

ABSTRAK

Stroke merupakan penyakit yang sering menyebabkan gangguan gerak, khususnya pada kaki, sehingga penyintas stroke mengalami kesulitan berjalan akibat lemahnya otot pergelangan kaki (*drop foot*). Untuk membantu mengatasi masalah tersebut, digunakan alat bantu berjalan berupa *Ankle-Foot Orthosis* (AFO). Penelitian ini bertujuan untuk menganalisis biomekanika kaki penyintas stroke saat menggunakan AFO, yang meliputi sudut pergerakan sendi lutut, betis, dan pergelangan kaki, serta distribusi beban tubuh selama berjalan. Metode penelitian yang digunakan adalah deskriptif kuantitatif dengan pendekatan biomekanika, di mana data diperoleh melalui observasi, wawancara, dan pengukuran antropometri subjek. Analisis dilakukan dengan membandingkan pola berjalan tanpa AFO dan dengan AFO, termasuk perubahan sudut gerak sendi dan pembagian beban tubuh. Selain itu, dilakukan evaluasi teknis AFO yang meliputi berat alat, gaya dan momen yang bekerja, tegangan, perpindahan (*displacement*), serta faktor keamanan (*safety factor*). Hasil penelitian menunjukkan bahwa penggunaan AFO dapat membantu menjaga posisi pergelangan kaki mendekati sudut netral 90° , sehingga kaki tidak mudah jatuh ke bawah dan risiko terseret saat berjalan dapat berkurang. Meskipun pergerakan lutut dan betis masih terbatas akibat kondisi pasca stroke, penggunaan AFO membuat langkah menjadi lebih stabil dan distribusi beban tubuh lebih seimbang dibandingkan berjalan tanpa AFO. Evaluasi teknis juga menunjukkan bahwa AFO yang digunakan masih aman untuk menopang beban biomekanika penyintas stroke. Penelitian ini diharapkan dapat memberikan gambaran yang jelas mengenai manfaat AFO dari sisi biomekanika serta menjadi bahan pertimbangan dalam evaluasi dan pengembangan alat bantu berjalan yang lebih aman dan sesuai bagi penyintas stroke.

Kata kunci: Biomekanika, Stroke, *Ankle-Foot Orthosis* (AFO), Pola Berjalan, Distribusi Beban.

ABSTRACT

Stroke is a disease that often causes movement disorders, especially in the lower limbs, so stroke survivors experience difficulty walking due to weakness of the ankle muscles (drop foot). To help overcome this problem, a walking aid in the form of an Ankle-Foot Orthosis (AFO) is used. This study aims to analyze the foot biomechanics of stroke survivors when using an AFO, including the movement angles of the knee, lower leg, and ankle joints, as well as the distribution of body load during walking. This study uses a descriptive quantitative method with a biomechanical approach, where data were obtained through observation, interviews, and anthropometric measurements of the subject. The analysis was carried out by comparing walking patterns without an AFO and with an AFO, including changes in joint movement angles and body load distribution. In addition, a technical evaluation of the AFO was conducted, covering the weight of the device, the forces and moments acting on it, stress, displacement, and safety factor. The results show that the use of an AFO helps maintain the ankle position close to the neutral angle of 90°, thereby reducing the risk of the foot dropping downward and dragging during walking. Although knee and lower leg movements remain limited due to post-stroke conditions, the use of an AFO makes walking more stable and body load distribution more balanced compared to walking without an AFO. The technical evaluation also indicates that the AFO used is safe to support the biomechanical load of stroke survivors. This study is expected to provide a clear understanding of the benefits of AFOs from a biomechanical perspective and to serve as a reference for the evaluation and development of safer and more suitable walking aids for stroke survivors.

Keywords: Biomechanics, Stroke, Ankle-Foot Orthosis (AFO), Gait Pattern, Load Distribution.