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REPERCUSSIONS OF THE WORLD TRANSITION TO REMOTE WORK SYSTEM DURING COVID PANDEMIC: INCREASED INSTANCES OF OCCUPATIONAL HEALTH AND SAFETY ISSUES AMONG STUDENTS AND PROFESSIONALS

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Abstract

Personal computer usage has increased tremendously during the past few years, especially in COVID pandemic which forced the worldwide operations, educational institutions and businesses to shift online. The computers dependency increased owing nationwide lockdowns and worldwide social distancing.

Objective: This research aimed to identify the occupational hazards faced by computer users (students and professionals) during the period.

Methods: A questionnaire survey was administered among 8126 computer users (4076 students and 4050 professionals) to gather information regarding various aspects related to computer usage.

Results: The major health issues reported by respondents include neck pain, musculoskeletal problems, vision problems, wrist pain, knee pain etc., due to inappropriate postures and workstation design and prolonged use of computer during the pandemic situation. Statistical correlation showed association between majority of the variables. Regression model highlighted lower arm pain, knee pain, lack of precautionary measures and unawareness about occupational health and safety as significant risk factors.

Conclusion: Study highlighted the health issues faced by computer users especially in the wake of current pandemic, which at least, for the near future, will force many people to work from home. It is important for users to be aware of implementation of safe work practices and personal behavior to reduce occupational health and safety risks. Measures to improve work environment and work station design should constitute an integral part of preventive measures.

Keywords

Computer, Occupational Health & safety, Musculoskeletal, Students, Professionals

1. Introduction

Technological advancement has resulted in millions of individuals using computers and gadgets in their daily lives. From students of all grades to professionals, it has been widely used to accomplish their tasks as computers provide numerous competitive advantages, efficiency and effective outcomes. Computers are involved in almost every field of life, providing advanced strategies for work management, which require less physical demand for energy and high intellectual attention (Bhanderi *et al.,* 2017). This dependency on computers has specifically and massively increased during the recent COVID-19 pandemic due to nationwide lockdowns and social distancing worldwide which necessitated individuals and organizations to shift their working system to online mode. In recent years, computer usage has emerged as a significant risk factor for developing musculoskeletal disorders (MSDs). Personal computers users (laptops, tablets, phablets etc.) face musculoskeletal disorder at some body site; wrist, shoulder, neck, and lower back being the most vulnerable to injury (Amin *et al*., 2016; Klussmann *et al*., 2008). According to Malinska *et al*., (2021), an estimated 48% respondents suffered MSDs especially lower back and neck pain which was attributed to increasingly computer usage. Appropriate workstation design, working hours and computer ergonomics can significantly decrease risks for developing MSDs. Absence of an adjustable drawer with a computer desk and chair armrests results in pain in the lower arm and back, wrist strain and general discomfort. Similarly, 77% computer users in Estonian offices have suffered atleast single body site musculoskeletal pain (Oha *et al*.,2014). There exists a significant association between job strain and the arm-hand and neck-shoulder MSDs among computer workers (Moon *et al*.,2015). Lower back pain emerges as a common disorder in computer users of every age group but is reported to be highly frequent in the younger age groups due to prolonged use of computing devices in an inappropriate body posture or long sitting hours (Juul-Kristensen *et al*., 2004).

Extended periods of computer use increase the risk of developing various computer-related ailments, compromising the health of users by inducing neck, back, arm and shoulder pain, and muscle and joint issues etc., through improper workstation design, poor posture and remaining in a steady position for extended periods. A widely reported occupational injury experienced by computer users is Repetitive Strain Injury (RSI) which is linked with long working hours and prolonged static posture. A research conducted among the computer workers at a telecommunication company to evaluate the repetitive rate of strain injuries depicted that around 41% of the respondents experienced tiredness in the upper back region near the neck area and 38% in the shoulder area (Baba and Daruis 2016), thus describing the commonness of neck and shoulder pain among computer users especially in offices. People are either unaware of these impacts or they simply ignore them (Khan and Siddiqui 2005; Gerr *et al*., 2002; Hannan *et al*., 2005; Brandt *et al*., 2004). Same study interpretations were gathered Marcus *et al.,* concluding that the risk of

musculoskeletal symptoms and disorder, can be lessened by promoting properly seated postures (Marcus *et al*., 2002).

Continuous and long periods of screen time place excessive stress on the eyes, which can lead to redness, eye fatigue, blurred vision, muscular pain, watery eyes etc. and may induce permanent damage to the visual system. According to Rathore, an undiagnosed and ignored eye condition may cause productivity loss among the users (Rathore, 2017). High occurrence of vision-related issues among the university students using the computer have been reported (Shantakumari *et al*.,2014). Computer vision syndrome (CVS) is a common condition experienced by computer users arising due to eye and brain reacting differently to characters on the screen as compared to printed characters. In Nigeria, 74% computer workers at the Securities and Exchange Commission, Abuja, developed at least one or two symptoms of CVS (Akinbinu and Mashalla 2013). Increase in daily hours as well as accumulated years of use of computers, data processing activities and graphics considerably enhance the risk of musculoskeletal disorders (Ayanniyi *et al*.,2010). The use of computer mouse for more than 0.5 hours a day, was also reported to be a significant risk factor causing forearm and shoulder strain thus reducing the productivity (Hagberg *et al*.,2007). The present study was carried out to identify the possible occupational health risks faced by computer users in various sectors.

2. Methodology

The data collected and analyzed in this study was based on questionnaire survey.

2.1.Questionnaire Design

Questionnaire was designed, based on previous studies, and included questions mainly related to the availability and duration of computer usage, change in usage in the wake of pandemic (COVID 19) situation, work posture, safety measures and experience of health issues related to computer usage etc.

2.2. Selection of Respondents

The questionnaire survey was conducted in Lahore, among respondents belonging to two different categories; students and professionals. The student's category involved respondents from different institutions (colleges and universities), while the professionals' involved respondents like bankers, teachers, office workers, etc. The educational institutions included Kinnaird College for Women, Lahore College for Women University (LCWU), Lahore University of Management Sciences (LUMS), University of Engineering & Technology (UET), Lahore, University of Punjab, University of Central Punjab (UCP) and Forman Christian College (FCC). The students as well as the teaching and administrative staff of these universities participated in study. Furthermore, different banks, offices like Wateen Head Office, Bank Alfalah, Habib Bank, Meezan Bank, etc. were the key professional institutions whose staff (computer workers) participated in the study.

2.3.Statistical Analysis

The responses collected were analyzed using the SPSS software and then the results were compared to assess the hazards and health effects experienced by computer users and the impact of online system

during the pandemic situation. The results obtained from both the categories were correlated, in order to establish a connection between both.

3. Results and Discussion

The current research was conducted to identify the possible occupational hazards and associated health risks among computer users. Computer users were categorized into two groups, students, and professionals. A total of 8126 respondents participated in the study (4076 students and 4050 professionals). The results of the statistical analysis of the responses collected for both groups are provided below.

In case of professionals, 57% males and 42.6% females participated and 60% of the participants were married. From literacy rate perspective, 55.6% of the participants were Bachelor's degree holders, while around 43% were MPhil/Ph.D. degree holders and a small percentage of (1.1%) were certificate holders. The majority of the participants (35.1 %) belonged to age group 21-25yrs, 29.2 % were between 26-30yrs, around 18.89% fall in the age group 31-35 yrs., (10.8%) were from age group 36-40 yrs., while a small percentage (5.9%) were above 40 yrs. While in case of students, majority of the students (67.9%) were in the age group 21-24yrs, (29.1%) were between 16-20 yrs., while (2.9%) were from the 25-28yrs age group. The majority (70.8%) students were studying at BS/MSc level, 19.9% had completed higher secondary level, 8.4% were M Phil/Ph.D. Most of the respondents (78.3%) among students were females Only a small percentage (12.4%) of the student participants were married. The information obtained as regards awareness and knowledge of precautionary measures showed that vast majority (84.3%) of professionals and 58% students were not aware of the precautionary measures related to computer usage and only 33% professionals and 36.9% students had knowledge of occupational health and safety (OHS). The results of questions based on computer availability and usage among professionals showed that the majority of the professionals owned a personal computer/desktop but a large percentage did not pay attention to their posture while working on a computer or desktop which showed a lack of awareness among the majority of respondents (Table 1). While in case of students, only 37.1% reported availability of proper computer or desktop setup but 62.9% lacked a proper setup. Majority around 72.3% used computer for study purpose but due to COVID about 90% reported disturbance in computer usage timing (Table 1). This increased use of computer and work overtime can be harmful and is one of the major risk factors reported for back and neck symptoms (Hagberg *et al*.,2007). COVID pandemic highly impacted all aspects of life, likewise the job requirements shifted from offices to work from home systems and this change disturbed the duration of computer usage. About 89.5 % professionals reported disturbance in timing, with over 6 h or more increase in computer usage. The responses to the questions based on work posture and computer adjustments showed that majority did not pay attention to their posture and lighting during work, 84.8% did not use a proper chair with a backrest nor used a mouse and keyboard with proper forearm

support, indicating lack of awareness among respondents as regards the importance of proper working posture and computer adjustments. Likewise, majority of students (66%) did not pay attention to their working posture while using computer. Similarly, respondents did not pay heed to proper monitor position. (Table 1). According to OHS requirements, provision of forearm support, when using mouse and keyboard, is an effective strategy to decrease muscle activity in the upper extremities. Proper posture, relevant computer equipment and adjustments play an important part in prevention of ergonomics and other health issues among computer users. Failure in provision of properly designed workstation such as absence of a computer desk with an adjustable drawer and lack of chair armrests leads to issues such as low back pain, headaches, and neck pain among computer workers (Malińska *et al*., 2021; Gerr *et al.,* 2002]. Workstation design, work practices and work environment are significant determinants of ergonomic risks for users. Many immediate issues faced by the computer users are related to feet distance, mouse and monitor position, sitting posture, work without rest breaks, room atmosphere and work desk condition (Hagberg *et al*.,2007; Poniran *et al*.,2020; Putra *et al*.,2018; Kiss *et al*.,2012). Responses related to the occurrence of pain among computer users showed that a large majority of the respondents complained of issues like lower arm pain, back pain, shoulder pain, headaches, knee and wrist pain, redness in the eye, insomnia, double vision and burning sensation during computer usage. These results are similar to Lassen *et al*., (2005) reporting frequently face forearm, wrist-hand, and elbow pain among computer users due to improper computer use. Moreover, incidence rate of RSI is reportedly higher at the upper back region, near neck areas as well as in the shoulder area as compared to other regions (Baba *et al.,* 2016). Such and many RSI related issues can be managed by correct alignment of computer input devices and accessories such as keyboard, mouse and monitor/screen as well as sufficient knowledge about safe practices (Mvungi *et al*., 2009). Similar results were reported by Brandt *et al*., (2004). Complaints of muscle discomfort of neck with shoulder pain and related disorders are common among the computer users. Improper adjustments of keyboards and mouse may lead to high risk of moderate to intense pain in the neck and right shoulder. Students were relatively more effected as compared to the professionals which can be due to the online lectures and associated academic activities. Almost 78% students, sometimes experienced general discomfort caused by computer use. Majority reported presence of lower arm pain, back pain, shoulder pain, headaches, knee pain, wrist pain, insomnia issues etc. These results were consistent with study conducted by Khan *et al*., which reports lower back pain as a common disorder among computer users and working on a computer for extended periods, in a faulty posture, improper ergonomics, absence of physical exercise and old age lead to ligaments laxity causing back pain (Khan and Siddiqui, 2005). Likewise, Oha *et al*., also found that musculoskeletal symptoms seem more prevalent in the neck (51%),

in the low back (42%), shoulder (30%), and in hand (35%) among computer workers (Oha *et al*.,2014). Apart from shoulder, wrist, knee pain etc., eye discomfort and vision issues were also experienced by students (Table 3). These eye issues, can result in CVS, which is commonly experienced by almost all the computer workers (Akinbinu and Mashalla 2013). The visual discomfort among computer users bears a strong relationship with a number of physical factors including time spent using computer, workplace design and administration support (Robertson *et al*.,2016). A large percentage of professionals suffered from insomnia; ~40% experienced insomnia problems sometimes while 20.9% experienced it often. In contrast, around 90% students faced sleep issues because of stress caused by continuous and long periods of working on computers, which can lead to redness, eye fatigue, sleepless nights and insomnia with permanent damage to the visual system (Rathore 2017). Eyestrain and headache are the mostly observed CVS symptoms among the computer users (Akinbinu and Mashalla 2013). Musculoskeletal problems caused by over usage of computer was reported by the majority of the professionals. This is much higher than those reported by Labeodan *et al.*, (2013) who studied relationship between practices regarding computer ergonomics and musculoskeletal complaints among the office staff in Nigerian University where around 70% of the respondents suffered from musculoskeletal symptoms in the shoulder, wrist, neck and back. While in case of students, the results are similar as the awareness of proper ways of using computers was very less due to which the students did not consider any preventive measures as regards their posture, position, etc. while using computers.

For statistical analysis, independent samples Mann-Whitney U test was applied to all the variables related to OHS which showed that lower arm pain, back pain, knee pain, wrist pain, redness in the eye, insomnia, double vision, and experience of musculoskeletal problems differ significantly for students and professionals. While shoulder pain, headaches, and experience of burning sensation in the eyes due to computer usage were experienced by both the students as well as professionals.

3.1.Statistical Analysis:

3.1.1. Chi-Square Testing

The results of chi-square test, performed on both the categories of respondants are provided in Tables 2-4. Table 2 exhibits that in case of professionals, the p-value of all the variables is less than 0.05, which is the level of significance, hence all the variables are positively associated with the age variable. While in case of students, almost half of the variables have significant associations with the age variable ($p<0.05$). These variables include the availability of proper computer setup, consideration of posture, disturbance in computer usage timing due to COVID, the extent of change in timing, the purpose of using a computer, use of proper chair and experience of musculoskeletal problems. Apart from these variables other variables have insignificant associations. In case of professionals, computer usage timing due to COVID-19, the extent of change in timing, the purpose of usage of the computer during COVID-19 and use of proper chair with

backrest during computer usage were significantly associated with education variable (Table 3). In case of students also, majority of the variables were significantly associated with education. The associated variable involved the presence of computer, computer setup, posture consideration, computer usage timing disturbance due to COVID, the extent of change in timing, the purpose of computer usage, use of proper chair, the experience of general discomfort, double vision and awareness of health and safety issues regarding computer use. For professionals, all the variables depict significance association with the gender variable except for the use of proper chair with backrest during computer usage (Table 4). While in case of students, variables such as presence of computer, computer setup, posture considerations, computer usage timing disturbed during COVID-19, the extent of change, the purpose of using a computer, use of the proper chair, and use of portable computer were associated with gender variable.

3.1.2. Logistic Regression Model

The logistic regression model was also applied to evaluate the significant predictors of the OHS and results are provided in Table 5. On the basis of this model, the variables which contributed significantly to OHS due to computer usage included lower arm pain, shoulder pain, knee pain, wrist pain, redness in the eye, double vision, age, and insomnia. The odd ratio or the exponential value of B indicates the predicted change in odds for a unit increase in the predictor. In the case of lower arm pain, the Exp (B) value is 2.401 for the 'sometimes' variable which shows that the participants who experienced pain sometimes have a 2.401% more chance of pain as compared to those who answered 'Yes'. While the participants who experienced pain 'rarely' have 2.190% more chance and those who answered 'No' have 1.283% more chances than those who answered 'Yes'. In the case of shoulder pain, the Exp (B) value is 0.981 for the 'sometimes' variable which shows that the participants who experienced pain sometimes have 0.981 % more chance of pain as compared to those who answered 'Yes'. While the participants who experienced pain 'rarely' have 0.756% more chance and those who answered 'No' have 0.985% more chances than those who answered 'Yes'. In the case of knee pain, the Exp (B) value is 0.702 for the 'sometimes' variable which shows that the participants who experienced pain sometimes have 0.702 % more chance of pain as compared to those who answered 'Yes'. While the participants who experienced pain 'rarely' have 0.953% more chance and those who answered 'No' have 0.824% more chances than those who answered 'Yes'. In the case of wrist pain, the Exp (B) value is 1.182 for the 'sometimes' variable which shows that the participants who experienced pain sometimes have a 1.182 % more chance of pain as compared to those who answered 'Yes'. While the participants who experienced pain 'rarely' have 0.709% more chance and those who answered 'No' have 0.887% more chances than those who answered 'Yes'. In the case of redness in the eye, the Exp (B) value is 0.374 for the 'sometimes' variable which shows that the participants who experienced pain sometimes have 0.374% more chance of pain as compared to those who answered 'Yes'. While the

participants who experienced pain 'rarely' have 1.026% more chance and those who answered 'No' have 0.850% more chances than those who answered 'Yes'. In the case of insomnia, the Exp (B) value is 1.333 for the 'sometimes' variable which shows that the participants who experienced pain sometimes have a 1.333% more chance of pain as compared to those who answered 'Yes'. While the participants who experienced pain 'rarely' have 0.632% more chance and those who answered 'No' have 0.955% more chances than those who answered 'Yes'. In the case of double vision, the Exp (B) value is 0.220 for the 'sometimes' variable which shows that the participants who experienced pain sometimes have 0.220% more chance of pain as compared to those who answered 'Yes'. While the participants who experienced pain 'rarely' have 1.228 % more chance and those who answered 'No' have 4.191% more chances than those who answered 'Yes'. In the case of burning sensation in the eye, the Exp (B) value is 2.275 for the 'sometimes' variable which shows that the participants who experienced pain sometimes have a 2.275 % more chance of pain as compared to those who answered 'Yes'. While the participants who experienced pain 'rarely' have 3.954 % more chance and those who answered 'No' have 3.592 % more chances than those who answered 'Yes'.

Table 1: Percentage Distribution Table of a) Computer Availability and Usage, b) Work Posture and c) Computer Adjustments and Occurrence of Pain

(a) Computer Availability and Usage		
	Professionals Percentage (%)	Students Percentage (%)
Availability of computer/PC/Desktop		
Yes	85.4	40.6
No	14.6	59.39
Availability of a proper computer/PC/Desktop setup		
Yes		
No	21.6	37.1
	78.4	62.9
Consideration of posture while working on the computer/PC/Desktop		
Yes	15.9	38.4
No	84.1	61.6
Daily use of computer		
5 hours	5.8	8.8
6 hours	11.6	55.1
7 hours	11.8	19.8
8 hours	62.4	13.2
>8 hours	8.4	3.1
Reason of spending time on the computer		
Study	1.0	72.3
Games	1.5	18.2
Watching Movies	1.3	5.5

Work	90.1	4.1
Others	6.9	0.0
Computer/PC/Desktop usage timing disturbed due to COVID-19		
Yes	89.5	90.3
No	10.5	9.7
Extent of change in the timing of computer/PC/ Desktop usage, increased up to:		
4 hours as compared to the normal routine	5.7	17.3
5 hours as compared to the normal routine	8.0	25.7
6 hours as compared to the normal routine	26.4	32.8
More than 6 hours as compared to the normal routine	59.8	24.2
Purpose you mostly used computers/PC/Desktop during COVID 19		
Educational Purpose	1.1	77.8
Work Purpose	89.5	15.2
Entertainment	2.3	6.0
Others	7.0	1.0
Main reason of connecting to the internet		
Study	4.5	77.8
Work	88.1	1.9
Watching Movies	2.5	14.7
Surfing	4.9	5.5

(b) Percentage Distribution on Work Posture and Computer Adjustments

	Professionals Percentage (%)	Students Percentage (%)
Attention paid to posture as well as to the lighting in the work environment		
Yes	11.6	34.0
No	88.4	66.0
Use of a proper chair with a backrest while working on the computer/PC/Desktop		
Yes	15.2	15.5
No	84.8	84.5
Use of a mouse or keyboard, with proper forearm support		
Yes	18.4	39.0
No	81.6	61.0
Sitting at the erect position while working at an angle of 90^{o}		
Yes	17.2	26.7
No	82.8	73.3
Use of the computer/PC/Desktop while lying in bed		
Yes	10.3	67.9
No	89.7	32.1

Use of the computer/PC/Desktop while sitting on the floor		
Yes	59.5	60.9
No	40.5	39.1
Use of a proper ventilation system to avoid the heat generated by a Laptop /Desktop during work		
Yes	50.2	25.5
No	49.8	72.5
Use of a portable computer in addition to, or instead of, a Laptop /Desktop		
Portable used in addition to desktop	41.4	32.7
Portable used instead of the desktop	49.7	53.2
Don't use any	8.9	14.0
Placement of monitor screen while working on the computer/PC/Desktop		
Directly in front of you	35.1	33.3
Below your eye level	50.2	49.8
Above your eye level	14.7	16.9

(c) Percentage Distribution on Occurrence of Pain

	Professionals Percentage (%)	Students Percentage (%)
Experience of general discomfort		
Sometimes	57	78.3
Rarely	32	6.1
Frequently	8.7	13.6
Never	2.3	2.1
Lower Arm Pain		
Yes/Often	33.7	59.6
Sometimes	57	33.1
Rarely	7	4.1
No	2.3	31
Back Pain		
Often	39.5	64.5
Sometimes	41.9	32.5
Rarely	16.3	1.5
No	2.3	1.6
Shoulder Pain		
Often	38.4	63.8
Sometimes	39.5	26.0
Rarely	19.8	7.0
No	2.3	3.1
Headaches		
Often	39.5	76.6
Sometimes	41.9	19.3
Rarely	16.3	3.0

No	2.3	1.1
Knee Pain		
Often	22.1	70.9
Sometimes	57	18.9
Rarely	14	9.2
No	7	1.0
Wrist Pain		
Often	38.4	71.0
Sometimes	39.5	17.4
Rarely	19.8	7.4
No	2.3	4.2
Redness in Eye		
Often	32.6	64.1
Sometimes	45.3	25.7
Rarely	19.7	7.9
No	2.4	2.3
Insomnia		
Often	20.9	51.0
Sometimes	40.7	40.7
Rarely	16.3	5.1
No	22.1	3.2
Double Vision		
Often	44.2	53.3
Sometimes	46.5	35.8
Rarely	8.1	7.7
No	1.2	3.2
Burning sensation in eyes		
Often	40.7	54.7
Sometimes	39.5	34.1
Rarely	17.2	10
No	2.5	01.2
Feeling any musculoskeletal problems due to over usage of computer/PC/Desktop		
Yes	66.3	51.7
Sometimes	32.6	38.0
Often	1.1	8.4
Rarely	0.0	2.0

Table 2: Association of Age variable with factors related to computer availability and usage, work posture and adjustments, occurrence of pain and precautionary information

	Professionals		Students	
	Pearson chi-square value	Significant value	Pearson chi-square value	Significant value
Presence of participants computer/PC/Desktop	183.340	0.000	3.494	0.174
Availability of a proper computer/PC/Desktop setup	488.003	0.000	56.849	0.000
Consideration of posture while working on the computer/PC/Desktop	353.728	0.000	46.558	0.000
Computer/PC/Desktop usage timing disturbed due to COVID-19	138.178	0.000	41.320	0.000
Extent of change in the timing of computer/PC/ Desktop usage	552.740	0.000	607.056	0.000
Purpose you mostly used computers/PC/Desktop during COVID 19	470.595	0.000	216.489	0.000
Use of a proper chair with a backrest while working on the computer/PC/Desktop	213.043	0.000	77.083	0.000
Use of a mouse or keyboard, with proper forearm support	91.987	0.000	5.774	0.056
Use of the computer/PC/Desktop while lying in bed	49.779	0.000	0.4111	0.814
Use of a portable computer in addition to, or instead of, a Laptop /Desktop	91.697	0.000	6.668	0.154
Experience of general discomfort	82.901	0.000	9.330	0.156
Shoulder Pain	251.337	0.000	6.159	0.406
Headaches	310.444	0.000	2.529	0.865
Wrist Pain	251.337	0.000	2.701	0.845
Double Vision	178.688	0.000	4.507	0.608
Feeling any musculoskeletal problems due to over usage of computer/PC/Desktop	343.379	0.000	36.293	0.000
Awareness regarding precautionary measures related to computer/PC/Desktop usage	68.999	0.000	2.742	0.254
Knowledge about Occupational Health and Safety	31.225	0.000	1.688	0.430

Table 3: Association of education variable with factors related to computer availability and usage, work posture and adjustments, occurrence of pain and precautionary information

	Professionals		Students	
	Pearson chi-square value	Significant value	Pearson chi-square value	Significant value
Presence of participants computer/PC/Desktop	1.376	0.503	267.789	0.000
Availability of a proper computer/PC/Desktop setup	0.193	0.908	171.589	0.000
Consideration of posture while working on the computer/PC/Desktop	3.545	0.170	440.154	0.000
Computer/PC/Desktop usage timing disturbed due to COVID-19	12.759	0.002	116.692	0.000
Extent of change in the timing of computer/PC/ Desktop usage	16.009	0.014	1156.499	0.000
Purpose you mostly used computers/PC/Desktop during COVID 19	20.187	0.003	668.622	0.000
Use of a proper chair with a backrest while working on the computer/PC/Desktop	8.131	0.017	83.261	0.000
Use of a mouse or keyboard, with proper forearm support	1.466	0.481	3.695	0.296
Use of the computer/PC/Desktop while lying in bed	0.562	0.755	6.870	0.076
Use of a portable computer in addition to, or instead of, a Laptop /Desktop	3.844	0.427	5.431	0.490
Experience of general discomfort	2.094	0.911	18.203	0.033
Shoulder Pain	1.538	0.957	9.336	0.407
Headaches	2.201	0.900	10.457	0.315
Wrist Pain	1.538	0.957	12.939	0.165
Double Vision	2.024	0.917	24.980	0.003
Feeling any musculoskeletal problems due to over usage of computer/PC/Desktop	2.661	0.616	8.171	0.517
Awareness regarding precautionary measures related to computer/PC/Desktop usage	0.873	0.646	0.929	0.818
Knowledge about Occupational Health and Safety	0.351	0.839	5.502	0.139
Awareness of Health and Safety Issues related to the use of computer	0.351	0.839	12.789	0.005

Table 4: Association of Gender variable with factors related to computer availability and usage, work posture and adjustments, occurrence of pain and precautionary information

	Professionals		Students	
	Pearson chi-square value	Significant value	Pearson chi-square value	Significant value
Presence of participants computer/PC/Desktop	6.361	0.012	170.714	0.000
Availability of a proper computer/PC/Desktop setup	7.101	0.008	172.770	0.000
Consideration of posture while working on the computer/PC/Desktop	59.314	0.000	14.083	0.000
Computer/PC/Desktop usage timing disturbed due to COVID-19	19.724	0.000	16.726	0.000
Extent of change in the timing of computer/PC/ Desktop usage	62.412	0.000	372.449	0.000
Purpose you mostly used computers/PC/Desktop during COVID 19	45.877	0.000	87.489	0.000
Use of a proper chair with a backrest while working on the computer/PC/Desktop	3.520	0.061	99.992	0.000
Use of a mouse or keyboard, with proper forearm support	6.909	0.009	0.278	0.598
Use of the computer/PC/Desktop while lying in bed	4.767	0.029	1.924	0.165
Use of a portable computer in addition to, or instead of, a Laptop /Desktop	23.223	0.000	7.547	0.023
Experience of general discomfort	102.051	0.000	4.318	0.229
Shoulder Pain	11.012	0.012	0.999	0.801
Headaches	86.062	0.000	2.803	0.423
Wrist Pain	11.012	0.012	1.440	0.696
Double Vision	19.035	0.000	2.572	0.462
Feeling any musculoskeletal problems due to over usage of computer/PC/Desktop	23.892	0.000	5.440	0.142
Awareness regarding precautionary measures related to computer/PC/Desktop usage	55.796	0.000	1.802	0.117
Knowledge about Occupational Health and Safety	44.734	0.000	0.666	0.414
Awareness of Health and Safety Issues related to the use of computer	44.734	0.000	0.009	0.926

Table 5: Results of logistic regression model

Variables	Exp (B)	Significance value
Lower Arm pain		0.000
Lower Arm pain 1	2.401	0.000
Lower Arm pain 2	2.190	0.000
Lower Arm pain 3	1.283	0.201
Shoulder pain		0.006
Shoulder pain 1	0.981	0.923
Shoulder pain 2	0.756	0.184
Shoulder pain 3	0.985	0.944
Knee pain		0.000
Knee pain 1	0.720	0.050
Knee pain 2	0.953	0.784
Knee pain 3	0.824	0.328
Wrist pain		0.000
Wrist pain 1	1.182	0.362
Wrist pain 2	0.709	0.082
wrist pain 3	0.887	0.531
Redness in eye		0.000
Redness in eye 1	0.374	0.000
Redness in eye 2	1.026	0.895
Redness in eye 3	0.850	0.418
Insomnia		0.000
Insomnia 1	1.333	0.005
Insomnia 2	0.632	0.000
Insomnia 3	0.954	0.715
Double vision		0.000
Double vision 1	0.220	0.000
Double vision 2	1.228	0.275
Double vision 3	4.191	0.000
Burning sensation		0.000
Burning sensation 1	2.275	0.000
Burning sensation 2	3.954	0.000
Burning sensation 3	3.592	0.000
Age	0.873	0.000

4. Conclusion

The research was conducted to identify the OHS issues experienced by computer users. The results of the study conclude that prolonged use of computer, inappropriate workstation design and posture are significant factors for potential health risks to computer users. All respondents, students as well as professionals, reported different hazards like neck pain, musculoskeletal problems, vision problems, wrist pain and knee pain etc. Furthermore, it was also found that during and post pandemic situation the use of computers has increased as compared to routine use. The majority 89.5% of the professional respondents reported that due to the pandemic situation their computer usage timing has been disturbed while majority of the students also reported disturbance in the routine usage period of the computer. The correlation of the variables showed that majority of the variables are associated. According to the results of the regression model, lower arm pain, knee pain, inadequate precautionary measures and lack of knowledge about occupational health and safety are the significant risk factors among the respondents. This study will prove very helpful to deal with the hazards faced by computer users, increase its awareness among students as well as professionals and identify the possible health risks so that they can be prevented.

Authors Contributions

Almas Hamid: Conceptualization and design of study, Investigation, supervision, Data Analysis, writing—original draft, review, editing and final manuscript. Faiza Shahzad and Khadija Masood: Data collection and analysis, writing—formatting draft. Kalsoom Akhtar: Statistical analysis, manuscript editing, Sana Akhtar: Statistical analysis, manuscript editing.

All authors have read and approved the final manuscript/version to be published.

Availability of data and materials

All relevant data generated or analyzed during this study are included in this article. The raw data of the study are available upon request from the corresponding author**.**

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Competing Interests

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Declaration of Interests

The Author(s) declare(s) that there is no conflict of interest.

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