Design and Evaluation of Corrective Orthosis Knee for Hyperextension

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Abstract : Corrective orthosis has great importance in orthopedic treatments providing assistance in improving mobility and stability in order to improve the quality of life for a different patient. The corrective orthosis studied in this article can correct deformities, reduce pain, and improve the ability to perform daily activities. This work describes the design and evaluation of a corrective orthosis for knee hyperextension. This orthosis is capable of generating a progressive and variable alignment of the joint, limiting the range of motion according to medical criteria. The main objective was to design a corrective knee orthosis capable of correcting knee hyperextension progressively to return to its natural angle with greater economic affordability and adjustable size. The limiting mechanism is based on a goniometer to determine the desired angles. The orthosis was made of acrylic to reduce costs and maintenance; neoprene is also used to make comfortable contact; additionally, Velcro was used in order to adjust the orthosis for various sizes. Simulations of static and fatigue analysis of the mechanism were performed to verify its resistance and durability under normal conditions. A biomechanical gait study of gait was carried out on 10 healthy subjects without the orthosis and limiting their knee extension capacity in a normal gait cycle with the orthosis to observe the efficiency of the proposed system. In the results obtained, the knee angle curves show that the maximum extension angle was the established angle by the orthosis. Showing the efficiency of the proposed design for different leg sizes.

Keywords : biomechanical study, corrective orthosis, efficiency, goniometer, knee hyperextension.

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