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## **Health prevention program for occupational overuse syndrome for computer users**

**Fatma Mahamed El Swerky**

Lecturer of Family & Community Health Nursing Department, Faculty of Nursing, Port Said University

**Sahar Ahmad Shafik**

Professor of Community Health Nursing, Faculty of Nursing, Fayoum & National University of Science and Technology, Iraq  
Email: [dsahar100@yahoo.com](mailto:dsahar100@yahoo.com)

**Ftma Khalil Abd Elhameed**

Assistant Professor of Community Health Nursing, Misr University for Science and Technology

**Abstract**--Computers are an integral part of the work environment and it is important to identify and establish safe work practices and procedures that ensure hazards associated with computer use Hence, The Aim of the present study to evaluate the effect of health prevention program for Occupational Overuse Syndrome for computer users. Design: Quasi-experimental study design was utilized in the current study. Setting: the study was carried out in Computer Science Center in El-fyoum University. Sample: A purposive sample of 400 computer users, who are using computer continuously for 6 hours and more per day were selected. Tools: Three tools were developed by the researcher for data collection. Tool (I) Structured Interviewing questionnaire, included three parts: Part (a):-Socio-demographic characteristics computer users. (b) Assess users, knowledge. (c) Assess physical health of computer users & musculoskeletal complaints. Tool (II) Observation checklist of Computer users practice. Tool (III) Observational checklist to assess work place environments among computer users. Results: The main finding of the present study revealed that 24% of computer users have complete knowledge before programs while improved to 80% after application the program. As for computer users practice. Only 15% of computer user's were scored as good practice before applying program. Their practices which improved to be 85% after applying the program with significantly.  $P \leq 0.001$  and 46.9% of them complain severe eye complication improved to 15.7% after program, 684% of them complain upper musculoskeletal complaints before program improved

to 21% after program. Significant statistics improvements were detected. As regards all items related to work place environment a statistical significant improvement were detected after applying program  $P \leq 0.001$ . Conclusion: The study concluded that applying of the preventive program led to significant statistics improvement in the computer users regarding their knowledge, practices and work place environments to prevent overuse syndrome among computer users. The study recommended a training program is one of the key health and safety issues of the modern information technology era to overcome the phenomenon of OOS and other health problems related to this types of work. Further researches are needed to detect the other problems to early management.

**Keywords**---Prevention Program, Occupational Overuse syndrome (OOS) & Computer User

## **Introduction**

Occupational Overuse Syndrome (OOS) usually develops over time and can be caused by types of work with sustained or constrained postures, repetitive and/or forceful movements. It is characterized by discomfort or persistent pain in the muscles, tendons and other soft tissues, with or without physical manifestations (swelling, deformity, bruising etc)<sup>1,2</sup>

The Occupational Safety and Health Administration (OSHA) defines ergonomics as “the science of fitting workplace conditions and job demands to the capabilities of the working population.”<sup>4</sup> according to the United States Bureau of Labor Statistics. On the same note, OSHA reports that musculoskeletal disorders in the United States account for over 600,000 injuries and illnesses that are serious enough to result in days away from work.<sup>5</sup> Ergonomics at a computer workstation involves the presence of suitable components and accessories and a proper working posture, allowing the employee to feel physically comfortable to prevent pains that could potentially result<sup>6</sup>

Each year, thousands of individuals are diagnosed with an illness directly related to poorly designed workstations, and among these are Musculoskeletal Disorders (MSDs). The MSDs are the repeated trauma and deterioration of the tissues, joint, tendons, and nerves that affect the muscles and supporting structures of the body, caused by the work nature or by an employee’s working environment.<sup>7</sup> The body parts affected are the arms, hands, fingers, neck, back, wrists, legs, and shoulders; and early warning signs include muscle cramping, stiffness, aching, pain, and weakness in an area. An example of an MSD is Repetitive Strain Injury (RSI), which refers to disorders that result from performing a repetitive task, such as typing, writing, or clicking a mouse. Overall ergonomic disorders are the fastest growing category of work-related illness and account for thousands of work-related illnesses.<sup>6,7</sup>

A prospective study conducted by Ariens, et al. found that sitting at work for more than 95% of the working time is a risk factor for neck pain, and non-neutral

positions are associated with musculoskeletal symptoms.<sup>8</sup> Another study by Gerr, et al. reported that individuals in computer workstations have a prevalence of 10-62% musculoskeletal symptoms in their neck and shoulder region. The treatment for these problems includes the modifications of posture and the working environment<sup>9</sup>.

As the use of computerized nursing information system increases, ergonomics is of increasing interest to nurses in their dual role as users of computers and as health care providers<sup>(10)</sup>. New role for nurses in nursing informatics are consultants, advisors, and researchers. Most recently, nurses are developing information management methods and tools for use in transforming health and nursing data to information. Interventions can be put into place in both work flow process development and workstation computer<sup>11</sup>. To be provided with an ergonomically conducive environment as well as to be educated and trained with respect to ergonomic principles<sup>12</sup>. It is essential that management and staff are provided with training and education about OOS if they are to learn how to avoid developing OOS and reduce incidence within the workplace. It is through management's responsibility to ensure that computer users have received adequate training before being put "at risk"<sup>13,14</sup>.

### **Aim of the study**

This study aimed to evaluate the effect of prevention program for Occupational Overuse Syndrome for computer users through:

- Assessing knowledge, practice and work place environments to determine computer users needs.
- Developing and implementing the prevention program for computer users to prevent the occupational overuse syndrome.
- Evaluating the effect the prevention program to prevent the occupational overuse syndrome.

### **Hypotheses**

The prevention program will improve the computer users knowledge, practice and work place environments to prevent overuse syndrome among computer users.

### **Subjects and Methods**

#### **Design**

A quasi - experimental study design was utilized to conduct this study.

#### **Setting**

The current study was applied in Computer Science center in El-fayoum university. This center provides all computer work activities as typing of documents and writing all paper researches.

#### **Sample**

A purposive sample of 400 computer users working in the previously mentioned setting was selected. A total number of employees at this center about 400 subjects with different qualification and computer skills . It is divided into 190 computer users who have received the all content of the program, , and 210 computer users who did not apply any content of the program because they were

enrolled in the Faculty ICDL Exam after assessment phase. The sample was selected according to the following inclusion criteria: computer users, who are using compute continuously for 6 hours and more per day were selected.

**Tools for data collection:**

Three Tools were developed and used by the researchers to collect the necessary data from the participants.

**Tool (I)- A Structured Interviewing questionnaire:**

It included three parts:

- a) Demographic characteristics as age, gender, level of education, etc .
- b) It was used to assess, knowledge, about information on health hazards related to OOS, signs and symptoms.(pre & post program).
- c) This part deals with the physical health of computer users & musculoskeletal complaints. It includes how often they had suffered from a range of the muscle Fatigue and discomfort burning sensation in muscle ,stiffness, aches and pain ,soreness ,weakness or numbness and tingling in the muscles, pain in the foot or toes, pain down in the legs ...etc

**Tools (II)** "Observation checklist of Computer users practices .It was used to assess the practice of computer user. It includes setting at arm monitor ,resting feet on floor or on a stable foot rest, moving frequently for circulation, using a document holder, center monitor and keyboard in front of him , sitting at upright position ( back straight ) ,thigh are parallel to the floors and knees at about the same level as the hips, wrists are flat and straight in relation to the forearms to use keyboard/ mouse, arms and elbows relaxed close to body .Duration of computer use, daily use/Hours, taking breaks and how often practicing exercises, etc.

**Tool (III)**"Observational check list to assess work place environments among computer users " . It includes a range of factors which can be controllable by management and can contribute to the development of OOS include workload, deadlines, interpersonal relationships, supervision styles, control over the work environment, and adaption to changes in the workplace and to new technology are all external stressors which may drive people to work beyond their safe capacity ,Physical factors such as lighting, heating, ventilation and noise can all contribute to elevate stress levels, and should be controlled within accepted criteria, equipment design and maintenance - Appropriate and suitably adjustable equipment as described in the Code of Practice should be provided. Work design which allows a person to carry out a variety of tasks within a single job. It allows for a variation in posture and the muscles used. Where a task requires sustained or repetitive activity, the task should incorporate micro pauses and rest breaks And Supportive' atmosphere that encourages early reporting of health and safety concerns and removes delay to early intervention. It involves users in the planning and decision making process.

**Scoring system:**

Assessing the computer users' knowledge as follows, complete knowledge=2 and incomplete knowledge 1. Total knowledge scores 30  
Satisfactory knowledge >50%

Unsatisfactory knowledge < 50%

**Health complaints** score were calculated as follows: Scores of eye complaints were as follows: mild 1 score, moderate 2 scores ,sever 3 scores. The sum 18 points and the total score were categorized as follows: sever 75-100 % 18-13 points, moderate.<75-50 = 12-9 points, and mild < 50% = 8-Zero points .

-Upper musculoskeletal complaints scores, were as follows: mild 1 score ,moderate 2 score, while sever 3 score .The total 42 points were evaluated as sever 100-75% = 42-31 points moderate 74-50% = 30-21 points -Mild < 50% = 20- Zero points.

-Lower musculoskeletal complaint scores, with total 12 points :Sever 100-75% = 12-9 points ,moderate 74%- 50% = 8-6 points, mild< 50% = 5- zero points.

-A **scoring system for the Observational checklist** to assess the computer users practices, was calculated as follows: Good 100-70%=10-7 points. Fair 70 - 50% = 6-5 points ,poor <50% = 4-Zero points.

-A **scoring system for Observational check list to assess** the computer users workplace environment. It was calculated as follows: suitable /yes =2 scores, while unsuitable/ No 1 score .The sum of total s suitable scores  $\leq 70\%$ , while, the unsuitable $70 \geq 50\%$ .

#### **Field work :**

An official permission was obtained through official letters from Chancellor of El-fayoum University, The process of data collection, was carried out in the period from January 2021 to December 2021, three days /week, about two session /day. Study was conducted through three phase:, the preparation phase, the pre-intervention phase &, the post-intervention phase

#### **Health prevention program about occupational overuse syndrome for computer users**

##### **Phase I: Program Development:**

The program was designed by investigator and based on the result obtained the study pre-test tools; also review of recent, current, national and international related literature in different aspects of health prevention program about occupational overuse syndrome for computer users . This program content was revised and validated by experts in Faculty of Nursing, Community health nursing department and Faculty in computer science .

##### **Phase II: Assessment:**

Two days / week, one hour / day (9.30 am - 11.30am) were allocated for data collection ( pre-test), which was carried out through one week, the average time consumed to fill tools was 30-45 minutes.

##### **Phase III: Implementation:**

- Program implementation based on conducting sessions plan using different educational methods and media in addition to the use of guiding booklet specifically designed and developed based on users ' assessment needs.

- Implementation of the program took about six months through conducting the pre- mentioned health educational class in computer science centers two days /week, (Tuesday & Thursday) from 10am – 12pm. Number of hours differed from one session to another to accomplish health prevention program. During theoretical sessions the investigator divided users into eight groups and each group composed of 18 users .
- Overall **general objective** of the prevention program: was to improve the computer users knowledge , practice and work place environment to prevent overuse syndrome among computer users .
- **Specific objectives of the program:** by the end of the health prevention program each users will be able to: Acquire the basic knowledge about :meaning of overuse syndrome for computer, complication of computer overuses, safe computing practice, common symptoms of overuses injuries ,progressive debilitation of overuse injuries, overuse injuries – high-risk jobs, risk factors in developing overuse injuries, reducing the risk of overuse injuries, changes to workplace design and treatment options for overuse injuries. Observe practice of computer user. It includes setting at arm monitor ,resting feet on floor or on a stable foot rest, moving frequently for circulation, using a document holder, center monitor and keyboard in front of him , sitting at upright position ( back straight )  
In this phase investigator analyzed the pre-test then tailored the educational intervention to the needs of each users.  
There were commonality among computer users needs from the educational program; as there was lack of knowledge in almost all items and need for improvement of their healthy use practice about computer users .  
Program sessions: Time allowed: 6-12 hours allocated for health prevention educational sessions. At the beginning of the first session, an orientation about the program and its purposes was given. From the second session and so on each session started by a summary about what was given through the previous sessions and the objectives of new one taking into consideration using simple and clear language.
- By the end of each session a summary was made and time allocated for questions and answers & plan for next session were made. Teaching methods and media used; lecture, open discussion, and brain storming also, role play. Suitable teaching aids prepared especially for the program were used such as printed materials, pictures, videos indicated the computer users .
- Practice instructions and power point presentations and the investigator sent all program via emails for all users .
- At the end of the health prevention program immediate post-test was done.

#### **Program Booklet:**

A booklet including all content of the program was designed and given to users as an educational reference during program implementation and internet reference after program implementation. Its aim was providing accurate knowledge & practice about occupational overuse syndrome for computer users.

#### **Phase IV: Program evaluation**

This phase aimed to evaluate the effect of health prevention program about occupational overuse syndrome for computer users, through the implementation of post-test immediately after the program follow-up test to identify differences,

similarities, areas of improvement and defects as well as indicators of program success and its effect on the users were showed in the follow-up test.

#### **Validity:**

Content validity test was done through five experts; 3 experts in Community Health Nursing & 2 experts in Computer Sciences , El-fayoum University to insure content validity of tools and program.

#### **Pilot study:**

The pilot study was carried out on 10% ( 40 computer users ) from total sample of computer users , and were later included from the main study sample. They were chosen to test practicability, clarity and simplicity of the tools used, after detection of difficulties that might arise. The subjects of this pilot study were included from the study sample. The time needed for filling the questionnaire and the observation tool was around 35: 40 minutes. It took about one month, from February to March 2021.

#### **Reliability of the tools:**

Reliability was applied by the researchers for testing the internal consistency of the tool, by administration of the same tools to the same subjects under similar conditions two times 15 days a part. Answers from the repeated testing were compared (Test- re- test reliability was 0.82) and Cronbach's Alpha reliability was. knowledge 0.89. and was practice 0.88.

#### **Ethical considerations:**

A written approval was obtained from the ethical and researcher committee of Faculty of Nursing, El-fayoum University Informed consent was obtained from both Vice deans of El-fayoum University and the Director and participating employees working in Computer Science center, after explaining the nature and aim of the study.

#### **Statistical Design:**

Data were scored, tabulated, and analyzed by using the statistical Package for Social Sciences (SPSS), version 24. Descriptive statistics were utilized such as standard deviation ,frequency of means , and percentage distributions .Inferential statistics included T test, chi-square, correlations test, P-value was set at 0.05.

#### **Results:**

Table (1): Frequency Distribution of computer users according to demographic characteristics.

(n=190)

Items	Total N=190	%
<b>Age (years)</b>		
20<30	109	57.4
30 <35	41	21.5
>35	40	21.1
<b>Means 23.02 ± 6.41</b>		

<b>Sex</b>		
Male	310	77.5
Females	90	22.5
<b>Level of education :</b>		
Secondary	90	47.4
bachelor degree or more	100	52.6
<b>Duration of computer use per day</b>		
6-<8	80	42.1
>8	110	57.9
<b>Monthly income :</b>		
Enough & save	4	2.1
Enough	91	47.9
Not enough	95	50.0

Table (1) Shows the computer users demographic characteristics. The table shows that the total studied sample is 190 computer users., 57.4% of them the age group ranged from 20<30 years, the mean age group was  $23.02 \pm 6.41$ . As for the computer users' sex, males represented 77.5% of computer users, Concerning the level of educational, 52.6% of them had bachelor degree or more , 57.9% of them the duration of computer use per day > 8 hours and 50.0% of them the monthly income not enough .

Table (2) : Frequency distribution of computer users according to their health complaints scoring before and after program application (n=190)

Items	Before application of program No=1 90		After application of program No=190		x <sup>2</sup>	P value
	No	%	No	%		
<b>Eye complaints:</b>						
Mild	30	15.7	50	26.31	11,04	<0.001**
Moderate	90	47.3	80	42.11		
Sever	70	36.9	60	31.57		
<b>Upper musculoskeletal complaints:</b>						
Mild	20	10.52	50	26.31	6,09	<0.001**
Moderate	40	21.0	20	10.52		
Sever	130	68.42	120	63.15		
<b>Lower musculoskeletal complaints:</b>						
Mild	15	7.9	30	15.79	8.75	<0.001**
Moderate	55	28.9	90	47.37		
Sever	120	63.1	70	36.9		

Significant at  $p \leq 0.001^{**}$



Table (2); Shows the distribution of computer users according to their health complaints. The current study revealed that ,36.9% of the computer users were experiencing severe eye complication before program application , decreased to 31.57% after application of the program. However a statistical significant difference was found between computer users before and after program application regarding eye complaints score ( $\chi^2 = 11, 04, P \leq 0.001^{**}$ ). Concerning, upper musculoskeletal complaints score; the current study revealed that 68.4% was suffering severe upper musculoskeletal complaints before program application decreased to 63.1% from severe upper musculoskeletal complaints after program application score statistically significant difference statistically significant difference ( $\chi^2 = 6, 09, P \leq 0.001^{**}$ )., The same table reveals that 36.1% of computer users who applied the program were suffering from severe lower musculoskeletal complaints before program , decreased to 36.9% of them after program application score statistically significant difference ( $\chi^2 = 8, 75, P \leq 0.001^{**}$ ),.,

**Answer the research Hypotheses:**The prevention program will improve the computer users **knowledge**, practice and work place environments to prevent overuse syndrome among computer users.

Figure (1): Frequency distribution of computer users satisfactory knowledge about Occupational Overuse Syndrome pre, and post program (n= 190).

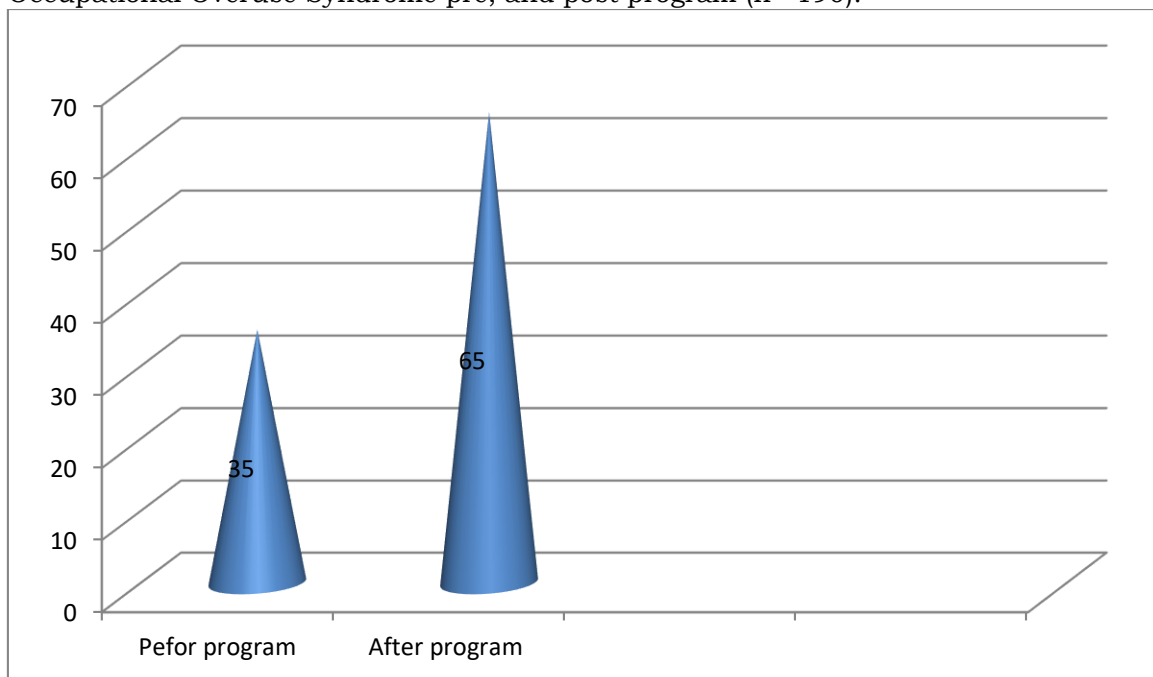


Figure 1: Reveals that there was statistical significant improvement in computer users satisfactory knowledge levels regarding occupational overuse syndrome at the post health prevention program-test, than that of pre test in all knowledge items,  $p < 0.001^{**}$ .

**Answer the research Hypotheses:** The prevention program will improve the computer users knowledge **practice**, and work place environments to prevent overuse syndrome among computer users

Figure (2): Frequency distribution of computer users according to their observational check list to assess computer users practice score before and after application the program.(n=190).

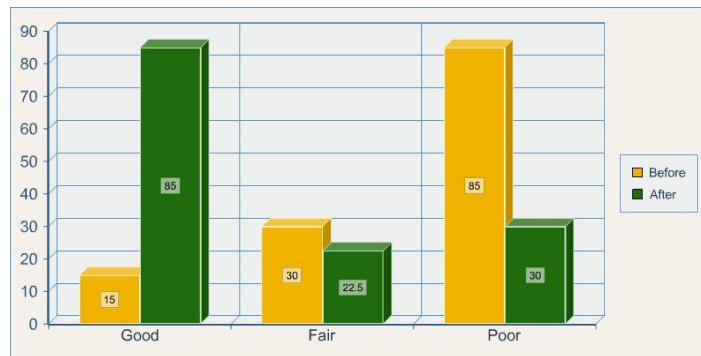


Figure (2): illustrates the distribution of computer users according to their practices observational score before and after program. It is apparent from this figure that only 15% of computer users practices were scored as good practices before applying the program. Their practices were improved to 80 % after program. Additionally, it was observed that about three quarters (85%) of computer users had poor practices score before program application. This decreased to 30 % of them after program application. Significant difference was found between computer users before and after program application. regarding to their practices observational score.  $\chi^2 = 116.04, p \leq 0.001^{**}$ .

**Answer the research Hypotheses:**

The prevention program will improve the computer users knowledge, practice and **work place environments** to prevent overuse syndrome among computer users

**Figure (3):** Frequency distribution of computer users according to their observational check list to assess computer users workplace environment score before and after application the program.(n=190).

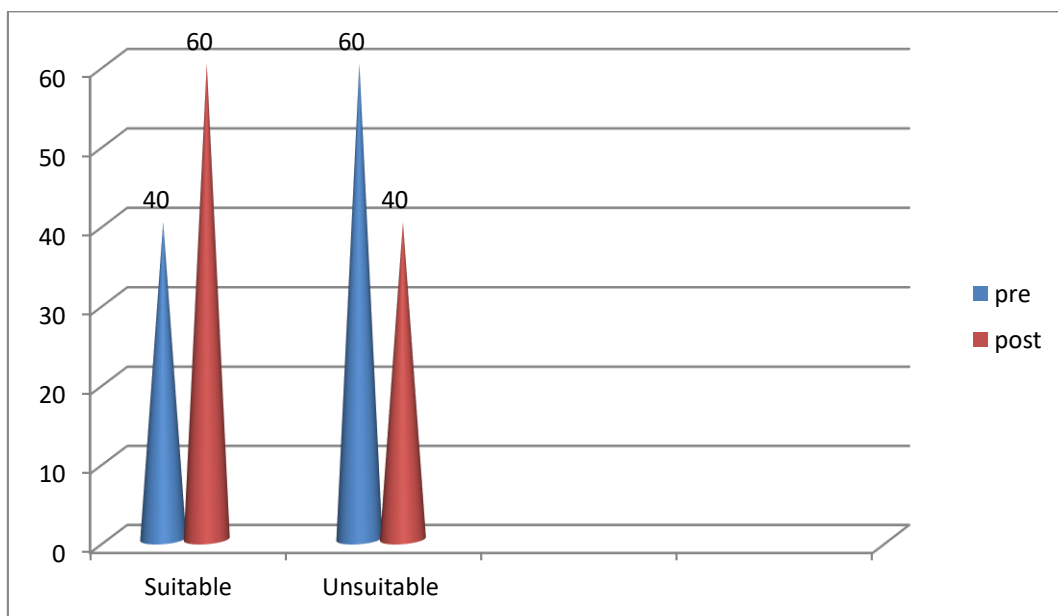


Figure (3): illustrates the distribution of computer users according to their observational score before and after program. the current study revealed that ,60% of the environmental unsuitable according to computer users needs ,before application the program improved to 40% after program implementation .Also, 40% of the environmental suitable according to computer users needs ,before application the program improved to 60% after program implementation  $p < 0.001^{**}$ .

**Table (3):** Mean and standard deviation of computers users demographic characteristics and total practices score before and after program application (n=190)

Items	Total knowledge Pre-program	Total knowledge Post program	Paired t test	P value
	Mean $\pm$ SD	Mean $\pm$ SD		
<b>Age</b>	17.2207 $\pm$ 2.31681	11.8759 $\pm$ 3.22938	*16.538	<0.001**
<b>Sex</b>	17.0207 $\pm$ 2.39927	12.0000 $\pm$ 3.14245	*15.506	<0.001**
<b>Level of education</b>	25.4966 $\pm$ 2.63028	16.5862 $\pm$ 4.78508	*20.307	<0.001**
<b>Monthly income</b>	15.4345 $\pm$ 1.76310	9.9724 $\pm$ 2.40065	*21.642	<0.001**
<b>Duration of computer users (hours).</b>	16.4644 $\pm$ 2.55212	10.7734 $\pm$ 3.42264	*23.562	<0.001**
<b>Total</b>	75.1724 $\pm$ 6.18729	50.4345 $\pm$ 10.85051	*25.359	<0.001**

Table (3) illustrates that there is statistical significant difference between the mean and standard deviation of all items of total knowledge and age ,sex, level of education , monthly income and duration of computer users (hours) . So, this table reflects the positive improvement of health prevention program ( $p < 0.001^{**}$ ).

Table (4): Mean and standard deviation of computers users practice pre; and post, of health prevention program (No=190).

Items	Practice Pre-program	Practice Post program	Paired t test	P value
	Mean $\pm$ SD	Mean $\pm$ SD		
<b>Age</b>	13.08 $\pm$ 2.30	19.22 $\pm$ 3.02	*18.527	<0.001**
<b>Sex</b>	7.86 $\pm$ 1.62	11.94 $\pm$ 2.42	*15.981	<0.001**
<b>Level of education</b>	7.16 $\pm$ 1.58	12.47 $\pm$ 1.93	*24.752	<0.001**
<b>Monthly income</b>	6.48 $\pm$ 1.09	11.40 $\pm$ 2.262	*22.992	<0.001**
<b>Duration of computer users (hours).</b>	62.73 $\pm$ 8.042	98.68 $\pm$ 14.41	*24.88	<0.001**

\* Paired t test (1) \*\* Paired t test (2)

Table (4) illustrates that there is statistical significant difference between the mean and standard deviation of all items of total practice and age ,sex, level of education , monthly income and duration of computer users (hours) . So, this table reflects the positive improvement of health prevention program ( $p < 0.001^{**}$ ).

**Table (5):** Distribution of computer users according to relation between total knowledge , total practices and computer users health complain (N= 190)

Items	Total Knowledge	T- test	P value
	Mean $\pm$ SD		
<b>Total practice</b>	29.00 $\pm$ 11.04	8.24	<0.001**
<b>Health complain</b>			
Eye complains	30.10 $\pm$ 12.05	9.56	<0.001**
Lower musculoskeletal	33.80 $\pm$ 11.06	8.44	<0.001**
Upper musculoskeletal	28.10 $\pm$ 10.33	7.45	<0.001**
(*) statistically significant at $P \leq 0.05$ (**) high statistically significant at $P \leq 0.001$			

Table (5): illustrates that there is statistical significant difference between the mean and standard deviation of all items of total practice, total knowledge and health complain, (eye complain, Lower musculoskeletal, and Upper musculoskeletal). So, this table reflects the positive improvement of health prevention program ( $p < 0.001^{**}$ ).

## Discussion

Occupational overuse syndrome is an ergonomic injury attracting much attention as this syndrome causes decreased productivity and increased costs in workers compensation, and medical expenses. Computer use is one of the numerous for the increase in OOS<sup>(15)</sup>

Many studies concluded that there is a need for implementation of programs that include the concepts of ergonomics, prevention program and training of computer users so as to be able to prevent and overcome the phenomenon of Occupational Overuse Syndrome (OOS)<sup>16,17,18</sup>. Therefore, this study was conducted to evaluate the effect of prevention program of Occupational Overuse Syndrome (OOS) for computer users.

The study was carried out in computer Science center in El -fayoum University .The total sample size was 400, about more than half of them the age between 20>30 years their mean age of them was  $23.02 \pm 6.41$  , more than thirds of them were males, regarding level of education , more than half of them were bachelor degree or more. And more than half of them the monthly income not enough. This study agreed with David, & Ira, (2018)<sup>20</sup>. Study which carried out in New York about “Ergonomic and the prevention of occupational injuries” the study found that, 55% of the study sample the age between 25-35 years, 70% of them were bachelor degree or more. and the 90% of them the monthly income enough. From the investigator point of view, the rise in prices in Egypt makes the sample income insufficient for the requirements of living

Regarding to computer users duration of computer use per day , the current study revealed that, more than half of them the duration of computer use per day >8 hours . This study disagree with Shaheen et al (2018)<sup>21</sup>. Study which carried out in Indian about “Cumulative musculoskeletal disorders related to computer products use in Arabic children and occupation.” The study found that, 90% of the study sample duration of computer use per day > 6 hours. From the investigator point of view, the small number of employees with the large number of work requires the employee to sit for more than eight hours in their day to complete the required daily work

On studying the effect of the health prevention program on the studied sample health complaint, the current study revealed that significant improvement of the eye complaints among those who applied the prevention program. This study finding was in agreement with David, & Ira, (2018)<sup>20</sup> the study conducted in who reported that the prevention program improved the eye complaints among computer users. Additionally, the current study investigated the effect of prevention program applications on the score of upper and lower musculoskeletal complaints, the finding of current study proved significant improvement of the

musculoskeletal complaints among the studied sample after applying program. A study finding in agreement by Bernard (2019)<sup>5</sup>: the study conducted in Pakistan about "Musculoskeletal disorders and workplace factors: A critical review of epidemiologic evidence for work-related musculoskeletal disorders of the neck, upper extremity, and low back national Institute for Occupational Safety and Health" the study found that, the effect of prevention program applications on the computer users upper and lower musculoskeletal complaints proved significant improvement of the musculoskeletal complaints among the studied sample after applying program. The investigator point of view it was observed that workers health complain has greatly improved after applying program, in comparison to the workers who didn't receive this program.

Answer the research Hypotheses::The prevention program will improve the computer users knowledge practice, and work place environments to prevent overuse syndrome among computer users

On studying the pattern of the effect of the health prevention program on studied computer user knowledge, revealed that their knowledge improved significantly after applying program (Figure 1). These finding may be attributed to the effect of prevention program on the computer users' knowledge and computer users had sufficiently understood the program. Regarding the knowledge of computer users about safe computing practices, the present study revealed that, the minority of the sample had complete knowledge about safe computing practice before applying program improved to be the majority of them, after applying program(Figure 1). These results were in the same line with other studies as Burgess et al<sup>23</sup>, and Zelmer<sup>24</sup> as they mentioned that "the minority" of computers, operators had complete knowledge about safe computing work practices which grew to be "the majority" of computer users, after applying program.

The health prevention program has a significant effect on improving the observational score of computer users' safe practice and their work place environment after applying program (figure 2). which is in accordance with the results of similar studies by Taylor, and Jensen et al<sup>(25,26)</sup> as they also proved that health prevention program had a statistically significant effect on computer workers in modifying their workplace design<sup>27,28</sup>. Through this study, it was observed that the significant knowledge gained from the program, participants were able to effectively transfer the training to appropriately change and adjust their workstation to adopt healthy computing behaviors and enhance their performance.

The current study finding revealed that there is no improvement of observational score of computer users practices and their work place environment in comparison with those who did not apply the program (table 4). It may be because knowledge alone doesn't change behavior, behavioral change requires an ongoing program of intervention, education and reinforcement<sup>29</sup>.

On the other hand, the current study findings proved a significant increase of the severity of eye complaints among those who partially or did not apply the program.(Table 3,4 ) This may be because the studied sample did not receive any

support from work to get facilities application of the program /Further explanation may be related to "Lack of time , being habituated on wrong posture, lack of facilities and work pressure of the studied sample. These results were in the same line with other studies as those of Amick et al and Roberston et al .<sup>30,31</sup> If a safe physical workstation design is not available at workplace , this will lead to severity of eye complains.

On the other hand, the current study finding proved a significant increased of the severity of musculoskeletal complaints among those who did not apply the program table (4).This finding was in line with another study done by Roberston et al .<sup>(31)</sup> ,as they found that the Non-trained group experienced a significantly higher number of musculoskeletal symptoms compared to the trained group<sup>31</sup>.

On studying the effect of various risk factors on the score of health complaints of the studied sample the result of the current study proved a statistically significant difference between the computer users, eye complaints score in relation to age group before and after applying program , as it was observed that the percentage of computer users who suffered severe eye complaints decreased by older age before and after applying program (Table 5 ) These finding were supported by another research of Rahman and Sanip <sup>32</sup> as they reported that younger age group had higher odds for computer vision syndrome (CVS) compared to older age group <sup>33</sup> .Additionally, the present study proved that the severity of upper and lower musculoskeletal complaints score reported by the studied sample declined by older age after program .This finding was in accordance with that of Janwantanakul et al .and Cote et al .<sup>34,35</sup> It may be due to that younger age represent the period where most individual are more active in life and probably have more computer work load than the older workers in the same stations . Through this study, it was observed that possible reason for higher occurrence of symptoms among younger computer users specifically could be because younger office workers use computers for longer period than their senior counterparts, resulting in more reporting of health complaints <sup>36</sup>.

Additionally, the present study proved statistically significant difference between computer users total good score of practice and level of educational levels as it was observed that higher the score was for those who Bachelor degree or higher from before to after applying program .(Table 6) this may be due to the better understanding and accepting the health prevention program by the higher educated computer users .Furthermore, it may be more difficult for persons with lower education to adhere to the program.

Regarding to evaluation of the prevention program according to computer users' opinion, the results of the current study depicts that the majority of computer users stated that the program was informative, the CD was easy to use, and it was easy to understand. More than half of computer users reported that the program was useful in preventing their discomfort resulting from computer use and it was easy to apply (Table 7) . This result was in the same line with Trujillo, and Zeng <sup>37</sup> When asked the study sample about the cases of not applying or partially applying the program they relate that mainly to "No time, being habituated on wrong posture. Lack of facilities and to work pressure "Table (8).It

may be due to that the self-administered health education program cant maintain the computer users compliance with the program.

Results of work place environments among computer users before and after program application represents the statistically correlations between pre/post tests among the study groups Table (9) the result in the same line with<sup>38</sup> this is evidence that occupational over use syndrome (OOS) can reduced through an employers should also continue to provide employees who use computers with appropriate ergonomic training <sup>39</sup>

### **Conclusion and Recommendation:**

#### **Conclusion**

The study concluded that, applying of the prevention program led to significant improvement in the computer users knowledge, practices and work place environments to prevent overuse syndrome

#### **Recommendation:**

Based on the finding of the study, the following recommendation were suggested:

- 1 A training program to computer user employees that helps in strengthening their knowledge and practice about the principled for prevention of occupational overuse syndrome among computer user.
- 2 Improve workstation adjustment and environmental setting through Standardized design to every computer center agency.
- 3 Further researches are needed to detect other problems to early management.
- 4 Encourage periodical medical check up to detect vulnerable risky groups.

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