



Effect of Health Education on Ergonomic Practices Towards Reduction of Low Back Pain Among Patients in Rivers State

Ime M.Ubom¹, Ernest I.Achalu²

^{1,2}Department of Health Education, Faculty of Education, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria.

Abstract – This study sought to investigate the effect of health education on ergonomic practices for the reduction of low back pain among patients in Rivers state, Nigeria. The study employed pretest-posttest quasi-experimental design and targeted 170 patients at the University of Port Harcourt Teaching Hospital in Nigeria. Two objectives with corresponding research questions and hypotheses guided the study. The sampling techniques used were convenience and stratified, and 50 participants were selected, 20 males and 30 females, comprising 35 patients from the general outpatient clinic department and 15 patients from the spine physiotherapy unit. Data were collected using a self-structured, self-administered questionnaire titled "health education effect on posture and low back pain," which had a reliability coefficient of 0.75. Both descriptive and inferential statistics were used to answer the research questions and test the hypotheses, respectively. The findings of this study revealed that the use of ergonomic chairs, adjustable desks, and anti-fatigue mats could promote spine alignment and reduce pain caused by prolonged standing. The study also found that health education intervention was effective in improving environmental ergonomic practices, such as taking breaks to stretch and move around and using a firm mattress. Therefore, the study concluded that health education intervention through furniture and environmental ergonomics practices is crucial in reducing low back pain among patients in Rivers state. The results recommended the need for further research to identify effective and sustainable interventions of health education in ergonomic practices for the prevention and management of low back pain.

Keywords: Health Education, Furniture Ergonomics, Environmental Ergonomics, Reduction of Low Back Pain, Patients.

1. BACKGROUND TO THE STUDY

Ergonomics is the scientific discipline that is concerned with understanding of the interactions among humans and other elements of a system. It applies theory, principles, data and methods to design, so as to improve human well-being and overall system performance including the issues of low back pain (International Ergonomics Association in Ikonne, 2014). Low back pain is a common musculoskeletal disorder that affects a significant number of people worldwide. It is often caused by poor posture, prolonged sitting or standing, and improper lifting techniques (Bettany-Saltikov et al., 2019). Health education in ergonomic practices aims to educate patients on the proper posture, body mechanics, and movement patterns that can help prevent or alleviate low back pain (Ubom, 2023). One of the key aspects of health education in ergonomic practices is teaching patients about proper body mechanics. Teaching patients ergonomic practices is a crucial aspect of health education, particularly for individuals who suffer from low back pain. Ergonomic practices involve the use of proper body mechanics and movements to reduce the risk of developing musculoskeletal disorders. In Rivers state, Nigeria, where low back pain is



prevalent, teaching patients ergonomic practices can help to reduce the burden of this condition and improve their quality of life (Ikonne, 2014). This involves teaching patients how to lift objects correctly, avoid twisting or bending at the waist, and maintain a neutral spine position. Patients are also taught how to maintain good posture while sitting or standing for prolonged periods (Bettany–Saltikov et al., 2019). This includes using ergonomic chairs and desks, taking frequent breaks, and avoiding slouching or hunching over. Another important aspect of health education in ergonomic practices is teaching patients about the importance of exercise and physical activity. Regular exercise can help improve flexibility, strength, and endurance, which can all help reduce the risk of low back pain (Ubom, 2023). Patients are taught about exercises that can help strengthen the core muscles that support the lower back, as well as stretches that can help improve flexibility.

More so, ergonomics aims at designing the workplace so that it will fit the needs and physical capabilities of employees, instead of physically forcing the worker's body to fit the job, (Ghosh et al., 2011). Ergonomic factors that can elicit job satisfaction could be derived from a wide range of issues that emanate from the workplace. For instance, if work environment is poorly designed, it could hinder or slow down the employee's performance in the workspace, and this could eventually lead to frustration which, in turn, affects job satisfaction (Ikonne, 2014). Ergonomics is all about comfort and efficiency which enhances productivity and work force satisfaction. It is the interaction between people and the objects they use and the environments they function in. If equipment, workstations and work methods are designed to suit employee capabilities and limitations, health, safety and performance is maximized. Ergonomics is fitting the task to the person. Ergonomics improves health and safety, reduces costs from absence and reduced productivity, and ensures that social and legal obligations of employers to their employees are being met (Emmanuel et al., 2014).

1.2 Statement of the Problem

In Nigeria, low back pain is prevalent, and it is a leading cause of disability and loss of productivity among the working population. Ergonomic practices have been identified as an effective approach towards reducing the incidence of low back pain in different parts of the world. However, there is a lack of awareness and knowledge about ergonomic practices among patients in Rivers state, Nigeria. Thus, the researcher is bothered to embark on this study because low back pain is quite expensive to manage going by the usual care in which ergonomic practices can be cost-effective to address. The researcher therefore assumed that using health education to provide evidence-based information on ergonomic practices to patients may reduce low back pain.

2. AIM AND OBJECTIVES

This study was aimed at investigating effect of health education on ergonomic practices towards reduction of low back pain among patients in Rivers state, Nigeria. Specifically, the objectives were to:

1. ascertain the effect of health education on furniture ergonomic practices towards reduction of low back pain among patients in Rivers state; and,
2. determine the effect of health education on environmental ergonomic practices towards reduction of low back pain among patients in Rivers state.

Research Questions

1. What is the effect of health education on furniture ergonomic practices towards reduction of low back pain among patients in Rivers state?

2. What is the effect of health education on environmental ergonomic practices towards reduction of low back pain among patients in Rivers state?

Hypotheses

The following two (2) hypotheses were tested at 0.05 level of significance.

1. Health education has no significant effect on furniture ergonomic practices towards reduction of low back pain among patients in Rivers state.
2. Health education has no significant effect on environmental ergonomic practices towards reduction of low back pain among patients in Rivers state.

Conceptual Framework

The concept of the study is based on the effect of health education on furniture and environmental ergonomic practices towards reduction of low back pain among patients in Rivers state. This is represented in Figure 1.

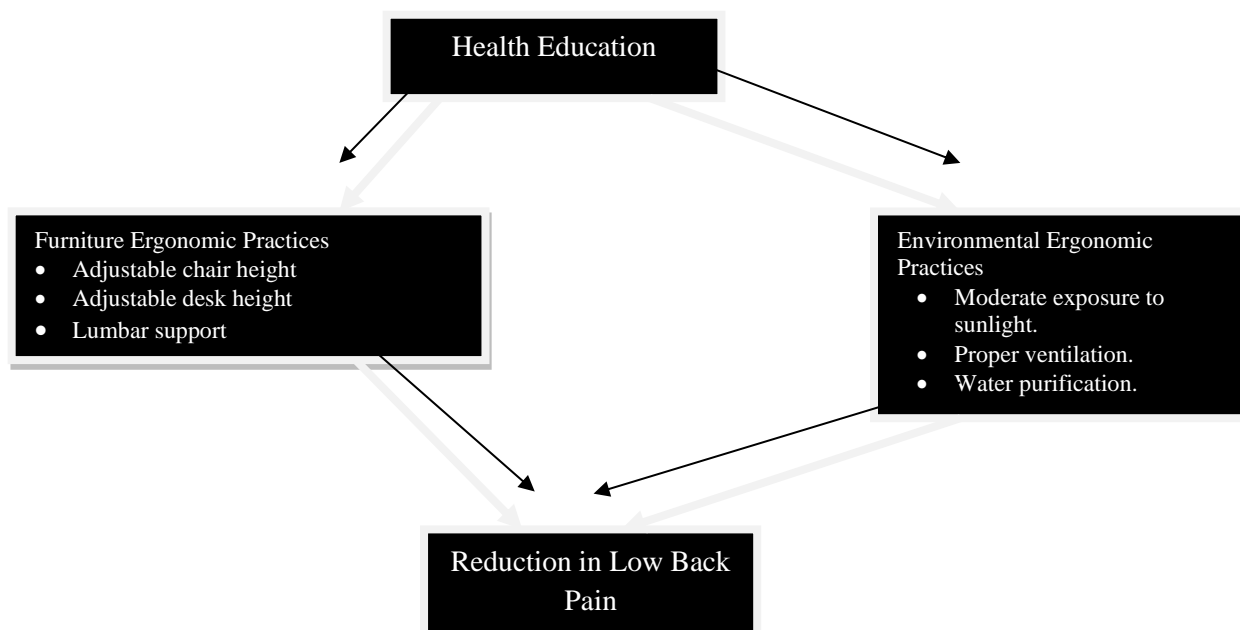


Fig -1: Showing the representation of the study’s conceptual framework.

Source: Researchers’ Conceptualizatiion (2023)

3. CONCEPTUAL REVIEW

Concept of Health

Health is an important aspect of human life. It encompasses all activities aimed at ensuring the protection of the body from diseases and promoting good habit (Fasoranti & Adeyeye, 2015). According to World Health Organisation (as cited in Fasoranti & Adeyeye, 2015), health is defined as a state of complete physical, mental and social well-being of individual and not merely the absence of diseases or infirmities. Health status of an individual is among the determining factor to achieving success in every aspect of life,



which explains why everyone wants to be healthy and will go to any length to be healthy or seek health through whatever means. Hence the important of health to sustainability of life cannot be over emphasized considering life to be fulfilled and productivity. It is significant to mention that in whatever function one finds oneself, the most important factor is good health.

Concept of Health Education

Health education comprises the teaching-learning experiences of skills, attitude, habit, health values and practices of positive health behaviour towards disease prevention and control (Ubom, 2023). It is a field of study and body of knowledge that facilitate the prevention of health problems through the application of scientific principles and strategies which include research and the contribution of meaningful experiences that influence health behaviour of individual and the community. However, outcomes of health education be determined by a simple factor of literacy (Onwuama, 2017). Health education is the process of persuading people to accept measures which will improve their health and to reject those that will have an adverse effect (Brar, 2018).

Concept of Low Back Pain

Low-back pain (LBP) is a condition of pain, aches, muscle tension, or stiffness, which is localized to the lumbosacral region of the spine (Kuiya et al., 2023). Nonspecific LBP is believed to stem from benign musculoskeletal problems such as muscle or soft tissue sprain or strains. This is particularly true when the pain arises suddenly during the physical loading of the back (Tamartash et al., 2023). According to Kuiya et al (2023) as well as Tamartash et al (2023), low-back pain is considered a major health problem due to its high prevalence, high probability of recurrence, and associated disability. It poses an economic and social burden to the society and incurs billions of dollars in medical expenditure each year. Similarly, Ogwumike et al (2020) observed that low-back pain occurs in similar proportions in all cultures, interfering with the quality of life and work performance. It has been estimated that about 80% of the general population will report LBP at one point or the other in their life.

Health Education and Furniture Ergonomic Practices towards Reduction of Low Back Pain

Health education related to furniture ergonomic practices at home and work is a crucial aspect of maintaining a healthy lifestyle. Ergonomics is the science of designing and arranging objects in such a way as to maximize efficiency and comfort while minimizing discomfort and injury (Ubom, 2023). The use of ergonomically designed furniture can significantly reduce the risk of musculoskeletal disorders, particularly low back pain (Eberendu et al., 2020). One essential ergonomic practice is the use of adjustable chair height. According to In et al (2021), an adjustable chair allows for proper alignment of the feet, hips, and knees, which helps reduce stress on the lower back. Additionally, an adjustable desk height can also be beneficial. Barbieri et al (2019) explained that an adjustable desk can help maintain proper posture and reduce strain on the neck and shoulders. Another important aspect of ergonomic furniture design is lumbar support. Lumbar support refers to the support provided to the lower back region. Gao et al (2023) averred that lumbar support can help prevent low back pain by reducing spinal compression and improving posture. Incorporating these ergonomic practices into daily life can significantly reduce the risk of low back pain in patients. In a related development, Bilar et al (2023) observed in their study that the use of ergonomic furniture in the workplace has the potential of reducing the incidence of low back pain by 50%.

Health Education and Environmental Ergonomic Practices towards Reduction of Low Back Pain



Environmental ergonomic practices play a significant role in reducing low back pain. Health education that emphasizes these practices can help individuals prevent and manage low back pain (Ubom, 2023). Exposure to sunlight, proper ventilation, and water purification are some of the environmental factors that can affect low back pain. According to Ebeling et al (2013), moderate exposure to sunlight is essential for maintaining healthy bones and muscles. Sunlight is a natural source of vitamin D, which helps the body absorb calcium and phosphorus. These minerals are essential for the development and maintenance of strong bones and muscles. A lack of vitamin D can lead to low bone density (Luo et al., 2023), which can cause low back pain. Health education that promotes moderate exposure to sunlight can help individuals prevent vitamin D deficiency (AlQuaiz et al., 2018) and reduce the risk of low back pain (Zadro et al., 2017). Proper ventilation is also crucial for reducing low back pain. According to Ana et al (2019), poor indoor air quality can cause respiratory problems, which can lead to low back pain. Health education that emphasizes proper ventilation practices such as opening windows, using air purifiers, and avoiding smoking indoors can help individuals maintain good indoor air quality and prevent low back pain. Water purification is also important for reducing low back pain. Contaminated water can cause various health problems, including gastrointestinal issues that can lead to low back pain (To Better Days, 2021). Health education that promotes water purification practices such as boiling water or using water filters can help individuals prevent waterborne illnesses and reduce the risk of low back pain.

4. THEORETICAL FRAMEWORK

The Health Belief Model (HBM)

The Health Belief Model (HBM) was postulated by Irwin M. Rosenstock in 1990. The model is based on the concept that an individual's health-related behavior is determined by their beliefs about susceptibility to a particular illness, the severity of the illness, the benefits of taking preventive action, and the barriers to taking such action. According to the HBM, individuals are more likely to engage in preventive health behaviours if they perceive themselves as susceptible to an illness, believe that the illness is severe, perceive the benefits of preventive action as high, and perceive few barriers to taking such action (Rosenstock, 1990). Health education is an avenue for promoting furniture and environmental ergonomic practices in addressing low back pain in patients because it can help individuals understand their susceptibility to low back pain and the severity of the condition. Health education can also communicate the benefits of using ergonomic furniture and environmental modifications to prevent low back pain (Ubom, 2023). Additionally, health education can address perceived barriers to taking preventive action, such as cost or lack of knowledge about ergonomic practices.

5. METHODOLOGY

This research utilized a quasi-experimental design with pretest-posttest measures to examine the effect of health education on ergonomic practices aimed at reducing low back pain in patients residing in Rivers state, Nigeria. In this study, a sample of 50 participants was drawn from a population of 170 individuals at the University of Port Harcourt Teaching Hospital (UPTH) in Nigeria using convenience and stratified sampling techniques. The sample included 35 patients from the general outpatient clinic department (GOPD) and 15 patients from the spine physiotherapy unit, with an almost equal distribution of males (20) and females (30). The study's participants were all diagnosed with low back pain and satisfied the inclusion requirements, which included being aged between 18–60 years old, having experienced low back pain for 12 weeks, receiving a medical diagnosis for this condition, and not having any underlying pathology or

undergoing surgery. Those with mental instability, underlying pathology, infection, or spinal fracture were excluded from the study using exclusion criteria to ensure that only qualified participants were included. Health Education Effect on Posture and Low Back Pain Questionnaire (HEEPLBPQ) was employed as the primary data collection instrument in the study. The questionnaire's validity was ensured and reliability established using expert review and test-retest methods, resulting in a Cronbach Alpha of 0.75. The research questions were addressed using mean and standard deviation, while hypotheses were tested at a significance level of 0.05 using ANCOVA and simple percentage. The high return rates indicated that all respondents completed their surveys with exceptional compliance.

6. RESULTS

6.1 Answer to Research Questions

Research Question 1: What is the effect of health education on furniture ergonomic practices towards reduction of low back pain among patients in Rivers state?

Table -1: Summary of Mean and Standard Deviation scores on the effect of health education on furniture ergonomic practices towards reduction of low back pain among patients in Rivers state.

S/No.	Items	Pre-Test		Post-Test		Mean
		Mean	SD	Mean	SD	Gain
1.	Insufficient lumbar support and adjustability in office chairs cause back pain.	1.29	0.10	3.08	0.43	1.79
2.	Improperly designed sofas can lead to lower back discomfort.	1.77	0.16	3.19	0.47	1.42
3.	The use of an adjustable desk and ergonomic chair enhances the natural curvature of the spine.	1.52	0.12	3.25	0.49	1.73
4.	Chairs that encourage leg crossing disrupt spinal alignment.	1.91	0.23	3.46	0.52	1.55
5.	Prolonged standing can be alleviated with anti-fatigue mats or height adjustable stools.	1.43	0.11	3.20	0.45	1.77
Cluster Mean/SD		1.58	0.14	3.24	0.47	1.65

Research Question 2: What is the effect of health education on environmental ergonomic practices towards reduction of low back pain among patients in Rivers state?

Table -2: Summary of Mean and Standard Deviation scores on the effect of health education on environmental ergonomic practices towards reduction of low back pain among patients in Rivers state.

S/No.	Item	Pre-Test		Post-Test		Mean
		Mean	SD	Mean	SD	Gain
6.	I take breaks to stretch and move around when sitting for long periods of time.	1.17	0.09	3.12	0.41	1.95

7.	I take breaks to move around when sitting for long periods of time.	1.42	0.15	3.11	0.41	1.69
8.	I slouch while working at my desk.	1.39	0.13	3.15	0.43	1.76
9.	I lean forward while working at my desk.	1.36	0.10	3.14	0.43	1.78
10.	I use a firm mattress that supports my spine while sleeping.	1.33	0.10	3.51	0.62	2.18
Cluster Mean/SD		1.33	0.11	3.21	0.46	1.87

Test of Hypotheses

Hypothesis 1: Health education has no significant effect on furniture ergonomic practices towards reduction of low back pain among patients in Rivers state.

Table -3: ANCOVA result for Pre-Test and Post-Test Analysis on the significant effect of furniture ergonomic practices towards reduction of low back pain among patients in Rivers state.

Source	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Pre-test	15.43	1	15.43	1.21*	0.391	0.006
Group	40.89	1	40.89	9.15*	0.000	0.850
Error	66.57	28	2.38			
Total	122.89	30				

Note: * indicates statistical significance at $p < .05$

Hypothesis 2: Health education has no significant effect on environmental ergonomic practices towards reduction of low back pain among patients in Rivers state.

Table -4: ANCOVA result for Pre-Test and Post-Test Analysis on the significant effect of environmental ergonomic practices towards reduction of low back pain among patients in Rivers state.

Source	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Pre-test	3.90	1	3.90	1.63*	0.411	0.009
Group	27.61	1	40.89	5.28*	0.000	0.745
Error	92.53	48	1.93			
Total	124.04	50				

Note: * indicates statistical significance at $p < .05$

7. ANALYSES OF RESULTS

The results presented in Table 1 reveal the statistical results regarding the improvement of five furniture ergonomic practices in reducing low back pain among patients in Rivers state. The Table presents pre-test



and post-test mean scores, standard deviations, and means gain. The results indicate significant improvements in all items with remarkable high mean gains ranging from 1.42 to 1.79. Notably, the post-test scores had a cluster mean gain of 1.65, demonstrating the positive effect of the health intervention on patients' furniture ergonomic practices.

The results presented in Table 2 illustrate the pre-test and post-test mean scores, standard deviation, and mean gain of five environmental ergonomic practices aimed at reducing low back pain among patients in Rivers state. The findings unveil significant improvements across all items, with high mean gains ranging from 1.69 to 2.18. Moreover, the post-test scores reveal a promising cluster mean gain of 1.87, signifying a positive effect of the health intervention on patient's environmental ergonomic practices. These results demonstrate the efficacy of the health education approach to reducing low back pain and improving patient outcomes.

The results presented in Table 3 indicate that the pre-test variable is not a significant predictor of the outcome variable, which is supported by the F-value of 1.21 and p-value of 0.391. Conversely, it is apparent that the grouping variable has a notable impact on determining the outcome variable, as evidenced by an F-value of 9.15 and p-value of 0.000. The Partial Eta Squared value of 0.850 further confirms that about 85% of the variation in the outcome variable is explained by the grouping variable, even after considering pre-test variables and error margins.

Results in Table 4 highlights that the pre-test variable is not a significant predictor of the outcome variable as shown by the F-value of 1.63 and p-value of 0.114. However, the grouping variable has a considerable effect on the outcome variable as exhibited by the F-value of 5.28 and p-value of 0.000. The Partial Eta Squared value of 0.745 indicates that 74.5% of the variability in the outcome variable could be explained by the grouping variable even after controlling for the pre-test variable and error.

8. DISCUSSION OF FINDINGS

The findings of this study are discussed under the following subheadings:

Effect of Health Education on Furniture Ergonomic Practices towards Reduction of Low Back Pain among Patients in Rivers State

It was found that health education plays an important role in reducing low back pain among patients in Rivers state. It showed that effective management of low back pain requires a systematic approach towards furniture selection. Office chairs must be adjustable and have lumbar support, while sofas shouldn't exacerbate discomfort. The use of ergonomic chairs, adjustable desks, and anti-fatigue mats can promote spine alignment and ease pain caused by prolonged standing. This is consistent with the findings of Bilar et al (2023) that proper posture and ergonomics in the workplace can help address low back pain. Moreover, ergonomic interventions in the workplace can significantly reduce low back pain among employees, according to a study by Nuraini and Amalia (2023). Nevertheless, Hartvigsen et al (2005) observed that ergonomic interventions in the workplace had little or no effect on the incidence of low back pain. Hence, the effectiveness of health education interventions and ergonomic practices in reducing low back pain seems dependent on various factors such as the intervention type, workplace setting and studied population (Traeger et al., 2019).

Effect of Health Education on Environmental Ergonomic Practices towards Reduction of Low Back Pain among Patients in Rivers State



It was found that health education can have a positive impact on environmental ergonomic practices and reduce low back pain among patients in Rivers state. The mean post-test scores are significantly higher than pre-test scores, indicating that the education intervention was effective in improving environmental ergonomic practices. Taking breaks to stretch and move around, using a firm mattress while sleeping, and avoiding slouching or leaning forward while working were among the practices reported to have been implemented, leading to significant improvements. Supporting this finding, research shows that taking breaks to stretch and move around, along with maintaining a good posture while working, can help reduce low back pain (Alrashed, 2016)). Similarly, studies suggest that using a firm mattress that supports the spine can help improve sleep quality and reduce low back pain (Radwan et al., 2015).

9. CONCLUSION AND RECOMMENDATIONS

In conclusion, health education intervention through furniture and environmental ergonomics practices play a crucial role in reducing low back pain among patients in Rivers state. The significance of a methodical approach to furniture selection is highlighted in this research. It stresses the need for adjustable chairs with lumbar support and sofas that do not worsen pain. Moreover, incorporating environmental ergonomic practices, such as taking breaks to stretch, using a firm mattress, and maintaining good posture while working can considerably alleviate low back pain. However, the effectiveness of these interventions depends on various factors such as the intervention type, workplace setting, and studied population. Therefore, it is essential to analyze these factors before implementing any intervention. Further research is necessary to identify effective and sustainable interventions to prevent and manage low back pain.

REFERENCES

- [1] AlQuaiz, A. M., Kazi, A., Fouda, M., & Alyousefi, N. (2018). Age and gender differences in the prevalence and correlates of vitamin D deficiency. *Archives of Osteoporosis*, 13, 1-11.
- [2] Alrashed, W. A. (2016). Ergonomics and work-related musculoskeletal disorders in ophthalmic practice. *Imam Journal of Applied Sciences*, 1(2), 48.
- [3] Ana, G. R., Alli, A. S., Uhiara, D. C., & Shendell, D. G. (2019). Indoor air quality and reported health symptoms among hair dressers in salons in Ibadan, Nigeria. *Journal of Chemical Health & Safety*, 26(1), 23-30.
- [4] Barbieri, D. F., Srinivasan, D., Mathiassen, S. E., & Oliveira, A. B. (2019). Variation in upper extremity, neck and trunk postures when performing computer work at a sit-stand station. *Applied Ergonomics*, 75, 120-128.
- [5] Bettany-Saltikov, J., Kandasamy, G., Van Schaik, P., McSherry, R., Hogg, J., Whittaker, V., & Racero, G. A. (2019). School-based education programmes for improving knowledge of back health, ergonomics and postural behaviour of school children aged 4-18: A systematic review. *Campbell Systematic Reviews*, 15(1-2), 1-11.
- [6] Bilar, M. A., Gonzales, J. B., & Lacsao, S. M. (2023). Reducing lower back pain by providing training for nurses working for nursing home. (Bachelor research project, Metropolia University of Applied Sciences).
- [7] Brar, S. K. (2018). Health education as a tool for effective primary health care services. *International Journal of Yogic, Human Movement and Sports Sciences*, 3(1), 87-89.
- [8] Ebeling, P., Daly, R., Kerr, D., & Kimlin, M. (2013). Building healthy bones throughout life: an evidence-informed strategy to prevent osteoporosis in Australia. *Medical Journal of Australia*, 2(S1), 1-9.
- [9] Eberendu, J., Achalu, E. I., & Asogwa, E. (2020). Ergonomic hazards and work-related musculoskeletal disorders among bank-tellers in Akwa Ibom state. *Trends in Educational Studies Journal*, 12(2), 1-17
- [10] Emmanuel, O. D., Jonathan, F. O. & Ayodeji, A. A. (2014). Assessment of ergonomic hazards and techno-stress among the workers of Obafemi Awolowo University, Ile-Ife. *Australian Journal of Business and Management Research*, 4(1), 27 – 34.



- [11] Fasoranti, A. J. & Adeyeye, M. F. (2015). Health education as a tool for effective primary health care services in Nigeria. *Journal of Emerging Trends in Educational Research and Policy Studies*, 6(7), 225–228.
- [12] Gao, K., Du, J., Ding, R., & Zhang, Z. (2023). Lumbar spinal loads and lumbar muscle forces evaluation with various lumbar supports and backrest inclination angles in driving posture. *European Spine Journal*, 32(2), 408–419.
- [13] Aakifa Shahul, A.S.Hovan George, & A.Shaji George. (2023). Enhancing Cardiovascular Health with Enhanced External Counter pulsation Therapy: A Comprehensive Review. *Partners Universal International Innovation Journal (PUIIJ)*, 01(02), 55–62. <https://doi.org/10.5281/zenodo.7853786>
- [14] Ghosh, S., Bagchi, A., Sen, D. & Bandyopadhyay, P. (2011). Ergonomics: A bridge between fundamentals and applied research. *Indian Journal of Occupational and Environmental Medicine*, 15(1), 14–17.
- [15] Hartvigsen, J., Lauritzen, S., Lings, S., & Lauritzen, T. (2005). Intensive education combined with low tech ergonomic intervention does not prevent low back pain in nurses. *Occupational and environmental medicine*, 62(1), 13–17.
- [16] Ikonne, C. N. (2014). Influence of workstation and work posture ergonomics on job satisfaction of librarians in the federal and state university libraries in southern Nigeria. *IOSR Journal of Humanities and Social Science*, 19(9), 78–84.
- [17] Dr.A. Shaji George, A.S.HOVAN GEORGE, Dr.T. Baskar, & A.S.Gabrio Martin. (2023). Human Insight AI: An Innovative Technology Bridging The Gap Between Humans And Machines For a Safe, Sustainable Future. *Partners Universal International Research Journal (PUIRJ)* ISSN: 2583-5602, 02(01), 1–15. <https://doi.org/10.5281/zenodo.7723117>
- [18] In, T. S., Jung, J. H., Jung, K. S., & Cho, H. Y. (2021). Spinal and pelvic alignment of sitting posture associated with smartphone use in adolescents with low back pain. *International Journal of Environmental Research and Public Health*, 18(16), 8369.
- [19] Kuiya, K., Joshi, S., & Kaushik, V. (2023). To determine the effect of iliopsoas MET along with the conventional therapy on pain, functional disability and lumbar lordosis in the Patients with non-specific low back pain. *Indian Journal of Physiotherapy & Occupational Therapy*, 17(1), 22–26.
- [20] A.S.Hovan George, Aakifa Shahul, A.Shaji George, T.Baskar, & A.Shahul Hameed. (2023). A Survey Study on Big Data Analytics to Predict Diabetes Diseases Using Supervised Classification Methods. *Partners Universal International Innovation Journal (PUIIJ)*, 01(01), 1–8. <https://doi.org/10.5281/zenodo.7644341>
- [21] Luo, L. M., Wu, N., Zhang, J., & Yang, D. (2023). Maternal vitamin D levels correlate with fetal weight and bone metabolism during pregnancy: a materno-neonatal analysis of bone metabolism parameters. *Journal of Perinatal Medicine*, 51(4), 538–545.
- [22] Nuraini, N., & Amalia, S. (2023). Reducing musculoskeletal disorders: ergonomic interventions in hospital staff workspaces. *International Journal of Health Systems and Medical Sciences*, 2(3), 46–58.
- [23] Ogwumike, O. O., Bashir-Bello, F., & Bashir Kaka, B. (2020). Patients' experiences about exercise prescription and education in the physiotherapy management of nonspecific low-back pain. *Journal of Patient Experience*, 7(6), 1458–1465.
- [24] Onwuama, M. A. C. (2017). School health education strategies. In O. A. Moronkola (ed.) *Health education for tertiary institution students*. Nigerian School Health Association (120–135).
- [25] Radwan, A., Fess, P., James, D., Murphy, J., Myers, J., Rooney, M., & Torii, A. (2015). Effect of different mattress designs on promoting sleep quality, pain reduction, and spinal alignment in adults with or without back pain; systematic review of controlled trials. *Sleep Health*, 1(4), 257–267.
- [26] Rosenstock, I. M. (1990). The health belief model: Explaining health behaviour through expectancies. In: K. Glanz, F. M. Lewis, B. K. Rimer, (eds.) *Health behaviour and health education: Theory, research, and practice*. San Francisco, CA: Jossey-Bass, 39–62.
- [27] Tamartash, H., Bahrpeyma, F., & Dizaji, M. M. (2023). The effect of remote myofascial release on chronic nonspecific low back pain with hamstrings tightness. *Journal of Sport Rehabilitation*, 1(aop), 1–8.
- [28] To Better Days. (2021, April). Pollution. <https://tobetterdays.co.uk/blog/how-does-pollution-affect-chronic-pain/>
- [29] Traeger, A. C., Lee, H., Hübscher, M., Skinner, I. W., Moseley, G. L., Nicholas, M. K., & McAuley, J. H. (2019). Effect of intensive patient education vs placebo patient education on outcomes in patients with acute low back pain: A randomized clinical trial. *JAMA Neurology*, 76(2), 161–169.
- [30] Ubom, I. M. (2023). Effect of health education on knowledge and practices towards reduction of low back pain among patients in Rivers state. (PhD thesis, University of Port Harcourt).
- [31] Zadro, J., Shirley, D., Ferreira, M., Carvalho-Silva, A. P., Lamb, S. E., Cooper, C., & Ferreira, P. H. (2017). Mapping the association between vitamin d and low back pain: A Systematic review and meta-analysis of observational studies. *Pain Physician*, 20(7), 611–640.