

# Awareness and Knowledge of Ergonomics Among Medical Laboratory Scientists in Nigeria

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## Abstract

**Background:** Ergonomics awareness helps in its right application and contributes significantly to general wellbeing and safety of worker at workplace. **Aim:** This cross-sectional descriptive study aimed at assessing the level of awareness and knowledge of the science of ergonomics among Medical Laboratory Scientists in Benin City, Nigeria. **Subjects and Methods:** A total of 106 medical laboratory scientists comprising 64 and 42 in public and private laboratories, respectively, were recruited for this study using systematic random sampling technique. Data were obtained from the study participants using a questionnaire and subsequently analyzed with the statistical software INSTAT®. **Results:** Out of 106 study participants, 27 (25.5%) were reported to have heard of the term ergonomics. Awareness was significantly associated with gender (male vs. female: 38.5% [15/39] vs. 17.9% [12/67]; odds ratio = 2.9; 95% confidence interval = 1.2, 7.1;  $P = 0.02$ ). Awareness of ergonomics was not significantly affected by affiliation ( $P = 0.18$ ), area of specialization ( $P = 0.78$ ), post-qualification experience ( $P = 0.43$ ), and educational qualification ( $P = 0.23$ ) of the study participants. Irrespective of the affiliation of the participant, only 6 of 27 (22.2%) participants who were aware of ergonomics knew at least a benefit of right application of ergonomics in the laboratory. Knowledge of risk factors for the development of musculoskeletal disorders was reported by 8 of 27 (29.6%) persons who claimed to be aware of ergonomics. **Conclusions:** Awareness of ergonomics and knowledge of gains of its right application was poor among the study participants. Regular ergonomic education of medical laboratory scientists in Nigeria is advocated.

**Keywords:** Ergonomics, Medical laboratory scientist, Musculoskeletal disorders, Nigeria

## Introduction

The Millennium Development Goals seek to address many health problems confronting Sub-Saharan Africa, such as high neonatal and maternal mortality and morbidity, HIV/AIDS, and scourge of malaria.<sup>[1]</sup> Critical to the realization of this objective is the availability of a well-motivated and healthy health-work

team which should ordinarily have a multidisciplinary content. The pivotal role of laboratory medicine in effective management of diseases is not questionable, as reports show that laboratory services play a role in as much as 60–70% of decisions related to hospital admission, prescribed medication, and discharges.<sup>[2]</sup> This dependence of patient's management

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on laboratory data put the laboratory worker in pole position in the fight against diseases.<sup>[2]</sup> However, in order to perform efficiently in this position, the health and safety of the laboratory worker at the workplace should be given utmost attention.

Ergonomics has been described as the science that deals with adjusting the work environment, tools, task, and equipment to fit with the employee physical capability and limitations.<sup>[3]</sup> The goal of ergonomics is to reduce the risk of work-related injury at workplaces.<sup>[3]</sup> When properly applied to workplace environment and tasks, it has been reported to promote efficiency of the employee, improve productivity, and ultimately contribute to achievement of organizational goals.<sup>[3]</sup> Improving worker productivity and occupational health and safety at workplaces are current global concerns.<sup>[4]</sup> Poor adherence to safety practices has been reported as a contributing factor to occupational-related infections in several Nigerian studies.<sup>[5,6]</sup> In most clinical settings in Nigeria, safety which is practiced is often focused on eliminating contact of personnel with infectious agents through the routine use of personal protective devices such as hand gloves, laboratory coats, and face masks, while paying little or no attention to other elements that may not necessarily cause an infection, but have the capacity to compromise the health of the worker. Medical laboratory personnel working in a laboratory with poor application of principles of ergonomics have increased risk for the development of work-musculoskeletal disorders (MSDs),<sup>[7]</sup> which could adversely affect his performance on the job, quality of test result, and ultimately patient's management and care.

MSDs, also known as cumulative trauma disorders or repetitive stress injuries,<sup>[8]</sup> are injuries to muscles, nerves, tendons, ligaments, joints, cartilage, and spinal discs.<sup>[9]</sup> They often present as pains in the upper extremities, neck, and back and shoulders, etc.<sup>[9]</sup> MSDs are an increasing health problem in workplaces, resulting in workers' disability, loss of precious time from work, and huge economic and social costs.<sup>[10]</sup> Poor posture at work, repetitive movements, ill-structured job, poor workstation design, and prolonged working time among others have been reported as risk factors for the development of MSDs among clinical laboratory workers.<sup>[10,11]</sup> Ergonomics awareness helps in ergonomics application and contributes significantly to human wellbeing and safety at workplaces.<sup>[12]</sup> While ergonomics has gained significant momentum in the developed countries; in developing regions of the world, its awareness still remains critically low.<sup>[4]</sup> The growing relevance of ergonomics to medical practice has been extensively described in a previous study.<sup>[13]</sup> Although speedily becoming an integral part of the operation of most organizations, nothing is known about the awareness of the science of ergonomics among personnel working in clinical diagnostic laboratories in Nigeria. Against this background, this study aimed at assessing the level of awareness of ergonomics among medical laboratory scientists working in private and public diagnostic laboratories in Nigeria.

## Subjects and Methods

### Study population

A total of 106 medical laboratory scientists comprising 64 and 42 in public and private laboratories, respectively, were recruited for this study using a systematic random sampling technique. The sample size was estimated using the formula  $n = Z^2Pq/d^2$  and an ergonomic awareness prevalence of 1.2% reported among health care workers in a previous Nigerian study,<sup>[3]</sup> where,  $n$  = sample size,  $Z$  = standard normal deviate = 1.96 at 95% confidence limit,  $P$  = prevalence of ergonomic awareness from previous Nigerian study = 0.225 (1.2%),  $q = 1 - P = 0.775$ ,  $d$  = error margin = 0.05. Using the formula above, a sample size of 19 was obtained. To allow for non response and inappropriately filled or unreturned questionnaires, the sample size was increased to 106. Edo State has a total of 18 local government areas. A sampling frame of all the registered (private and public) medical diagnostic laboratories in Edo State was obtained from the Edo State Ministry of Health Edo State, Nigeria. A systematic sampling of one in three eligible laboratories was done to select the laboratories for this study. Study questionnaires were administered to laboratory scientists in selected diagnostic medical diagnostic laboratories. Inclusion criteria included having at least 1 year post-qualification experience and working in a registered medical diagnostic laboratory facility. A detailed Questionnaire was used to obtain relevant information from the study participants such as gender, area of specialization, institutional affiliation (public or private), and post-qualification experience (in years). The questionnaire also sought to know if participants were aware of the term "ergonomics" and benefit of its right application in the clinical laboratory among other issues. The questionnaire was pilot tested among 20 laboratory scientists in a different setting from that used in this study. Appropriate modifications were thereafter effected to questionnaire where necessary. The content of questionnaire after modification was examined by experts who graded it as good in meaning and construct. Informed consent was obtained from all the participants prior to administration of the questionnaire. This study was conducted from February 2014 to August 2014. Study approval was obtained from Edo State Ministry of Health, Benin City, Nigeria.

### Statistical analysis

The data obtained were analyzed using Chi-square ( $\chi^2$ ) test and odds ratio (OR) analysis using the statistical software INSTAT<sup>®</sup> (GraphPad software Inc., La Jolla, CA, USA). Statistical significance was set at  $P < 0.05$ .

## Results

Irrespective of the affiliation of medical laboratory scientist, 27 of 106 participants (25.5%) were reported to have heard of the term "ergonomics." Awareness of ergonomics was significantly

associated with gender (male vs. female: 38.5% [15/39] vs. 17.9% [12/67]; OR = 2.9; 95% confidence interval = 1.2, 7.1;  $P = 0.02$ ). Ergonomic awareness was not significantly affected by participant's educational qualification ( $P = 0.23$ ), affiliation ( $P = 0.18$ ), post-qualification experience ( $P = 0.43$ ), and area of specialization ( $P = 0.78$ ) [Table 1].

Irrespective of the affiliation of participants, only 6 of 27 (22.2%) participants who were aware of ergonomics knew at least a benefit of the right application of ergonomics in the laboratory. Knowledge of benefits of ergonomics did not significantly differ between medical diagnostic laboratory scientists in public and private sector [Table 2].

Knowledge of risk factors for the development of MSDs was reported by only 8 of 27 (29.6%) persons who claimed to be aware of ergonomics. This did not differ significantly between participants in the public and private medical diagnostic laboratories [Table 3].

## Discussion

The right and timely application of the principles of ergonomics at work places promotes the health, efficiency, and well-being of the workers.<sup>[14]</sup> However, practicability of ergonomic principles is a function of its awareness. Against this background, this study aimed at assessing the awareness and knowledge of ergonomics among medical laboratory scientists in public and private diagnostic laboratories in Nigeria. To authors' knowledge, this is the first study to access the knowledge of ergonomics among medical laboratory scientists in Nigeria.

Of 106 participants recruited, 27 (25.5%) reported to be aware of the concept of ergonomics. This is higher than 2.1% recorded among medical personnel in a previous Nigerian study.<sup>[3]</sup> It is, however, lower than 35.5% and 44.0% recorded elsewhere among manufacturing workers and computer users, respectively.<sup>[15,16]</sup> Ergonomics has been applied over time to production processes in several industries such as manufacturing, oil, and construction industries<sup>[4,17,18]</sup> with great gain. Its application, however, in healthcare is quite new<sup>[19]</sup> and have not gained much grounds in developing countries of the world. This may explain the low level of ergonomic awareness reported among study participants. The finding in this study that male participants were significantly more aware of ergonomics has also been reported in another Nigerian study.<sup>[3]</sup> Being a female is often described as a "risk factor" for many MSDs because prevalence in the general population and in large groups of employees has been reported to be twice as high among women compared to men.<sup>[20]</sup> This may be due in part to generally low awareness level of the subject of ergonomics among the female gender.

Although ergonomic awareness was observed to be higher among participants with a postgraduate degree, it was not

**Table 1: Awareness of ergonomics among medical laboratory scientists**

Characteristics	n	No aware (%)	OR	95% CI	P
<b>Gender</b>					
Male	39	15 (38.5)	2.9	1.2, 7.1	0.02
Female	67	12 (17.9)			
<b>Educational qualification</b>					
AIMLS	26	6 (23.1)			0.23
BMLS	49	9 (18.4)			
MSc	28	11 (39.3)			
PhD	3	1 (33.3)			
<b>Affiliation</b>					
Public	61	19 (31.1)	2.1	0.8, 5.3	0.18
Private	45	8 (17.8)			
<b>Postqualification experience (years)</b>					
1-5	52	12 (23.1)			0.43
6-10	29	7 (24.1)			
≥ 11	25	8 (32.0)			
<b>Area of specialization</b>					
Medical microbiology	48	11 (22.9)			0.78
Hematology	21	7 (33.3)			
Chemical pathology	27	6 (22.2)			
Histopathology	10	3 (30.0)			

n: Number of laboratory scientists, OR: Odds ratio, CI: Confidence interval

**Table 2: Knowledge of benefit of application of ergonomics in the laboratory**

Responses	Public laboratory (n <sub>1</sub> =19) n (%)	Private laboratory (n <sub>2</sub> =8) n (%)	OR	95% CI	P
Prevents injuries to workers	2 (10.5)	1 (12.5)	0.9	0.1, 11.9	1.00
Improves job satisfaction	1 (5.3)	1 (12.5)	0.4	0.1, 7.1	0.51
Improves overall performance	1 (5.3)	0 (0.0)	1.4	0.1, 37.5	1.00
No idea	13 (68.4)	6 (75.0)	0.7	0.1, 4.7	1.00
Incorrect answer	2 (10.5)	0 (0.0)	2.4	0.1, 56.4	1.00

n<sub>1</sub>: Number of participants aware of ergonomics in public laboratories, n<sub>2</sub>: Number of participants aware of ergonomics in private laboratories, OR: Odds ratio, CI: Confidence interval

**Table 3: Knowledge of risk factor for development of work-related musculoskeletal disorders in the clinical laboratory**

Responses	Public laboratory (n <sub>1</sub> =19) n (%)	Private laboratory (n <sub>2</sub> =8) n (%)	OR	95%CI	P
Poor posture	2 (10.5)	1 (12.5)	0.8	0.1, 10.6	1.00
Excessive repetitive tasks	2 (10.5)	0 (0.0)	2.4	0.1, 56.4	1.00
Poor workstation design	1 (5.3)	1 (12.5)	0.4	0.1, 7.1	0.51
Lack of a work-rest schedule during work	1 (5.3)	0 (0.0)	1.4	0.1, 37.5	1.00
No idea	6 (31.6)	4 (50.0)	0.5	0.1, 2.5	0.41
Incorrect answer	7 (36.8)	2 (25.0)	1.8	0.3, 11.2	0.68

n<sub>1</sub>: Number of participants aware of ergonomics in public laboratories, n<sub>2</sub>: Number of participants aware of ergonomics in private laboratories, OR: Odds ratio, CI: Confidence interval

significantly affected by academic qualification of participants. This is in contrast to findings from a Nigerian study.<sup>[3]</sup> It is important to note that the study population of Ismaila *et al.*, 2010<sup>[3]</sup> was a blend of professionals in healthcare, transport, communication, construction, manufacturing, education, and banking industries in contrast to ours which was strictly made up of medical laboratory scientist. In this study, awareness of ergonomics was not significantly affected by affiliation, post-qualification experience, and area of specialization of study participants. The concept of ergonomic is quite new in healthcare, especially in the developing countries of the world.<sup>[19]</sup> Again, opportunities for ergonomic education through continuous professional development among medical laboratory scientists may be nonexistent, as findings from a recent Nigeria study<sup>[21]</sup> shows a generally poor in-service training policy by the employee of medical laboratory scientists in both public and private diagnostic laboratories.

Knowledge of benefits of the right application of ergonomics in the laboratory was generally poor among study participants. This finding clearly paints in one's mind, a poor culture of application of ergonomics by participants as knowledge of benefit of ergonomics is a driver for its practice at workplace and it is quite impossible to maintain interest in anything for which its benefit is not known. MSDs at work places are often the result of poor application of ergonomic principles.<sup>[22]</sup> Irrespective of the affiliation of the study participant, only eight medical laboratory scientists correctly identified a risk factor for the development of work-related MSDs. Such poor display of knowledge of risk factors for the development of work-related MSDs among participants of this study could cause a lot of preventable injuries at work place, the proportion of which is unknown as there is currently no published data on the prevalence of MSDs among medical laboratory scientists in Nigeria. It is, however, important to note that findings from this study may not be representative of the situation in Nigeria as the study was only carried out in Edo State, Nigeria. This is an observed limitation to the study.

In summary, awareness of ergonomics was poor among medical laboratory scientists and was only significantly affected by gender. Participant's affiliation, area of specialization, post-qualification experience, and educational qualification did not significantly affect the awareness of ergonomics. In general, poor knowledge of benefit of ergonomic application and risk factors for the development of MSDs was observed among the study participants. Statistics failed to show any significant difference among the study participants in public and private sectors with respect to the knowledge of benefits of ergonomics and risk factors for the development of MSDs. Findings from this study have great implications for the safety and health of the medical laboratory scientist at the workplace. Ergonomic education of medical laboratory scientists in Nigeria is advocated.

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## Conflicts of interest

There are no conflicts of interest.

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