ABSTRACT

Carpal Tunnel Syndrome (CTS) is a common health issue affecting the median nerve in the wrist. With limited information about CTS in Indonesia, non-surgical treatments often fail to provide permanent solutions, necessitating surgical procedures such as Transversal Carpal Ligament (TCL) release or nerve conduit placement. The lack of material options for nerve conduits and the need for CTS hand phantoms in surgical procedures prompted this research, employing 3D printing methods like FDM, SLA, and molding with materials such as PLA, resin, and silicone. Research findings indicate that varying concentrations of silicone material yield optimal mechanical properties, including tensile strength and elasticity. The best formula involves Silicone concrete 1:1 (3% catalyst) with an elastic modulus of 0.250 MPa, Silicone concrete 1:2 (2.5% catalyst) with a tensile strength of 0.447 MPa, and Silicone RTV H-00 (2.5% latex, 2.5% catalyst) with a tensile strength of 4.76 MPa. A nerve phantom using silicone RTV H-00 + latex (2.5%) + catalyst (2.5%) offers a balanced combination of tensile strength and elasticity. The formula silicone RTV + 6.5% catalyst is suitable for simulating surgeries on a TCL phantom with higher firmness. The hand phantom with the formula silicone RTV H-00 + thinner (10%) + catalyst (2.5%) demonstrates a significant improvement in tensile strength and elasticity, accompanied by visually ideal molding results to simulate the elastic and transparent anatomy of the hand, supporting the success of CTS hand surgical phantoms. This research provides recommendations for accessible materials and effective fabrication methods for the development of CTS hand simulation tools.

*Keywords: Carpal Tunnel Syndrome (*CTS*), 3D Printing, saraf conduit, molding,phantom.*