

Awareness and practice of computer-related ergonomics among resident doctors

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Article Info

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Abstract

The present study was designed to see the level of awareness and practice of computer-related ergonomics among resident doctors. A total of 227 residents participated in this study who had used a computer for at least a year. They were selected by simple random sampling. A self-reporting questionnaire was used to conduct the study. For better understanding and convenience, the responses were categorized into good, fair, and poor. Awareness level was good in only 15% (n= 34) of residents, fair in 16.7% and the majority 68.3% (n= 155) of residents had a poor level of awareness about ergonomics. Poor computer ergonomics was practiced by 49.5% of residents, while fair and good practice of computer ergonomics were found in 24.2% and 26% of residents respectively. The formal training program on computer ergonomics was unattended by 93.5% of participant residents. In graduation/postgraduation level 81.5% of residents didn't get any lecture on correct posture. To measure the practice of computer ergonomics, we found that 64.3% of residents didn't take breaks regularly while using a computer, 69.2% didn't use an adjustable chair and 59% didn't have armrests in those chairs. Proper positioning of knee, elbow, and wrist during computer use wasn't maintained by 56.8%, 58.1%, and 44.9% of residents respectively. A significant association was found between awareness and resident phase with computer practice ($p<0.005$) and sex with awareness ($p<0.005$).

Introduction

Computers have become an integral part of our modern life. The use of the computer and the internet is rapidly becoming a key component of both the medical education and professional life of physicians in many parts of the world. Physicians use computers for a variety of purposes like accessing professional resources, searching information, clinical note-taking, to keep electronic health records (EHR), e-prescribing, communication among colleagues and administrative tasks.^{1,2} Easy access to digital information and communication have revolutionized computer uses in the medical profession in Bangladesh also. A study among 322 medical students in a medical college in Dhaka showed that 66.8% had personal computers.³ Since 2009 the MIS unit of the Directorate General of Health Services of Bangladesh has equipped almost every public sector health facility in the country with computers and internet connections.⁴

The word ergonomics is derived from Greek words, "ergo" and "nomos", meaning work and law respectively.⁵ Ergonomics has been described as the science that deals with adjusting any work environment, tools, task, and equip-

ment to fit with the person's physical capability and limitations to provide a safe, comfortable environment and reduce the risk of the work-related injury.^{6,7} Ergonomics emerges as an important issue in case of computer use because, in the absence of good ergonomic design, computer work for prolonged periods in faulty posture can adversely affect vision, muscles of the neck, upper back, shoulders, and arms, leading to visual and muscular fatigue and pain.⁸ Hedge and James (2014) in a survey among 204 health professionals found that electronic health record (EHR) implementation had substantially increased daily computer use in 90% of health professionals and around two-thirds of them reported increased frequency of neck, shoulder back and wrist discomfort because of not considering computer ergonomics while using computer.⁹

Ergonomics training and intervention is frequently cited as the best way to reduce the incidence of computer-related health disorders.^{10,11} So, there is a need to educate new computer users about computer-related ergonomics.¹² But the results of different studies show that many people are not aware of ergonomics and they fail to put it into



practice. Only 25.5% in Nigeria and 28.7% in Pakistan in the medical profession were seen to be aware of ergonomics ^{13,14} Unfortunately, to date there is no data available on this topic among the physician community of Bangladesh. Among all physicians, resident doctors have an incomparable position because they have to play a dual role of being a clinician and a student at the same time.¹⁵ In this context, the present study was designed to see the level of awareness regarding computer ergonomics and the pattern of practice of computer ergonomics among resident doctors.

Materials and Methods

The study was performed from March 2015 to September 2016 among the 227 resident doctors (142 males, 85 females; age range 26-42 years) of Phase-A (n=103) and Phase-B (n=124) of three faculties who used desktop/laptop computer for at least one year. Two hundred were Bangladeshi and the rest of them were foreign residents. Residents were selected irrespective of age, sex, and nationality by

rheumatic diseases like rheumatoid arthritis, spondyloarthropathy and any systemic illness were excluded from this study.

A structured, close-ended, investigator-developed, self-reporting questionnaire was used to conduct the study. The questionnaire was prepared based on previous studies on ergonomics, theory, a standard questionnaire on computer ergonomics (Easy ergonomics: For desktop computer users, 2005).^{8,14,16-18} The questionnaire was divided into three segments: general information about participant residents, awareness of computer ergonomics, and practice of computer ergonomics. In the study, the level of awareness and practice of computer ergonomics were judged by categorizing awareness and practice of ergonomics into 3 categories: good, fair, and poor. Resident doctors answered some questions in the individual section on the awareness and practice of computer ergonomics. Answering a section resulted in some scoring points according to the Likert scale. Then summation of these scores culminated in a category (Good/fair/poor) of that section.^{19,20}

All the data were compiled and sorted properly and the data were analyzed statistically by using Statistical Package for Social Sciences (Version-20). The Chi-square test was used to determine the association between categorical variables and computer-related variables with awareness and practice of study participants.

Variable	Response	Frequency
Heard the term 'Ergonomics'	No	144
	Yes	83
Knowledge about computer ergonomics	Poor	89
	Little/Not satisfactory	97
	Satisfactory	32
	Good	8
	Excellent	1
Lecture/session in graduation/post-graduation level on correct posture	No	185
	Yes	42
Formal training program on computer ergonomics	No	212
	Yes	15
Learn about computer ergonomics	I didn't learn it	119
	Read documents on it	87
	Attended an educational training program (lecture/course)	14
	Both	7

simple random sampling calculated using Cochran's (1977) sample size formula for a sufficiently large population. Residents who had any physical disability which prevented him/her from practicing computer ergonomics, who had a history of fractures or major trauma, inflammatory

Results

Awareness of computer ergonomics

Analyzing Table I, it was observed that 63.4% (144 residents out of 227) of the total respondents had not heard the term ergonomics and only 36.6% heard the term. The majority of the resident i.e, 42.7% (n=97) claimed that their knowledge about computer ergonomics was little/not satisfactory and 39.2% (n=89) rated it as poor and only 1 resident rated it as excellent. 81.5% (n=185) of residents said that they did not get or attend any lecture on correct posture in their MBBS life or at the postgraduation level. Only 6.6% of residents attended formal training programs on computer ergonomics and 38.3% (n=87) had read a document on computer ergonomics on the internet or paper.

The practice of computer-related ergonomics

Analyzing Table II, we found that majority of residents didn't follow the parameters of good ergonomic use of a computer. 64.3% (n=146) of respondents didn't regularly take breaks every 20-30 minutes while using the computer. Only 43.2% (n=98) could keep thighs parallel to the floor with hip and knee at 90 degrees. 69.2% (n=157) of them

Table II

Practice of computer ergonomics (n=227)

Variable	Response	Frequency
Regularly take a break every 20-30 min	No, use it continuously	146
	Yes	81
Thighs parallel to the floor with hip and knee at 90°	No	129
	Yes	98
The curve of the chair fit into the lower back	No	157
	Yes	70
Can work without overreaching/awkward posture	No	57
	Yes	170
Document off the flat work surface and at the same distance as the monitor	No	179
	Yes	48
The chair has an armrest	No	134
	Yes	93
Elbows bent to 90 degrees and close to the body	No	132
	Yes	95
keyboard at the same height as elbow	No	116
	Yes	111
Wrist straight during keying (not bent)	No	102
	Yes	125
The shoulder remains relaxed (not hunched)	No	71
	Yes	156
A monitor placed at a comfortable distance (50-100 cm)	No	73
	Yes	154
Top of the screen at or below eye level	No	67
	Yes	160

didn't have a chair with a curve that fits the lordotic curve of the lower back. 59% (n=134) didn't have chairs with armrest. 58.1% (n=132) didn't keep elbow bent to 90 degree and close to the body. 51.1% (n=116) didn't use the keyboard at the same height

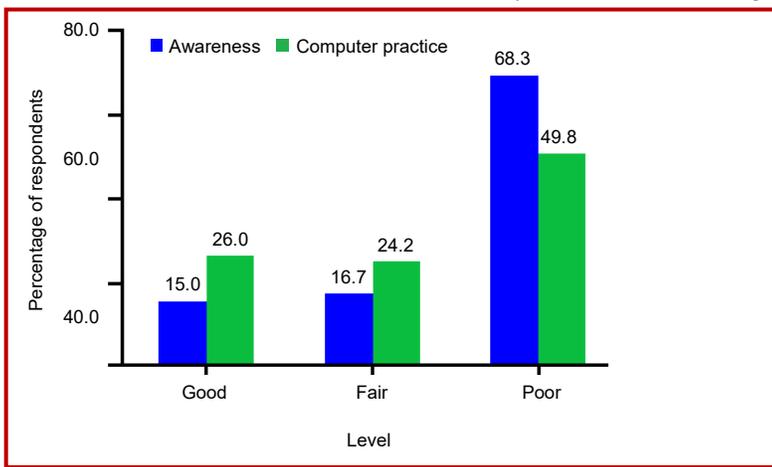


Figure 1: Level of awareness and practice of computer ergonomics

as the elbow. In the case of viewing the monitor, the parameters were better. 70.5% (n=160) used a computer monitor in such height that the top of the screen was at or just below the eye level and they could read the monitor screen with only eye movements, not head movements. 67.8% (n=154) viewed the monitor at a comfortable distance.

Level of awareness and practice of computer ergonomics

Figure 1 illustrates the overall picture of the categorization of residents by awareness and practice of computer-related ergonomics. Awareness level was good in only 15% (n=34) of residents, fair only in 16.7% of residents and the majority 68.3% (n=155) of residents had poor awareness of ergonomics. 49.5% (n=113) of participant residents practiced poor computer ergonomics while using their computers. 24.2% (n=55) of them did fair practice and 26% (n=59) did good practice of computer ergonomics. It was observed that poor awareness was higher than other ratings of awareness in all the age groups especially in older age groups than the younger ones. A significant association of sex with awareness ($\chi^2=7.030$, $p=0.030$), residents phase with practice ($\chi^2=9.871$, $p=0.007$) and computer practice with awareness ($\chi^2=18.762$, $p=0.001$) was observed as a 5% level of significance. We didn't see much of a difference phase-wise or faculty wise, though residents of Phase-A and surgery faculty had slightly better awareness category wise than their counterparts.

Discussion

This study revealed that the majority of residents had an unsatisfactory and poor level of awareness about computer ergonomics and didn't follow the parameters of good ergonomic use of a computer. The reason behind this finding was the lack of any lecture and training on computer ergonomics and correct body posture in MBBS and postgraduation level. This reason had been backed up by two previous studies.^{21, 22}

In this study, 144 (63.4%) residents even hadn't heard the term ergonomics. This scenario is slightly better than Sarfraz et al. (2013), Oladeinde et al. (2015), and Ismaila (2010) and worse than Khan et al. (2012).^{6, 8, 13, 14} But those studies didn't specifically measure the level of awareness. Shantakumari et al. (2012), said that 44% of their study samples were aware of ergonomics.¹⁶ But here any specific measurement tool for measuring awareness could not be found. In this study, a rating scale was used to measure and categorize the level of awareness based on some previous studies.^{19, 20} In this study, 68.3% of residents had poor awareness and only

15% had good and 16.7% had fair awareness level. Kalghatgi et al. (2014) found fair knowledge of ergonomics among 57.2% while Siddiqui et al. (2016) found fair knowledge among 38.4% and good among 21.4% of dentists.^{19,23} So, in comparison to other studies, our residents had an inferior level of awareness about ergonomics. This just reflects the lack of education about ergonomics in our education system.

Ergonomic intervention and training about computer ergonomics increases knowledge and awareness about it and decreases the frequency of computer-related musculoskeletal disorders.^{24, 25} Only 6.6% of residents of this study attended a formal educational training program on computer ergonomics in comparison to 37.67% found by Sarfraz et al. (2013)¹⁴ 38.3% of residents in this study had read documents on computer ergonomics, whereas it was 22.9% in another study.¹⁶

In this study, 64.3% (n=146) of respondents didn't take a break every 20-30 min when using a computer. Prolonged sitting or standing without breaks or rest increases intradiscal load and weakens posterior lumbar structures.⁸ 25.1% (n=57) of residents had to adopt awkward posture during computer use. A long duration of improper posture contributed to repetitive injuries of the lower and upper back.²⁶

Other workplace modifications during computer use include the use of an adjustable chair to prevent neck and upper thoracic strain and provision of forearm rest in the chair to support the arms, forearm, and elbow. In this study, most of the residents didn't have an adjustable chair in contrast to another study done among bankers in Dhaka.²⁷ 59% (n=134) of these chairs didn't have armrest, almost similar finding to Khan et al (2012) who found that only 20% of their respondents used armrest.⁸ 56.8% (n=129) of residents can't keep thigh parallel to the floor and hip and knee at 90 degrees to each other. This type of posture also puts a strain on the lower back and knees.^{27, 28} Posture correction is an important factor to reduce low back pain.²⁹ 69.2% (n=157) didn't have a chair which has a curve that fits the lordotic curve of the lower back, so by using these type of chairs residents didn't get upper and lower back support. As most of the residents didn't have an ergonomic chair, most of them (58.1%) couldn't keep their elbows bent to 90 degrees and close to the body. 44.9% of residents kept their wrist bent, not straight during keying and 51.1% didn't use a keyboard at the same height as the elbow. These findings of computer practice were worse than that of UAE study.¹⁶ Overall, 49.5% of residents fell into the category of the poor practice of

computer ergonomics, 26% was a good practitioner and 24.2% was a fair practitioner of computer ergonomics.

Conclusion

Most of the resident doctors had poor awareness of computer-related ergonomics. The majority of them didn't get any formal education on computer ergonomics and as a consequence, they didn't practice ideal ergonomics in front of a computer.

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Ethical Issue

Before starting the study, approval was taken from the Ethical Committee (Institutional Review Board, IRB) of BSMMU (BSMMU/2015/13162). All precautions were taken to protect privacy, anonymity, and confidentiality of the information given by the participant residents. Participants enjoyed the full-right to withdraw themselves from the study at any time for any reason what-so-ever. A well informed written consent was obtained from the subject.

Conflict of Interest

The authors declare no conflict of interest.

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