

Design of Ankle foot orthosis for patients with Diabetic foot ulcer

The accepted etiology of diabetic plantar wounds is excessive pressure on the insensitive foot that leads to callus formation, skin breakdown and infection. Thus off-loading of Peak Plantar Pressures (PPPs) reduces the risk for skin breakdown and allows healing of open wounds. One of the effective offloading devices is Ankle Foot Orthosis (AFO). Among the pressure offloading techniques, AFO offers lot of advantages for physicians and patients. But the current design and materials used for fabrication of AFO make the treatment expensive which is not affordable by the patients in India. Therefore a new design of AFO for patients with diabetes having diabetic foot ulcer was developed by CSIR-CLRI.

AFO was designed in such a way that:

- It can be worn either on left or right foot.
- The foot part and the ankle part are moulded as a single piece so that the excess of plantar flexion movement can be arrested.
- The Velcro fastener from the foot part wraps over the dorsal part of the foot so that slipping of foot can be controlled.
- The insole plays the major role in offloading the pressure at the ulcer site. The insole was designed exclusively with three layers of foam in which the middle layer is formed with many holes and the upper layer has projections in its inner side which lock the holes in middle layer. The upper layer is segmented so that each hole of the middle layer is locked by each segment of the upper layer.
- The foot care specialist can remove the segments at the ulcer site so that offloading will take place effectively.



New Design of AFO

The currently available AFOs are customized and costly. Customization may cause delay in treatment. Therefore, standardization of foot dimensions of patients with diabetes was made and statistically we arrived at 3 sizes for which AFO can be fabricated so that maximum

number of patients can use it. A simple and cost effective design was developed to benefit both patients and physicians. Further research is going on in material selection using FEM and then fabrication of off the shelf AFO for patients with diabetic foot ulcer will be done in future work.