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Original Research Article

Awareness of ergonomics for online teaching in school teachers

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ABSTRACT

Background: Musculoskeletal disorders (MSDs) have been a well-known health issue in many occupations and its incidence among school teachers is particularly high. The teachers were thrown into a "new normal" of working from home offices because of the COVID-19 pandemic. Online teaching invites its own set of musculoskeletal aches and pains accompanied with eye strain and even hoarseness of voice or discomfort in the throat caused due to speaking for hours at a stretch. Teachers teaching online have to work in a sitting posture for extended periods of time, gaze at the screens of the computer/mobile constantly throughout the task, speak continuously for most hours of their work and make voice modulations for them to be clearly audible over the connection. Hence, this study was conducted to find out the awareness of various ergonomic principles in school teachers conducting online lectures.
Methods: The study included 97 participants within the age group of 20-58 years (38.35±10.50) who were sent the Self-made questionnaire via online platform. The questionnaire included several closed ended questions about the ergonomic principles, sitting postures and workstation set ups. The information so obtained was documented and converted into a computer based spread sheet for data analysis.
Results: Based on the results obtained, the participants showed reduced levels of ergonomic awareness.
Conclusions: The study therefore concluded that the teachers had reduced levels of ergonomic awareness.

Keywords: Ergonomics, School teachers, Online teaching, Awareness, MSDs, Workstation set-up

INTRODUCTION

The term ergonomics has been derived from two Greek words, 'ergon' and 'nomos' meaning 'work' and 'laws' respectively.[1] Ergonomics is a science that studies how a person adapts to their environment to use the best possible posture during an activity. It is 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 methods to design to optimize human well-being and overall system performance.[1]

Following proper ergonomic design and principles help to avoid repetitive strain injuries and other musculoskeletal aches and pains, that can develop over time and lead to future complications.[2] The application of ergonomics principles and practices, and the implementation of ergonomic programs, have been successful in improving performance, productivity, competitiveness, and reducing danger and ill health.[3]

Teachers have proven to be the society's primary elements in terms of knowledge and growth. Along with greater liabilities, teachers are involved in different tasks throughout the day and have exposure to unfavorable working conditions and postures for an extended period of time which becomes a risk factor for health problems.[4] MSDs have been a well-known health issue in many

occupations and its incidence among school teachers is particularly high.[4]

While schools were deemed to be an optimal place for teachers to be working at, the COVID-19 (Coronavirus disease 2019) pandemic changed the outlook of classroom teaching and the best resort to avoid physical contact and continue the learning process was via online teaching. Hence, the teachers, along with other workers, were thrown into a "new normal" of working from home offices. Their screen time increased drastically than ever before, and they started spending long durations in working spaces that were ergonomically poorly designed for long-term use.[5] To further complicate the situation, individuals were only given laptops or other electronic devices with little to no information about ergonomics and ideal workstation principles that should be followed in order to maintain an adequate posture. As a result, they had to face suboptimal working conditions.[5]

Online teaching has been the most commonly used solution in this pandemic; however, online teaching invites its own set of musculoskeletal aches and pains accompanied with eye strain and even hoarseness of voice or discomfort in the throat caused due to speaking for hours at a stretch. Teachers teaching online have to work in a sitting posture for extended periods of time, gaze at the screens of the computer/mobile constantly throughout the task, speak continuously for most hours of their work and make voice modulations for them to be clearly audible over the connection. Teachers spend anywhere from a few to several hours per week sitting at their desks while teaching exclusive of the time that they sit at their desk while not teaching. Hence, work related MSDs (WRMDs) are really common in this population.

Davis et al, in their study have given a detailed assessment of home workstations being set up during COVID-19 and the authors found that the workers used inappropriate set ups and worked there for hours with arm rests, chair types, monitor height only being a few of the many components that were considered.[5] Therefore, ergonomic education and awareness is important so as to ensure lack of muscular pains and body discomforts in the long run and in turn improve performance.

Based on research done in 2009 and 2017, results highlighted a paucity of knowledge regarding an ergonomic sitting position and lack of literature on teachers' awareness of ergonomics of computer.[6,7] The preventive and educational role of physiotherapists extends their role into the society and demands continuous assessment and appraisal so as to guarantee the use of appropriate clinical skills and relevant practice.[10] Hence, this study was conducted to find out the awareness of various ergonomic principles in school teachers conducting online lectures so as to get an idea about the scope of modifications to be made in this population.

METHODS

Study design

This study was a cross-sectional observational study.

Sampling technique

Purposive sampling was the technique use in this study.

Study set-up

Questionnaire format via online platform.

Sample size

Total 97 participants included in this study

Inclusion criteria

Primary and secondary school teachers conducting online lectures and should be conducting online lectures since at least 1 month were included in the study.

Exclusion criteria

Teachers who might have sustained any trauma/injury within the past 6 months. Subjects who might have consulted a physiotherapist or an ergonomist before for the same were excluded from the study.

Procedure

Permission was taken from the ethical committee for the study. Further the subjects were recruited based on the inclusion criteria. A questionnaire was formed which contained closed ended questions based on ergonomics.[17] The self-made questionnaire included questions pertaining to the following domains: 1) Demographic data and work-related information, 2) Workstation setup and ideal equipment to be used while working, 3) Optimum sitting postures and optimum body placement while working on computer/mobile and 4) Visual ergonomics and Stretch breaks. Face validation of the questionnaire done by four experts in the field-Necessary changes were made for the study. Questionnaire was sent across the probable participants via online platforms. Participants who agreed to be a part of the study and gave the consent filled the questionnaire, and information obtained through the responses was documented and converted into a spread sheet for data analysis

Data analysis

Descriptive Analysis was used and the data was analyzed in Microsoft excel version 2016 by creating a spreadsheet of all the information collected via the responses. The results so obtained were converted into percentile format and tables and graphs were created accordingly.

RESULTS

The questionnaire was filled by primary and secondary school teachers from various schools and a total of 97 responses were recorded. The population included 21.6% male and 78.4% female respondents within the age group of 20-58 years (38.35±10.50). A majority of the respondents (85.6%) were conducting online lectures since 3 months or more with most of them taking 1-2 (42.3%) or 2-4 hours (40.2%) of lectures in a day. Table 1 summarizes the issues of ergonomics considered in this study and the results obtained by the participants.

Table 1: Percentage of teachers aware or unaware about topics in ergonomics.

Information on ergonomics	Teachers who were aware (%)	Teachers who were unaware (%)
Aware of the term 'ergonomics'	52.6	47.4
Ideal distance to be maintained between eyes and computer screen	44.4	55.6
Ideal distance to be maintained between eyes and mobile screen	30.9	69.1
Use of eye drops or anti-glare spectacles	43.3	56.7
Use of ideal sitting equipment	67.4	32.6
Use of typical chair	70.1	29.9
Adjustments of ideal equipment	20.6	79.4
Correct sitting postures	67.7	32.3
Taking stretch breaks	80.4	19.6
Intervals between stretch breaks	75.3	24.7

DISCUSSION

As mentioned in Table 1, up to 47.4% respondents were not aware of the term ergonomics. A study by Dockrell et al also suggested that teachers were not receiving enough information on computer-related ergonomics.[6] Since home-based work is going to continue for a fair amount of time, it is necessary for the individuals to understand the ramifications of a poorly designed workstation, and adapt to the new normal as described in text 1.[5]

In Bababekova et al found that mean working distances for the participants were 36.2±7.12 cm and 32.2±7.41 cm while viewing a text message and browsing internet via mobile phones respectively which was established to be closer than the typical near working distance of 40 cm while viewing hardcopy text, however, as described in Table 1, majority of the responses in the current study were incorrect about the ideal distances and only a small proportion was aware about the ideal distance to be maintained between the eyes and the mobile screen which is 30-40 cm.[11]

Authors in the current study found that approximately half of the teachers knew the ideal distance to be maintained between the eyes and the computer screen which is 20-40 inches (percentage of the population is mentioned in Table 1). The current study also established that, more than half the population disagreed to using eye drops or anti-glare spectacles. This suggests that they are prone to having the symptoms of eyestrain, tired eyes, irritation, burning sensation, redness, blurred vision, and double vision which were collectively termed as "computer vision syndrome" by Blehm et al.[9] These are the most frequently occurring problems among computer or electronic display users and hence the solutions such as proper lighting, anti-glare filters, lubricating eye drops, special spectacles made for computer use and taking breaks at regular intervals between work schedule were postulated by Blehm et al to help improve visual comfort and also relieve dry eyes and other symptoms.[9]

In the current study, 67.4% respondents agreed on using desk and chair while conducting online lectures while the rest agreed on using dining table (15.9%), stool (6.8%) and couch or bed (5.3 and 4.5% respectively). When considering the ideal chairs, 70.1% respondents in the current study were aware about using adjustable chairs and the rest (29.9%) settled with plastic chair, dining chair, stool etc. Similar to the findings of the present study by Davis et al found that 58% of the population used some type of office chair which was not necessarily the ideal one, and the rest of them used dining chairs, couches etc., whereas 88% used a desk and the remaining population used dining table/any other table.[5] Such incorrect workspace set ups can be attributed to their reduced level of knowledge about ideal ergonomic principles or lack of practice of such ergonomics despite of being aware.

When talking about the ideal workspace designs, the individuals should also be familiar with the settings of various equipment in order to procure optimum benefits. In the current study, although 70.1% respondents agreed on using an ideal adjustable chair, more than half the population (79.4%) wasn't aware about the adjustments of the seat height in order to place the joints of the lower extremities in a certain way and only a few of them could answer it correctly as given in Table 1. Research has found that sitting positions are usually incorrect and can be evidenced by various musculoskeletal pain syndromes and dysfunctions. Musculoskeletal dysfunctions, that present as pain or muscular tension in various regions of the body like in shoulder, cervical and lumbar regions, occur in the workplace and have been linked to repetitive strain disorders, and these account for almost a third of

the related injuries and later become the reason for absenteeism.[8] In a study by Szczygieł et al the findings were indicative that a typical seat to be used is the one with a backrest.[7]

Individuals spend many hours in a position that is supposedly comfortable according to their knowledge but in reality affects the musculoskeletal system in many ways as evidenced by a study by Chiu et al where the neck and upper limb pain were proportional to the time of computer use and by Sumaila et al where authors stated that computer use was one of the factors causing low back pain among teachers.[7,15,16] A question which allowed multiple answers displayed images of different working postures and the participants were supposed to mark the correct ones, two third of the responses were correct while almost a third of them were incorrect (Refer Table 1 for percentages). Only 54% of the teachers reported to actually pay attention to their postures while working when they were specifically asked about it by Lai et al.[13] Chiu et al postulated that working with a 'poking chin' posture while working on a computer might lead to substantial load over the posterior structures of the neck leading to neck pain.[12] Moreover, slump posture eliminates the natural curvature of spine and causes the an increase in the intradiscal pressures with the nucleus pulposus shifting backwards and predisposing the individuals to develop a prolapsed intervertebral disc in the long run.[7] Studies have shown that creating awareness on work related health risks are necessary and education on ergonomically correct sitting postures should be introduced but having an ergonomically conscious work culture is equally important to reduce the risks of work related MSDs.[7]

A majority of 80.4% of the participants in the current study were aware about the importance of taking stretch breaks. Amongst all the respondents, 75.3% knew the duration after which it should ideally be taken and the rest 24.7% thought that it could be taken after 2 or 3 hours. According to previous studies, frequent breaks reduced great amount of discomfort in individuals working on computer as compared to lesser breaks taken at larger intervals. A review by Goodman et al reported a few studies investigating rest breaks as an intervention and found positive results of reduced pain and static awkward postures suggesting that rest breaks are important and can prove to be helpful in relieving musculoskeletal symptoms.[14]

CONCLUSION

The study concludes that there is reduced level of knowledge and awareness of ergonomics in school teachers teaching online. A significant percentage of teachers are unaware about the term ergonomics. Most teachers are aware about the usage of a correct sitting equipment but unaware about the necessary adjustments required for its optimal functioning. They should be helped by devising work stations and working habits suitable to the correct form.

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