



Awareness of Ergonomics in the Clinical Laboratory

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Clinical laboratory employees are highly susceptible to developing musculoskeletal disorders directly related to their job duties. This study assesses the level of ergonomics awareness among Medical Laboratory Scientist practitioners working across both public and private laboratories.

Study Design: A web-based system and program were employed online to produce, distribute, and assess surveys.

Place and Duration of Study: The survey was conducted from May 27 to June 6, 2023, among Medical Laboratory Scientists employed in private or government institutions in Bayelsa State, Nigeria.

Methodology: Structured questions about ergonomics were created to achieve research goals. Respondents were between 20 and 60 years.

Results Regardless of age, 85% of participants had good knowledge of ergonomics. Gender was found to impact knowledge, as demonstrated by a t-test.

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Conclusion: Laboratory heads of departments and scientists must understand the importance of preventing injuries and acknowledge the potential for future discomfort, even if they are not currently experiencing any. Safety is a serious responsibility for everyone, and prioritising injury prevention is critical in laboratory environments.

Keywords: Awareness; ergonomics; clinical laboratory; safety.

1. INTRODUCTION

The study of ergonomics involves aligning job requirements with the worker's capabilities and the work environment to create the most efficient workspace while minimising the risk of injury. The primary objective of ergonomics is to decrease the incidence of work-related musculoskeletal disorders. It encompasses the quality, quantity, efficiency, and ease of output in the workplace while reducing worker injury, turnover, and fatigue [1].

In the past, the emphasis on ergonomics was mainly on physical aspects, as Scheen's 1997 study stated. However, in recent years, mental health has also been considered, as noted by Gupta et al. in their 2014 research. Ergonomics primarily aims to reduce Musculoskeletal disorders (MSDs), also known as Work Musculoskeletal disorders (WMSDs) [2].

The United States Department of Labor [3] states that MSDs can impact blood vessels, ligaments, muscles, tendons, and nerves. Employees in various industries and workplaces may encounter different hazards, including pulling and pushing heavy loads, lifting weighty objects, twisting, reaching overhead, assuming uncomfortable body positions, and performing the same tasks repeatedly. Consistent exposure to these risks can heighten the likelihood of injury among workers.

Depending on the individual's injury style, WMSD can vary in degree and type. The most common injury type manifests as general body discomfort, exhibiting symptoms of stiffness, varicose vein swelling, and postural imbalance. Other symptoms may include pain, weakness, and discomfort in the knees, ankles, and hips, as well as more severe outcomes like Carpal Tunnel Syndrome, spondylosis, radiculopathy in the back, shoulder impingement syndromes, and De Quervain's tendonitis [4-6].

Musculoskeletal disorders significantly impact physical abilities, causing immense pain and distressing an individual's psychosocial well-

being. Back pain, in particular, is the primary culprit, as shown by the 2016 Global Burden of Disease study, which identified MSDs as the second most common cause of disability worldwide. In 2017, Vos et al. reported that approximately 20% to 30% of the population globally is affected by a musculoskeletal condition [7].

Individuals who work in clinical laboratories are at a high risk of developing work-related musculoskeletal disorders (WMSDs). To avoid any potential reoccurrence, it is crucial to implement adequate preventive measures.

Working in a laboratory can be challenging and monotonous, often requiring precise and repetitive actions that demand steady hands and strict adherence to time and accuracy constraints. Additionally, the added pressure to maintain reproducibility and quality control can increase the risk of musculoskeletal injuries. Engaging in everyday laboratory activities such as pipetting, microscopy, micromanipulation, and handling biosafety cabinets or cryostats can result in micro-trauma, increasing the risk of long-term damage [8]. This risk is exceptionally high for women who work extended hours and still have to provide for their families, leading to a higher incidence of musculoskeletal problems [9].

Emphasising the significance of ergonomics is crucial in ensuring workplace safety. However, it is concerning that several developing countries seem to lack a sufficient understanding of this concept. While developed nations have recognised and implemented ergonomics principles, it is unacceptable that developing countries have yet to adopt them fully. This study assesses the level of ergonomics awareness among Medical Laboratory Scientist practitioners in Bayelsa state.

2. MATERIALS AND METHODS

2.1 Research Design

The data was collected using an online survey tool from May 27 to June 6, 2023, using a non-

probability sampling method to identify issues and collect data [9,10]. The survey collected demographic information such as age, sex, and educational qualification and utilized multiple-choice and pre-defined answer questions to gather opinions on ergonomics awareness in clinical laboratories. The online survey platform was chosen for its ability to collect data from geographically diverse locations and its unique opportunity to gather data online.

2.2 Study Area

Yenagoa is a capital city and a Local Government Area in southern Nigeria's Bayelsa State. It is situated at 4°55'29"N 6°15'51"E, in the southern part of the country. The area covers 706 km², and in the 2006 census, it had a population of 352,285 and has 2 tertiary healthcare facilities.

2.3 Sample Population Size

A survey was conducted among Medical Laboratory Scientists employed in private or government institutions in Yenagoa, Nigeria. The survey questions were formulated to meet our research goals. The statistical analysis was conducted using GraphPad Prism version 9.5.1. The sample size was determined using Taro Yamanes's approach [11], and we obtained 60 responses.

Using the formula:

$$n = N / 1 + N(e)^2$$

n- sample size,
N- sample,
e- margin of error.
 $n = 261 / 1 + 261(0.1)^2$
n= 50

3. RESULTS

A total of sixty medical laboratory personnel took part in the research. The details of the study population are shown in Table 1. Among the participants, the majority (53%) were aged between 31-40 years, and the next largest group belonged to the 41-50 age bracket. The gender ratio was nearly equal between males and females, and there was a statistically significant difference in knowledge based on gender, as determined by the student's t-test.

Over 60% of the participants recognised the usefulness of ergonomics in injury prevention. Moreover, an overwhelming majority of 68.3% firmly believed that it enhances the overall quality of work. Regarding ergonomics and its impact on job satisfaction, 58.3% of respondents agreed it is essential. Additionally, 56% felt that ergonomics helps to eliminate workplace hazards. According to the survey, only 20% of the participants believe that ergonomics can help reduce absenteeism, while only 61.75% perceive it as a laboratory safety measure. The survey results indicate that 10% of participants have inadequate knowledge regarding ergonomics benefits for Medical Laboratory Scientists.

In Table 2, we explore the topic of ergonomics, including its associated risks. The study surveyed 60 scientists, with only 9 (or 15%) reporting a lack of knowledge on the subject, while a majority were well-informed. Out of the 60 respondents surveyed regarding the existence of an ergonomics policy in their workplace, only 45% (27 scientists) confirmed its

Table 1. Characteristics of the population

Variable	Number	%	
Age range			P=0.39
20-30	4	8.0	
31-40	32	53.3	
41-50	18	30.9	
>50	6	10.0	
Affiliation			
Private	7	11.7	
Public	53	88.3	
Gender			P=0.03
Males		47.5	t=21.00, df=1
Females		52.5	
Area of Specialisation			
Medical Microbiology	23	38.3	
Chemical Pathology	17	28.3	
Haematology and Blood transfusion	14	23.3	
Histopathology	6	10.0	

Table 2. Knowledge and awareness of ergonomics

Variable	Number (%)
Do you know what ergonomics means?	
Yes	51 (85.0%)
No	9 (15.0%)
Is there an ergonomics policy in your establishment	
Yes	27 (45.0%)
No	20 (33.35%)
No idea	13 (21.7%)
Benefits of ergonomics	
Prevents injuries	36(60%)
Enhances work quality.	41(68.3%)
Boost job satisfaction	35(58.3%)
Decreases absenteeism	12(20%)
Eliminates hazards	34(56%)
Safety	37(61.75%)
No idea	6(10.0%)
Risk factors	
Heavy lifting	22 (36.7%)
Awkward posture	33 (55.0%)
Forceful exertion	29 (48.3%)
Repetitive activities	27 (45.0%)
Contact stress	25 (41.7%)
No idea	10 (16.7%)

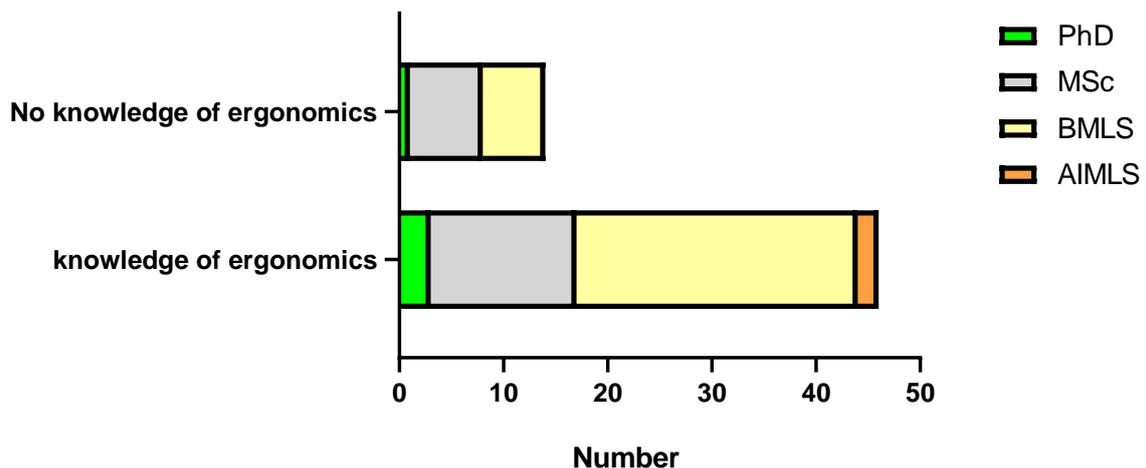


Fig. 1. Relationship between academic qualification and knowledge of ergonomics

existence, while 33.35% (20 scientists) responded negatively. Surprisingly, 21.7% (13 scientists) were uncertain about the policy's existence.

The relationship between academic qualification and knowledge of ergonomics was analysed with the one-way ANOVA (p-value of 0.3784), and there was no significant correlation.

Fig. 1 shows that the participants' educational qualifications did not impact their ergonomics awareness. There was no correlation found between the two factors.

According to this research, Medical laboratory scientists within the research area demonstrated excellent knowledge and awareness of workplace safety. To further enhance adherence to ergonomic policies, it is highly recommended

that hospital authorities establish a well-functioning ergonomics committee.

4. DISCUSSION

Clinical laboratories are essential healthcare facilities that provide various laboratory procedures crucial for diagnosing, treating, and managing patients [12]. Various tasks pose ergonomic risks to the staff in a laboratory setting. These tasks may include pipetting, microscopy, and working in the biosafety hood/cabinet. However, prioritising ergonomics in the laboratory can enhance work quality. [13].

According to the study, the majority of the respondents (85%) showed a strong understanding of ergonomics, which is a positive trend compared to previous surveys that reported lower percentages of 25.5% [14] and 54.5% [15]. This increase in awareness may be attributed to the inclusion of safety and ergonomics as a subject in schools. The participants' academic qualifications and areas of specialisation did not show a significant relationship, as safety in the laboratory is taught at all levels.

The study found that knowledge of ergonomics was not linked to the age of the participants, even though there were more respondents in the 31-40 age bracket. Recognising that workers' psychosocial, physiological and physical abilities and limitations change as they age is essential. By understanding and accommodating these changes, companies can retain the valuable expertise of older workers and avoid negative impacts on their operations. As workers age, they may have different shift preferences and learning styles and may feel disconnected from their work, so it is crucial to make accommodations for them [16].

Regarding gender, 40% of males knew ergonomics, while females (45%) were knowledgeable. Although male and female workers in a given workplace handle the same equipment, follow the same procedures, and encounter comparable ergonomic hazards, their ergonomic requirements vary due to inherent gender differences. Womenfolk are more at risk of injury and health complications due to their lower upper body strength and repetitive movements. Differences in physiology and physical strength between men and women can contribute to these risks [17]. This might be why women were more ergonomically knowledgeable in this study.

The implementation of an ergonomics policy in the workplace holds great significance. Out of the participants surveyed, only 20, accounting for 33.3%, reported awareness of such a policy in their organisation, while a more significant proportion seemed ignorant or lacked knowledge. This is concerning, particularly in the clinical laboratory setting where personnel are susceptible to developing musculoskeletal disorders.

According to the United States Department of Labour [3] guidelines, employers must ensure a safe and healthy workplace for their employees. This can be achieved by implementing an ergonomic process, setting clear goals and objectives, assigning specific responsibilities to staff members, and maintaining open communication with the workforce. Department heads are responsible for training and retraining their staff on ergonomics and monitoring their progress. However, staff members also play a crucial role in ensuring the smooth running of the ergonomics process. They can contribute by identifying and sharing vital information about workplace hazards and reporting any early signs of MSD.

Maintaining proper ergonomics in the workplace is crucial for ensuring a safe and secure work environment. This study has demonstrated that an impressive 60% of respondents reported a significant improvement in laboratory work quality, surpassing the findings of 2015 [14]. This remarkable increase in awareness can be attributed to medical laboratory scientists' heightened knowledge regarding Nigeria's workplace hazards and safety measures.

A 2014 study by Fritzsche et al. [18] showed that effective implementation of ergonomics policy in the workplace could significantly reduce absenteeism. This study revealed that 20% of participants believed ergonomics was crucial in preventing absenteeism. Poor ergonomics can cause worker frustration and fatigue, leading to missed work days. Therefore, it is evident that incorporating a good ergonomics policy can help improve workplace productivity by reducing absenteeism [19].

It is vital to conduct seminars and workshops on ergonomics in all clinical laboratories, emphasising the advantages of complying with the laboratory's policies. Knowing ergonomics without implementing it can still result in health problems, specifically MSDs. It is essential to

remind everyone of the benefits of ergonomics, especially since the responses from the participants regarding the benefits and risks were not encouraging. Regardless of the task, the objective is to prioritise safety and comfort and minimise the risk of work-related injuries.

5. CONCLUSION

Medical laboratory scientists in the research area showed exceptional awareness of workplace safety. Hospital authorities should establish a well-functioning ergonomics committee to enhance adherence to ergonomic policies.

Improving ergonomics in the workplace is crucial for enhancing work quality, increasing productivity, boosting morale, reducing absenteeism, and lowering the risk of worker's compensation claims. Laboratorians must understand the importance of preventing injuries and acknowledge that discomfort may arise in the future, even if they are not experiencing it now. The Ergonomics Society of Nigeria must enforce this policy in every organisation, including clinical laboratories. Although there used to be limited awareness about the significance of ergonomics, employers must now prioritise implementing these policies. Employees should communicate with management, and management should be open to information about potential or actual risk situations. Safety is everyone's job [20].

CONSENT

We obtained informed consent from all involved in the study after the concept of the study was explained to them.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Edwards Z, Can AS. Continuing Education Activity. Ergonomics - StatPearls - NCBI Bookshelf (nih.gov); 2022.
2. Gupta A, Bhat M, Mohammed T, Bansal N, Gupta G. Ergonomics in dentistry. *Int J Clin Pediatr Dent*. 2014 Jan;7(1):30-4.
3. United States Department of Labour Ergonomics - Overview | Occupational Safety and Health Administration (osha.gov). Assessed 31/05/2023
4. Barnard E, Sheaffer K, Hampton S, Measel ML, Farag A, Shaw C. Ergonomics and Work-Related Musculoskeletal Disorders: Characteristics among Female Interventionists. *Cureus*. 2021 Sep;13(9):e18226.
5. Chu PC, Wang TG, Guo YL. Work-related and personal factors in shoulder disorders among electronics workers: findings from an electronics enterprise in Taiwan. *BMC Public Health*. 2021 Aug 09;21(1):1525.
6. Jin X, Dong Y, Wang F, Jiang P, Zhang Z, He L, Forsman M, Yang L. Prevalence and associated factors of lower extremity musculoskeletal disorders among manufacturing workers: a cross-sectional study in China. *BMJ Open*. 2022 Feb 02;12(2):e054969.
7. Vos T, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd-Allah F, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: A systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*. 2017;390:1211–59
8. Agrawal P, et al. Work related musculoskeletal disorders among medical laboratory professionals: a narrative review. *Int J Res Med Sci*. 2014;2(4): 1262–1266.
9. Sadeghian F, Kasaeian A, Noroozi P, Vatani J, Hassan Taiebi S. Psychosocial and individual characteristics and musculoskeletal complaints among clinical laboratory workers. *International Journal of Occupational Safety and Ergonomics*. 2014;20(2):355-361.
10. Patton MQ. Qualitative evaluation and research methods. SAGE Publications, inc; 1990.
11. Köhler T, Smith A, Bhakoo V. Templates in Qualitative Research Methods: Origins, Limitations, and New Directions. *Organizational Research Methods*; 2021. Available: <https://doi.org/10.1177/10944281211060710>
12. Taro Yamane Formular In Calculating Sample Size For Research | by Projectclue 12 | Medium.

13. Bayot ML, Lopes JE, Naidoo P. Clinical Laboratory. 2022 Dec 19. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. PMID: 30570979.
14. Caskey CR. Ergonomics in the clinical laboratory. Clin Lab Sci. 1999 May-Jun; 12(3):140-4. PMID: 10539101.
15. Oladeinde B, Ekejindu I, Omoregie, R, Aguh O. Awareness and Knowledge of Ergonomics among Medical Laboratory Scientists in Nigeria. Annals of Medical and Health Sciences Research. 2015;5(6): 423-427. Available:<https://doi.org/10.4103/2141-9248.177989>
16. Alwahaibi N, Al Abri I, Al Sadairi M. Al Rawahi S. Ergonomics knowledge, attitude, and practice among biomedical scientists. New Zealand Journal of Medical Laboratory Science. 2022;76(3):129-134.
17. Mark Middlesworth. Ergonomics and the Aging Workforce - How to Improve Workplace Design (ergo-plus.com; 2023. Assessed 07/06/2023
18. Flexispot. Available:<https://www.flexispot.com/spine-care-center/4-ways-ergonomics-in-men-and-women-differ> Accessed 07/06/2023.
19. Fritzsche L, Wegge J, Schmauder M, Kliegel M, Schmidt KH. Good ergonomics and team diversity reduce absenteeism and errors in car manufacturing. Ergonomics. 2014;57(2):148-161.
20. Crawford JO, Berkovic D, Erwin J, Copsey SM, Davis A, Giagloglou E, Woolf A. Musculoskeletal health in the workplace. Best Practice & Research Clinical Rheumatology. 2020;34(5):101558.

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