

Effect of Educational Intervention about Work Related Musculoskeletal Disorders on Restaurant Workers in Toshiba Alarabi Factories at Benha City

¹Hanan Abd Elwahab Elsayed

¹Community Health Nursing, Faculty of Nursing, Benha University, Egypt

Abstract: Musculoskeletal disorders are the most common cause of physical disability in working individuals as restaurant work is physically demanding that develop symptoms of various musculoskeletal disorders. Occupational Health Nurse plays important role in improving or maintaining a worker's health using prevention, protection and pro-active health interventions. The aim of the study was to evaluate the effect of an educational Intervention about work related musculoskeletal disorders on restaurant workers in Toshiba Alarabi Factories at Benha City. A quasi-experimental design was utilized for the study. The study was conducted at the restaurant of Toshiba Alarabi Factories at Benha city. A convenient sample of 43 workers was recruited for the study. Two tools were used for data collection; 1) a structured interviewing questionnaire to collect data about the workers' socio demographic characteristics, knowledge regarding work related musculoskeletal disorders and workers' self-reported pain /discomfort in the last 12 months. 2) An observation sheet to assess workers 'practice during performing their tasks. The study results showed that 62.8 % of workers had more than10 years of experience and more than two thirds of them suffer from musculoskeletal discomfort with highly statistically significant differences ($P < .001$) before and after educational intervention regarding total knowledge and practices scores of the studied workers. Moreover, there was statistically significant correlation ($P < 0.01$) between the workers' total knowledge and practice scores before and after educational intervention. The study concluded that the implementation of the educational intervention significantly improved workers' knowledge and practice regarding work related musculoskeletal disorders after the educational intervention than before intervention. The study recommended that adequately planned educational training programs must be conducted in order to improve workers' knowledge and practices regarding prevention of work related musculoskeletal disorders.

Keywords: Educational Intervention, Work Related Musculoskeletal Disorders, Restaurant Workers.

1. INTRODUCTION

Work related Musculoskeletal Disorders (WRMSDs) have been described as the most notorious and common causes of sever long term pain and physical disability that affect hundreds of millions workers across the world.^[1] According to a recent report, musculoskeletal disorders (MSDs) contributed 3.4% and 1.7% towards the total disease burden in the developed and developing world respectively.^[2] Although WMSDs are not fatal, they have the potential of developing into serious injuries in the musculoskeletal system if ignored.^[3] WRMSDs are common in working population, but this topic has not received adequate attention as they have negative impact on job performance, leisure activities and family roles.^[4]

Work related Musculoskeletal Disorders are conditions affecting the musculoskeletal system and can present in the tendons, muscles, joints, blood vessels or nerves of the limbs and back that arise when individuals are exposed to work activities and conditions that significantly contribute to their development or exacerbation.^[5] MSDs among kitchen workers are caused by long hour shifts, strenuous tasks and heavy workload or arm movements or put pressure on supporting parts of the body like back.^[6] Common types and outcomes of musculoskeletal disorders include sprains, tears, soreness, carpal tunnel syndrome, sciatica, osteoarthritis, and myalgia.^[7]

Symptoms of WRMSDs may include pain, discomfort, numbness and tingling in the affected area and can differ in severity from mild and periodic to severe, chronic and debilitating conditions.^[5] It has been found that some types of jobs represent a heightened risk of developing or aggravating WRMSDs and specific sectors, including homecare, nursing, mining and manufacturing, also have been identified as posing a heightened risk. The cost borne by employers for WMSDs has been found to have substantial economic implications.^[8] People work in the kitchen has higher pain level when compared with those who work in floor and other sectors. The frequency of bodily movement has the most contribution to the development of WRMSDs.^[9]

Work at restaurant is usually physically demanding that may develop symptoms of various WRMSDs such as in the back, lower limbs, neck and upper limbs. Workplace risk factors that affect any joint and muscle in the body may include, improper manual handling of loads, and awkward movements, prolonged repetitive movements, improper workstations, forceful hand exertions, improper working postures, prolonged standing, unsuitable tools equipment, inappropriate space of and work and time patterns. WRMSDs are more often associated with habitual tasks that contribute to gradual tissue damage.^[10] These are caused primarily by the performance of work and by the effects of the immediate environment in which work is carried out. The symptoms may vary from discomfort and pain to decreased body function and invalidity. Although it is not clear to what extent MSDs are caused by work, their impact on working life is huge. They interfere with activities at work resulting in absence from work and chronic occupational disability.^[11] Moreover, occupational health professionals should be enhanced for developing WRMSDs interventions by modifying techniques for correct practices, use of light weight in-flight items and by including other types of interventions as changing of organizational culture.^[12]

Restaurant workers have to maintain standing posture with long working hours, and repetitive movement of upper limbs.

There is a need of developing effective preventive strategies including training and education. It is important that the worker needs to understand which body movements and postures contribute to discomfort and the severity of WRMSDs. The training for workers should contain information to adjust specific workplace layouts to the workers' advantage to reduce or eliminate health hazards. Besides, the worker should be aware that the importance of rest periods (regular breaks) to relax when muscles are tired, or move around when muscles are stiff, to walk when work restricts the worker's ability to change postures or positions.^[13] Kitchen workers should encourage to actively participating in work analysis, planning, and implementing of the practice changes to decrease physical and mental workload.^[14]

The Occupational Health Nurse plays important role in maintaining or improving a worker's health using protection, prevention, and pro-active health interventions, creating productive healthy workers in a healthy workplace.^[15] Before identifying workers at risk, options of actions as applying the principle of best practice and providing evidence-based medicine must be also determined.^[16] Moreover, musculoskeletal disorders can be prevented through risk assessment, control procedures and safety measures at workplaces together with instructions and training of workers of all age groups. Occupational health services should design effective workplace design in combination with education and individual training focussing on the working technique to minimize the risk of repetitive injuries in all age groups, increase the efficiency and productivity of employees.^[17]

Significance of the study:

Work related Musculoskeletal Disorders have a substantial impact on disability among adults of working age. They are the second most common cause of disability worldwide.^[18, 19] also, WRMSDs problems result in low worker capacity and productivity that constitute the highest number of work-related disorders in Europe and accounted for 49% of all sickness absences lasting two weeks or more and 60% of permanent incapacity cases with total costs up to 2%.^[20, 21] They accounted for 34% of workplace illnesses and considered substantial for wait staff with incidence rate of 9.8 per 10,000

servers. [22] There are mixed findings regarding the prevalence of WRMSDs in the general population, and what age group suffers the most or is at greatest risk. Also, the prevalence rate of various WRMSDs is not reported well for restaurant workers in Egypt, Meanwhile, very less surveys has been done on WRMSD among non-healthcare working population in Egypt, among servants 84.5% , among university dentists 88.4% compared to physicians 58.5%, among paediatric physical therapists at a high prevalence of 90.6%. [23, 24, 25, 26] Occupational health nurse can effectively reduce WRMSDs risks and subsequent claims through adopting new practices using an evidence informed approach. More work is required to evaluate the success of interventions, identify potential barriers and implementation of controls. [27] Restaurant workers have been generally ignored when addressing WRMSDs. So, in this study we tried to explore and address this category of workers.

Aim of the study:

The aim of this study was to evaluate the effect of an educational Intervention about work related musculoskeletal disorders on restaurant workers in Toshiba Alarabi Factories at Benha City

Hypothesis: Knowledge and practice of restaurant workers about work related musculoskeletal disorders will improve after receiving an educational intervention also self-reported discomfort will decrease through:

- Assessing workers' knowledge and practice regarding WRMSDs
- Developing and implementing educational intervention according to workers' needs.
- Evaluating the effect of intervention on workers' knowledge and practice and self-reported discomfort.

2. SUBJECTS AND METHODS

Research design: A quasi-experimental design was utilized to fulfill the aim of this study

Setting: The study was carried out at the restaurant of Toshiba Alarabi factories at Benha city which started production in 1982 and consisted of three factories operating and one factory for feeder industries. This particular setting was chosen because it serves more than five thousand workers along three shifts also workers shared in all job tasks of the restaurant and the kitchen of Toshiba Alarabi factories.

Sample type and criteria:

Workers in the above mentioned setting at the time of the data collection (43) workers were recruited for the study as a convenient sample with the following inclusion criteria; agree to participate in the study, with experience for at least one year, free from recent injury, fracture, fall or accidents, free from recent surgery due to musculoskeletal problems like joint arthritis.

Tools of data collection: Two tools were used for data collection:

1-A structured interviewing questionnaire:

It was designed by the researcher after reviewing related literature. [10, 27] It was written in Arabic language in the form of closed ended questions and open-ended questions. It encompassed two major parts:

Part I: included sociodemographic data such as age, level of education, social status, years of experience and income

Part II: assess workers' knowledge about MSDs. This part was used before and after implementation of the educational intervention (pre/post-test format), It consisted of (2) sections;

Section (1) general knowledge regarding MSDs, it consisted of (6) items (definition, types, causes and risk factors, signs and symptoms, law about WRMSDs, prevention, complications and methods of treatment).

Section (2) workers' self-reported pain /discomfort in the last 12 months. It was adapted from the Standardized Nordic Questionnaire (SNQ) [28] it consisted of (9) items as participants were asked if they "ever had trouble in the past 12 months (pain, or discomfort)" around five different upper quadrant body regions (neck, shoulder, elbow, wrist/hand, and upper back) and four different lower quadrant body regions (lower back, hip/thigh, knee, and ankle/feet).

International Journal of Novel Research in Healthcare and Nursing

Vol. 4, Issue 3, pp: (1-15), Month: September - December 2017, Available at: www.noveltyjournals.com

Scoring system of knowledge:

In the open-ended questions the answers were classified into 3 categories (2) degrees for correct answer (1) degree for incomplete answer and (0) for who don't know answer. The total score of each section was calculated by summation of the scores of its items. The total score for the knowledge of workers was calculated by the addition of the total score of all sections. The mean and standard deviation was calculated. In addition, the score of total knowledge was divided into three levels, the worker was considered to have good level if the score was $\geq 75\%$, average level if the score was $50 - < 75\%$ and poor level if $< 50\%$.

II- An observation sheet:-

It was developed by the researcher after reviewing related literature. ^[27,29] to assess workers 'practice during performing their tasks it consisted of (17) items that include carrying , lifting and lowering objects, pushing , pulling, gripping things with hands, posture of arms , back / trunk, neck, wrist, clearance at workstation, making space, using tools, sitting, standing and wearing suitable footwear .

Scoring system of practices:

The scoring system for practices ranged from 1 to 0 as follows, each statement took (1) score if done correctly, and (0) if done not correctly. The total score of practices was divided into two levels, where workers whose practice scores $\geq 60\%$, were considered satisfactory, when their practice score $< 60\%$ they were considered unsatisfactory.

Methods:

The study was executed according to the following steps:

Approvals:

After approval to conduct this research, official letters were used from the Dean of the Faculty of Nursing to the director of the previously mentioned setting in order to obtain their agreement to conduct the study after explaining its purpose

Tools validity:

Tools were reviewed by a panel of five experts in the field of Community Health Nursing to test their content validity and ascertain relevance and completeness of tools. Modifications were done accordingly based on their judgment.

Tools reliability:

Internal reliability for tools was done by Cronbach's Alpha coefficient test which revealed that each of the two tools consisted of relatively homogenous items as indicated by high reliability of each tool (knowledge = 0.892 and practices = 0.863).

Ethical considerations:

Permission was obtained orally from each worker before starting data collection and after giving a brief orientation to the purpose of the study. Confidentiality was ensured throughout the study process, and the worker was assured that all data were used only for research purpose. Each worker was informed that participation is voluntary and they are free to withdraw from the study at any stage.

Pilot study:

A pilot study was carried out on 10% from the total number of sample (5) workers to assess the tools clarity, objectivity and feasibility, as well as to estimate the time needed to fill in the questionnaire. Required modifications were done in the form. Workers involved in the pilot were excluded from the study.

Field work:

The study was carried out through four phases: assessment, planning, implementation, and evaluation. These phases were carried out from beginning of July 2014 to the end of March 2015, covering along a period of nine months. The previously mentioned settings were visited by the researcher 5days/week from 11.00 a.m. to 2.00 p.m

International Journal of Novel Research in Healthcare and Nursing

Vol. 4, Issue 3, pp: (1-15), Month: September - December 2017, Available at: www.noveltyjournals.com

Assessment phase: Upon securing official permissions to conduct the study, the researcher interviewed the workers, greeted each worker, explained the purpose of the study, and asked for participation. Upon consent to participate, the worker was interviewed to assess general characteristics, knowledge regarding WRMSDs, as well as workers' practices during performing their job tasks. The data obtained during this phase constituted the baseline for further comparisons to evaluate the effect of the educational intervention. Average time for the completion of interviewing schedule 20-30 minutes. The number of assessed worker/week ranged from 3- 4 workers. The observation sheet was filled in by the researcher during performing their job tasks inside the kitchen and restaurant of the factory in the morning and afternoon shifts.

Planning phase: Based on the needs identified in the assessment phase from the workers, and in view of the related literature, the educational intervention was developed by the researchers in the form of printed Arabic booklet to satisfy the studied workers' deficit knowledge and practices regarding WRMSDs. Presentation about WRMSDs was prepared in simple Arabic language to suit the workers' level of understanding. The *general objective* of the educational intervention evaluates the effect of an educational Intervention about WRMSDs on restaurant workers.

Specific objectives: By completion of the educational intervention, each worker will be able to:

- Discuss the significance of WRMSDs as a major cause of disability.
- Define WRMSDs.
- List common causes and risk factors for WRMSDs.
- Differentiate between types of WRMSDs.
- Discuss the complications of WRMSDs.
- Discuss preventive measures of WRMSDs.
- Enumerate treatment methods WRMSDs.
- Identify risky tasks for developing WRMSDs
- Discuss practical solutions for these risky tasks.

Implementation phase: Implementation of the educational intervention took (16) weeks period. The researchers visited each of the previously mentioned setting in one shift during their break in the afternoon, 5 days/week alternatively. The educational intervention involved (7) scheduled sessions; 4 sessions for theoretical content and 3 for practical content. These sessions were repeated to each subgroup of (3-4) workers. The duration of each session lasted from half an hour to one hour including periods of discussion according to their achievement, progress and feedback. At the beginning of the first session an orientation to the educational intervention and its aims took place. Feedback was given in the beginning of each session about the previous one. Different teaching strategies were used such as group discussions, critical thinking and problem solving and demonstrations /re-demonstrations. Suitable teaching media were used, included an educational booklet that was distributed to all workers in the first day of the educational intervention. This booklet illustrates a number of tasks which may result in MSDs and provides practical solutions. It aims at assisting employers workers in preventing MSDs and consequent economic loss, and fulfilling their legal responsibilities in a factory.

Evaluation phase: Immediately after implementation of the educational intervention, the post test for workers' knowledge and practices was done by the same formats of the pre-test to assess the impact of the implemented educational intervention.

Statistical analysis:

Data analysis was performed using Statistical Package for Social Sciences (SPSS), version 20.0. Descriptive statistics were applied (e.g frequency and percentage). Test of significance (chi-square) were applied to test the study hypothesis. Correlation coefficient was calculated between knowledge, and practice scores. A statistically significant difference was considered at $p\text{-value} \leq .05$, and a highly statistically significant difference was considered at $p\text{-value} \leq .001$, while the $p\text{-value} > .05$ indicates non-significant results.

3. RESULTS

Table (1) represents socio-demographic characteristics of the studied workers. It was clear that 34.9% of the workers were aged from 40-<50 years, with a mean age 40.4±10.1years. Furthermore, 62.8% had diploma. 90.7% of workers were married. Regarding family income, it was revealed that 74.4% had insufficient income In addition, 62.8 % of the sample had more than10 years of experience in the kitchen and restaurant, with a mean 17.6+11.1years.

Table (2) displays that there were general improvements (P<.001) before and after implementation of the educational intervention in relation to workers’ general knowledge about WRMSDs definition, types, causes and risk factors, signs and symptoms, Law about WMSDs , prevention, complications and methods of treatment.

Fig. (1) represents that, 69.8% of workers suffer from musculoskeletal discomfort in the last 12 months .

Table (3) shows distribution of the studied subjects according to correct practices during performing tasks before and after educational intervention. It displays that, there were highly statistically significant differences (P<.001) before and after educational intervention in relation to all items of practice.

Fig. (2) illustrates that, no workers had a good knowledge level before the educational intervention. However, 79.1% of them had good knowledge level after intervention.

Table (4) displays that, there were statistically significant differences (< 0.05) before and after educational intervention in relation to workers’ self-reported pain /discomfort in the last 12 months.

Fig. (3) demonstrates that, 18.6% of the workers had satisfactory level of practices during performing tasks before the educational intervention. However, after the educational intervention, 53.5% of them had got satisfactory level of practices.

Table (5) Illustrates that, there was a positive, highly statistically significant correlation (P ≤ .01) between workers' total knowledge and practice scores before and after the educational intervention.

Table (1): Distribution of the study subjects according to their socio-demographic characteristics. (n= 43)

Characteristics	No	%
Age		
- 20-<30	7	16.3
- 30-<40	11	25.6
- 40-<50	15	34.9
- 50+	10	23.3
Mean ± SD	40.4±10.1	
Level of education		
- Preparatory education	5	11.6
- Diploma	27	62.8
- Bachelor	11	25.6
Social status		
- Married	39	90.7
- Not married	4	9.3
Years of experience		
- 1< 5	8	18.6
- 5 - <10	8	18.6
- 10+	27	62.8
Mean ± SD	17.6+11.1	
Income		
- Sufficient	11	25.6
- Insufficient	32	74.4

Table (2): Distribution of the studied subjects according to their general knowledge regarding WRMSDs before and after educational intervention (n= 43).

Items	Study period		Pre-intervention		Post-intervention		χ^2	<i>P value</i>
	No	%	No	%	No	%		
Definition of WRMSDs								
- Correct answer	8	18.6	43	100.0	59.0	<.001**		
- Incomplete answer	18	41.9	0	0.0				
- Don't know	17	39.5	0	0.0				
Types of WRMSDs								
- Correct answer	0	0.0	18	41.9	44.1	<.001**		
- Incomplete answer	18	41.9	25	58.1				
- Don't know	25	58.1	0	0.0				
Causes & risk factors of WRMSDs								
- Correct answer	0	0.0	14	32.6	43.4	<.001**		
- Incomplete answer	13	30.2	27	62.8				
- Don't know	30	69.8	2	4.7				
Signs and symptoms								
- Correct answer	0	0.0	37	86.0	68.8	<.001**		
- Incomplete answer	15	34.9	6	14.0				
- Don't know	28	65.1	0	0.0				
Law about WRMSDs								
- Correct answer	8	18.6	34	79.1	36.0	<.001**		
- Incomplete answer	18	41.9	9	20.9				
- Don't know	17	39.5	0	0.0				
Prevention of WRMSDs								
- Correct answer	0	0.0	29	67.4	54.5	<.001**		
- Incomplete answer	18	41.9	14	32.6				
- Don't know	25	58.1	0	0.0				
Complications								
- Correct answer	0	0.0	29	67.4	48.6	<.001**		
- Incomplete answer	20	46.5	12	27.9				
- Don't know	23	53.5	2	4.7				
Methods of treatment								
- Correct answer	8	18.6	36	83.7	37.8	<.001**		
- Incomplete answer	19	44.2	6	14.0				
- Don't know	16	37.2	2	3.1				

 χ^2 : Chi-Square test

 ** Highly statistically significant difference at $P \leq .001$

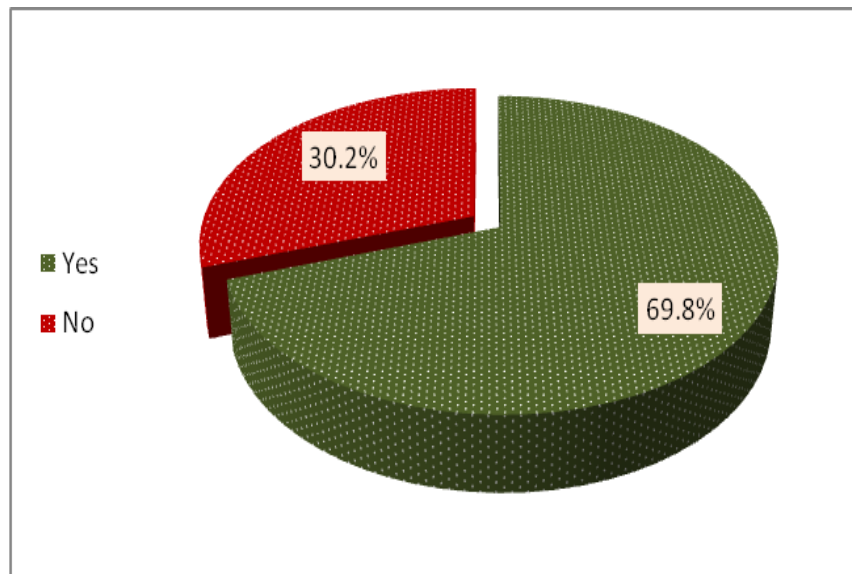


Figure (1) Distribution of workers' self-reported pain /discomfort in the last 12 months (n=43)

Table (3): Distribution of the studied subjects according to correct practice during performing tasks before and after educational intervention (n= 43).

Study period Items	Pre-intervention		Post-intervention		χ^2	P value
	Correct practice		Correct practice			
	No	%	No	%		
Carrying objects	9	20.9	43	100.0	56.23	<.001**
Lowering objects	12	27.9	43	100.0	48.4	<.001**
Pushing things	12	27.9	43	100.0	48.4	<.001**
Pulling things.	8	18.6	37	86.0	36.6	<.001**
Gripping things with hands	11	25.6	43	100.0	48.4	<.001**
Lifting objects	13	30.2	43	100.0	48.4	<.001**
Posture of arms	8	18.6	43	100.0	56.2	<.001**
Posture of back / trunk	14	32.5	35	81.4	24.8	<.001**
Posture of neck	10	23.3	39	90.7	35.1	<.001**
Posture of wrist	15	34.9	37	86.0	29.6	<.001**
Posture of hands	7	20.9	36	83.7	33.9	<.001**
Clearance and cleaning of workstation	14	32.5	39	90.7	35.1	<.001**
Making space	12	27.9	37	86.0	29.6	<.001**
Using tools	9	20.9	35	81.4	31.4	<.001**
Sitting	13	30.2	39	90.7	35.1	<.001**
Standing	12	27.9	37	86.0	29.6	<.001**
Wear suitable footwear	11	25.6	37	86.0	29.6	<.001**

χ^2 : Chi-Square test

** Highly statistically significant difference at $P \leq .001$

Table (4): Distribution of workers' self-reported pain /discomfort in the last 12 months before and after educational intervention (n=30)

musculoskeletal discomfort	Pre-program		Post-program		χ^2	<i>P</i>
	No	%	No	%		
Neck	20	66.7%	18	60.0%	3.992	< 0.05*
Shoulder	25	83.3%	24	80.0%	4.065	< 0.05*
Upper back	17	56.7%	16	53.3%	4.049	< 0.05*
Lower back	28	93.3%	23	76.7%	4.032	< 0.05*
Elbow	15	50.0%	13	43.3%	3.876	< 0.05*
Wrist/hand	23	76.7%	21	70.0%	3.923	< 0.05*
Hip/thighs	13	43.3%	12	40.0%	3.655	< 0.05*
Knee	18	60.0%	17	56.7%	3.789	< 0.05*
Ankle/feet	16	53.3%	15	50.0%	3.698	< 0.05*

χ^2 : Chi-Square test

*Significant difference at $P \leq .05$

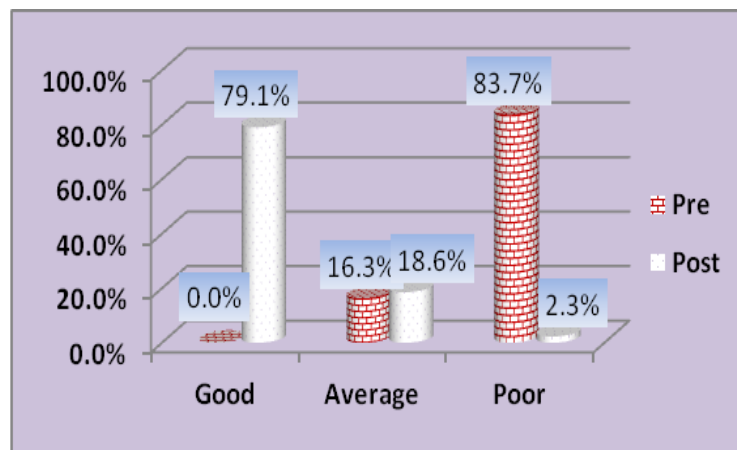


Fig. (2): Distribution of the study subjects according to their total knowledge scores regarding WRMSDs before and after educational intervention (n= 43)

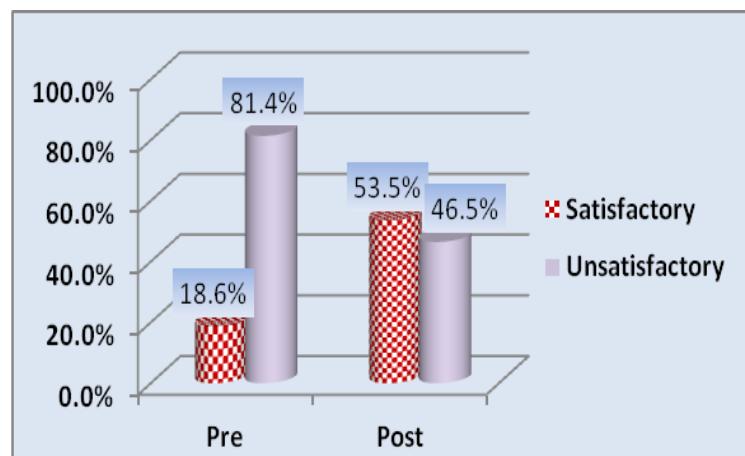


Fig. (3): Distribution of the study subjects according to their total practice scores during performing tasks before and after educational intervention (n= 43)

International Journal of Novel Research in Healthcare and Nursing

Vol. 4, Issue 3, pp: (1-15), Month: September - December 2017, Available at: www.noveltyjournals.com

Table (5): Correlation coefficient between study subjects' total knowledge and practice scores before and after educational intervention (n= 43)

Variables		Knowledge	
		r	P
Practices	Pre-intervention	0.40	<.01**
	Post-intervention	0.24	<.01**

**Correlation is highly statistically significant at $P \leq .01$

4. DISCUSSION

Musculoskeletal disorders are the most common cause of physical disability and severe long-term pain in working individuals.^[30] The prevalence of WRMSDs is significant in many professions, and this has had a marked impact on the professionals, businesses, governments, and society at large.^[31] Health problems range from discomfort, minor aches, and pains, to more serious medical conditions requiring time off work and even medical treatment. In more chronic cases, treatment and recovery are often unsatisfactory, and the effects could be permanent disability and loss of employment.^[32] Working in a kitchen will involve more than one activity e.g. cutting, grinding, washing that may lead to musculoskeletal disorders.^[33] Long working hours, stress, long standing, heavy workload, high-speed work, and inadequate rest are the factors influencing the increase of MSDs prevalence among the kitchen workers.^[34] I believe that it is important in this occupational group to be provided with education for preventive strategies and appropriate self-management techniques.^[35]

Several evidences suggested a strong need for health educational programe in this area. **Nag, et al.**^[36] pointed out that it is crucial to increase workers' perceptions about the risks factors of MSDs in order to organize preventive measures and intervention for productivity, health, and well-being. similarly, **Health and Safety Authority**^[5] demonstrated a need for a training programme to make employees aware of the risks of WRMSDs associated with certain work activities and stated that training should be relevant and relate to site-specific hazards, and should provide participants with the knowledge and skills to allow them to carry out activities in a manner which reduces the risk of WRMSDs. **Akinpelu, et al.**^[37] Also, **Occupational Safety and Health Administration**^[38] recommended that employees should receive general awareness ,training that can integrated into initial safety and health training to learn the proper use of equipment and tools, recognize early symptoms of WRMSDs and the importance of early reporting. Besides **Tiwari**^[39] in his study on restaurant workers as he stated that there is a need to increase awareness about preventable nature of hazards and protective measures available Moreover, The present study findings showed highly significant improvement in the workers' knowledge regarding all items related to WRMSDs after the educational intervention as compared to before the intervention. The results of the present study agree with at least three other researches. *First*, **Tamirin , et al.**^[40] Who had studied "the effectiveness of intervention program for preventing and reducing low back pain" He pointed out that, a significant increase of knowledge was observed among the intervention group after intervention compared to the control group as mean score for control group remained the same after intervention. *Second*, **Zakerian, et al.**^[41] Who found that participants' awareness of ergonomic principles was mediocre and, the level of their knowledge about working conditions and work-related injuries were scored low and weak, respectively. *Third*, **Abareshi, et al.**^[42] In his educational intervention for reducing WRMSDs on 158 employees of the factory. They found that before intervention in both the experimental and control groups, there were no significant differences; however, following training intervention there was a significant increase in all constructs as they stated that that increased knowledge of the subject can lead to an increase in productivity. This improvement of knowledge post intervention in the current study may be attributed to the ability of workers to gain knowledge easily and they are interested to refresh and update their knowledge. As well as, educational training programs about prevention and management of WRMSDs are recommended by many researches to improve heath condition of workers. Finally the distribution of the written booklet to workers to be used as an ongoing reference, was helpful in workers' acquisition of knowledge.

Additionally, the finding of the present study pointed out that, more than two thirds of workers suffer from musculoskeletal discomfort as most of them having lower back pain followed by wrist/hand neck and shoulder as the physical demands of restaurant work appeared to adversely impact the discomfort that developed .These results are in

accordance with **Iiban**,^[35] Who had studied "musculoskeletal disorders among first class restaurant workers " He found that work-related musculoskeletal disorders was prevalent among more than of the half of restaurant workers and was most frequently reported in the ankle/foot region with the highest mean pain intensity score was found in the forearm region. This difference in the most frequently places of complain than places of complain in our study is due to difference in the tasks that is performed by restaurant servers and our study sample tasks that includes a lot of tasks in the kitchen and restaurant. Second, **Huynh**,^[34] who study health risks among chefs also found that musculoskeletal pains are quite prevalent among the participants. Back, neck/ shoulder, leg and back pains all happen to participants. In addition to **Sal, et al.**^[43] Who evaluate kitchen workers for MSDs and reported that more than two thirds of them suffered from some kind of symptoms during 12 months. The highest prevalence was reported in lower back, neck, and upper back. Furthermore, **Chang, et al.**^[44] Found that the prevalence of neck, shoulder and low back pains as common health problems among chefs and kitchen workers has been reported.

Also, the results are congruent with at least four other researches that have been done surveys on WRMSDs among non-healthcare workers. *First, the* previously mentioned **Balakrishnan, et al.**^[4] who had studied "work-related musculoskeletal disorders among non-healthcare working population" They found that most of the participants having lower back pain and followed by neck and shoulder. Besides that, minority of the sample has wrist pain and elbow pain. These differences in discomforts in some parts of the body due to difference in the nature of work in the kitchen and restaurant work and in the sample characteristics. *Second, Egwuonwu, et al.*^[45] They reported that, among the different categories of workers included in the study, all drivers and mechanics complained of WRMSDs over 12 months period. *Third, Maduagwu, et al.*^[46] Who had studied "WRMSDs among self employed sewing machine operators " they reported that the prevalence of WMSDs in the respondents was high and the lower back and neck were the most affected body parts based on annual prevalence. *Fourth, Salve*^[47] He mentioned that back was an area of concern as the majority of the respondents were complaining about the low back, which was supported by the physical examination. *Fifth, Nur et al.*^[48] Who investigated" the prevalence of WMSDs among workers performing industrial repetitive tasks "The results of this study showed that the overall prevalence of body pain is high .The highest prevalence of MSDs for the last twelve months is on the neck, followed by hand/wrist, shoulder and upper back.

In relation to researches that have been done surveys on WRMSDs among healthcare workers, our study findings are agree with most of them also. *First, the* previously mentioned **Hassan et al.**^[25] who reported that most of university dentists and physicians complain of WRMSDs. *Second, the* previously mentioned **Atia, et al.**^[26] They found that most participating pediatric physical therapists suffered from musculoskeletal problems in one area at least during the last year and almost one third of them suffered from four injured regions at least as the most common injured regions were neck, shoulder, wrist and hand, lower back and knee while elbow, upper back, hips and thighs and ankles were the least complaint region. *Third Milhem et al.*^[49] who found that the prevalence of WMSDs among physical therapists was high at 12-month and the lower back as the most frequently affected. *Fourth, Abdel Raof, et al.*^[50] They found that reported 12 months prevalence of work related musculoskeletal disorders among Egyptian physiotherapist was high especially in spine and upper limb with the low back was the most commonly affected part.

It was obvious from the study results that workers' self-reported pain /discomfort in the last 12 months was decreased in post intervention phase than pre intervention. This result goes in the same line with **Pourhaji etal.**^[51] His study shows the rate of felt pain in neck, shoulder, upper and lower back was decreased significantly at three months post-intervention compared to pre intervention stage.

Regarding to practices scores of workers, as observed; correct practices of workers were in low percentages before educational intervention regarding to carrying, lifting and lowering objects, pushing, pulling, gripping things with hands, posture of arms, back / trunk, neck, wrist, clearance at workstation, making space, using kitchen tools, sitting, standing and wearing suitable footwear. This goes in line with the previously mentioned **Wills et al.**^[22] who study restaurant servers during a typical shift. They observed awkward postures for the different body regions. A total of 260 poor postures were recorded during the observations as they observed several body regions with greatest number of poor posture including, wrist extension, shoulder abduction, elbow flexion, and neck side bending for all three of the restaurants that have been studied. Moreover, our study results go in the same line with the previously mentioned **Huynh**,^[34] who observed that chiefs are working and standing all the time incorrectly and doing kitchen jobs with awkward

International Journal of Novel Research in Healthcare and Nursing

Vol. 4, Issue 3, pp: (1-15), Month: September - December 2017, Available at: www.noveltyjournals.com

postures also carrying and lifting heavy items in a faulty manner. Furthermore, **Sal, et al.**^[43] Found awkward postures, manual material handling badly and back rotation and bending among kitchen workers in his study. In addition, **Ansari, et al.**^[52] Who study work posture and MSDs and stated that long working hours, heavy workload, stress, high-speed work, long standing and inadequate rest are the factors influencing the increase of MSDs prevalence.

Additionally, the present study also revealed that there were highly improvements in practice scores in relation to workers' practices about all previous items in post intervention phase than before intervention. This was supported by previously mentioned **Sal, et al.**^[43] Who found improvement in kitchen workers practice after training intervention that will help to reduce MSDs and increase productivity. This finding is also in agreement with **Pourhaji, et al.**^[51] Who found that workers' behavior mean scores were different promoted after three month post intervention.

Concerning workers' total knowledge and total practice about WRMDs, the present study findings revealed that, a minority of the sample had a good knowledge and practice levels before educational intervention. However, after educational intervention the good knowledge level and practice levels changed to be for the majority. The decrease of the percentage of the workers' good knowledge level before educational intervention may be due to that most of the studied workers were diploma graduates, working since more than 10 years ago, as well as the inadequate participation in intervention programs related to our research topic leading to this poor in knowledge.

Moreover, the current study showed a positive, statistically significant positive correlation between workers' total knowledge and practice scores. In the same line with **Occupational Safety and Health Administration**,^[38] Stated that teaching workers and increasing their knowledge to avoid long standing, maintain neutral postures, and use proper lifting techniques will help them to adapt correct posture whether they are sitting, standing, pulling, pushing, lifting, or using tools or equipment. In addition study by **Ithnin & Amirul**,^[53] showed that there is significant relationship between each knowledge, attitude and practice of safety and health. Meanwhile a study by **Khorsandi, et al.**^[54] was contradict to our study findings as revealed no significant relationship was observed between knowledge and practice of the participants toward prevention of chronic low back pain. Also, **Berthelette, et al.**^[55] reported that interventional programs should start before the high incidence of the problems. Thus, to produce knowledgeable and well trained worker, emphasis should be made on educational training programs and continual observation of practices during performing their job tasks which will help in increasing productivity and decreased risks for developing MSDs.

5. CONCLUSION

Based on the results of the present study, it can be concluded that, there was a statistically significant improvement in workers' knowledge and practice regarding to WRMSDs after the educational intervention than before intervention. The implementation of an educational intervention significantly improved workers' self-reported pain /discomfort in the last 12 months. Moreover, the above mentioned results proved and reinforced the study hypothesis.

6. RECOMMENDATIONS

Based on the findings of the present study the following recommendations are suggested:

- Adequately educational training programs in the form of posters, films, workshops, must be conducted in order to improve workers' knowledge and practices toward prevention of WRMSDs to enhance self-management techniques which will be reflected on job performance.
- Education on the awareness of occupational health hazards and implementation of interventional and corrective measures in order to reduce the risk of WMSDs is necessary.
- Replication of the study on a larger sample and in different geographical areas in Egypt is recommended for generalization of findings and to better understand the demands required for this group.

ACKNOWLEDGEMENTS

The author would like to express their appreciation to all workers who willingly participated in the study.

REFERENCES

- [1] Yogi, K., Kawakami, T., Itani, T., & Batino, J. Low-cost work improvements that can reduce the risk of musculoskeletal disorders. *Int J Ind Ergon.*, 2012; 27(1): 4-15.
- [2] Connelly, L.B. , Woolf, A., & Brooks P. Cost effectiveness of interventions for musculoskeletal conditions. In Jamison, D.T., Bremen, J.G., & Meacham, A.R. (eds.). *Disease control priorities in developing countries*. 2nd ed., New York: Oxford Univ Press, 2007; pp. 963–980
- [3] Kumar, V., K., Kumar, S., P, & Baliga, M. R. Prevalence of work-related musculoskeletal complaints among dentists in India: a national cross-sectional survey. *Indian J Dent Res.*, 2013; 24:428-38
- [4] Balakrishnan, R., Chellappan, M.E., Changalai, E., Prevalence of work-related musculoskeletal disorders among non-healthcare working population in different gender at Selangor, *International Journal of Physical Education, Sports and Health*, 2016; 3(2): 30-34.
- [5] Health and Safety Authority, *Guidance on the prevention and management of musculoskeletal Disorders (MSDs) in the workplace*, 2013; pp.2-32.
- [6] Haukka E., Leino- Arjas P., Ojajarvi A., Takala E., Viikari-Juntura E., Riihimäki H., *Mental Stress and Psychosocial Factors at Work in Relation to Multiple sites Musculoskeletal Pain: A Longitudinal Study of Kitchen Workers*, *Eur J Pain*. 2011; 15(4):432-8.
- [7] Osborne A, Blake AC, Fullen BM, et al. Risk Factors for Musculoskeletal Disorders Among Farm Owners and Farm Workers : A Systematic Review. *Am J Ind Med*. 2012;389(December 2011):376-389. doi:10.1002/ajim.22001.
- [8] Summers , K., Jinnett, K., & Bevan, S., *The Center for Workforce Health and Performance*, 2015; 525–537.
- [9] Occupational Safety and Health Council, *Final Report on the Study of Work-related Musculoskeletal Disorders in Catering Industry in Hong Kong*, 2011; pp2-73
- [10] Occupational Safety and Health Branch, Labour Department, *Catering Industry: Hints on Prevention of Musculoskeletal Disorders*, 2006; pp.1-30
- [11] European Agency for Safety and Health at Work, *Work-related musculoskeletal disorders: Back to work report* , Belgium , 2007; p. 12
- [12] Hyeonkyeong , L.E.E., Hyunmi , A.H.N., Chang, Gi, P.A.R.K., Sun Jung, K.I.M., & Sun Hye, M.O.O.N., *Safe Health Work* , 2011; 2:183-93
- [13] Occupational Safety and Health Council, *Final Report on The Study of Work-related Musculoskeletal Disorders in Catering Industry in Hong Kong*, 2011; p.
- [14] Haukka, E., Pehkonen, I., Leino-Arjas, P., Viikari-Juntura, E., Takala, E.P., Malmivaara, A., Hopsu, L., Mutanen, P., Ketola, R., Virtanen, T., Holtari-Leino, M., Nykanen, J., Stenholm, S., Ojajarvi, A., & Riihimaki, H. Effect of a participatory ergonomics intervention on psychosocial, factors at work in a randomized controlled trial. *Occup Environ Med.*, 2011; 67(3): 170–7
- [15] Riddell, M., & King, J., *occupational health nursing : practice profile*, 2011; pp.1-4.
- [16] Hagberg ,M., Violante, F.S., Bonfiglioli, R., Descatha, A., Gold, J., Evanoff, B., *Prevention of musculoskeletal disorders in workers: classification and health surveillance – statements of the Scientific Committee on Musculoskeletal Disorders of the International Commission on Occupational Health*, *BMC Musculoskeletal Disorders* 2012; 13:109
- [17] Diso Khan, R., Surti, A., Rehman, R., Ali, U., *Knowledge and practices of ergonomics in computer users*, *J Pak Med Assoc.*, 2012; 62(3): 213–217
- [18] Shaw, W.S.; Hartvigsen, J.; Woiszwilllo, M.J.; Linton, S.J.; Reme, S.E. Psychological distress in acute low back pain: A review of measurement scales and levels of distress reported in the first two months after pain onset. *Arch. Phys. Med. Rehabil.*, 2016; Sep; 97(9):1573-1587

International Journal of Novel Research in Healthcare and Nursing

 Vol. 4, Issue 3, pp: (1-15), Month: September - December 2017, Available at: www.noveltyjournals.com

- [19] Vos, T., Flaxman, A.D., Naghavi, M., Lozano, R., Michaud, C., Ezzati, M., Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*; 380(9859):2163-2196.
- [20] Stolt, M., Suhonen, R., Virolainen, P., & Leino-Kilpi, H., Lower extremity musculoskeletal disorders in nurses: A narrative literature review, *Scandinavian Journal of Public Health*, 2016; 44: 106–115.
- [21] Bevan, S. Economic impact of musculoskeletal disorders (MSDs) on work in Europe. *Best Pract. Res. Clin. Rheumatol.* 2015, 29, 356–373.
- [22] Wills, A.C., Devis, K.G., Kotowski, S.E., Quantification of Ergonomic Exposures for Restaurant Servers, *J Ergonomics*, 2016; 6 (3): 1–11.
- [23] McPhail, S.M., Schippers M, Marshall AL. Age, physical inactivity, obesity, health conditions, and health-related quality of life among patients receiving conservative management for musculoskeletal disorders. *Clin Interv Aging.* 2014; 9:1069-80.
- [24] El Tayeb, I.M., Ghareeb, N.S., & Zalat MM, prevalence musculoskeletal problems among full time lady servants in Doqqi area, Cairo, *Egyptian Journal of Occupational Medicine*, 2013; 37 (1) : 47-59
- [25] Hassan, E.E., Elkhateeb AS, Ewis AA and Ali AN., Musculoskeletal disorders among dentists and physicians at Minia university hospital; A comparative study. *Egyptian Journal of Occupational Medicine*, 2017; 41 (1) : 55-70
- [26] Atia, D.T., Abdelazeim, F.H., & Radwan, H., Impact of Work-Related Musculoskeletal Disorders on Egyptian Pediatric Physical Therapists: One-Year Follow-Up Study, *Trends in Applied Sciences Research* , 2015;10 (3): 175-182,
- [27] Macdonald, W., & Oakman, J., Musculoskeletal Disorders at work: Using evidence to guide practice, *J Health & Safety Research & Practice*, 2017; 5(2) : 7-12
- [28] Kuorinka, I., Jonsson, B., Kilbom, A., et al. Standardized Nordic questionnaires for the analysis of musculoskeletal symptoms. *Appl Ergon* 1987;18:233–237.
- [29] Watt, D., Employee health and safety orientation manual: guide to health and safety in the work place, 2013
- [30] Parot-Schinkel, E., Descatha, A., Ha, C., Petit, A., Leclerc, A., Roquelaure, Y. Prevalence of multisite musculoskeletal symptoms: a French cross-sectional working population-based study. *BMC Musculoskelet Disord.* 2012; 13(1):122.
- [31] Hsien-Lin ,T., Liu, Y.C., Hsieh, T.Y., Hsiao, F.Y, Lai,Y.C., Chang, C.S., Prevalence of and risk factors for musculoskeletal complaints among Taiwanese dentists, *J Dent Sci.*, 2012; 7(1): 65–71
- [32] Magdy A. Darwish and Shatha Z. Al-Zuhair: Musculoskeletal Pain Disorders among Secondary School Saudi Female Teachers. Volume 2013;
- [33] Sripaiboonki, P., & Taptakarnporn, S., Health Effects on Canteen Staff Working in a University Canteen, *Health*, 2014; 6, 2392-2398.
- [34] Huynh, T., Health Risks of Being a Chef and its effects on chefs and the restaurant business, Master thesis in hospitality management, 2015 ; p.41,42
- [35] Ilban, M.O., Musculoskeletal Disorders among First Class Restaurant Workers in Turkey, *Journal of Foodservice Business Research*, 2013 ; 16 (1): 95-100.
- [36] Nag, A., yas, H. V., Shah, P., & Nag, P.K., Risk Q1 Factors and Musculoskeletal Disorders Among Women Workers Performing Fish Processing, *American journal of industrial medicine*, 2012; 6(3): 1–11 .
- [37] Akinpelu , A. O., Oyewole, O. O., Odole, A. C., & Olukoya R, Prevalence of Musculoskeletal Pain and Health seeking Behaviour among Occupational Drivers in Ibadan, Nigeria, *Afr. J. Biomed. Res.* 2011; 14(2): PP.89-94
- [38] Occupational Safety and Health Administration, United States Department of Labor, Prevention of Musculoskeletal Injuries in Poultry Processing, 2013; p.4

International Journal of Novel Research in Healthcare and Nursing

 Vol. 4, Issue 3, pp: (1-15), Month: September - December 2017, Available at: www.noveltyjournals.com

- [39] Tiwari, R.R., Situational Analysis of Occupational Health Issues of Restaurant and Dhaba Workers, *Occup Med Health Aff.*, 2012; 6(3): 3:6
- [40] Tamirin,S.B.M., Yokoyama, K., Naing,L., Guan,N.Y., the effectiveness of simplified intervention program for preventing and reducing low back pain among malasian bus drivers ,*American Journal of Applied Science*, 2014;11(5):818-832
- [41] Zakerian,S.A., Monazzam,M,R., Farhang, S., Relationship between knowledge of ergonomics and workplace conditions with musculoskeletal disorders among nurses: A Questionnaire Survey, *World Applied Sciences Journal*, 2013 ; 24 (2): 227-233
- [42] Abareshi, F., Yarahamadi, R.,Solhi, M.,& Farshad, A.A., Educational intervention for reducing work-related musculoskeletal disorders and promoting productivity, *International Journal of Occupational Safety and Ergonomics*, 2015; 21(1): 480-485.
- [43] Sal, S.K., kohpaei, A., Gharghani,Z.G., habibi, P., Zeyaei,M., Gilasi, H., Moghadam, R., Ferasati, R., Ergonomic evaluation of musculoskeletal disorders among kitchen workers by QEC technique in the Tehran University of Medical Science, *sjimu.*, 2013, 20(5): 18-23
- [44] Chang, H., Kim J., Ju S., Go.E. 2012. How do the Work Environment and Work Safety Differ Between the Dry and Wet Kitchen Foodservice Facilities? , *Nutr Res Pract.* , 2012; 6(4): 366–374
- [45] Egwuonwu, V.A., Abidemi, T, B., Aiyejunsunle, C. B., Ezeukwu, O. A., Auwal, A., Okoye, C. E., A Cross-Sectional Survey Of Work Related Musculoskeletal Disorders Prevalence And Associated Risk Factors Among Quarry Workers In A South Eastern Nigerian Community. *The Internet Journal of Epidemiology*, 2013; 11(2): 1-7.
- [46] Maduagwu, S.M., Sokunbi, G.O., Bwala, M.P., Akanbi, O.A., Jajere, A.M., et al., Work-Related Musculoskeletal Disorders among Self-employed Sewing Machine Operators in Maiduguri, Nigeria. *Occup Med Health Aff.*, 2015; 3:219.
- [47] Salve,U.R., Prevalence of musculoskeletal discomfort among the workers engaged in jewelry manufacturing, *Indian J Occup Environ Med.*, 2015 ; 19 (1): 44-55
- [48] Nur, N.M., Md Dawal and Mahidzal ,D., M., The Prevalence of Work Related Musculoskeletal Disorders Among Workers Performing Industrial Repetitive Tasks in the Automotive Manufacturing Companies, *Proceedings of the 2014 International Conference on Industrial Engineering and Operations Management Bali, Indonesia, January 7 – 9; 2014*
- [49] Milhem, M., Kalichman,L., Ezra, D., and Nagenson, D. A., work-related musculoskeletal disorders among physical therapists : Narrative review, *International Journal of Occupational Medicine and Environmental Health*, 2016;29 (5):735 – 747
- [50] Abdel Raouf, N., EL Desoky,E.M., and Farag ,Y., Work Related Musculoskeletal Disorder among Egyptian Physiotherapists, *Bull. Fac. Ph. Th. Cairo Univ.*, 2014; 19 (1):1-9
- [51] Pourhaji,l., F., Naserinia, S.G., Pourhaji,F., Pourhaji, R., &Ranjbar, H., Educational ergonomic intervention and work-related musculoskeletal disorders among office workers in Tehran, Iran, *International Journal of Musculoskeletal Pain prevention*, 2016; 1(2): 61-67.
- [52] Ansari, S., Ataei, S.S,Varmazyar, S., Heydari, P.,The effect of mental workload and work posture on musculoskeletal disorders of Qazvin hospitals, in 2016; *JOHE*, 2016; 5 (4) : 202-210
- [53] Ithnin, A., & Amirul,M., Knowledge, Attitude And Practice (KAP) Of Safety And Health Among Students In School, *Journal of Occupational Safety and Health*, 2016; 13(1): 41- 44.
- [54] Khorsandi, M., Sharafkhani, N., Shamsi, M., Ranjbaran, M., Knowledge, self-efficacy, and practice among nurses for prevention of chronic low back pain in Arak, Iran, in 2014, *JOHE.*, 2015; 2(4) : 157-164.
- [55] Berthelette , D., Leduc,N., Bilodeau, H., Durand ,M., Faye, C., Evaluation of the implementation fidelity of an ergonomic training program designed to prevent back pain, *Applied Ergonomics*, 2012; 43 :239-245