A review on the orthotics and prosthetics and the potential of kenaf composites as alternative materials for ankle-foot orthosis

ABSTRACT

Since ancient Egypt, orthosis was generally made from wood and then later replaced with metal and leather which are either heavy, bulky, or thick decreasing comfort among the wearers. After the age of revolution, the manufacturing of products using plastics and carbon composites started to spread due to its low cost and form-fitting feature whereas carbon composite were due to its high strength/stiffness to weight ratio. Both plastic and carbon composite has been widely applied into medical devices such as the orthosis and prosthesis. However, carbon composite is also quite expensive, making it the less likely material to be used as an Ankle-Foot Orthosis (AFO) material whereas plastics has low strength. Kenaf composite has a high potential in replacing all the current materials due to its flexibility in controlling the strength to weight ratio properties, cost-effectiveness, abundance of raw materials, and biocompatibility. The aim of this review paper is to discuss on the possibility of using kenaf composite as an alternative material to fabricate orthotics and prosthetics. The discussion will be on the development of orthosis since ancient Egypt until current era, the existing AFO materials, the problems caused by these materials, and the possibility of using a Kenaf fiber composite as a replacement of the current materials. The results show that Kenaf composite has the potential to be used for fabricating an AFO due to its tensile strength which is almost similar to polypropylene's (PP) tensile strength, and the cheap raw material compared to other type of materials.

Keyword: Ankle-foot orthosis; Kenaf composite; Orthosis history