

Advancing Biomechanics in Nigeria: Overcoming Challenges and Bridging Gap

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Summary

As a certified prosthetist who transitioned into biomechanics research, I have observed a significant gap in biomechanics awareness and application among rehabilitation clinicians in Nigeria, particularly among physical therapists, prosthetists, and orthotists. Most rehabilitation clinics have yet to adopt digital tools, such as inertial sensors, and GaitRite for gait analysis in their rehabilitation protocols, whereas advanced healthcare systems have already integrated these technologies into standard practice. Despite the growing relevance of biomechanics in rehabilitation, no Nigerian university offers biomechanics as a standalone program, and most that offer it as a unit course in a program lack functional labs for practical training. This study explores the systemic barriers to the integration of biomechanics in Nigeria's healthcare system. It advocates educational reform, an increase in research investment, and grassroots biomechanics awareness.

Introduction

Nigeria, Africa's most populous country with an estimated population of over 200 million people [1], has approximately 14 million people living with physical disabilities [2]. Despite this high prevalence, biomechanics, the study of the movement of the living body, remains underdeveloped in the country's education and healthcare system. Biomechanics, which integrates all the components of STEM (science, technology, engineering, and mathematics) [3], plays a critical role in rehabilitating people with physical challenges. However, many rehabilitation clinicians lack exposure to biomechanics tools and concepts, limiting their application in patient care. In 2016, National Biomechanics Day (NBD) was introduced to promote biomechanics awareness, especially among young people considering career paths in STEM fields [3]. The goal was to encourage the inclusion of biomechanics in high school curricula and university programs worldwide. However, no high school or university in Nigeria currently offers biomechanics as a standalone program. Instead, it is embedded as a minor course within fields like human kinetics, biomedical engineering, prosthetics and orthotics, and physiotherapy. Additionally, most Nigerian institutions lack functional biomechanics laboratories, preventing students from gaining hands-on experience in clinical biomechanics applications. This educational gap has led to the focus of many rehabilitation clinicians focusing on treating symptoms rather than analyzing the movement mechanics, which could help identify the root cause of musculoskeletal issues. This study examines the gap between clinical practice and biomechanics in Nigeria, using case studies to highlight instances where biomechanics could have significantly improved patient outcomes. The paper also advocates for a structured framework to advance biomechanics education, research, and clinical practice in Nigeria.

Methods

This narrative review was developed based on the author's personal experiences transitioning from clinical practice to a Biomechanist.

Case studies were drawn from the author's clinical practice and that of colleagues, highlighting instances where biomechanics knowledge could have improved rehabilitation and how biomechanics are incorporated in developed countries. Also, a literature search was conducted using Web of Science and PubMed to identify existing research on biomechanics in Nigeria. The search included keywords such as "biomechanics" and "Nigeria," focusing on studies related to rehabilitation in Nigeria.

Results and Discussion

Our findings indicate that to date, no peer-reviewed clinical biomechanics study has been carried out in any Nigerian higher institution or healthcare facility. The only existing study in biomechanics is a narrative review study on the first National Biomechanics Day (NBD) held at the Federal University of Technology Akure (FUTA) in 2022 [4]. The primary barrier to biomechanics research and clinical implementation is the lack of research settings that support biomechanics studies. Academic institutions have no access to motion analysis tools, force plates, or wearable sensors, limiting real-world clinical application. Additionally, the absence of collaborations between regulatory organizations like the National Association of Physiotherapists and the leading international bodies further restricts research growth and advancements.

To bridge this gap, several solutions are recommended:

1. Establishment of biomechanics research laboratories in higher institutions and healthcare facilities. Most orthopedic clinics in developed countries do have motion labs that help in tracking patients' progression.
2. Strengthening partnerships: Institutions and regulatory bodies should collaborate with international biomechanics organizations, such as the Black Biomechanics Association and International Women in Biomechanics, which offer opportunities for research and career development.
3. Nationwide observance of National Biomechanics Day: Hosting NBD annually will raise awareness for the field of biomechanics.

Finally, a list of essential biomechanics lab equipment was outlined, along with clinical scenarios where these tools can enhance rehabilitation.

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References

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