"Med1cast"- Oil Palm Empty Fruit Bunch (OPEFB) and Plaster of Paris as a Novel Composite to Produce an Eco-Friendly and Cost Effective Orthopedic Cast

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In United States, six million people suffer from bone fractures every year and require an orthopedic cast during their recovery. The demand for orthopedic casts is expected to surge due to the high incidence of osteoporotic fractures and road accidents. Additionally, complications such as itchiness, plaster sores, and compartment syndrome are also troubling patients. The main objective of this study is to produce an affordable orthopedic cast while enhancing its functionality. This paper presents a preliminary study on the novel, eco-friendly orthopedic cast composite (Med1cast) prepared from calcined gypsum (matrix) and Oil Palm Empty Fruit Bunch (OPEFB), as Malaysia's oil palm industry generates 20 million tons of OPEFB as a byproduct annually. In this study, OPEFB was ground and particle size of 100-270 mesh number was mixed with calcined gypsum at different percentages, ranged from 0-25 % (w/w) with an interval of 5%. The samples were subjected to flexural test and impact test. In addition, morphology study was done using Scanning Electron Microscopy and porosity test was conducted to determine its air permeability. The results significantly showed composite with 15% OPEFB loading was much stronger, lightweight, air permeable and flexible-another novelty. This study had proved the composite with 15% OPEFB is best used to produce an eco-friendly and cost effective orthopedic cast, the Med1cast. Hence, our research concluded that the new orthopedic cast composite, Med1cast is able to reduce environmental and economic challenges associated with the disposal of organic byproduct from oil palm industry both regionally and globally.

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