Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

The Effect of an Ergonomic Program on Preventing Health Hazards of the Computer among Faculty Staff

Mariam Mohammed Fouda [(1)], Afaf Salah Abd El-Mohsen [(2)], Sahar Ahmad Shafik [(3)], Ons Saied El-Zayat [(4)]

[(1)]Assistant Lecturer of Community Health Nursing, Faculty of Nursing, Helwan University,

[(2)]Professor of Community Health Nursing, Faculty of Nursing, Helwan University

[(3)]Professor of Community Health Nursing, Faculty of Nursing, Fayum University & Al-Kut University College, Iraq. Wasit, 52001, Sas19 @ fayoum.edu.eg

[(4)]Assistant professor of Community Health Nursing, Faculty of Nursing, Helwan University, Egypt·

DOI: https://doi.org/10.5281/zenodo.13762804

Published Date: 14-September-2024

Abstract: **Background: Computers are widely used in academic institutions, working for prolonged period in an ergonomically deficient workplace increases the risk of many health issues such musculoskeletal problems and computer vision syndrome.**

Aim: To evaluate the effect of an Ergonomic Program on Preventing Health Hazards of the Computer among Faculty Staff.

Design: A quasi- experimental design (pre and post-test). Setting: This study was conducted at Faculty of Nursing, Helwan University. Subjects: A convenient sample of 102 faculty staff at Faculty of Nursing, Helwan University was included in this study.

Tools: three tools was used; Tool I: Structured Interviewing Questionnaire, Tool II: Faculty staffs' reported practices regarding Computer workstation Ergonomics and Tool III: Computer Health Hazards Questionnaire.

Results: 97.1% of the studied faculty staff gained satisfactory level of knowledge regarding ergonomics post-program as compared with 23.5% pre-program, 90.2% of them gained adequate level of practices post- ergonomic program as compared with 24.5% pre-program, and 76.5% of them gained a mild level of computer health hazards post ergonomic program as compared with 19.6%. pre-ergonomic program. Also, there was a high statistically significant positive correlation between the studied faculty staffs' knowledge and reported practices regarding ergonomics at (r ranged from 0.824 to 0.985 & P= 0.000).

Conclusion: Ergonomic program had large effect size on the studied faculty staffs' knowledge, reported practices regarding ergonomics and computer health hazards so hypothesis was accepted.

Recommendations: Continues implementation of ergonomic programs and workshops for all faculty staffs in universities to highlight the importance of ergonomics in preventing computer health hazards.

Keywords: **An Ergonomic program, computer health hazards, faculty staff.**

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

I. INTRODUCTION

Nowadays, the development of technology along with the need to access information has resulted in use of computer to be inevitable. Computer is an integral and essential part of daily work in academic institutions due to its positive effects on accuracy, efficiency, and the achievement of desired outcomes**.** [1] However, the prolonged use of computers, along with the inappropriate adherence to ergonomics principles, health and safety requirements of workstations, has been associated with various potential health problems. [2]

Ergonomics is the science of establishing the best fit between a faculty staff and the tasks they carry out and working environment. The International Ergonomics Association (IEA) defines ergonomics as the scientific discipline concerned with the understanding of interactions among humans and other elements of a system and the profession that applies theory principles, data and method of design to optimize human well-being and overall system performance. The primary goal of ergonomics is prevention of workplace illness and accidents associated with Repetitive Strain Injury (RSI) and Work-related Musculoskeletal Disorders (WMSD) and maximize efficiency, quality, and quantity of work improves performance and productivity of the faculty staff**.**[3]

Computer ergonomics is a field of study which aims to reduce the effects of working at a computer for an extended period by improving the placement of computer monitor, desk, keyboard as well as accessories that can be used. Among the computers, laptop also is found to be not ergonomically designed for prolonged use because of the monitor and keyboard that are close together where they cannot both be in a good position at the same time. [4]

The faculty staff are the most important components of the higher education system and more risky for WMSDs because they spend a lot of their time working in front of a computer. Long-term use of computer, working at a desk and static sitting postures for long time play an important role in developing WMSDs. [5] As such, serious attention ought to be given to workplace conditions under which they perform their respective tasks as prerequisites for improving their performance and outcomes**.** [6]

Computer is related with many health issues such musculoskeletal problems and computer vision syndrome. Common cause for these disorders is use of computers extensively over a prolonged period in awkward postures or static postures without any position change, leading to reduce circulation, joint pain and stiffness **.**Extended period of continuous work raises the risk of Musculoskeletal Disorders (MSDs) and leads to prolonged disability. [7] Muscles and tendons can become inflamed due to repetitive movement or intensive use of a mouse or keyboard. Carpal tunnel syndrome is a common example of an overuse injury associated with computer. [8]

Ergonomic program aimed at identifying and reducing sources of stress and resulting injuries by designing a better fit between needs of faculty staff and their workplaces. These prevention strategies in the workplace can reduce the incidence of musculoskeletal illness and disorders, promote health safety, efficiency, and comfort to optimize faculty staff's performance and improve health. A little knowledge of the principles of ergonomics of workstation setup and exercises can prevent a lot of discomfort and maximize productivity. [9]

Community Health Nurses (CHNs) is a pivotal member who can work for the prevention of computer related health hazards and enhancement of safe ergonomic principles. CHN assess faculty staffs' health needs and conduct educational programs that afford tailored health information about computer related health problems and safe preventive ergonomic practices to prevent health hazards associated with computer use.[10]

1.1 Significance of the Study

Computers have become an important part of life and necessary device for all the faculty staff engaged in universities. Around 90 million adults in the world are using computer on a regular basis. [11] Globally, 25% of computer users are already suffering from computer related health hazards. The United States has to shell out more than 2 billion US dollars annually for having ignored these computer related problems. [12]

Musculoskeletal disorders are the most common, widespread, computer work related problems and account for 42% to 58% of all work-related illnesses. Approximately 1.71 billion computer users have musculoskeletal conditions worldwide. [13] The annual prevalence of WMSDs among computer users varied from 33.8 to 95.3 %. In Egypt, study was performed on computer users in Alexandria city showed that 54.1% of computer users reported musculoskeletal discomforts symptoms as 69% in the neck, and 70% at shoulder. [14]

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

Computer vision syndrome (CVS) affects more than 70% of all computer users. [1] Approximately 60 million individuals globally suffer from CVS, with 1 million new instances occurring each year. [15] In Egypt, eyestrain (72.4%) and headache (64.4%) were the most reported symptoms of CVS among computer users. [16] So, there is a necessity to teach faculty staff about computer-associated ergonomics and the importance of ergonomic principles involved in Laptop computer usage, this study conducted to evaluate the effect of an ergonomic program on preventing computer health hazards among faculty staff.

1.2 Aim of the study

This study aims to evaluate the effect of ergonomic program on preventing computer health hazards among faculty staff through:

1) Assessing faculty staff's knowledge and practices regarding computer ergonomics.

2) Assessing computer health hazards among faculty staff.

3) Designing and implementing the ergonomic program for preventing computer health hazards among faculty staff.

4) Evaluating the effect of ergonomics program on preventing computer health hazards among faculty staff.

1.3 Research Hypothesis:

Implementation of ergonomic program will improve faculty staff's knowledge and practice regarding prevention of computer health hazards.

II. SUBJECTS AND METHODS

2.1 Research design:

A quasi- experimental design was utilized in this study.

2.2 Research setting:

The study was conducted at Faculty of Nursing, Helwan University. It composed of four floors. Ground floor was specialized for administrative offices for employees and vice deans of the faculty, the 1st floor composed of Dean's office, the quality assurance office, medical surgical department offices, clinical labs and two seminar classes. The 2nd floor composed of two departments' pediatric and obstetric departments' offices, measurement and evaluation unit, obstetric clinical labs and seminar classes. The 3rd floor composed of three departments' community health nursing, psychiatric and administration departments' offices, the electronic examination labs, library, objective structured clinical examination lab (OSCE) and seminar classes.

2.3 Subjects:

A convenient sample of faculty staff at Faculty of Nursing, Helwan University was included in this study. The sample was equal 102 faculty staff.

2.4 Tools of data collection:

The data were collected through using the following tool:

Tool I: Structured Interviewing Questionnaire: This tool was developed by the researcher after reviewing the related literature and include the following three parts:

1st part: Personal data of studied faculty staff:

It consists of 5 items which include data regarding age, sex, marital status, occupation, and years of experience.

2nd part: Faculty staff computer usage:

This part was developed by the researcher and include faculty staff's usage of computer as duration of computer usage, type of computer used, average numbers of daily hours using computer, number of consecutive hours using computer, number of hours using computer for academic works, number of hours using computer for personal works and average number of breaks taking during computer use. It consists of 7 items.

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

3rd part: Ergonomics Knowledge Assessment Questionnaire:

This part was developed by the researcher and included faculty staffs' knowledge regarding to computer ergonomics as meaning of ergonomics, benefits of ergonomics, health hazards of prolonged use of computer, risk factors and symptoms of work related musculoskeletal disorders, symptoms of computer vision syndrome, correct postures while using computer, standards and specifications that must be available in the chair when using a computer, correct placement of the keyboard and input device, correct position of the screen while using the computer, correct placement of computer accessories and health precautions while using the computer. It consists of 12 items.

Scoring system for knowledge items:

This tool consisted of 12 items with a total grade (24). Two grade was given for each complete correct answer, one grade given for incomplete correct answer and zero grade was given for don't know. The total grades for each item were summed up and then converted into a percentage score**.** They were classified in to two levels *as* the following**:**

- **Satisfactory level**: if total score ≥ **75%.** It means (≥ 18 grades.)
- **Un-satisfactory level**: if total score **< 75%.** It means **(<** 18 grades.)

Tool II: Faculty staffs' reported practices regarding Computer Workstation Ergonomics:

Concerned with the faculty staffs' reported practices regarding workstation ergonomics and it was adapted from **Occupational Safety and Health Administration (OSHA, 2014).** [17] Which consist of 58 items for working postures covering 13 items, seating covering 9 items, keyboard and input devices covering 7 items, screen covering 5 items, mobile devices (laptop / I pad) covering 5 items, computer accessories covering 8 items and healthy practices when using computer covering 11items. It contains 7 sections.

1st section: Included working postures**,** which include correct postures of head and neck, trunk, torso, shoulders, elbows, forearms, wrists and hands, thighs, legs and feet, leaving a sufficient room under the work surface and ensuring that sharp or square edges are padded or rounded. It is covering 13 items.

2nd section: Included seating which include adjusting backrest height, using a chair with a sturdy 5 leg base, using a seat with an appropriate width and depth, using a seat front does not press on knees and lower legs, using a cushioned and rounded seat, adjusting seat height, using a chair with an adjustable armrest, using an adjustable head rest, and using a chair with an appropriate caster. It covers 9 items.

3rd section: Included keyboard and input devices which include ensuring that keyboard/input device is stable, adjusting the keyboard / input device, adjusting the keyboard to a horizontal or slightly tilted position, using an input device that easy to activate, shape/size fits hand, putting the input device close to the midline of the body, using a detached keyboard and mouse, and ensuring absence of any sharp edges contact wrists and hands. It covers 7 items.

4th section: Included screen which include adjusting top of the screen at or below eye level, adjusting the screen position directly in front of user, putting the primary screen directly in front of user and the other screens are directly beside it, ensuring that glare is not reflected on screen, and adjusting the screen brightness and contrast. It covers 5 items.

5th section: Included mobile devices (laptop / I pad) which include using the same ergonomic principles with the use of laptops, changing postures regularly, using a separate keyboard and stylus, correct postures for shoulders, arms and neck, and using a separate keyboard and mouse if the duration of use is more than 2 hours a day or 30 minutes at a time. It covers 5 items.

6th section: Included computer accessories which include using a stable and large document holder, correct position of the document holder, using a padded wrist/palm rest, using wrist/palm rest keeping forearms, wrists, and hands straight, placing the telephone within easy reach, using the telephone with head upright and shoulders relaxed, using a suitable headset, and using a footrest. It covers 8 items.

7th section: Included healthy practices when using computer which include ensuring workstation adjustability, making sure that the computer workstation, and accessories are function properly, placing items within easy reach, organizing

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

computer tasks, alternating between sitting and standing, practicing stretching exercises, taking small breaks, resting the eyes, using safety glasses, adjusting the lighting levels for various tasks and avoid holding a pen in hand while typing. It covers 11 items.

Scoring system for reported practices items:

This tool consisted of 58 items with a total grade (116). Two grade was given for done, one grade given for sometimes done and zero grade was given for not done. The total grades for each item were summed up and then converted into a percentage score. They were classified into two levels *as* the following:

- **Adequate level**: if total score **≥ 75%.** It means (≥ 87 grades.)
- **Inadequate level:** if total score **< 75%.** It means (< 87 grades.)

Tool III: Computer Health Hazards Questionnaire:

This tool included the following two parts:

1st part: Computer vision syndrome questionnaire (CVS-Q):

This tool adapted from **(Crespo et al., 2015)** [18] and concerned with questions about vision symptoms such as burning eye, itching eye, feeling of foreign body in the eye, watery eye, excessive blinking, eye redness, eye pain, heavy eyelids, dryness in eye, blurred vision, double vision, difficulty focusing for near vision, increased sensitivity to light, colored halos around objects, feeling that sight is worsening and headache. It consists of 16 items.

2ndpart: Cornell Musculoskeletal Discomfort Questionnaire:

This part adapted from **(Hedge, etal., 1999)** [19] and concerned with items about complains related to musculoskeletal system such as feeling pain or discomfort in neck, right and left shoulder, upper back, right and left arm, lower back, right and left forearm, right and left wrist, hip and buttocks, right and left thigh, right and left knee, right and left lower leg and foot. It consists of 20 items.

Scoring system for computer health hazards items:

This tool consisted of 36 items with a total grade (72). Two grade was given for always response, one grade given for sometimes response and zero grade was given for never response. The total grades for each item were summed up and then converted into a percentage score. They were classified in to three levels *as* the following:

- **Mild level**: if total score **< 50%.** It means (< 36 grades.).
- **Moderate level**: if total score ≥ **50 % - < 75%.** It means (≥ 36 grades - < 54 grades.).
- **Severe level**: if total score **≥ 75%.** It means (≥ 54 grades.).

2.5 Validity

Content and face validity of the tools for clarity, comprehensiveness, appropriateness, and relevance was done by five experts in community health nursing, Faculty of Nursing, Helwan University. No modifications done but the expertise recommended rephrasing for some questions and items of the tool.

2.6 Reliability

Reliability for the utilized tools was tested to determine the extent to which the items of the tools are inter-correlated to each other. The Cronbach's alpha model is one of the most popular reliability statistics in use today and considered as a model of internal consistency that is used to estimate reliability of test scores. The statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0-1. [20] The following table show the degree of Alpha Cronbach's for the used tools.

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

Tools	No of items	Alpha Cronbach test
knowledge regarding ergonomic	12	0.980
Reported practices regarding ergonomic	58	0.997
Computer health hazards	36	0.987

2.7 Pilot study

The simplicity, clarity, and applicability of the tools were evaluated in a pilot study involving 10% of the entire sample (10 faculty staff). The time required to collect the questionnaire was determined as well as any problems during data collection were identified. Since no modifications were made, pilot study participants were included within the total sample size.

2.8 Fieldwork

Data was collected during six months from (the beginning of July 2023 to the end of December 2023).The questionnaire was distributed as a google form to the studied faculty staff through WhatsApp application for assessing their knowledge, reported practice regarding ergonomics and computer health hazards at pre intervention. The time required for each faculty staff to fill out the questionnaire was about 15- 20 minutes. An ergonomic program was developed based on the results obtained from the pre-test questionnaire sheet. As well, the effect of the ergonomic program was assessed immediately after the end of the program sessions by using the same questionnaire sheet. The ergonomic program included 7 sessions (two theoretical session, four practical session and the last one evaluation session); each session lasted for 30 - 45 minutes.

The ergonomic program phases: This study was conducted by preparatory, assessment, planning, implementation and evaluation phases as following:

(I) Preparatory phase: Tools of data collection development: This phase started with a review of current and past national and international related literature, the most recent available information, and theoretical knowledge of various aspects of the study by using books, articles, internet periodicals, and magazines. This helped the researcher to be acquainted with the problem, and guiding the process of tools' designing.

(II) Assessment phase: By using pre-testing questionnaire to assess the studied faculty staffs' knowledge, reported practices regarding ergonomics and computer health hazards. The researcher introduced herself to the faculty staff and explained the purpose of the study. The questionnaire was distributed as a google form through WhatsApp application and filled out by the faculty staff.

(III) Planning phase: According to the analysis of pretest findings gained during the assessment phase on detecting the actual needs of faculty staff and relevant literature, areas of weakness were identified, and implementation program objectives were set. So, the researchers designed an ergonomic program for preventing computer health hazards among faculty staff. The educational methods and the number of sessions required were determined. The booklet was written in a simple Arabic language with attractive and colorful pictures to be a guide and a reference for the faculty staff in the future. The ergonomic program was conducted through lectures, group discussion, brainstorming, role play, demonstrations, and re-demonstrations using data show, pictures, videos, and a booklet prepared by the researcher.

(IV) Implementation phase: In this phase, the researcher implemented the ergonomic program sessions. The sessions were delivered over 24 weeks, which equals 6 months. Each week involved two sessions except the last week involve one session for each group lasting for 30-45 minutes. The study sample was divided into 6 groups; each group contained 17 faculty staff, took 7 sessions; which means 4 weeks for each group. Developing an ergonomic booklet based on faculty staffs' assessment needs, which given to faculty staff as an educational reference during program implementation. Its aim was providing accurate knowledge, and healthy practices regarding computer ergonomics.

Contents of the booklet including (introduction, concept of ergonomics, goal and objectives of ergonomics, benefits of ergonomics, health hazards associated with computer use, common symptoms associated with prolonged use of computer, ergonomics instructions and preventable measures for declining computer health hazards regarding "working postures,

seating, key board, mouse, computer screen, laptops, computer accessories", healthy practices while using computer and recommended exercises while using computer. The ergonomic program included 7 sessions (two theoretical session, four practical session and the last one evaluation session); each session lasted for 30-45 minutes. After each session, feedback on the previous session was given, as well as the objectives for the next one. Different teaching methods were used, such as group discussion, brainstorming, and demonstration using data show, PowerPoint presentations, pictures, videos, and a booklet prepared by the researcher.

(V) Evaluation phase: The effect of an ergonomic program for preventing health hazards of the computer among faculty staff was evaluated by comparing the assessment tools of the faculty staffs' knowledge, reported practices regarding ergonomics and computer health hazards immediately post-program implementation.

2.9 Ethical considerations:

An official permission to conduct the proposed study obtained from the Scientific Research Ethics Committee Faculty of Nursing, Helwan University. Participation in the study was voluntary and subjects were given complete full information about the study which included explaining the purpose and nature of the study, stating the possibility to withdraw at any time and confidentiality of the information were guaranteed. Ethics, values, culture and beliefs were respected.

2.10 Statistical analysis:

Data entry and analysis were performed using SPSS statistical package version 25. Categorical variables were expressed as number and percentage while continuous variables were expressed as (mean ±SD). Chi-Square (x2) was used to test the association between row and column variable of qualitative data. Additionally marginal homogeneity test is used to test categorical data. This test is an extension of the McNemar test from binary response to multinomial response. It tests for changes in response (using the chi-square distribution) and is useful for detecting response changes due to experimental intervention in before-and-after designs. The fisher exact test was used with small, expected numbers when value being less than 5 and if table being 2 × 2.

While T test used to compare mean in normally distributed quantitative variables between two groups. Pearson correlation was done to measure correlation between quantitative variables. For all tests, a two-tailed p-value ≤ 0.05 was considered statistically significant, P-value ≤ 0.01 was considered highly statistically significant. While p-value > 0.05 was considered not significant. Moreover, (Cohen's d) is used to measure the effect size of ergonomic program on studied faculty staff' knowledge, reported practice regarding ergonomics and computer health hazards throughout pre and post ergonomic program. The referential framework for identifying the effect size for t-test value. [21]

Effect size **η2**	Interpretations
0.20 < 0.50	Small
0.50 < 0.80	Median
≥ 0.80	Large

III. RESULTS

Table 1 shows that, 56.9% of the studied faculty staff, their age was ranged from 24 - < 35 years old, with a mean age of 34.72 ± 6.4. Regarding to marital status, 89.2% of them were married. Concerning occupation, 31.4% of them were lecturer. Regarding years of experience, 40.2% of them were working in a nursing field for 5- < 10 years with a total mean ± SD of 9.68 ± 5.10.

Figure 1 illustrates that, 84.3% of the studied faculty staff were female, while 15.7% of them were male with a male to female ratio is 0.2:1.

Table 2 shows that, 76.5 % of the studied faculty staff using computer since ≥ 10 years and 59.8% of them use laptop, while 62.7%, 51%, 52%, 94.1% and 43.1% of them using computer daily for 3-< 7 hours, using computer consecutively

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

for 1- < 3 hours, using computer for academic works for 3-< 6 hours, using computer for personal works for 1-< 3 hours, and taking one break during computer use respectively.

Figure 2 clarifies that, during the post application of ergonomic program, the studied faculty staff gained satisfactory level of knowledge regarding ergonomics with the percentage of 97.1% as compared with the phase of pre- application of ergonomic program 23.5%. In addition to presence of a highly statistically significant difference at P=0.000. In addition to, during pre- application of ergonomic program; satisfactory to unsatisfactory ratio= 0.3:1. While during the post-application of ergonomic program; satisfactory to unsatisfactory ratio= 33:1.

Figure 3 clarifies that, during the post application of ergonomic program, the studied faculty staff gained adequate level of reported practices regarding ergonomics with the percentage of 90.2% as compared with the phase of pre- application of ergonomic program 24.5%. In addition to presence of a highly statistically significant difference at P=0.000. In addition to, during pre- application of ergonomic program; adequate to in- adequate ratio= 0.3:1. While during the post-application of ergonomic program; adequate to in- adequate ratio= 9.2:1.

Figure 4 clarifies that, during the post application of ergonomic program, the studied faculty staff gained a mild level of computer health hazards with the percentage of 76.5% as compared with the phase of pre- application of ergonomic program 19.6%. In addition to presence of a highly statistically significant difference at P=0.000.

Table 3 clarifies that, there was a high statistically significant positive correlation between the studied faculty staffs' knowledge and reported practices regarding ergonomics at (r ranged from 0.824 to 0.985 & P= 0.000). Moreover, it describes that there was a high statistically significant negative correlation between the studied faculty staffs' knowledge regarding ergonomics and computer health hazards throughout pre and post ergonomic program at (r ranged from - 0. 467 to - 0. 795 & P= 0.000). Additionally, it shows that there was a high statistically significant negative correlation between the studied faculty staffs' reported practices regarding ergonomics and computer health hazards throughout pre and post ergonomic program at (r ranged from - 0.751 to - 0. 828 & P= 0.000).

Table 4 clarifies that, ergonomic program had large effect size on studied faculty staffs' knowledge, reported practices regarding ergonomics and computer health hazards at Cohen's d= 1.63, 1.72 & 1.58 respectively. As when Cohen's d value = 0.20 < 0.50, the effect is considered small, when it = 0.50 < 0.80, the effect is considered medium and when it ≥ 0.80 the effect is large. Therefore, this provides enough evidence to support research hypothesis.

IV. DISCUSSION

Ergonomics is a crucial issue nowadays because with the advancement in technology, all tasks in most organizations, especially universities, are completed in a sedentary position and on the computer. Computer ergonomics is vital for the health and productivity of faculty staff in universities. Ensuring proper workstation design, promoting awareness of ergonomics principles, and encouraging compliance with ergonomic guidelines are essential steps to prevent computer-related illnesses and musculoskeletal disorders. [22]

Regarding personal characteristics of the studied faculty staff and compuer usage, the current study results revealed that more than half of the studied faculty staff's ages ranged from 24 - < 35 years old, with a mean age of 34.72 ± 6.4 years. This result was supported by **Kibria and Rafiquzzaman**[23] in Bangladesh (n=265), who reported that 59.62% of the studied subjects aged between 23 and 30 years. Although, this result disagreed with **Tajurahim et al.** [24] in Malaysia (n=40), found that 47.5% of the studied faculty staffs' age was ranged from 31–40 years. In addition, this study result was dissimilar with **Abdul Aziz & Azmi** [25] in Malaysia(n=50), who clarified that 58% the studied subjects were between 31 and 40 years old. From the researcher's point of view**,** these findings clarify that the studied faculty staffs' age is young, and this age is a productive age, that indicates they highly need training to continue the productivity of their work and avoid musculoskeletal disorders symptoms.

Related to marital status of the studied faculty staff, the current study represented that more than four-fifths of them were married. This finding was in line with **AlOmar et al**., [26] in Saudi Arabia(n=451), who revealed that 76.9 % of the studied subjects were married.

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

Considering occupation, the present study showed that nearly one-third of the studied faculty staff were lecturer. This result was in agreement **with Kibria and Rafiquzzaman** [23] who reported that 32 % of the studied subjects were lecturer. Also, in consistent with **Tajurahim et al**., [24] and reported that 70% of the studied faculty staff were lecturer. From the researcher's point of view, these findings might be due to the younger ages represents more than half of the studied faculty staff as their ages ranged from 24 - < 35 years old.

Regarding years of experience, the current study clarified that two-fifths of the studied faculty staff were working for 5- < 10 years with a total mean ± SD of 9.68 ± 5.10. This result was similar to **Kibria et al**. [27], in Bangladesh(n=271), who reported that 60 % of the participants had 5–15 years of experience in using computers. Although, this result was in discrepancy with **Abdul Aziz & Azmi** [25] and clarified that 46% of the studied subjects had more than 11 years of work experience. From the researcher's point of view, this finding might be due to nearly large proportion of the studied faculty staff had completed their postgraduates' studies and appointed as a lecturer.

As regards sex of the studied faculty staff, the present study clarified that more than four-fifths of the studied faculty staff were females, while the minority of them were male with a male to female ratio was 0.2:1. This result was similar to **Nwosu et al**. [28] in Nigeria(n=423), who reported that the majority of the studied subjects were females. Also, this result was in the same line with **De Barros et al.** [29] in Brazil(n=60) and reported that 75.9 % of the studied subjects were females and 24.1% were males. As well, this result was supported by **Kanika et al.** [30] in India(n=130), who reported that 76.2% of the study participants were female. From the researcher's point of view, this finding might be due to the field of nursing which be dominated by its feminine nature as most of the faculty staff recruits in the faculty are females.

Regarding computer usage related data, the current study clarified that the majority, more than three quarters, more than three-fifths, more than half and more than two-fifths of the studied faculty staff using computer for personal works for 1< 3 hours, using computer for ≥ 10 years, using computer daily for 3< 7 hours, use laptop, using computer consecutively for 1<3 hours, using computer for academic works for 3< 6 hours and taking one break during computer use respectively. This result was in agreement with **Shahwan et al**. [2] in Jordan(n=231), reported that 40.7% of the studied faculty staff worked on the computer for 3–5 h/day, using computer for personal works for 1- 3 hours and for 3-5 hours for academic work. Also reported that 54.1% of them had a continuous computer work pattern. Also, these findings in consistent with **Stanam etal**. [31] in Western Kentucky University (n=51), stated that majority 70% of participants exposed for prolonged time periods (i.e. > 4 hours/day) with reduced rest breaks during their computer work. From the researcher's point of view, this finding might be due to the workload on faculty staff that requires them to sit for more than seven hours in their day to complete the required daily work.

In relation to the total levels of knowledge regarding ergonomics pre- and post-ergonomics program, the current study clarified that at the post application of ergonomic program, the majority of the studied faculty staff gained satisfactory level of knowledge regarding ergonomics. In addition to presence of a highly statistically significant difference at P=0.000. In addition to, at pre- application of ergonomic program; satisfactory to unsatisfactory ratio= 0.3:1. While at the post- application of ergonomic program; satisfactory to unsatisfactory ratio= 33:1.This result was congruent with **Mahmoud & Hussien**[32] in Egypt (n=75), stated that the total knowledge score of the studied subjects before the educational intervention, only 2.7% of the studied subjects had a good knowledge level compared to 70.7% after the educational intervention. As well, This result was similar to **Abd El-Rasol & Abd El Rahman** [33] in Egypt (n=50), who found that more than three quarters of the studied subjects had a good level of knowledge related to ergonomics immediately after program implementation; compared to 74% of them, who had poor knowledge preprogram implementation. These finding may be attributed to the effectiveness of ergonomic program in improving the faculty staffs' knowledge about prevention of computer health hazards**.**

In relation to the total levels of faculty staffs' reported practices pre- and post-ergonomics program, the current study revealed that during the post application of ergonomic program, most of the studied faculty staff gained adequate level of reported practices regarding ergonomics. In addition to presence of a highly statistically significant difference at P=0.000. In addition to, during pre- application of ergonomic program; adequate to inadequate ratio= 0.3:1. While at the post- application of ergonomic program; adequate to inadequate ratio= 9.2:1. This result of the current study was consistent with **El Swerky et al.** in [34] Egypt (n=400), revealed that there was a significant difference between computer users before and after program application regarding to their practices score, p≤ 0.001. As, he found that only 15% of

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

computer users practices were scored as good level of practices before applying the program while improved to 80 % after program. In addition, this result was in accordance with the result of the study performed by **Subashini et al.** [35] in India (n=50), who reported that 74% of the studied subjects had poor practice level in pre-test while in post-test only 2% of them had poor practice, 26% had average practice and 72% of them had good practice.

From the researcher's point of view, this finding might be due to exposure to ergonomic educational content and activities that highlighted the principles of ergonomics safety practice and its application. Furthermore, the ergonomic program might make the studied faculty staff feel more vulnerable and understand the health hazards and consequences of neglecting ergonomic practice, as well as have increased motivation and tendency to engage in preventive behaviors. This was reflected in the faculty staffs' engagement in the recommended ergonomic practices for preventing computer health hazards.

Concerning total levels of computer health hazards among the studied faculty staff throughout pre and post ergonomic program, the current study clarified that, during the post application of ergonomic program, slightly more than three quarters of the studied faculty staff gained a mild level of computer health hazards as compared with the phase of pre- application of ergonomic program, only less than one fifth of them had mild level of computer health hazards. In addition to presence of a highly statistically significant difference at P=0.000.

These results were confirmed by **Mahmoud & Hussien** [32] who reported that 5.3% of the studied subjects had mild level of computer health hazards in pre-intervention which increased to 12% of them after the educational intervention at p-value <0.01. Also, this result was in the same line with **Sayed et al.** [10] in Egypt (n=140), who revealed that before the educational intervention, the studied subjects had 0% mild, 57.1% moderate and 42.9% sever levels of computer health hazards and improved to 78.6 % mild, 21.4 % moderate and 0% sever levels of computer health hazards through the post educational intervention. These results may reflect the effect of ergonomic program on diminishing the computer health hazards among the studied faculty staffs**.**

As regards correlation between the studied faculty staffs' knowledge, reported practice regarding ergonomics and computer health hazards throughout pre and post ergonomic program, the present study represented that there was a high statistically significant positive correlation between the studied faculty staffs' knowledge and reported practices regarding ergonomics at (r ranged from 0.824 to 0.985 & P= 0.000). Moreover, there was a high statistically significant negative correlation between the studied faculty staffs' knowledge regarding ergonomics and computer health hazards throughout pre and post ergonomic program at (r ranged from - 0. 467 to - 0. 795 & P= 0.000). Additionally, there was a high statistically significant negative correlation between the studied faculty staffs' reported practices regarding ergonomics and computer health hazards throughout pre and post ergonomic program at (r ranged from - 0.751 to - 0. 828 & P= 0.000).

These results of the present study were in the same context with **Bahgat et al.** [12] in Egypt (n=100), reported that there were highly statistically correlation between the studied subjects' knowledge and their practices at $P \leq 0.001$. Also, these results were in agreement with **Hamid, et al.** [36] in Egypt (n=30), who reported that a positive correlation was found between the studied subjects' total ergonomics knowledge and their safety practices post program implementation, while no correlation was founded pre- program. As well, these results were in the same line with **Abd Rabou & Akel** [37] in Egypt (n=90), and reported that there was a highly statistically significant positive correlation between the studied subjects' knowledge regarding ergonomics, and their ergonomics' practice throughout pre ($r= 0.231$, $p < .05$) and post intervention ($r= 0.354$, $p < .05$). This might be due to the studied faculty staffs' knowledge might be effect on their total practices.

Similarly, this result was supported by **Mahmoud & Hussien**[32] who clarified that highly statistically negative correlations were found between computer health hazards with the studied subjects' total knowledge ($r = -0.596$ & $P= 0.007$) and ergonomic practices ($r = -0.612$ & $P= 0.004$). In addition, this result was confirmed by **Kanika et al.** [30] who reported that there was a significant correlation between the studied subjects' computer ergonomic knowledge and computer health hazards ($p=0.03$), which emphasizes the importance of computer ergonomics to decrease the related musculoskeletal and visual disorders. And were agreed by **Mohammad et al.** [38] in Iran (n=260), who revealed that there

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

was a significant and negative correlation between the studied subjects' knowledge of ergonomics and musculoskeletal disorders (r =-0.180 & P= 0.005).

Moreover, this result was in accordance with the result of the study performed by **Jasmine et al.** [39] **in** India (n=403), who clarified that there was a highly statistically significant negative correlation between the studied faculty staffs' practices regarding ergonomics and computer health hazards. Furthermore, these results were reinforced by **Boadi-Kusi et al.** [40] in Ghana (n=200), who indicated that, there was a significant association between the presence of computer health hazards and poor ergonomic practices ($\chi = 15.175$, $p = 0.001$).

From the researcher's point of view, this could be due to faculty staffs with satisfactory knowledge levels regarding ergonomics, tend to practice more healthy preventive behaviors to eliminate or prevent computer health hazards. Also, this highlights the effectiveness of the ergonomics program and provides the policymaker an effective proof of the importance of conducting health awareness sessions about computer ergonomics to help in controlling and preventing computer health hazards.

With regards to effect of ergonomic program on studied faculty staffs' knowledge, reported practices regarding ergonomics and computer health hazards throughout pre and post ergonomic program, the current study clarified that, ergonomic program had large effect size on studied faculty staffs' knowledge, reported practices regarding ergonomics and computer health hazards at Cohen's d= 1.63, 1.72 & 1.58 respectively. Therefore, this provides enough evidence to support research hypothesis.

These results were reinforced by **Navidi et al.** [41] in Iran(n=19), and indicated that there was a positive effect of ergonomic training and corrective movements program on reducing the prevalence of musculoskeletal disorders, Also, these findings were supported by **Heidarimoghadam et al**. [42] in Iran (n=311), and revealed that the implementation of ergonomics program revealed a greater impact on reducing MSDs among the studied subjects.

As well, this result was consistent with **El Swerky et al.** [34] who concluded that the health prevention ergonomic program had a significant effect on improving the studied subjects' knowledge and practices to prevent overuse syndrome. Also, these findings were supported by **Hamid, et al**. [36] who illustrated that the implementation of the ergonomic training program had positive effects on improving the studied subjects' ergonomics knowledge and safety practice.

V. CONCLUSION

Based on the study findings and research hypothesis it can be concluded that:

The results of the study supported the research hypothesis which showed that, there was a marked enhancement in faculty staffs' knowledge and reported practices after implementation of an ergonomic program on preventing computer health hazards. The current study concluded that most of the studied faculty staff gained a satisfactory level of knowledge and adequate level of reported practices regarding ergonomics post-program as compared with less than one fourth of them pre-program while, more than three quarters of them gained a mild level of computer health hazards post ergonomic program as compared with less than one fifth of them at pre-ergonomic program. Also, there was a high statistically significant positive correlation between the studied faculty staffs' knowledge and reported practices regarding ergonomics and there was a high statistically significant negative correlation between the studied faculty staffs' knowledge, reported practices regarding ergonomics and computer health hazards.

VI. RECOMMENDATIONS

On the light of the current study findings the following recommendations are suggested:

1. Continues implementation of ergonomic programs and workshops for all faculty staffs in universities to highlight the importance of ergonomics in preventing computer health hazards
2. Dissemination of booklet about healthy use of computers and its consequences among faculty staff members.

Further research:

- Further researches are needed for faculty staff regarding prevention of computer health hazards, applying it on large sample and in different setting in Egypt.

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

Table (1): Frequency Distribution of Personal Data among the Studied Faculty Staff (n= 102)

Personal data		No.	%
Age (year)	24 - < 35 Yrs.	58	**56.8**
	35 - < 45 Yrs.	36	35.3
	45 - < 55 Yrs.	7	6.9
	≥ 55 Yrs.	1	1.0
	Mean ± SD	**34.72 ± 6.4**	
Marital status	Single	10	9.8
	Married	91	**89.2**
	Divorced	1	**1.0**
Occupation	Demonstrator	16	15.7
	Assistant lecturer	23	22.5
	Lecturer	32	**31.4**
	Assistant professor	23	22.5
	Professor	8	7.8
Years of Experience	< 5 years.	18	17.6
	5 - < 10 years.	41	**40.2**
	10 - < 15 years.	24	23.5
	≥ 15 years.	19	18.6
	Mean ± SD	**9.68 ± 5.10**	

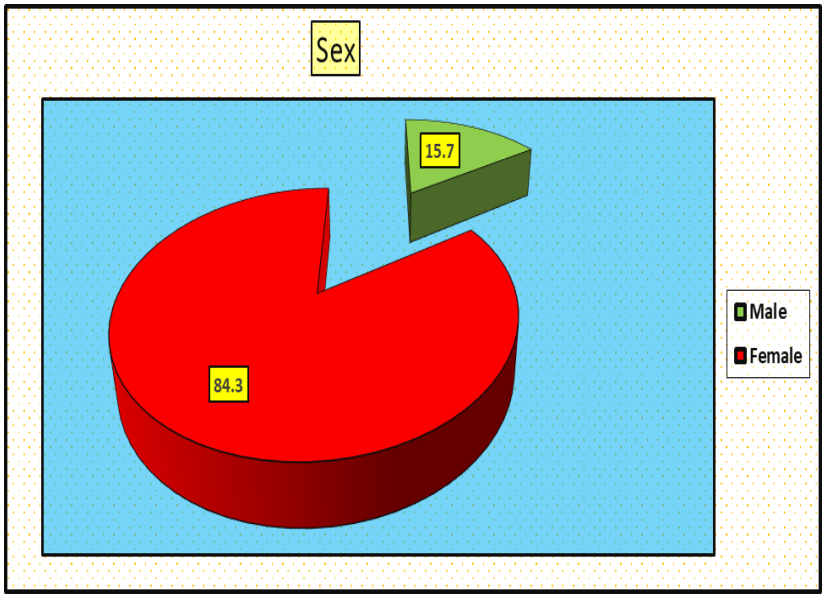


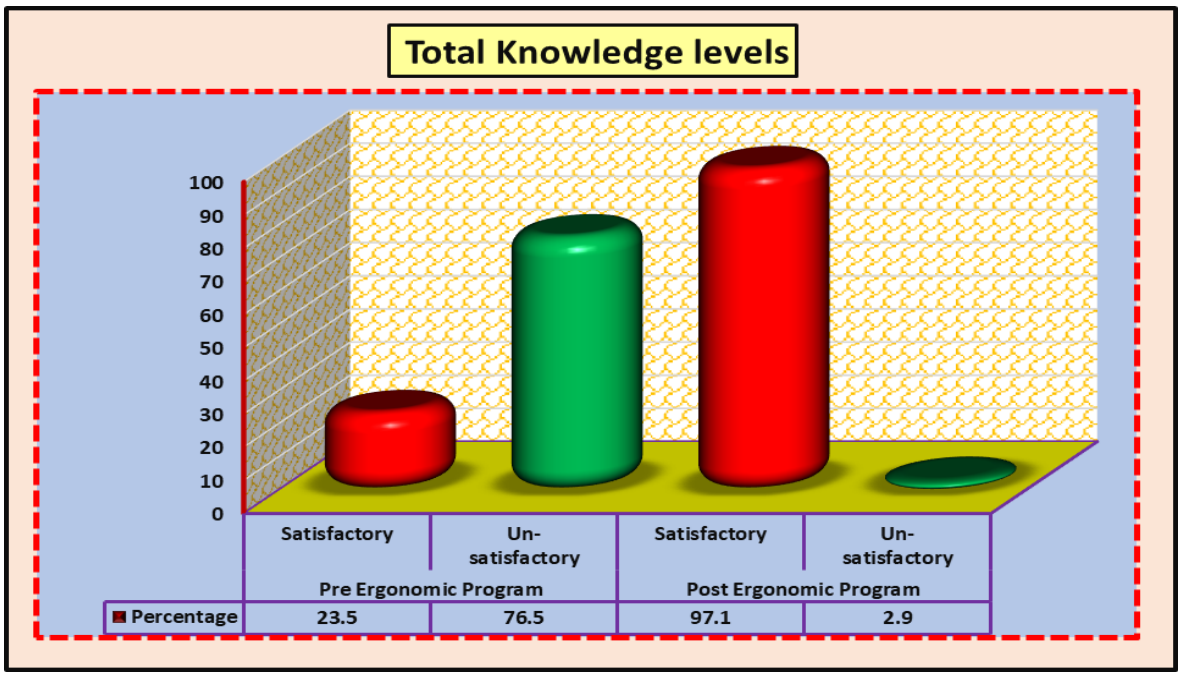
Figure (1): Percentage Distribution of the Studied Faculty Staffs regarding their Sex (n= 102).

Table (2): Frequency Distribution of Computer Usage related data among the Studied Faculty Staff (n= 102)

Computer usage		No.	%
Using computer	**< 1 years.**	**2**	**2.0**
	1- < 5 years	**7**	**6.9**
	5- < 10 years.	**15**	**14.7**
	≥ 10 years.	**78**	**76.5**
	Mean ± SD	**13.93 ± 6.39**	

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

Type of computer	**Desktop pc**	**34**	**33.3**
	Laptop	**61**	**59.8**
	Tablet / I Pad	**7**	**6.9**
Average numbers of daily hours using computer	**1- < 3 hours**	**31**	**30.4**
	3- < 7 hours	**64**	**62.7**
	7- < 10 hours	**4**	**3.9**
	≥ 10 hours	**3**	**2.9**
	Mean ± SD	**3.78 ± 1.92**	
Number of consecutive hours using computer	**1- < 3 hours**	**52**	**51.0**
	3 - < 6 hours	**46**	**45.1**
	≥ 6 hours	**4**	**3.9**
	Mean ± SD	**3.14 ± 1.49**	
Number of hours using computer for academic works	**1 - <3 hours**	**37**	**36.3**
	3 - <6 hours	**53**	**52.0**
	≥ 6 hours	**12**	**11.8**
	Mean ± SD	**3.70 ± 1.74**	
Number of hours using computer for personal works	**1- < 3 hours**	**96**	**94.1**
	3- < 6 hours	**5**	**4.9**
	≥ 6 hours	**1**	**1.0**
	Mean ± SD	**2.14 ± 0.65**	
Average number of breaks taking during computer use	**One break**	**44**	**43.1**
	Two breaks	**31**	**30.4**
	Three breaks	**27**	**26.5**



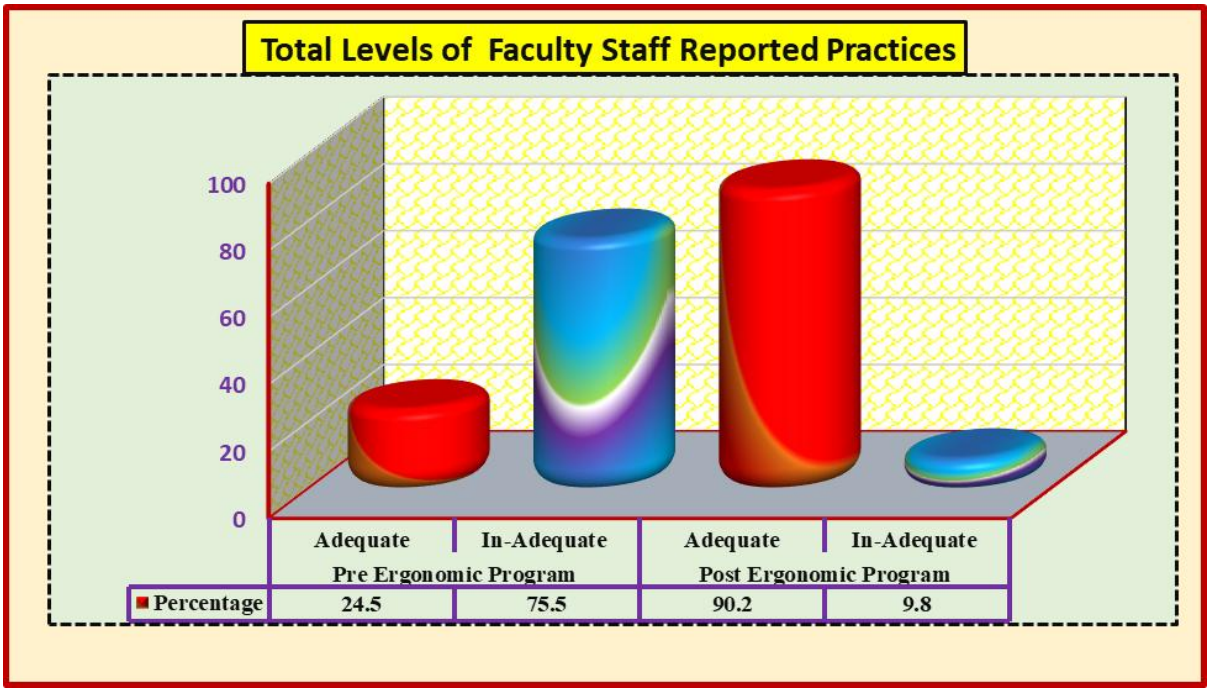
Pre- ergonomic program: Satisfactory to Unsatisfactory ratio= 0.3:1

Post- ergonomic program: Satisfactory to Unsatisfactory ratio = 33:1

M.H: 8.6, P=0.000

Figure (2): Percentage Distribution of Studied Faculty Staffs' Total Knowledge Levels regarding Ergonomics throughout Pre and Post Ergonomic Program (n=102).

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

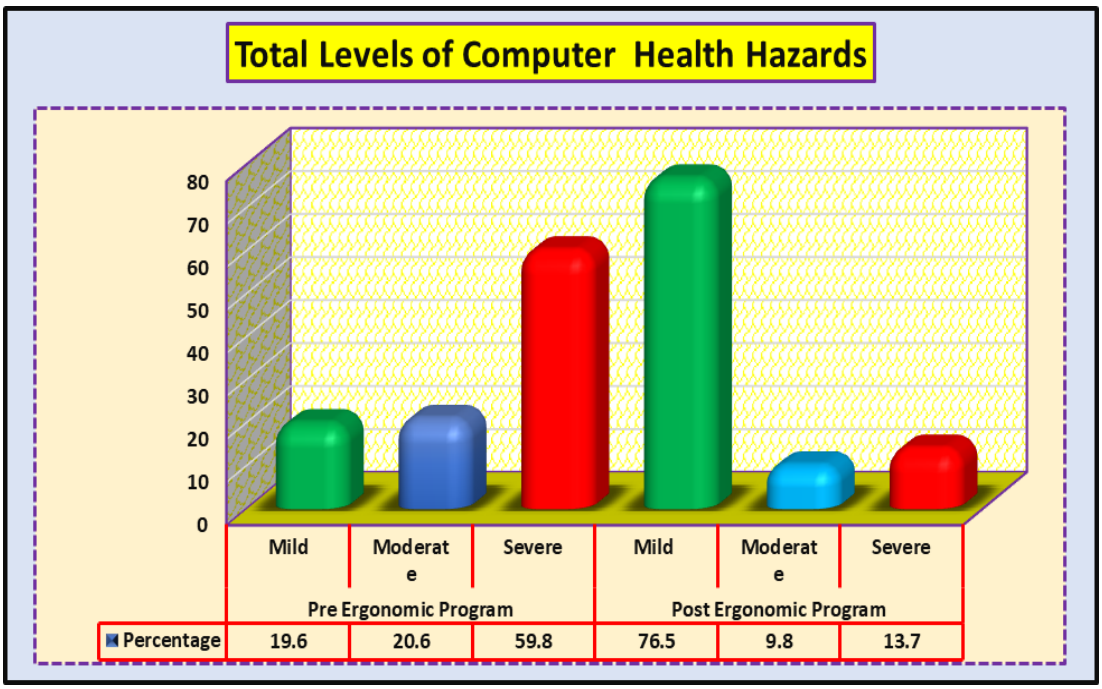


Pre- ergonomic program: Adequate to In-adequate ratio= 0.3:1

Post- ergonomic program: Adequate to In-adequate ratio = 9.2:1

M.H: 8.18, P=0.000

Figure (3): Percentage Distribution of Studied Faculty Staffs' Total Levels of Reported Practices regarding Ergonomics throughout Pre and Post Ergonomic Program (n=102)



M.H: 7.84, P=0.000

Figure (4): Percentage Distribution of Total Levels of Computer Health Hazards among the Studied Faculty Staff throughout Pre and Post Ergonomic Program (n=102)

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

Table (3): Correlation Matrix between the Studied Faculty Staffs' Knowledge, Reported Practice regarding Ergonomics and Computer Health Hazards throughout Pre and Post Ergonomic Program (n=102)

Items		Knowledge pre-ergonomic program	Knowledge post-ergonomic program	Reported Practices pre-ergonomic program	Reported Practices post-ergonomic program	Computer health hazard pre-ergonomic program	Computer health hazard post-ergonomic program
Knowledge pre-ergonomic program	R			0.985		-.795	
	p-value			0.000**		0.000**	
Knowledge post-ergonomic program	R				0.824		-0.467
	p-value				0.000**		0.000**
Reported Practices pre-ergonomic program	R	0.985				-0.828	
	p-value	0.000**				0.000**	
Reported Practices post-ergonomic program	R		0.824				-0.751
	p-value		0.000**				0.000**
Computer health hazard pre-ergonomic program	R	-0.795		-0.828			
	p-value	0.000**		0.000**			
Computer health hazard post-ergonomic program	R		-0.467		-0.751		
	p-value		0.000**		0.000**		

Table (4): Effect of Ergonomic Program on Studied Faculty Staffs' Knowledge, Reported Practices regarding Ergonomics and Computer Health Hazards throughout Pre and Post Ergonomic Program (n=102)

Variables	Interval	Mean	SD	t Test	P value	Cohen 's d	Effect size
Knowledge	**Pre-program**	**13.09**	**6.91**	**16.55**	**0.000*** **	**1.63 *** **	**Large effect**
	Post- program	**23.55**	**2.21**				
Reported practices	**Pre-program**	**62.48**	**34.44**	**17.39**	**0.000*** **	**1.72 *** **	**Large effect**
	Post- program	**109.16**	**19.74**				
Computer health hazards	**Pre-program**	**52.72**	**24.06**	**15.90**	**0.000*** **	**1.58 *** **	**Large effect**
	Post- program	**16.78**	**24.39**				

REFERENCES

[1] Jabeen, S., Khalid, M., Shahid, R., Khalil, I., Haider, S., and Jamil, U. (2023): Effect of Ergonomic Practices on Computer Vision Syndrome (CVS) symptoms among undergraduate and postgraduate IT students at University of Chakwal: Effect of Ergonomic Practices on CVS symptoms, THE THERAPIST (Journal of Therapies &Amp; Rehabilitation Sciences), Vol. 4, No.4, available at: https://doi.org/10.54393/tt.v4i04.183, 3 september2024, 3:30 pm.

[2] Shahwan, B. S., Demeh, W. M., and Yacoub, M. I. (2022): evaluation of computer workstations ergonomics and its relationship with reported musculoskeletal and visual symptoms among university employees in Jordan, International Journal of Occupational Medicine and Environmental Health; Vol.,35(2):141–156, available at: https://doi.org/10.13075/ijomeh.1896.01822, 30 June 2024, 1:36 pm.

[3] Edwards, C., Fortingo, N., and Franklin, E. (2024): Ergonomics, National Library of Medicine, available at: file:///C:/Users/lv/Desktop/d%20saha/Edwards%20et%20al.,%202024).html, 3 september2024, 11:30 pm.

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

[4] Poniran, H., Zain, N.N.M., Mohan, N.M.M., Tamsir, F., and Ibrahim, N. A. (2020): Determinants of Computer Ergonomic Hazards among Office Workers in Klang Valley, Malaysia, Asian Journal of Education and Social Studies, Vol. 13, No.2, available at: DOI: 10.9734/AJESS/2020/v13i230325, 3 September 2024, 12:00 pm.

[5] Mohammadi, Z., Rahnama, R., Nikbakht, R., and Hosseini-Koukamari, P. (2020): work-related musculoskeletal disorders and workstation condition prevalence among computer users of a university in Tehran by Maastricht tool: a cross-sectional study, International Journal of Musculoskeletal Pain Prevention, Vol.5, No. 3, 367-372, available at: DOI: 10.52547/ijmpp.5.3.367, 3 september2024, 7:00am.

[6] Sheila, A. O. and Purity, N. O. (2020): Effect of ergonomic factors on employee's performance in Nigeria's banking sector, European journal of business and management, Vol.12, No.23, available at: DOI: 10.7176/EJBM/12-23-10, 3 September 2024, 3:20 pm.

[7] Chika, C., and Ndidi, A. (2022): Working with Display Screen Equipment: Health Problems and Preventive Measures; International Journal of Clinical Practice, Vol.7, No.3, available at: file:///C:/Users/lv/Downloads/CIRD-IAJMCP-22-0899%20(1).pdf, 3 September, 4:00 pm.

[8] Jomoah, I. (2021): Work-Related Health Disorders among Computer Users. E. Book,3rd ed., Elsevier health sciences, P214.

[9] National Institute for Occupational Safety and Health (NIOSH)(2024): ergonomics and musculoskeletal disorders, available at https://www.cdc.gov/niosh/ergonomics/ergo-programs/index.html, 8 September 2024, 12:00 pm

[10] Sayed, S.H., Abd El Wahed, A.Y., and Madian, A.A.M. (2020): Effect of interactive digital-based educational intervention about digital eye strain on the severity of eye complaints, knowledge and ergonomic practices preventive among computer users. American Journal of Nursing Research; V., No.,8 (1):48-59, available at: DOI:10.12691/ajnr-8-1-6, 28 July 2024, 7:30pm.

[11] Gogoi M and Kalita M (2022): Assessment of Occupational Health Hazards of the Computer Users, Journal of Ergonomics, V., No., 12: 308, available at: DOI: 10.35248/2165-7556.22.12.308, 18 august 2024, 5:00 pm.

[12] Bahgat, H.H., Mahmoud, A.A. and Abosree, T.H. (2024): occupational health hazards among computer users in benha university administration, journal of nursing science - Benha University, Vol. (5) No. (1), 2682 – 3934, available at: https://jnsbu.journals.ekb.eg/article_335780_fc206a105bc150193a2845a27f297fbb.pdf, 17 August 2024, 1:50 pm.

[13] World health organization (WHO), 2022: Musculoskeletal health Key facts, available at Musculoskeletal health (who.int),4 September 2024,11:00 am.

[14] Demissie, B., Bayih, E. T., and Demmelash, A. A., (2024): A systematic review of work-related musculoskeletal disorders and risk factors among computer users, Heliyon, Vol. 10, available at: https://doi.org/10.1016/j.heliyon. 2024.e25075 4 September 2024,11:00 am.

[15] Adane, F., Alamneh, Y.M., and Desta, M. (2022): Computer vision syndrome and predictors among computer users in Ethiopia: a systematic review and meta-analysis, Tropical Medical Health ,Vol.50, doi: 10.1186/s41182-022-00418-3, 4 September 2024, 11.00 am.

[16] Dimitrijević, V., Todorović, I., Viduka, B., Lavrnić, I., and Viduka, D. (2023): Prevalence of computer vision syndrome in computer users: a systematic review and meta-analysis, vojnosanitetski pregled, V.80, No. 10, 860–870, DOI: https://doi.org/10.2298/VSP220301024D, 4 September 2024, 12:12 pm.

[17] Occupational safety and Health administration (2014): Computer Workstation e tool checklist, Available at: https://www.osha.gov/SLTC/etools/computerworkstations/checklist_evaluation.html, 8February, 2021, 8.00am.

[18] Crespo A., Segu M. and Ronda E. (2015): A reliable and valid questionnaire was developed to measure computer vision syndrome at the workplace. Journal of Clinical Epidemiology, Vol. 68, No. 6, 662-73, doi: 10. 10 16/j.jclinepi.2015. 01.015, 2, available at https://pubmed.ncbi.nlm.nih.gov/25744132/, 11feburary 2021, 7.07 pm.

[19] Hedge, A., Morimoto, S., and McCrobie, D. (1999): Cornell Musculoskeletal Discomfort Questionnaire, Available at: https://ergo.human.cornell.edu/Pub/AHquest/mmsquest.pdf, 24 December, 2020, 8.00am.

[20] Malkewitz, C. P., Schwall, P., Meesters, C., & Hardt, J. (2023): Estimating reliability: A comparison of Cronbach's α, McDonald's ωt and the greatest lower bound. Social Sciences & Humanities Open, 7(1), 100368.

[21] AlWahaibi, I. S. H., AlHadabi, D. A. M. Y. A., & AlKharusi, H. A. T. (2020): Cohen's Criteria for Interpreting Practical Significance Indicators: A Critical Study. Cypriot Journal of Educational Sciences, 15(2), 246-258.

[22] Nizami, G. N. (2022): workstation for university faculty – an ergonomic view, Ziauddin University, available at: https://pjr.zu.edu.pk/vol-2-issue-2-2/workstation-for-university-faculty-an-ergonomic-view/, 17 August 2024, 8:00 pm.

[23] Kibria, M.G., and Rafiquzzaman, M. (2019): ergonomic computer workstation design for university teachers in Bangladesh, Jordan journal of mechanical and industrial engineering, Volume 13, Number 2 (ISSN 1995-6665), Pages 91 – 103, available at: https://jjmie.hu.edu.jo/vol-13-2/jjmie_43_19-01.pdf, 20 August 2024, 6:30 pm.

[24] Tajurahim, N.A., Er, T.S., Mahmood, S., and Abdul Rahman, I. (2023): ergonomics assessment among staff at the faculty of engineering technology using rosa technique, Human Factors and Ergonomics Journal (HFEJ), Vol. 8 (1): 57 – 79, available at: https://hfej.hfem.org/wp-content/uploads/2023/06/Paper-6-HFEJ-Revised63030.pdf, 29 July 2024, 7:30 pm.

[25] Abdul Aziz, F., and Azmi, N.A. (2022): The impact of risk factors associated with long-term computer use on musculoskeletal discomfort among administrative staff: A case study, journal of modern manufacturing systems and technology (JMMST),V. 6, issue 2, 7 – 17, available at: DOI: https://doi.org/10.15282/jmmst.v6i2.8557, 23 August 2024, 7:15 am.

[26] Al Omar, R. S., Al Shamlan, N. A., Alawashiz, S., Badawood, Y., Ghwoidi, B. A., and Abugad, H. (2021): Musculoskeletal symptoms and their associated risk factors among Saudi office workers: a cross-sectional study. BMC Musculoskeletal Disorders, V.,22, issue(1),1-9. Available at: https://doi.org/10.1186/s12891-021-04652-4, 20 July 2024, 9.00 pm.

[27] Kibria, M. G., Parvez, M. S., Saha, P. and Talapatra, S. (2023): Evaluating the ergonomic deficiencies in computer workstations and investigating their correlation with reported musculoskeletal disorders and visual symptoms among computer users in Bangladeshi university, Heliyon journal, V., 9 e22179, available at: https://doi.org/10.1016/ j.heliyon.2023.e22179,18 August 2024, 11:50 am.

[28] Nwosu, S.C., Atulomah, N.O., Nwakwo, N.V, and Suleiman, J.V. (2024): influence of educational-intervention program on adherence to workplace-ergonomic principles among catering staff of selected universities in Ogun state, Nigeria, Babcock University Medical Journal, V., 7(1):88-95, available at: DOI:10.38029/babcockuniv. med.j..v7i1.193, 27 July 2024, 7:00 pm.

[29] De Barros, F. C., Moriguchi, C. S., Chaves, T. C., Andrews, D. M., Sonne, M., and de Oliveira Sato, T. (2022): Usefulness of the Rapid Office Strain Assessment (ROSA) tool in detecting differences before and after an ergonomics intervention. BMC Musculoskeletal Disorders, 23(1), 1-12, available at: https://doi.org/10.1186/s12891-022-05490-8, 30 July 2024, 9.15 pm.

[30] Kanika, Joseph, B., and Jimmy Dharwal, J. (2021): Knowledge Regarding Computer Ergonomics and Incidence of Musculoskeletal Disorders among Desktop Users, Indian Journal of Forensic Medicine & Toxicology, Vol. 15, No. 2 199, available at: DOI: https://doi.org/10.37506/ijfmt.v15i2.14304, 18 August 2024, 12:30 pm.

[31] Stanam, A., Golla, V., Vasa, S. and Taylor, R.D.(2019): Exposure to computer work and prevalence of musculoskeletal symptoms among university employees: A cross- sectional study, American public health association annual meeting, available at: file:///C:/Users/lv/Downloads/Abstract--386940.pdf, 30 June 2024, 12:40 pm.

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (1-18), Month: September - December 2024, Available at: www.noveltyjournals.com

[32] Mahmoud, S. F., and Hussien, M. E. (2021): effect of educational intervention about computer vision syndrome on the severity of eye complaints among computer users, Egyptian Journal of Health Care (EJH), Vol. 12. no.3, available at: Doi 10.21608/EJHC.2021.197201, 18 August 2024, 12:00 pm.

[33] Abd El-Rasol, Z. F. M. and Abd El Rahman, R. M. (2018): effect of implementing body mechanics and ergonomics training program on nurses' low back pain and quality of nursing work life, IOSR Journal of Nursing and Health Science, Volume 7, Issue 3, PP 20-35, available at: DOI:10.9790/1959-0703102035,12 July 2024, 12:25 pm.

[34] El Swerky, F. M., Shafik, S. A., & El Hameed, F. K. A. (2022): Health prevention program for occupational overuse syndrome for computer users, International Journal of Health Sciences, 6(S5), 1717–1735, available at: https://doi.org/10.53730/ijhs.v6nS5.9494, 27 July 2024, 7:00 pm.

[35] Subashini, S., Sathya, M. S., Kalaivani, Malarvizhi S., Moni K., and Ravichandran, K. (2023): Effect of video assisted teaching on knowledge, attitude and practice regarding ergonomics among secretaries at selected tertiary care center, Puducherry. International Journal of Advance Research in Medical Surgical Nursing, V. 5(1):132-136. DOI: https://doi.org/10.33545/surgicalnursing.2023.v5.i1b.129, 30 August 2024, 10:00pm.

[36] Hamid, A. A., Fekry, N., and Etway, E. A. (2022): Effect of ergonomics training program on nurses' knowledge and safety practice. International Journal of Health Sciences, 6(S6), 5992–6006. https://doi.org/10.53730/ijhs.v6nS6.11195, 28 July 2024, 8:00pm.

[37] Abd Rabou, H. M., and Akel, D. T. (2020): Workplace ergonomics training intervention and its effect on quality of nursing work life among nurse interns, clinical nursing studies, Vol. 8, No. 3, available at: DOI:10.5430/cns.v8n3p35, 30 July 11:49 am.

[38] Mohammad, A., Abbas, B., and Narges, H. (2019): Relationship between knowledge of ergonomics and workplace condition with musculoskeletal disorders among nurses, international archives of health sciences; Vol.6 :121-6, available at: DOI:10.4103/iahs.iahs_10_19, 18 August 2024, 3:00 pm.

[39] Jasmine, M., Fasna, L., Chellaiyan, V.G., Raja, V.P., and Ravivarman, G. A. (2020): study on knowledge and practice of ergonomics among the software engineers in a private firm, Chennai, Tamil Nadu, journal of family medicine and primary care; Vol.,9 :4287-91, available at: DOI: 10.4103/jfmpc.jfmpc_848_20, 17 August 2024, 3:30 pm.

[40] Boadi-Kusi, S.B., Abu, S.L., Acheampong, G.O., Adueming, P.O., Kwasi, E. & Abu, EK. (2020): association between poor erg ophthalmologic practices and computer vision syndrome among university administrative staff in Ghana, Journal of environmental and public health, Vol. 2020, 8 pages, available at: https://doi.org/10.1155/2020/7516357,18 August 2024, 11:07 am.

[41] Navidi, S.F., Keramat Kar, M., Jahan, M.G., and Varmazyar, S. (2022): Effects of ergonomics training and corrective exercises on musculoskeletal disorders among office computer users at Qazvin province gas company, journal of occupational health epidemiology, Vol.11(3):246-55, available at: doi 10.52547/johe.11.3.246, 15 August 2024, 2:15 pm.

[42] Heidarimoghadam, R., Mohammadfam, I., Babamiri, M., Soltanian, A. R., Khotanlou, H., and Sohrabi, M. S.(2023): Can ergonomic interventions in knowledge-based companies improve musculoskeletal disorders, alter job contents, or increase quality of work-life and productivity? a quasi-randomized control trial, Journal Occupational Health Epidemiology, Vol.,12(3):175-86, available at: doi 10. 61186/johe.12.3.175, 30 July 2024, 7:38 pm.