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Development of Adjustable Foot Corrective Device for Clubfoot Treatment

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ABSTRACT

Congenital talipes equinovarus (CTEV) or clubfoot is a complex deformity of the foot that is characterised by four main deformities; forefoot cavus and adductus, hindfoot varus and ankle equinus. Currently, the Ponseti method is the most general and recognized treatment with a high success rate of over 90%. The treatment involves gentle manipulation and serial casting. However, the casting method could create complications for the patients such as soft-tissue damage and inconvenience in following the treatment schedule especially for those living far away from hospital. The aim of this research is to develop an adjustable corrective device for clubfoot treatment based on the techniques in the Ponseti method and at the same time attempt to eliminate the side-effects. The prototype consists of six adjustable movements from six different mechanisms to correct the four deformities. The prototype was developed using 3D printing method and the main material used is polylactic acid (PLA), rubber, aluminium and cotton fabric with sponge. The total weight of the prototype is around 300 g.

Keywords: 3D printing, clubfoot, CTEV, design and fabrication, Ponseti method

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INTRODUCTION

Congenital talipes equinovarus (CTEV), commonly known as clubfoot, is one of the most common deformities involving the musculoskeletal system of the lower limb (Zeno & Sorin, 2014). It is estimated that one or two in a thousand of newborns are affected with this deformity (Bass, 2011). The congenital deformity has four main