ABSTRACT

Stroke is a medical condition that often leads to muscle weakness and motor function impairment, necessitating rehabilitation to restore these functions. One crucial step in post-stroke rehabilitation is muscle strength evaluation. Typically, the Manual Muscle Testing (MMT) method is employed, but it tends to be subjective and less accurate. This study aims to develop an ankle joint muscle strength testing device based on a Brushless DC (BLDC) motor as an objective and consistent evaluation tool for post-stroke patients. The BLDC motor is equipped with an RPM sensor and a current sensor, enabling torque calculations based on the motor's power output during operation. The motor's calculated torque values were compared and aligned with torque readings from a dynamometer using linear regression with the equation y = 0.0965x + 0.4904. The results show that this mapping yielded an error of 0.07. Subsequently, MMT values were classified based on the literature, with a minimum torque of 0.72 Nm (MMT 3) required to move the foot without external resistance. This torque value served as a benchmark to classify muscle strength on the MMT scale, where higher torque indicates greater muscle strength. Other classifications include MMT 0 (0 Nm), MMT 1 (0-0.5 Nm), MMT 2 (0.5-0.72 Nm), MMT 4 (0.85-1.0 Nm), and MMT 5 (≥1.0 Nm).

Keywords: BLDC Motor, Muscle Strength, Stroke.