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# A survey of body-seat dimensions as physical risk factors of common musculoskeletal complaints among academics of a Ghanaian higher education institution

**Elaine E AHIAKE [1], Ajediran I BELLO [1*], Bernard MARTIN [2], Augustine A ACQUAH [1]**

*[1]Department of Physiotherapy, School of Biomedical and Allied Health Sciences, College of Health Sciences, University of Ghana, Legon, Ghana; [2]Department of Industrial and Operations Engineering, University of Michigan, United States of America.*

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**Abstract**

***Background:*** Potential occupational stress, such as musculoskeletal complaints (MSCs), in relation to workstation arrangements in higher institutions requires population-based assessment. The potential mismatch in the body dimensions of academics and their workstation seats is grossly under-reported in Ghana.

***Objective:*** This study aimed to assess physical risk factors such as body-chair mismatch as a correlate of the prevalence of MSCs among academics in a Ghanaian higher education institution.

***Methods:*** Academics of one of the foremost health training institutions in Ghana participated in the study. Participants were enrolled using the convenience sampling method. The prevalence of MSCs was determined using the Standardised Nordic Body Map Questionnaire. The workplace physical risk factors were estimated using an ergonomic assessment checklist, while the body-seat dimensions were measured with an inelastic tape measure. The crude association of the variables was analysed with chi-square analysis at a $p < 0.05$ level of significance.

***Results:*** Eighty-two academics, comprising 65.90% (n = 54) males and 34.10% (n = 28) females, participated in the study between October and December 2021. The point and period prevalence of MSC were 59.60% and 64.60%, respectively, and low back pain was the most reported MSC (73.60%). Over half (53.70%) of the staff reported high physical risks regarding their work activities. The body-chair mismatch and their self-reported workstation risk factors were also significantly associated with MSCs ($p < 0.001$).

***Conclusion:*** A mismatch in the body dimensions of the participants relative to their seats seems to be partly responsible for the moderate prevalence of MSC, of which low back pain constituted the most reported complaint.

**Keywords:** Musculoskeletal complaints, Ergonomic risk factors, Academic Staff, Workstation seat

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## INTRODUCTION

There have been rising concerns about workplace physical and ergonomic risk factors and their imminent health outcomes among different workforces. The rise in the reported work-related disorders lately seems to be linked to the increasing awareness among employers, including institutions of higher education. University staff comprises both academic and non-academic staff with complementary functions to attain the statutory goals of their institutions. In recent years, the number of prospective students has risen exponentially in developing countries, which seems to have increased the academic workload amid a low workforce. For instance, Balogun et al. [1] reported grossly inadequate faculty strength for physiotherapy training programs in the West African Sub-Region (Ghana in particular) compared to developed countries. This scenario is tantamount to disproportionate task assignments among the few available staff. Academics, in particular, spend long hours using computers for lecture presentations,

* *Corresponding author*
*Email: aibello@ug.edu.gh*

e-learning activities, research proposals, publication writing, and, on a few occasions, administrative tasks, which can predispose them to biomechanical overload and subsequent musculoskeletal sequelae [2]. Thus, the scope and workload of academicians necessitate workstation assessment to ascertain possible association with work-related physical disorders such as musculoskeletal complaints (MSC). Aside from their exposure to cognitive pressure [3] and organisation issues [4], workstation seats and physical demands of their work constitute potential physical risk factors, which are insufficiently reported in Ghana's higher institutions of education. Previous studies on musculoskeletal disorders have alluded to the high prevalence of the disorders among various groups of workers in Ghana, including gold miners [5], nurses, and midwives [6], as well as workers in an informal electronic-waste recycling site [7]. There is, however, limited literature regarding similar studies on academics despite their crucial role in the Ghanaian workforce. Physical health-related complaints among workers are largely dependent on the nature of work (including the workstation arrangements), which justifies an adequate description of potential physical risk factors on a group or population basis [8]. In Ghana, previous efforts on a similar subject were conducted on physical assessment of classroom furniture among undergraduate students [9,10].

The present study sought to assess the mismatch in body-seat dimensions as a prelude to MSCs and exposure to physical risk factors at the workplace among academics in a higher education institution in Ghana. We hypothesised that body-seat dimensions and workplace physical risk factors would be associated with the prevalence of MSCs.

## MATERIALS AND METHODS

### Study design and sites

The study was conducted at selected academic constituents of the College of Health Sciences at the University of Ghana between October and December 2021. The college is an amalgamation of various schools that train healthcare professionals in Ghana.

### Sample size and sampling technique

Academics in various constituent schools in the college were enrolled in this cross-sectional study using the convenience sampling method. The following criteria were set in advance for participation in the study: the eligible academics must have used their office chairs for at least six months before the conduct of this study and are actively involved in teaching and research activities. We excluded staff with any underlying physical impairments that can be aggravated during measuring procedures (Figure 1). The sample size for this study was calculated with the Taro Yamane formula [11] given as

$$n = \frac{N}{1 + N(e)^2}$$

Where N is given as 102 (eligible staff) out of the total study population of 134 from three out of the six schools in the College of Health Science, and e is the marginal error, given as 0.05. The three schools, which include the University of Ghana Medical School, University of Ghana Dental School and School of Biomedical and Allied Health Sciences, were selected based on their locations at the Korle Bu Teaching Hospital campus, as well as their similar modes of training. Thus, a sample population (n) of 82 staff was estimated to participate in the study. All the sampled population was measured.

### Instruments and procedure for data collection

The Standardised Nordic Body Map Questionnaire (SNBMQ) (Kuorinka et al., 1987) was used to determine the MSC of participants at their workplaces using nine different body areas. A body map delineates the nine body segments to assist respondents in the completion of the form. We screened the physical risk factors with an ergonomics assessment checklist at each staff workplace [13]. The checklist consisted of 18 close-ended items, and each question required a 'yes' or 'no' response. The questionnaire was incorporated with various diagrams depicting occupational activities to help the participants identify ergonomic risk factors. A response with a 'yes' by the respondent was further explained in the separate space provided for justifications. The categorisation of respondents was based on the responses to 'yes' options. For instance, a respondent was classified under 'high ergonomic risk factor' if he or she checked 'yes' for item 1 and if it is affirmed that the institution has not made changes to correct the issue(s). A 'medium ergonomic risk factor' is defined if a 'yes' option is chosen for item 1 (of which the institution has made changes). Respondents who do not check 'yes' for items 1, 2, or 3 and have less than 3 'yes' responses in items 4 through 15 were classified in the 'low ergonomic risk factor' category.

Participants were briefed on the aim and their expected role in the study using an information sheet. The informed consent was obtained thereafter from those who agreed to participate. Permission was also sought from the school management of the selected schools and departments. Following approval, convenient dates and times were arranged via phone calls and personal contact with the staff regarding the data collection process. The socio-demographic information provided by the participants was recorded on a well-structured and self-designed data-capturing form. Copies of the SNBMQ and risk factors checklist were administered in succession by trained Research Assistants. Participants were asked to indicate any MSCs being experienced at the point of contact with the Research Assistants in the last seven days (point prevalence) or 12 months (period prevalence). Both the SNBMQ and the ergonomics assessment checklist took approximately 20 minutes to complete. The questionnaires were retrieved after the completion process.

**Body-chair dimension measurements**

Anthropometric measures were taken on the dates arranged with each participant. Participants wore their usual attire and footwear and were required to adopt the generic seated posture with their torso upright, knees inclined at an angle of 90 degrees, and feet flat on the floor. An inelastic tape measure was used to measure the following dimensions: buttock-gluteal length, popliteal height, and hip height, as well as seat and desk dimensions (seat height, seat depth, and elbow height), in line with the procedure outlined by Parcells et al. [14] and was defined as body dimension and seat and workstation dimensions.

**Body dimensions**

Popliteal height (PH) was measured from the vertical distance from the popliteus at the apex of the underside of the knee to the floor while keeping the knee inclined at an angle of 90 degrees of flexion; gluteal popliteal length (GPL) was measured as the horizontal distance from the farthest point on the posterior surface of the buttock to the apex of the popliteal space with the knee inclined at an angle of 90 degrees; Knee height (KH), measured from the lateral knee condyle to the floor, with the knee inclined at 90 degrees and torso upright (90 degrees from horizontal).

**Seat and workstation dimensions**

Seat depth (SD) is the horizontal distance from the front of the backrest to the front of the seat surface; seat height (SH) is the vertical distance from the floor to the highest point on the front of the seat surface; seat width (SW), is the horizontal distance between the two front edges of the seat + 4 mm on either side (Figure 2).

**Determination of body-chair mismatch**

We determined whether the range of dimensions between the participants' body dimensions and that of the seats fell within (matched) the recommended ranges by Lee et al. [15] as follows: Mismatch for PH and SH: If SH is either greater than 95% or less than 88% of the PH. Mismatch for GPL and SD: if SD is either less than 80% or greater than 95% of GPL. Mismatch for KH/Table Height (TBH): if the (knee clearance) space between the seat surface and TBH is less than 2.50 cm or greater than 3 cm. Mismatch SH/TBH: if the SH is less than 64% or greater than 77% of TBH.

**Data analysis**

Data analysis was performed with IBM SPSS Statistics for Windows, Version 26.0, Armonk, NY: IBM Corp. Descriptive statistics involved percentage, frequency means, and standard deviation to summarise the body and seat dimensions as well as the workplace physical risk factors. The prevalence of MSC was determined by dividing the proportion of respondents who affirmed the presence of MSC in a body region by the total number of respondents, multiplied by 100. The crude association was performed between the prevalence of MSCs and body-seat dimensions as well as ergonomic risk factors using the Chi-square test at a level of significance set at $p < 0.05$.

## RESULTS

Eighty-two (82) academics participated in the study with an age range of 34 - 68 years (mean age ± SD: 49.50 ± 8.30 years). They comprised 65.90% (n = 54) males and 34.10% (n = 28) females. The majority (96.30%, n = 79) of the participants were married. The mean (± SD) year of work experience was 13.00 (± 6.60) years, with a range of 5 - 30. Moreover, 41.50% (n = 34) of the staff had worked between 5 and 10 years at the institution. The point and period prevalence were 59.60% and 64.60%, respectively (Figure 3). The overall prevalence of low back pain was 73.60% of all the MSCs, followed by neck pain (66.00%), while elbow pain was the least 7.5%, as presented in Table 1. A larger proportion of staff was using mismatched seats, of which most (74.40%; n = 61/82) were observed for GPL and SD (Table 2). The self-reported ergonomic risk factors by the participants are presented in Fig 4. A moderate proportion of participants (53.70%, n = 44/82) were classified in the high-risk exposure category, compared to 46.30% (n = 38/82) under the low-exposure category. Crude association between the variables was determined with Chi-square analysis. There was a significant association ($p < 0.05$) between MSC prevalence and participants' body-seat dimension mismatches in the selected domains. Similarly, the association between the prevalence of MSC and categories of workplace physical risk factors was statistically significant ($p < 0.05$) (Table 3).

Table 1. Prevalence of MCS among participants across nine body regions

| Body part | Frequency | Prevalence | 95% CI |
|---|---|---|---|
| Neck | 35 | 66.00 | 52.1-77.7 |
| Shoulder | 18 | 33.90 | 22.3-47.9 |
| Elbow | 4 | 7.50 | 2.7-18.8 |
| Wrist | 8 | 15.10 | 7.6-27.7 |
| Upper back | 19 | 36.50 | 24.4-50.7 |
| Lower back | 39 | 73.60 | 59.8-83.9 |
| Hips/thighs | 10 | 18.90 | 10.3-31.9 |
| Knees | 20 | 37.70 | 25.5-51.7 |
| Ankle | 11 | 20.70 | 11.7-34.1 |

Table 2. The proportions of matched and mismatched body and seat dimensions.

| Body-chair | Frequency (N=82) | Percent |
|---|---|---|
| Popliteal height/ seat height | | |
| Match | 27 | 32.90 |
| Mismatch | 55 | 67.10 |
| Buttock popliteal length/Seat depth | | |
| Match | 21 | 25.60 |
| Mismatch | 61 | 74.40 |
| Knee height/ Table bottom height | | |
| Match | 23 | 28.100 |
| Mismatch | 59 | 71.9 |

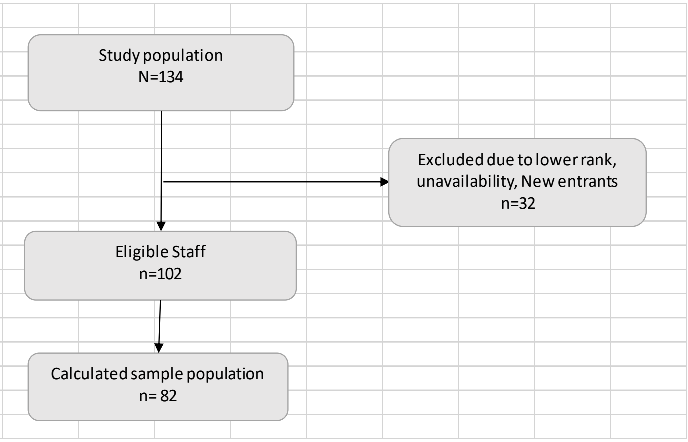


Figure 1. Flow chart for the recruitment of participants


Figure 2. Common swivel chair with adjustable seat height used by academic staff.

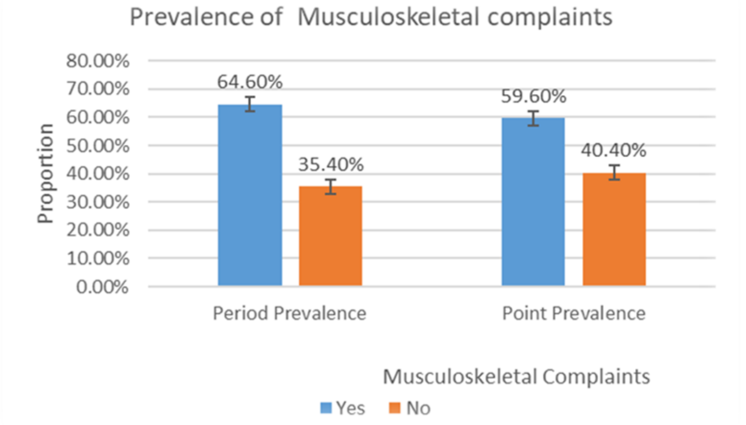


Figure 3. The period and point prevalence of musculoskeletal complaints among the staff

Table 3. Chi-square analysis of the association between musculoskeletal complaints of participants and body-chair mismatch.

| Body-chair dimension | Prevalence of MSC | | $\chi^2$ | *p* value |
|---|---|---|---|---|
| Popliteal height/ seat height | No | Yes | | |
| Match | 10 | 17 | 8.24 | 0.04* |
| Mismatch | 9 | 46 | | |
| Buttock popliteal height/Seat depth | | | | |
| Match | 9 | 12 | 18.40 | 0.003* |
| Mismatch | 15 | 46 | | |
| Knee height/ Table bottom height | | | | |
| Match | 8 | 15 | 8.40 | 0.009* |
| Mismatch | 11 | 48 | | |
| Physical risk factors | | | | |
| Low | 24 | 5 | 23.90 | <0.001 |
| High | 14 | 39 | | |

* - Significant, MCS - Musculoskeletal Complaints, $\chi^2$ - Chi Square value, P - level of significance

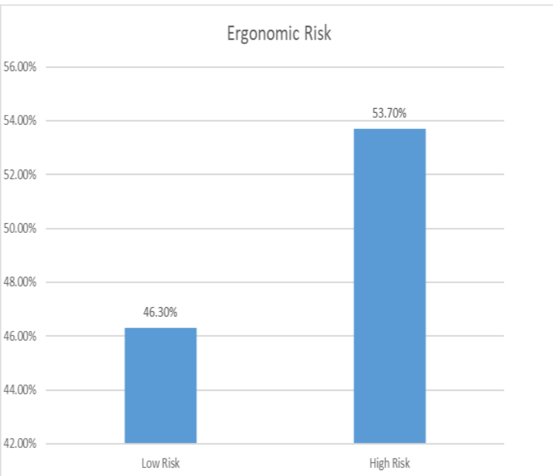


Figure 4. Physical risk factors among the academic staff as assessed independently with ergonomics assessment checklist at each workplace

## DISCUSSION

The physical risk factors and body-seat dimensions in relation to the prevalence and patterns of MSC among academics in a Ghanaian health training institution were determined. The 12-month (period) and 7-day recall (point) prevalences of MSC were 64.60% and 59.60% respectively. Low back pain was the most prevalent, accounting for 73.60% of the overall MSC prevalence. More than half (53.70%) of the academics were captured in the high-risk exposure category, while the body-seat dimensions were disproportionate in more than half of the participants. The body-chair dimensions and the categories of physical risk factors were significantly associated with MSCs. Thus, we reject our initial hypothesis, which proposed no association between MSCs and the two variables.

**Socio-demographic characteristics of the participants**

More male than female faculty members participated in the present study, which concurs with earlier observations by Kumah et al. [16] and Sirajudeen et al. [17] in higher educational institutions. The dominance of males over their female peers may be hinged on many factors, including cultural discrimination against women, particularly in developing countries. Female individuals have often had to bear an unfair distribution of household responsibilities in comparison with their male counterparts and suffer in terms of their career prospects as well as a reduced ability to meet their occupational goals. In addition, most of the participants were within the age range of 34 - 68 years (mean = 49.50 ± 8.30 years). This suggests that the mainstream workforce in the university was within the middle-age range. Given the physical, organisational, and cognitive demands of academic tasks, a strong population of workers is required for such tasks. Most (41.50%) of the academics had worked between 5 and 10 years (mean = 13.00 ± 6.60 years) in the institution, which implicates the influence of their workstation on the reported MSCs. On the other hand, the inherent physiological adaptation of their body to the workstation seats might have also resulted in the moderate prevalence of MSCs.

**Prevalence and pattern of musculoskeletal complaints among the participants**

The most reported MSCs were low back pain and neck pain in more than half of the participants. These complaints were not surprising given the increasing need to use electronic and computer devices for academic tasks. Moreover, the use of such devices is often accompanied by prolonged sitting and awkward postures, thus culminating in low back and neck dysfunctions. These findings are consistent with the reports of previous studies on workstation risk factors in other populations by Velasco Garrido et al. [18] and Masilamani & Ganapathy [19], indicating pain at the waist, neck and several parts of the spine (particularly the lumbosacral region). The present study revealed a moderate prevalence of MSCs, which are speculated to be due to many factors, including workstation arrangements such as the types of seats and desks used, placement of the computer screen and keyboard, and workloads. The participants had no prior knowledge of the correct placement of the office items.

**Body-chair dimensions and physical risk factors exposure among the academics**

Mismatch in body-seat dimensions was found in more than half of the participants. The proportion of participants with mismatched seats was higher compared to those reported in previous studies [20,21] on similar populations. Indeed, most measured office seats and desks in this study were short of meeting the adaptability and adjustability features to accommodate varying body dimensions. However, it must also be noted that regardless of the high level of adjustability of the emerging workstation chairs in the market, the limited knowledge of the participants on the use of the chairs was worth noting. In reality, the provision of office chairs for workers is often plagued with high financial cost implications for any organisation. The high proportion of body-chair mismatches in the present study is consistent with the findings of Adu and Adu [10]. These findings thus strengthen the support for thorough ergonomic evaluations before the procurement of work seats to guarantee academic comfort. The inputs of professionals (such as Occupational Medical Practitioners, Physical Therapists, Occupational Therapists, Occupational Health Hygiene, and Industrial Nurses) are therefore imperative. Similarly, half of the participants (57.3%) reported high-risk factors in relation to their assigned task activities, which was significantly associated with MSC prevalence. As expected, academics perform most activities in prolonged sitting and for a long duration, thus potentiating a high prevalence of MSC [2]. Our findings agree with the previous report of Mohan et al. [22], which showed an appreciable number of participants who were exposed to high ergonomic risk. Likewise, Algani et al. presented similar findings in which the high prevalence of MSCs was associated with physical work components among academics. Indeed, there were significant associations between body-chair dimensions and the prevalence of MSCs in our study, which follows similar patterns to that of other populations, such as undergraduate students [9] and the IT industry [24]. The study was undermined by some limitations, including accessibility to the Faculty Members due to their time constraints, which prevented the researchers from exhausting all other requisite parameters, including sitting duration and ergonomic practices. In addition, the study could not differentiate other sources of MSC from those related to the seat of the academic workers.

**Conclusion**

The academic staff in this study presented a moderate prevalence of MSCs, which seems to be influenced by body-chair mismatches and high ergonomic risk factors. These findings underscore the requisite evaluation of workstations during the procurement processes. Thus, the engagement of relevant professionals within the university's existing incentive structure is necessary to provide expertise in the assessment of workstation seats prior to the procurements.

## DECLARATIONS

**Ethical consideration**

Ethical approval for this study was obtained from the Ethics and Protocol Review Committee of the School of Biomedical and Allied Health Sciences, University of Ghana (Ref Number: SBAHS/AAPT/10628546/2020-2021). All the methods were performed in accordance with the Declaration of Helsinki. The participants also gave their informed consent, having been briefed thoroughly about the purpose of the study and their expected roles.

**Consent to publish**

All authors agreed on the content of the final paper.

**Funding**

None

**Competing Interest**

The authors declare that there is no conflict of interest regarding the publication of this article.

**Author contributions**

EEA was involved in the generation and editing of data for the article. AIB designed the study and drafted the manuscript. BM and AAA contributed to the editing and interpretation of data.

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**Availability of data**

Data is available upon request to the corresponding author.

## REFERENCES

1. Balogun J, Mbada C, Balogun A, Bello A, Okafor U (2016) Profile of Physiotherapist Educators in Anglophone West African Countries: A Cross-Sectional Study. International Journal of Medical and Health Sciences Research 3:99–109.
2. Tai KL, Ng YG, Lim PY (2019) Systematic review on the prevalence of illness and stress and their associated risk factors among educators in Malaysia. PLoS One 14:e0217430.
3. Harris D. (Ed.), (2013). Engineering psychology and cognitive ergonomics: understanding human cognition. 10th International Conference, EPCE 2013, Held as Part of HCI International 2013, Las Vegas, NV, USA, 21–26 July 2013, Proceedings Part. Springer, New York.
4. Boatca M– E, Draghici A, Carutasu N (2018) A Knowledge Management Approach for Ergonomics Implementation within Organizations. Procedia Soc Behav Sci 238:199–206

5. Tawiah A, Oppong-Yeboah B, Bello A (2015) Work-related Musculoskeletal Disorders among Workers at Gold Mine Industry in Ghana: Prevalence and Patterns of Occurrence. Br J Med Med Res 9:1–9.

6. Boakye H, Numarce B, Ameh JO, Bello AI (2018) Work-related musculoskeletal disorders among nurses and midwives at a municipal health facility in Ghana. Ghana Med J 52:228

7. Acquah AA, D'Souza C, Martin BJ, Arko-Mensah J, Dwomoh D, Nti AAA, Kwarteng L, Takyi SA, Basu N, Quakyi IA, Robins TG, Fobil JN (2021) Musculoskeletal Disorder Symptoms among Workers at an Informal Electronic-Waste Recycling Site in Agbogbloshie, Ghana. Int J Environ Res Public Health 18:2055.

8. Lasota AM (2020) A New Approach to Ergonomic Physical Risk Evaluation in Multi-Purpose Workplaces. Tehnicki vjesnik - Technical Gazette 27:.

9. Bello AI, Sepenu AS (2013) Mismatch in body–chair dimensions and the associated musculoskeletal pain among selected undergraduate students in Ghana. J Musculoskelet Res 16:1350016.

10. Adu G, Adu S, (2015). Mismatch between Office Furniture and Anthropometric Measures in Ghanaian Institutions. Engineering and Technology, 4:.

11. Israel GD (1992). Determining Sample Size. University of Florida Cooperative Extension Service, Institute of Food and Agriculture Sciences, EDIS, Florida 25:2017

12. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, Jørgensen K (1987) Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon 18:233–237.

13. Keyserling WM, Stetson DS, Silverstein BA, Brouwer ML (1993) A checklist for evaluating ergonomic risk factors associated with upper extremity cumulative trauma disorders. Ergonomics 36:807–31.

14. Parcells C, Stommel M, Hubbard RP (1999) Mismatch of classroom furniture and student body dimensions. Journal of Adolescent Health 24:265–273.

15. Lee S, De Barros FC, De Castro CSM, De Oliveira Sato T (2021) Effect of an ergonomic intervention involving workstation adjustments on musculoskeletal pain in office workers—a randomised controlled clinical trial. Ind Health 59:78–85

16. Kumah DB, Akuffo KO, Affram DE, Ankamah E, Osae EA (2016) Ergonomic Challenges of Employees Using Computers at Work in a Tertiary Institution in Ghana. Optom Open Access 1:2

17. Sirajudeen MS, Alaidarous M, Waly M, Alqahtani M (2018) Work-related musculoskeletal disorders among faculty members of college of Applied Medical Sciences, Majmaah University, Saudi Arabia: A cross-sectional study. Int J Health Sci (Qassim) 12:18–25

18. Velasco Garrido M, Mette J, Mache S, Harth V, Preisser AM (2020) Musculoskeletal pain among offshore wind industry workers: a cross-sectional study. Int Arch Occup Environ Health 93:899–909.

19. Masilamani N, Ganapathy D (2020) Awareness about low back pain among Dentists. International Journal of Research in Pharmaceutical Sciences 11:537–540.

20. Chaiklieng S, Suggaravetsiri P, Boonprakob Y (2010) Work ergonomic hazards for musculoskeletal pain among university office workers. Walailak J. Sci. & Tech. 7:169-176

21. Adu G, Adu S, Effah B, Anokye R (2014) Anthropometric evaluation of public institution sitting furniture designs. World Journal of Science and Technology Research 2:1-15

22. Mohan V, Justine M, Jagannathan M, Aminudin SB, Johari SHB (2015) Preliminary study of the patterns and physical risk factors of work-related musculoskeletal disorders among academicians in a higher learning institute. Journal of Orthopaedic Science 20:410–417.

23. Algarni FS, Kachanathu SJ, AlAbdulwahab SS (2020) A Cross-Sectional Study on the Association of Patterns and Physical Risk Factors with Musculoskeletal Disorders among Academicians in Saudi Arabia. Biomed Res Int 2020:1–7.

24. Math MM, Rao R, Kirthan LJ (2019). Analysis of Ergonomic Office Chair for Information Technology Work Environment- A case study in Indian context. In Proceedings of International Conference on Sustainable Computing in Science, Technology and Management (SUSCOM), Amity University Rajasthan, Jaipur-India