal disorders consider an important global health problem, which are more obvious in school students, and the prevention during this stage very important to reduce musculoskeletal pain and deformity in adulthood. **Aim:** the study aimed to evaluate the effects of a primary prevention program for musculoskeletal disorders among school age students in Ismailia city. **Design:** A quasi-experimental design was used in this study. **Setting:** the study was conducted in six primary schools in Ismailia city. **Sample:** A multistage random sample technique used in this study, it consisted of 168 students in 6th grades randomly selected and 27 from their teachers/managers who are available during the study period. **Tools:** two tools were used in the present study, the first tool was self-administered questionnaires which included three parts: socio-demographic data, knowledge and practices regarding prevention of musculoskeletal disorders among studied subjects and physical assessment sheet to assess musculoskeletal pain among students, the second tool was an observational checklist for assessment safety school environment. **Results:** the results revealed that, statistically significant ($P < 0.001$) difference between studied students mean scores of knowledge and practices regarding the prevention of musculoskeletal disorders (pre/post) implementing of the program and reduced musculoskeletal pain among studied students' after implementing the program. **Conclusion:** The knowledge and practices related to the prevention of musculoskeletal disorders among school age students were improved after implementing the program. **Recommendation:** Develop a health educational program among school teachers'/managers' regarding prevention of musculoskeletal disorders to be applied to their students.

Key Words: Musculoskeletal disorders, Prevention of musculoskeletal disorders, School age and School bag.

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I. Introduction

School age children represent a large proportion of the population worldwide, in Egypt the total number of school age children enrolled in primary educational level estimated 10,638,860 from the total population, (CAPMAS & UNICEF, 2017).

Children in this stage undergo rapid musculoskeletal development and an application of external forces (school bags) and various postural deviations especially of the spine cause musculoskeletal disorders, (Panicker & Sandesh, 2014). Pain in the musculoskeletal system in school age children also called "growth pain", symptoms of overload, also associated with postural defects, as well as manifestation of various diseases. They always raise some anxiety in the child's parents or guardians, (Slowinska et al, 2015).

School age children spend one-third of their waking hours at school, an environment that can expose them to ergonomic risk factors. Thus, the school is a potential environment for the development of musculoskeletal disorders, as well as implementing educational programs for preventing the musculoskeletal disorders, (Foltran et al, 2012).

There are many factors affecting the musculoskeletal system as inadequate ergonomic conditions, inappropriate school bag, school related factors such as the furniture, poor posture, repetitive activities, sedentary lifestyle, reduction of physical activity and lack of exercise, (Azabagic et al, 2016).

Low back pain and neck pain have the highest burden of musculoskeletal disorders in most of the Eastern Mediterranean Region (EMR) countries. In Egypt, low back pain estimated 159.23 per 1000, (Moradi-Lakeh et al, 2017). Also, the study was conducted at preparatory schools in Menouf district, Menoufia Governorate, Egypt, the results showed 74.1% of the studied schoolchildren had suffered from back pain, (Ali & Mohamed, 2017).

Today's, the MSDs were shown as an increase burden in several societies. Health policy makers and other professionals looking for a suitable find national preventive programs for musculoskeletal disorders

reporting and preventing, (Aghilinejad et al, 2012). The community health nurse may play a vital role in organizing and delivering educational sessions that help in the prevention of several health problems, and applying standardized care for school age children by using structure and systematic planning process and ongoing support for implementation, a core of educational sessions must take into account local circumstances and should be disseminated through an active educational and training programs. This must be implementation prevention program regarding MSDs among school age students' to evaluate the effect on their knowledge and practices to prevent it, (Henschke et al, 2014).

Aim of The Study

The study aimed to evaluate the effects of primary prevention program for musculoskeletal disorders among school age students in Ismailia city, through:

- 1- Assessing students' knowledge and practices regarding prevention of musculoskeletal disorders to detect their needs.
- 2- Assessing the health problems related to musculoskeletal system among school age students.
- 3- Designing and implementing the primary prevention program for musculoskeletal disorders according to their needs.
- 4- Evaluating primary prevention program regarding the students practices for prevention of musculoskeletal disorders.

Research Hypotheses

Implementing the primary prevention program will improve knowledge and practices among school age students regarding prevention of musculoskeletal disorders.

II. Subject And Methods

Research design:

A quasi-experimental design was conducted in this study.

Setting:

The study was conducted at primary schools in Ismailia city (North Ismailia administration), six primary schools were selected randomly from the total number (69 schools).

Subjects:

The subjects of the present study was selected randomly from previously mentioned schools, the subject consisted of 168 students (boys & girls) who were in 6th grades and their teachers/managers who are available during the study period.

Data collection:

Two tools were used for data collection.

Tool I:

A self-administered questionnaires

it was developed by the researcher after reviewing the relevant literature, which include three parts to gather the following data:

❖ **Part 1:** Socio-demographic Data:-

A- For students: as (age, gender, parent educational level, parent occupation, address, family income, ...etc.).

B- For teachers/managers: as (age, gender, education level and teaching subjects... etc..).

❖ **Part 2:** It was included questionnaire about knowledge and practices regarding prevention of musculoskeletal disorders among studied subjects, it was modified by the researcher and composed as follows:-

A- For the students: to assess knowledge and practices stated by them, as (anatomy and physiology of the musculoskeletal system, meaning of musculoskeletal disorders, nutrition, exercise, body mechanics and schoolbag), (pre/post).

Scoring for students' knowledge:-

The students' questionnaire sheet for assessment knowledge regarding musculoskeletal disorder consisted of 39 Q., as MCQs and the total scores were 78 degrees.

The result categorized as the following:

Zero = incorrect answer

1= incomplete and correct answer
2 = complete and correct answers

Summation of all and calculate the mean and standard deviation were computed.

Scoring for students' practices: -

The students' questionnaire sheet for assessment practices regarding musculoskeletal disorder consisted of 39 Q., total scores were 78 degrees and every question answered by: Always (2), Sometimes (1) and Never (0). Summation of all and calculate the mean and standard deviation were computed.

B- For teachers/managers: questionnaire to assess teachers/manager's knowledge and their opinions regarding musculoskeletal disorders before implementing the program.

Scoring for teachers/manager's knowledge:-

The result categorized as the following:

Zero = incorrect answer

1= incomplete and correct answer

2 = complete and correct answer

Summation of all and calculate the mean and standard deviation were computed.

❖ **Part 3:** Physical assessment sheet to assess musculoskeletal pain among student's it's modified by the researcher based on (*Nordic style questionnaire, 1987 & Dutch, 2001*).

Scoring system:

The result categorized as the following :

Zero = Absent (No pain)

1= pain (Present)

Summation of all and calculate the number and percentage were computed.

Tool II:

An Observational checklist for safety school environment, adapted from, (*Abd-Elstar, 2004 & Jawad, 2004*):-

❖ It was used to assess safety school environment and consisted of 40 points about (schools place, building, design, playground, health visitor and school workstations such as classrooms, computer lab and black board dimension, desks dimension and chair dimension).

Scoring system:-

Each item was given two points to make a total grade 80 and the school's condition with divided into as follows -:

Poor = 20 - 40 (50%).

Average = 41-60 (50% - 75%).

Good = 61- 80 (75% - 100%).

The summation of all and calculate the number and percentage were computed.

❖ **Operational design:**

1-Tools validity:

The three experts in the field of community health nursing / faculty of nursing (Ain shams and Cairo University), to assess the study tools for clarity, relevance, applicability, comprehension, understanding and their recommendation were modified.

2 -Pilot study

A pilot study was conducted among 14 students and 3 from their teachers/managers from the 6 schools (10 % of the estimated sample) to evaluate the feasibility of implementing the designed tools and time required to fill in each tool. The necessary modification was carried out as revealed from the pilot and subjects included in the pilot study were excluded later from the study samples.

3- Ethical Considerations

Written permission for collection of data was obtained from the responsible managers of schools after explaining the aim of the study. Also, the aim was explained to the student's participant to be familiar with the importance of her participation. Promote the confidentiality of data and student's freedom to withdraw from the study at any time.

4 -Field work:

A. Approvals:-

- An official letters were issued from the Faculty of Nursing, Suez Canal University to the information security office in Central Agency for public mobilization & Statistics (CAPMAS), to get an approval for data collection to conducted the study, that forwarded to the directorate of education and the Ismailia educational administration to obtain permission for collecting the necessary data from the selected schools.
- A written approval was obtained from the managers of the selected schools based on the approval of directorate of education in Ismailia.
- Before starting the data collection the agreements were obtained and the aim of the study explained to the schools managers to gain their cooperation during data collection.

B. Data collection:-

- Data were collected from beginning of December 2015 to beginning of May 2016, the actual duration was three months & a half, *"the period of examination and holidays were excluded"*.
- This was implemented through four phases as namely:-
 - Assessment phase
 - Planning phase
 - Implementation phase
 - Evaluation phase.

Statistical Analysis:-

All Data were collected, tabulated and subjected to statistical analysis. Statistical analysis is performed by SPSS in general (version 17, 2008), also Microsoft office Excel is used for data handling and graphical presentation.

Quantitative variables are described by the Mean, Standard Deviation (SD), and the Range (Maximum – Minimum)

Qualitative categorical variables are described by proportions and Percentages.

Paired sample t test is used for comparing pre and post quantitative scales. Independent samples t test is used for comparing two groups.

For qualitative categorical variables chi-squared test is applied.

Pearson correlation coefficient and Spearman rho correlation coefficient are used for correlation analysis as appropriate.

Significance level is considered at $P < 0.05$ (S); while for $P < 0.01$ is considered highly significant (HS). Two Tailed tests are assumed throughout the analysis for all statistical tests.

III. Results

Part I: Socio-demographic characteristics of the studied subjects

The mean age of the studied students' was 11.49 ± 0.59 years, 55.3% of them ranged in age from 11-12 years and 50.0% of them were males. Regarding the parent's education level, 51.8% of fathers had high educational level, while, 50.0% of their mothers had intermediate educational level. While 58.9% of their fathers were an employee, 60.1% of their mothers were housewife and 50.0% of their family income was enough and saving.

The social characteristics of the teachers and managers of the studied students'. The average age of teachers and managers was 41.59 ± 8.28 years and 55.6% of them were female.

With regard to their level of education, 59.3 % had a high level of education.

Part II: Knowledge of studied subjects regarding prevention of musculoskeletal disorders throughout the program phases.

There was statistically significant ($P < 0.001$) difference between studied students mean scores of knowledge regarding the prevention of musculoskeletal disorders (pre/post) implementing of the program.

Figure (1): Total mean score of knowledge's regarding prevention of musculoskeletal disorders among studied students':-

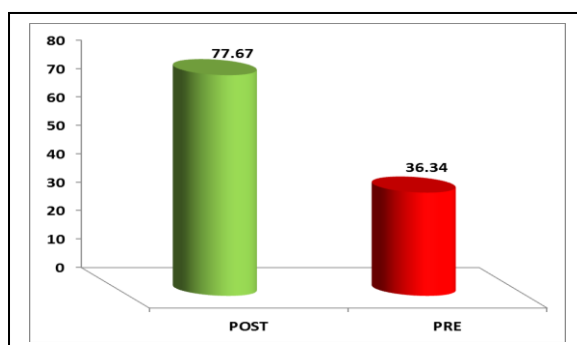


Figure (1) illustrates that, the improvement in the total mean score of students' knowledge's regarding prevention of MSDs after implementation of the program compared with before implementation the program.

Table (1): Mean difference scores of knowledge regarding the prevention of musculoskeletal disorder among student teachers'/managers'.

Items	Minimum	Maximum	Mean	SD
Musculoskeletal disorders among school age students	0.00	50.00	25.00	14.29
Factors of musculoskeletal disorders among school age students	12.50	75.00	33.33	19.30
Prevention of musculoskeletal disorder age students among school	16.70	100.00	43.83	25.79
Total Knowledge	13.60	68.20	33.16	17.64

Table (1) mentions that the mean value of the total score for teachers'/managers' knowledge regarding prevention of MSDs was 33.16 ± 17.64 .

Part III: Practices as reported by the studied subjects regarding prevention of musculoskeletal disorders throughout the program phases

There was statistically significant ($P < 0.001$) difference between studied students' mean scores of practices as reported by them regarding prevention of MSDs (pre/post) implementation the program about nutrition, physical exercise and rest and sleep. It also revealed statistically significant improvement in studied students' mean scores of body mechanics and school bag.

Figure (2): Total mean score of practices regarding prevention of musculoskeletal disorders as reported by the studied students':-

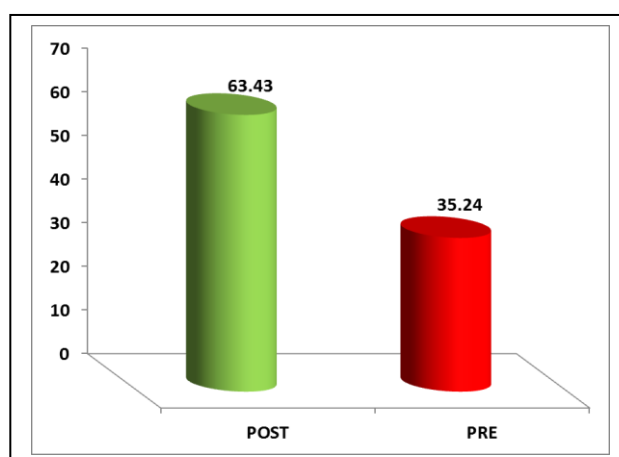


Figure (2) demonstrates that, improvement in the total mean score of students' regarding their practice's as reported by them for prevention of musculoskeletal disorders after implementation of the program compared to before implementation.

Part IV: Musculoskeletal pain assessment among studied student's throughout the program phases

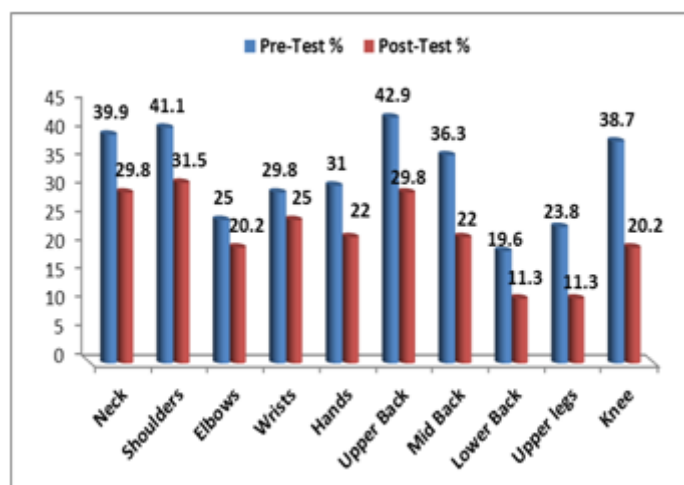


Figure (3) shows that reduced health complaint (MSS pain) among studied students' post implementation the program regarding body parts as upper back 42.9% to 29.8%, mid back 36.3% to 22.0% and knee 38.7% to 20.2%.

Figure (4): Distribution of back pain among studied students' throughout the program phases.

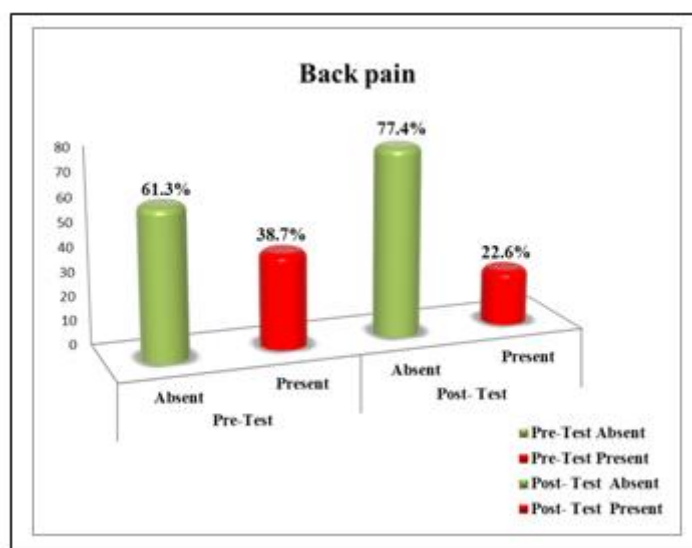


Figure (4) demonstrates that the back pain were improving among studied students after implementing the program as they're reported.

Figure (5): The school bag weight among studied students throughout the program phases.

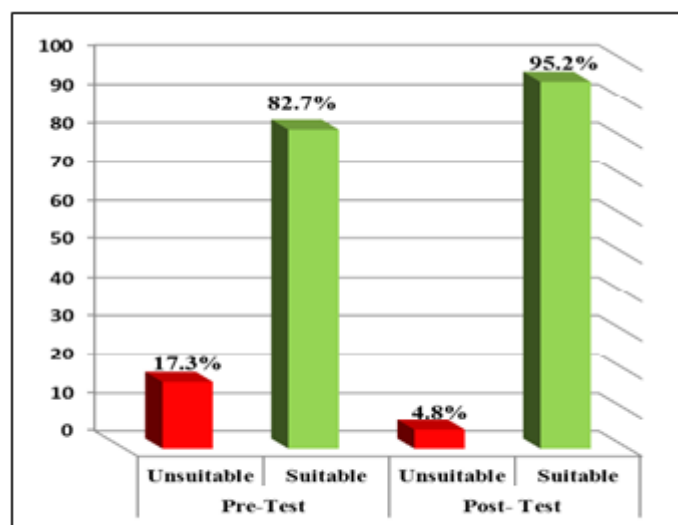


Figure (5) describes that the weight of school bag before and after program, in which 82.7% of the students have a suitable school bag weight before the program and the rate increased to 95.2% after implementation it.

Part V: Schools Environment.

Figure (6): Safety schools environment (n=6).

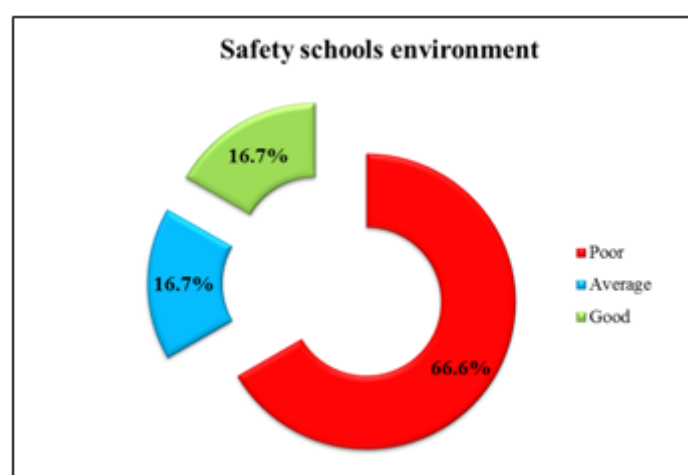


Figure (6) portrays that, 66.6% of the studied schools had poor scores for safety school environment (<50%), while 16.7% ($\geq 75\%$) of them had good scores.

Part VI: Association between dependent and independent variables throughout the program, (tables 2 - 3).

Table (2): Relation between socio demographic characteristic of studied students and their total knowledge

Items	Student's total knowledge					
	Pre-test			Post-test		
	Mean	SD	P-value	Mean	SD	P-value
Gender						
Male	37.03	13.88	0.495	75.55	14.71	0.055*
Female	35.64	12.35		79.79	13.81	
Fathers' education						
Illiterate	29.36	12.13	0.002* *	67.93	17.69	0.006* *
Intermediate	40.18	14.36		77.31	13.90	
High	34.87	11.53		79.85	13.35	
Mothers' education						

Illiterate	39.50	14.79	0.212	78.52	13.74	0.013*
Intermediate	36.46	13.77		74.65	14.89	
High	34.29	10.64		81.97	12.95	
Schools category						
Accredited governmental school	52.29	7.23	0.000* *	70.17	14.30	0.002* *
Governmental school	33.68	12.58		78.53	14.50	
Experimental Language School	29.94	6.43		81.63	12.14	

* Significant $P < 0.05$

** Significant ($P < 0.01$)

Table (2) clarify that, there were statistically significant relation between student gender, mothers' education and their total knowledge after implementation the program. While there were statistically significant relation of fathers' education, schools category and their total knowledge throughout the program.

Table (3): Relation between socio demographic characteristic of students and their total practices

Items	Student's total practices					
	Pre-Test			Post-Test		
	Mean	SD	P-value	Mean	SD	P-value
Gender						
Male	35.79	15.32	0.648	63.51	12.68	0.940
Female	34.70	15.56		63.36	12.76	
Fathers' education						
Illiterate	28.78	9.11	0.061	58.71	10.30	0.203
Intermediate	38.15	15.84		63.05	12.30	
High	34.36	15.69		64.64	13.26	
Mothers' education						
Illiterate	34.06	13.19	0.782	61.08	12.87	0.376
Intermediate	36.05	16.61		63.27	12.14	
High	34.64	14.79		65.07	13.40	
School category						
Accredited governmental school	58.19	10.45	0.000* *	69.36	9.44	0.005* *
Governmental school	29.23	11.42		62.92	14.07	
Experimental Language School	31.31	8.63		59.93	9.67	

Table (3) shows that, there are statistically significant ($P < 0.01$) relations between the schools category and student's total practice throughout the program phases.

IV. Discussion

Musculoskeletal and postural development progresses through a series of stages (growth spurts, development of balance and coordination, postural stability) which occur when children at school age and during this period, dynamic and rapid changes in growth are observed. The physical inactivity, obesity, inappropriate school bags and increased usage of electronic devices have negative side effects such as bad body posture habits, (*Brzek et al, 2017*).

Healthy postural habits adopted during daily activities may protect the musculoskeletal system from overload and prevent postural deviations that may lead to discomfort and pain. However, a lack of knowledge and adequate instruction during childhood may result in inadequate postural habits, which in turn may lead to structural deformations and pain in adulthood, (*Hanvold et al, 2010*).

The present study found, many studied students' have musculoskeletal disorders as back pain, shoulder pain and knee pain. These finding in the line with the study by *Legault et al., (2015)* who studied "Musculoskeletal symptoms in an adolescent athlete population: a comparative study" who reported that, most common musculoskeletal disorders among school age students' founded in shoulder, upper back and low back.

Also, *Zakeri et al., (2016)* who studied "Prevalence of Musculoskeletal Disorders in Primary School Students in Abadan-Iran in 2014" reported that, the majority of the school age studied students' suffering from shoulder pain.

It could be, this age group had musculoskeletal disorders due to lack of knowledge and bad practices such as heavy school bag weight, physical inactivity and bad body posture habits, so it was important to conduct this study.

The results of the present study showed that, lack of students' knowledge and practices among prevention of musculoskeletal disorders, In the same direction, with the study by *Kanaparthi et al., (2015)* who

studied "Postural awareness among dental students in Jizan, Saudi Arabia" founded that, lack of knowledge among studied students regarding prevention of musculoskeletal disorders (MSDs) and the educational programs are very important to improve the knowledge and reduced the incidence of MSDs among students.

In the study by *Tran & Ciccarelli, (2012)* who studied the "Primary school children's knowledge of, and attitudes towards, healthy computer use" who founded that, the children lacked in sufficient knowledge about the importance of postural and task variation, but in contrast with the present results before the program implementation the children had sufficient knowledge about adjusting workstation furniture specific to healthy computer use.

In the line with the current study, the study by *Citzol et al., (2012)* who studied "An assessment of the perception of physical activity, eating habits, self-efficacy and the knowledge about healthy food in Albanian adolescents" they reported that, only fifth of the study sample had very active lifestyle and physical exercise.

Also, this results agreement with the study by *Djordjevic-Nikic et al., (2013)* who studied "Nutritional and physical activity behavior and habits in adolescent population of Belgrade" they found one third of the studied adolescents participate in physical activity.

Meanwhile, the present study indicated that, lack of teachers'/managers' knowledge regarding prevention of musculoskeletal disorders, in the same line, the study by *Shuai et al., (2014)* who studied "Assessing the effects of an educational program for the prevention of work-related musculoskeletal disorders among school teachers". They mentioned that, the teachers' had lacking of knowledge regarding prevention of MSDs.

According to research hypotheses: - ***Implementing the primary prevention program will improve knowledge and practices among school age students regarding prevention of musculoskeletal disorders:-*** the finding in the present study revealed that, improving in the students' knowledge and practices after program implementation and there were statistically significant ($P < 0.001$) difference (pre/post implementation).

In the same line, the study by *Dolphens et al., (2011)* who studied "Long-term effectiveness of a back education programme in elementary school children" reported that, the knowledge scores were significantly higher ($P < 0.001$) in the intervention group in comparison with the control group. Also, this finding was in agreement with *Foltran et al., (2012)* who studied "Effects of an educational back care program on Brazilian school children's knowledge regarding back pain prevention", they reported that, there was a significant increase ($p < 0.001$) between pre and post intervention.

Similarly, the study by *Dehghan et al., (2016)* who studied "The effect of a multifaceted ergonomic intervention program on reducing musculoskeletal disorders in dentists" their results revealed that the prevalence of musculoskeletal disorders was reduced among studied students after the intervention because of the improvement in awareness rate, attitude and best practices.

According to this logic, improvement in students' knowledge lead to also improvement in their practices, the finding of current study illustrates that, there was statistically significant ($P < 0.01$) relations between the schools category and student's total practice.

In the same line with this result, the study by *Mohammed, (2014)* who studied "Lifestyle Risk Factors among Adolescent in Ismailia City" who reported that, statistically significant relation between students' lifestyle habits and their school types.

Similarly, the study by *Barnekow Rasmussen et al., (2006)* who studied "Health-promoting schools: a resource for developing indicators" who mentioned that, there were positive significant relation between students' practice and their school categories.

V. Conclusion

Based on the finding and research hypothesis of the present study, it was concluded that:

Statistically significant ($P < 0.001$) difference between studied students mean scores of knowledge and practices regarding the prevention of musculoskeletal disorders (pre/post) implementing of the program, it also improved after implementation of the program among school age students', while the prevention of musculoskeletal disorders program effective in reducing musculoskeletal pain among studied students after implementing the program.

Recommendation

In the view of the study findings the following are recommended:

- Distributes educational booklet about prevention of musculoskeletal disorders for teachers' / managers' and students' under the study.
- Replication of the program in other schools to improve the students' knowledge and practices regarding prevention of musculoskeletal disorders.

Future researchers:-

- Develop health educational program among school teachers/ managers' in different educational level regarding prevention of musculoskeletal disorders to be applied to their students, it will contain the knowledge and practices of the following: -
- ❖ Structure of musculoskeletal system
- ❖ Musculoskeletal disorders
- ❖ Prevention of musculoskeletal disorders (Diet, exercise, sleep, body mechanics).

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