Applicant Information

Applicant Name	Applicant Email	Affiliation	Country
Ms Deborah Adiki Aniteye	deborahaniteye@gmail.com	University of Health and Allied Sciences	Ghana

Abstract Details

Title:

Exploring the use of bamboo as a lightweight and durable material for reinforcing a transtibial laminated prosthetic socket

Category:

New technologies in health and digitalisation of the health system

Authors:

Deborah Adiki Aniteye1, Agbenyegah Samuel Delasi1 Michael Kuaku Bansah1, Felix Kofi Glago1, Joseph Thompson1, Akouetevi Aduayom-Ahego1, Napoleon Abiwu1

Objectives:

To investigate the feasibility of using bamboo as a lightweight, durable material to reinforce transtibial laminated prosthetic sockets. By analyzing its mechanical properties. This study aims to provide insights into the benefits and challenges of integrating bamboo into prosthetics, ultimately contributing to more functional, affordable, and sustainable solutions for lower limb amputees.

Method:

This study was conducted at the Regional Prosthetics and Orthotics Center in Ho, Ghana, explored using bamboo fiber to reinforce transtibial laminated prosthetic sockets. Two lamination processes were tested: one using bamboo fiber and another with fiberglass. The ESM301L Mechanical Testing Machine was used to assess the properties and suitability of bamboo-reinforced sockets for prosthetic use.

Results:

Mechanical testing revealed that bamboo offers strength comparable to conventional materials like fiberglass. In addition, the force displacement curves described a very similar behaviour. These findings indicate that bamboo could facilitate the creation of stronger, lighter, and more durable prosthetic sockets while being environmentally sustainable. The widespread availability and cost-effectiveness of bamboo in the country also make it a suitable alternative to fiberglass.

Conclusion:

This research shows that bamboo fiber is a viable alternative to fiberglass for reinforcing transtibial laminated prosthetic sockets. Bamboo-reinforced sockets demonstrated superior load-bearing capacity and elasticity, while being cost-effective. This advancement has the potential to significantly improve the quality of life for amputees and contribute positively to the field of prosthetics. Future studies should optimize bamboo's mechanical properties and explore its applications beyond prosthetics, where fiberglass is currently used.

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