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Original Article

Effects of Critical Components of Home Office on Ergonomics of Workers during COVID-19 Pandemic

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Abstract

Background: The COVID-19 has impacted our education system in various ways and to compensate the losses, teachers had to make quick transition from face to face teaching to online mode of teaching. This unexpected transition has entailed challenges and constraints for the health all of us.
Objective: To find the effect of critical components of home- office on the ergonomics of workers.
Study type, settings & duration: This cross sectional survey was conducted at Riphah International University (all departments), Lahore Grammar School, Lahore and Minhaj University, Lahore from March to June 2020.
Methodology: This was a cross sectional survey on computer workers and faculty from educational setups such as university centers in an attempt to determine the effects of critical components of home-office on the ergonomics of the workers. The sample size was calculated to N=80. As per inclusion criteria, workers and members of faculty working on computers from Lahore, had worked from home-office during the lock down for consistent 4 months and the working should be synchronous, were included in this study. REBA questionnaire was used to collect data from the workers in person. Frequencies and percentages were calculated to find the impact of home-office components on the ergonomics of the workers.
Results: The study found that 57% of computer workers between 26-30 years had a high risk index for poor ergonomics, with moderate changes in 71.3% of the population. The REBA score represents MSD risk for the job task and the design goal is 4.
Conclusion: From this study it was concluded that nearly 70% of the population was having an ergonomically poor posture while working. In addition to that, in nearly half of the population the risk was significant.
Key words: Home-office, ergonomics, critical components, tele working, COVID-19.

Introduction

The COVID-19 affected our education system in various ways and to compensate the losses teachers had to make quick transition from face to face teaching to online mode of teaching. This unexpected transition has entailed challenges and constraints for the health all of us. To cope up with this situation, the use of remote devices like computer or laptop for online teaching became mandatory and sitting for hours making it home office without any proper setup was even worse.[1]

These days most people use laptop as a computer and spend hours on using it; over time, this everyday activity can lead to unhealthy habits. The factor that make laptops so useful; light weight, portable, able to use anywhere is a big part of this. When keyboard is placed optimally, screen downward so you have to stoop over the screen and look downward. Over time, this causes back and neck pain or keeping the laptop high so you are looking up when sitting straight and keyboard angled at a degree that causes you to scream of wrist pain.[2]

Ergonomics means knowledge of human and his relation to environment. It deals with human abilities and limitations and then apply this learning to improve individual's interaction with products and environment. To achieve a goal with comfort means to comfy your physical as well as mental health. Physical comfort means how you feel in using the

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SS conceptualized the project and did the data collection. RN did the literature search. NM performed Statistical analysis. Drafting, revision & writing of manuscript were done by TS.

machine to achieve your goal. The mental aspect of comfort is found in the durability, appearance, and body of machinery.[3]

Methodology

A cross sectional survey was conducted at Riphah International University (all departments), Lahore Grammar School, Lahore and Minhaj University, Lahore. Data was collected from March-June 2020. Selected population was computer workers that worked from home-office during COVID-19 pandemic lockdown, in the above mentioned setting. Non-probability convenient sampling technique was used. Sample size was calculated using Raosoft software. A minimum sample of N=80 was required. Therefore, 80 workers participated in the survey. Both genders with age of 20-45 years. After explaining the study procedure and taking consent from the participants, they were provided with a REBA questionnaire and they were asked to 'mark' the positions they assume for neck, trunk, legs, upper arms, lower arms and wrists while working from home-office. The REBA questionnaire was used and its reliability is 80% and its validity is 54%. The data was analyzed by using the SPSS version 22.0 statistical software. Qualitative and demographic information analyzed by using suitable frequency tables.

The ethical approval was obtained from Research & Ethics Committee of Riphah International University, Lahore vide reference no. REC/RCR & AHS/21/303.

Results

Current study included most number of computer workers between 26-30 years (n=41) and the results indicated that more than half of the sample population (57%) had a high risk index (n=44) as calculated through REBA calculator (Figure). This implies that workers and faculty that worked from home-office during lockdown due to COVID19 were greatly affected by the critical components of home-office.

The working environment was not as appropriate as they had in normal office setting and the components for instance, inappropriate seating, unavailability of foot rest, arm rest and improper desk played a critical role in putting them to high risk of developing poor ergonomics. REBA score as calculated through REBA calculator also indicated moderate changes in 71.3% of population.

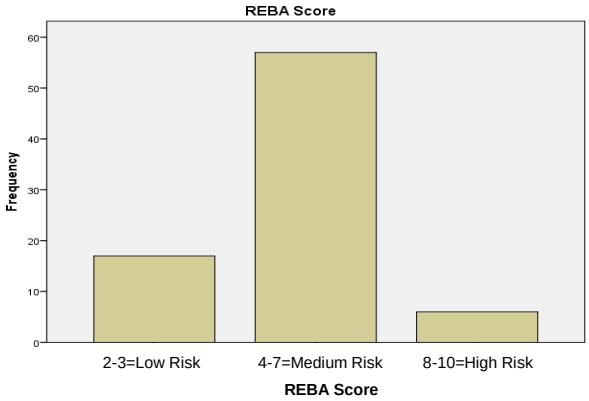

Figure: REBA score.

Table-1 gives information regarding the REBA score as calculated from the REBA scale. As the value indicate, 71.3% of the sample population were falling in the 'medium risk' category with a REBA score of 4-7 while 21.3% of the population were at low risk with a REBA score of 2-3. Only 6% of the population was at high risk according to REBA scale calculator.

Table 1: REBA score calculated from the REBA scale.

Population at risk	*Percentage*	*Frequency*
Low	21.3	17
Medium	71.3	57
High	7.5	6
Total	100.0	80

The REBA score represents the level of MSD risk for the job task being evaluated. The minimum REBA Score=1, and the maximum REBA Score=15.The design goal for the REBA assessment is a score of 4.

Table-2 shows that age categories of the population included in the sample. It indicates that n=41, most percentage (51.3%) were 26-30 years old and n=15, 18.8% were between 31-35 years of age. Out of 100, n=14 were 36-40 years old while only 10 were 20-25 years' old.

Table 2: Age categories of the population.

Age	Percentage	Frequency
20-25	12.5	10
26-30	51.3	41
31-35	18.8	15
36-40	17.5	14
Total	100.0	80

Table-3 indicates the body mass index. As per the values, out of 100, majority fell under the category of normal BMI, 35%were overweight, n=10

that is 12.5% were moderately obese while only a small percentage (n=4) were underweight.

Table 3: Body mass index.

Body mass index	*Variable*	*Percentage*	*Frequency*
16-18.4	Underweight	5.0	4
18.5-24.9	Normal	43.8	35
25-29.9	Overweight	35.0	28
30-34.9	Moderately Obese	12.5	10
35-39.9	Severely Obese	3.8	3
Total		100.0	80

Discussion

In this study, it was observed that out of 80 participants, more than half of participants were affected by bad ergonomics. Fifty seven percent of participants were at high risk for musculoskeletal problems and selected population was workers that worked from home-office during COVID 19 pandemic lockdown. Whereas in the study of Tasneem burhani the percentage was 47% out of 150. The reason of increased musculoskeletal problems would be increased population size as compared to current study. Other reason may be lack of awareness among people about poor ergonomics.[4]

In recent study, 39 out of 80 persons (48.8%) did not make any wrist adjustments. They kept the wrist in neutral position while 5% did make wrist adjustments while typing by keeping the wrist deviated either in ulnar direction or radial. On other side, in the study of Elaine R Serina, 20% of people made deviation while typing on computer. The reason behind is that people in our study has more poor wrist position due to negligence.[5]

Most of them had beck rest. It was noticed that participants made little adjustments to their trunk while sitting on a chair or bed with a backrest. Total 83.8% workers did not make any adjustments. Only 15% twisted the in neck and only 1% side bent their trunk. Whereas in the study of Vergara, only 5% adjustment was found.[6]

Although previous studies have always emphasized the importance of sitting in an upright position, subjects who work for long hours tend to adopt a position that strays from the ideal to reduce fatigue. In the recent study, we assessed the leg position of workers who had to sit for long hours during online job. Many of them said it is impossible to attain single position for long hours. When the questionnaire was given to them 96% had their both legs in weight bearing position and only 3% had their one leg in bent position.[7]

The results of current study are consistent with the existing literature in finding that poor ergonomics has effects on health of workers. It concludes that the critical components of home office have a significant role in the poor ergonomics of the workers.

The results suggest that critical components of home office could play a vital role in putting the workers to a high risk population, so the goal should be to design job task that accomplish a Risk Index 1.0 or lower. It is recommended to keep population size as larger as possible to enhance generalizability of results. Future studies should be interventional to design appropriate posture and ergonomics of workers.

Conflict of interest: None declared.

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