A Case Report: The Role of Acupuncture in Systemic Lupus Erythematosus Induced Peripheral Neuropathy

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Abstract: Systemic lupus erythematosus (SLE) can cause peripheral neuropathy via immunopathogenic mechanisms, producing polyneuropathy, mononeuritis multiplex, axonal injury, or demyelination, with pain, weakness, sensory loss, and brain fog. In neuropsychiatric SLE, peripheral involvement affects 4.9–7.6% of patients. Clinical patterns may resemble acute inflammatory neuropathies or neuromuscular junction disorders and include autonomic dysfunction. Acupuncture is an effective therapy for peripheral neuropathy with minimal side effects. A 30-year-old woman with SLE presented with complaints of weakness in both her legs and hands for the past week, accompanied by numbness that had been present for one month and was spreading upwards. The weakness in her legs and hands was reported to be persistent and increasing day by day. Physical examination revealed weakness in both hands and feet, with motor strength measured as 3332/2333/3333/3333, along with a negative Hoover sign. The NCS examination indicated small fiber neuropathy (2022). After 12 sessions of therapy, there was significant improvement, particularly after the 6th session when the patient began to notice an increase in motor strength. This outcome was also supported by positive changes in the NSS, EQ-5D, and HAM-A scores. Manual acupuncture therapy combined with electroacupuncture and scalp acupuncture showed satisfactory results with minimal side effects.

1 INTRODUCTION

Systemic lupus erythematosus (SLE) is a chronic and complicated autoimmune disease which attacks multiple organ systems. Multiple phenotypes are presented by the disease from mild mucocutaneous symptoms to severe multiple organs and the central nervous system. Several immunopathogenic pathways play a role in pathogenesis of this disease. (Molina et al., 2023) Central and peripheral nervous system can be influenced by SLE and cause a broad spectrum of neuropsychiatric manifestations. These consist of mood and behavioral disturbances (depression, anxiety, and frank psychosis), as well as neurological manifestations including persistent headaches which occur in more than half of patients, focal or generalized seizures, aseptic meningitis, demyelinating syndromes (optic neuritis and myelitis), and movement disorders. Ischemic stroke, central and peripheral neuropathies, mononeuritis multiplex, and autonomic dysfunction are the complication of SLE. Peripheral nervous system involvement may happen with clinical manifestations like Guillain–Barré syndrome and myasthenia gravis. In addition, patients frequently report severe fatigue and cognitive difficulties which manifested as problems with concentration and memory and commonly described as “brain fog.”(Rayes et al., 2018; Vaillant et al., 2022).

Neuropsychiatric involvement in SLE impacts as many as 5% of patients exhibiting additional systemic manifestations. The incidence of peripheral nervous system (PNS) involvement in patients exhibiting neuropsychiatric (NP) manifestations varies between 4.9% and 7.6%. A 2019 cohort study involving 1,827 patients with NPSLE revealed a prevalence of PNS manifestations at 7.6%. The most frequent types were polyneuropathies (PNP) at 41% and single and multiplex mononeuropathies (MNP) at 27.3%. Electrophysiological studies indicated axonal injury in 41.7% and demyelination in 21.7% of patients with PNP and MNP. (Bertsias et al., 2010; Hanly et al., 2020; Bortoluzzi et al., 2019).

The effects of acupuncture and its safety in managing peripheral neuropathy caused by systemic lupus erythematosus (SLE) were evaluated in this case report. In addition, the possibility of any adverse effects experienced by the patient was also assessed. Acupuncture can reduce symptoms, improve motor and sensory function that enhance quality of life in patients with peripheral neuropathy. Accordingly, acupuncture is an effective and safe therapeutic option for peripheral

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neuropathy. (Li et al., 2016; Rong et al., 2009; Xiong et al., 2011; Liang et al., 2009).

2 CASE PRESENTATION

A 30-year-old woman experienced bilateral weakness in the arms and legs as the main symptoms for the past week. The numbness/tingling (paresthesia) felt for a month is the beginning of the symptoms, initially involving the lower extremities and then spreading to the upper extremities. The weakness was progressively worsening day by day.

The patient has a history of systemic lupus erythematosus (SLE) accompanied by antiphospholipid syndrome (APS) without any history of diabetes mellitus, hypertension, arrhythmia, bleeding disorders, or malignancy. Family history is notable for SLE and rheumatoid arthritis (RA) in an uncle and a cousin.

At the time of the visit, the patient had been taking vitamin B6 and B12 twice daily for six weeks. Physical examination revealed motor weakness in all four extremities, graded using the Medical Research Council (MRC) scale as follows: right upper extremity (RUE) 3/3/3/2, left upper extremity (LUE) 2/3/3/3, right lower extremity (RLE) 3/3/3/3, and left lower extremity (LLE) 3/3/3/3 (proximal–distal sequence). Hoover's sign was negative. Physiologic reflexes were 2/2/2/2 and symmetric; pathologic reflexes Hoffmann, Tromner, and Babinski were negative. Sensory examination was within normal limits. On ancillary examination, the nerve conduction study (NCS) showed findings consistent with small fiber neuropathy (SFN), and laboratory tests revealed microcytic hypochromic anemia.

Based on the history, neurologic examination, and supporting investigations, the patient was considered to have peripheral neuropathy, with findings suggestive of small fiber neuropathy (SFN), in the setting of underlying systemic lupus erythematosus (SLE).

The patient then received manual acupuncture at body acupoint EX-HN3; intermittent 5 Hz electroacupuncture at body acupoints LI4–LI11 and ST36–SP6 bilaterally; and ISNSA scalp acupuncture at MS6 and MS7 bilaterally. Sterile disposable Huanqiu acupuncture needles (0.25 × 25 mm) were used at all acupuncture points. All needles were retained for 30 minutes per session without additional manipulation. Treatment was administered for up to 12 sessions.

Medical Research Council (MRC) scale was used to evaluate muscle strength in extremities (deltoid, biceps, wrist extensors, and interosseous for the upper limbs; and the iliopsoas, quadriceps, tibialis anterior, and extensor hallucis longus for the lower limbs) and examined bilaterally. Neuropathy Symptom Score (NSS) was used to assess the degree of neuropathy, if the score result is 7 indicating severe neuropathy. Hamilton Anxiety Rating Scale (HAM-A) was used to evaluate possible psychosocial stressors, anxiety levels, considering the chronicity of symptoms, which produced score of 30 indicating moderate–severe anxiety. The functional impact on quality of life was measured using the European Quality of Life–5 Dimensions (EQ-5D), with a utility index of 0.483, lower than the reference value (0.933), indicating a reduction in quality of life related to the symptoms experienced.

After receiving 12 acupuncture sessions, there was an improvement of motor strength in all four extremities reached MRC 5/5 across all muscle groups assessed. The improvement occurred steadily starting from session 6, with details: RUE 5/5/5/5, LUE 5/5/5/5, RLE 5/5/5/5, and LLE 5/5/5/5 (proximal–distal sequence). This also happened to NSS, HAM-A and EQ-5D, producing following result; The NSS decreased to 1 (normal category), the HAM-A score decreased to 14 (mild anxiety category), and the EQ-5D index increased to 1.000. These findings indicate clinical improvement and an enhanced quality of life compared to before therapy.

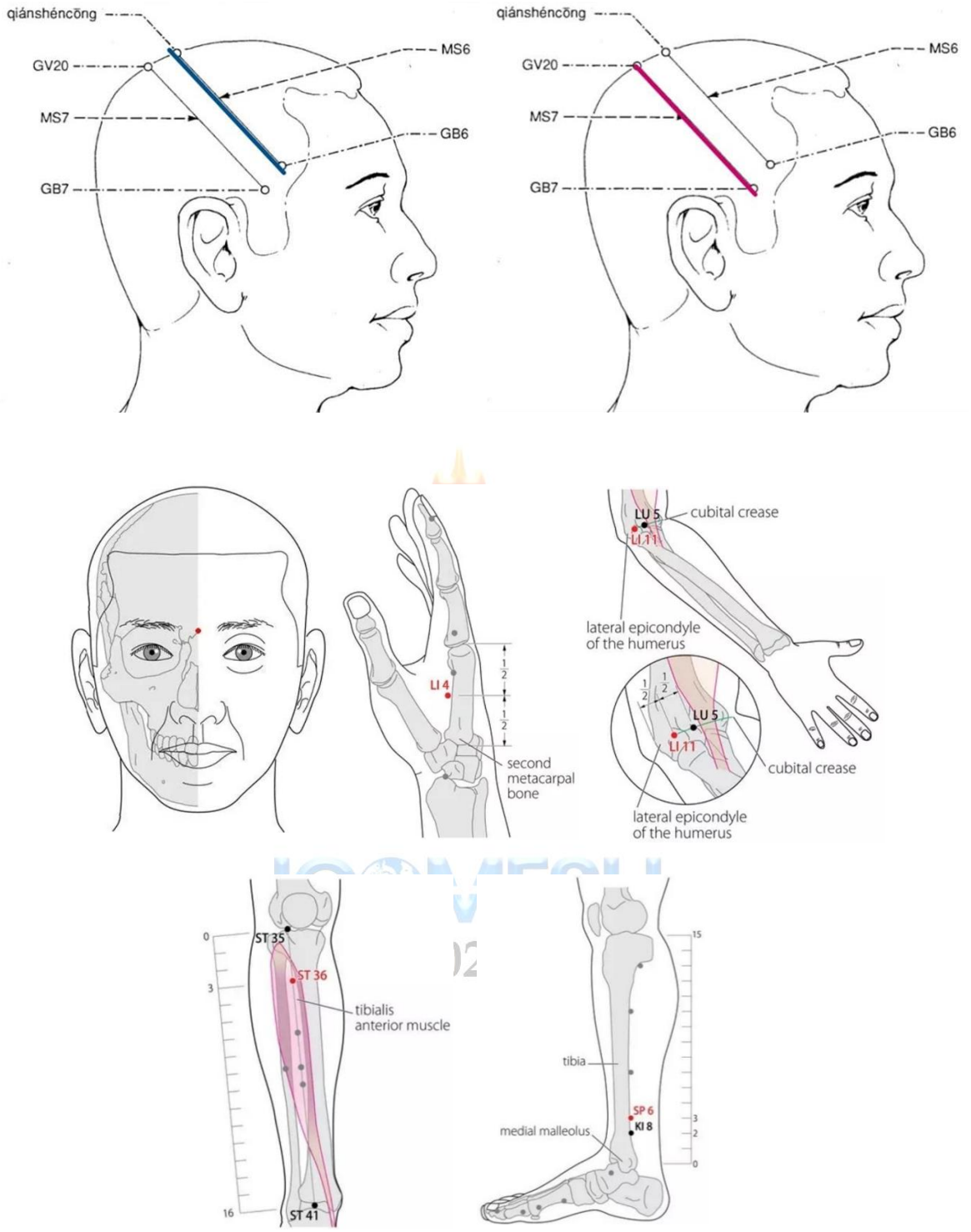

Figure 1: Acupuncture points

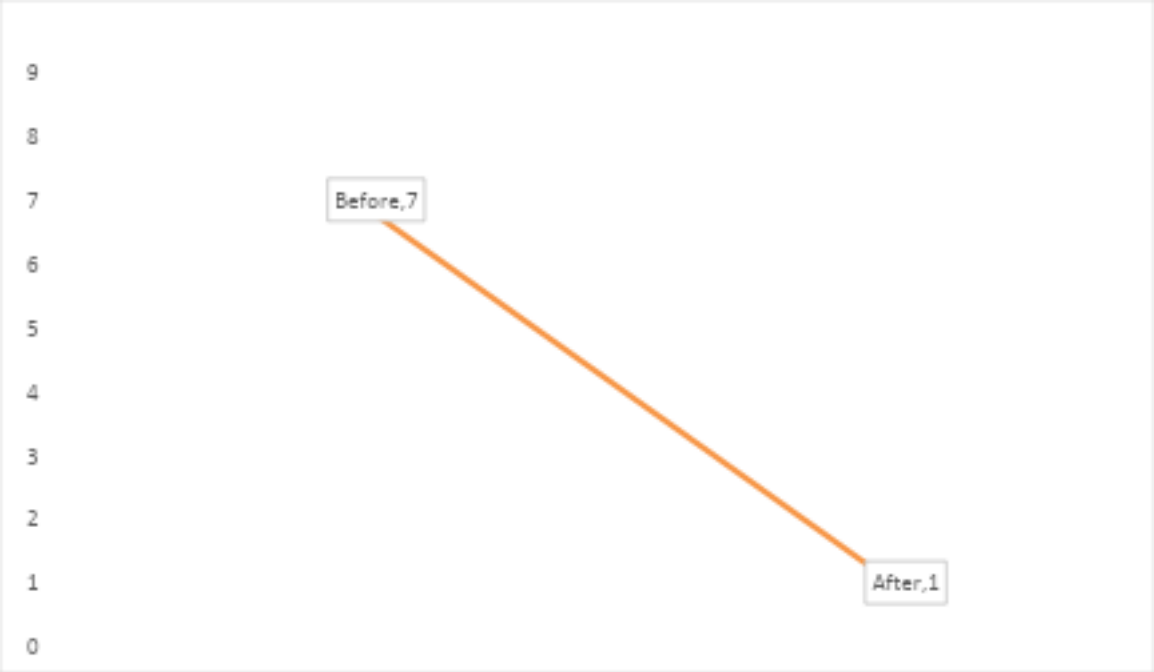

Figure 2: Neuropathy symptom score before and after acupuncture

Figure 3: Hamilton Anxiety Rating Scale before and after acupuncture

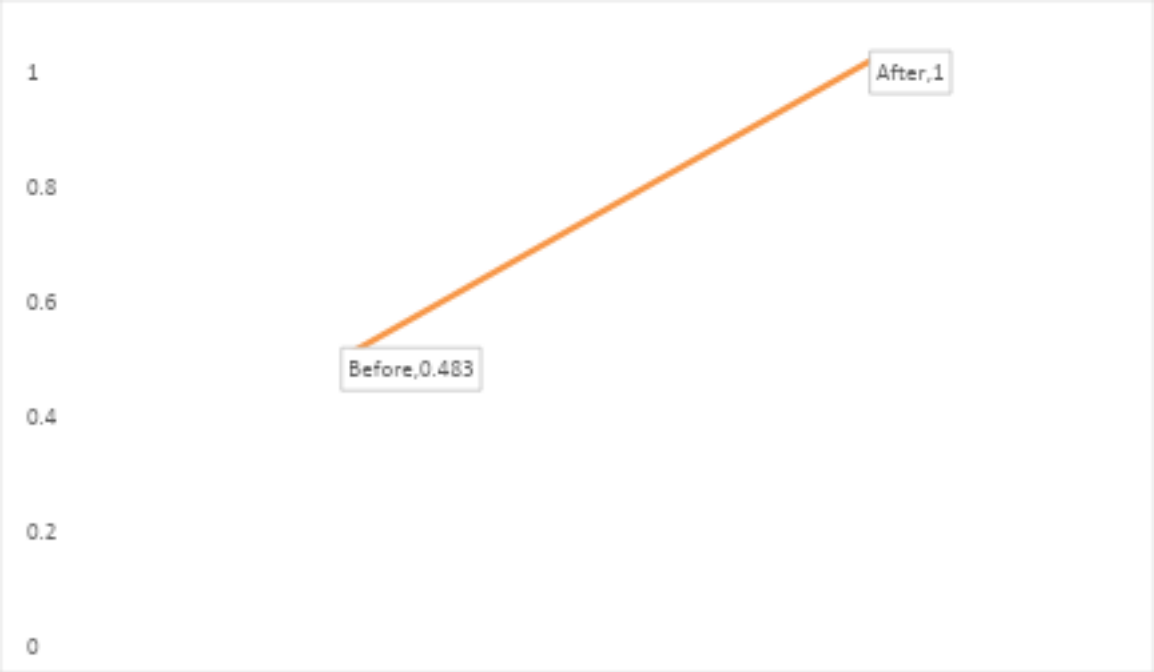

Figure 4: European Quality of Life 5 Dimensions before and after acupuncture

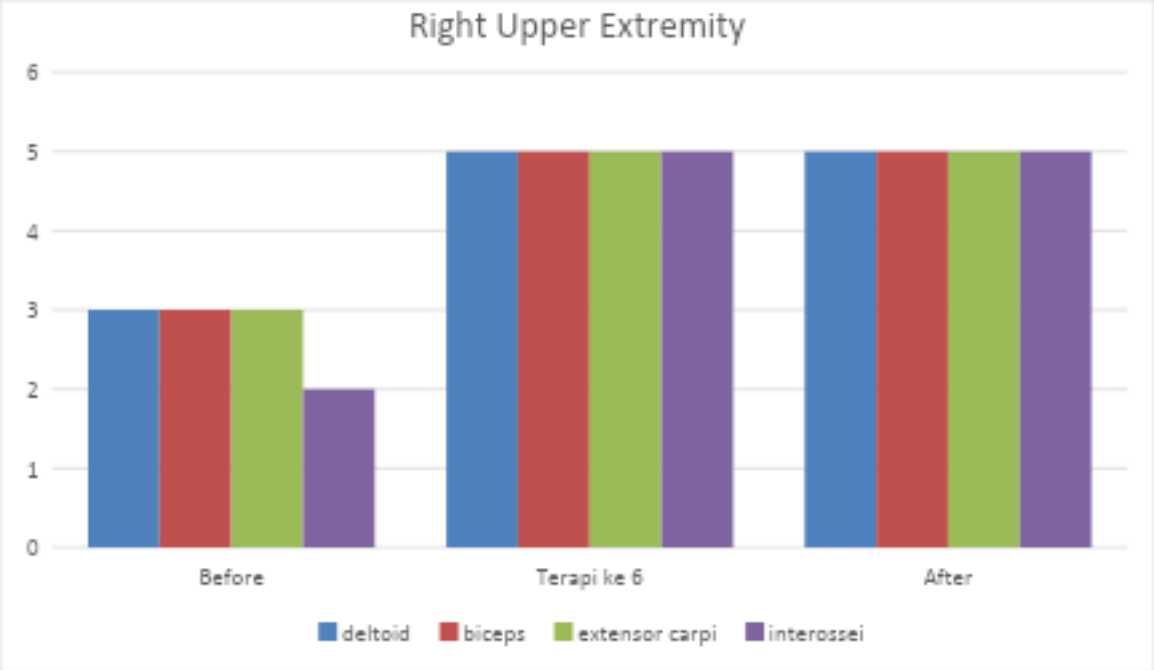

Figure 5: Muscle Strength of right deltoid, biceps, extensor carpi, interossei before and after acupuncture

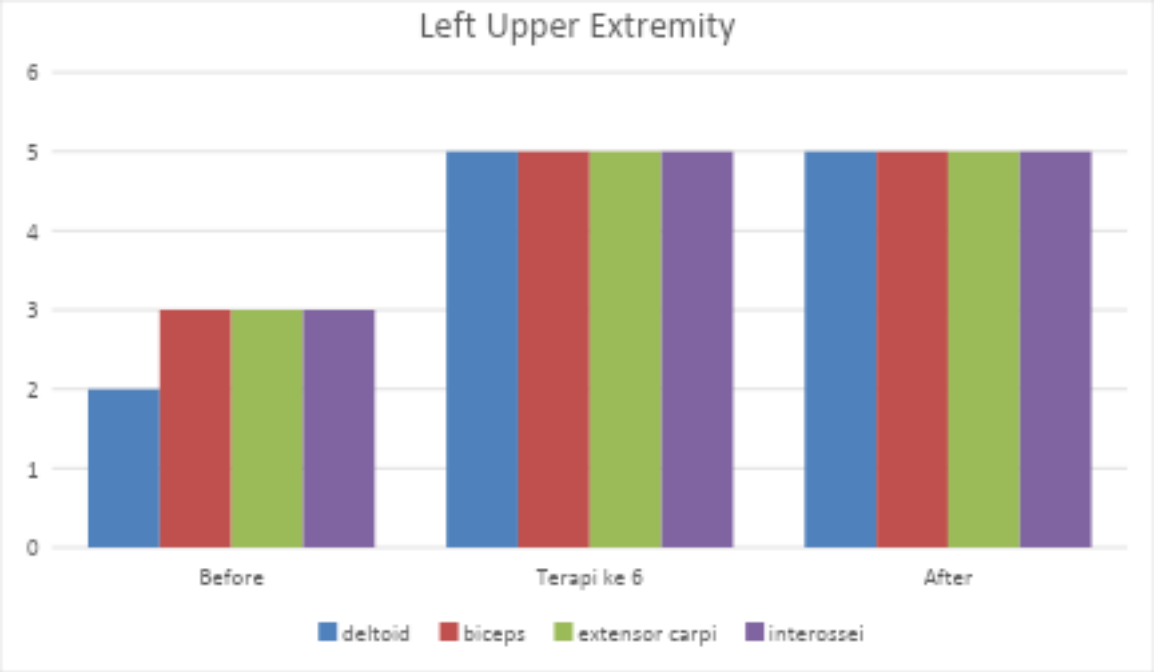

Figure 6: Muscle Strength of left deltoid, biceps, extensor carpi, interossei before and after acupuncture

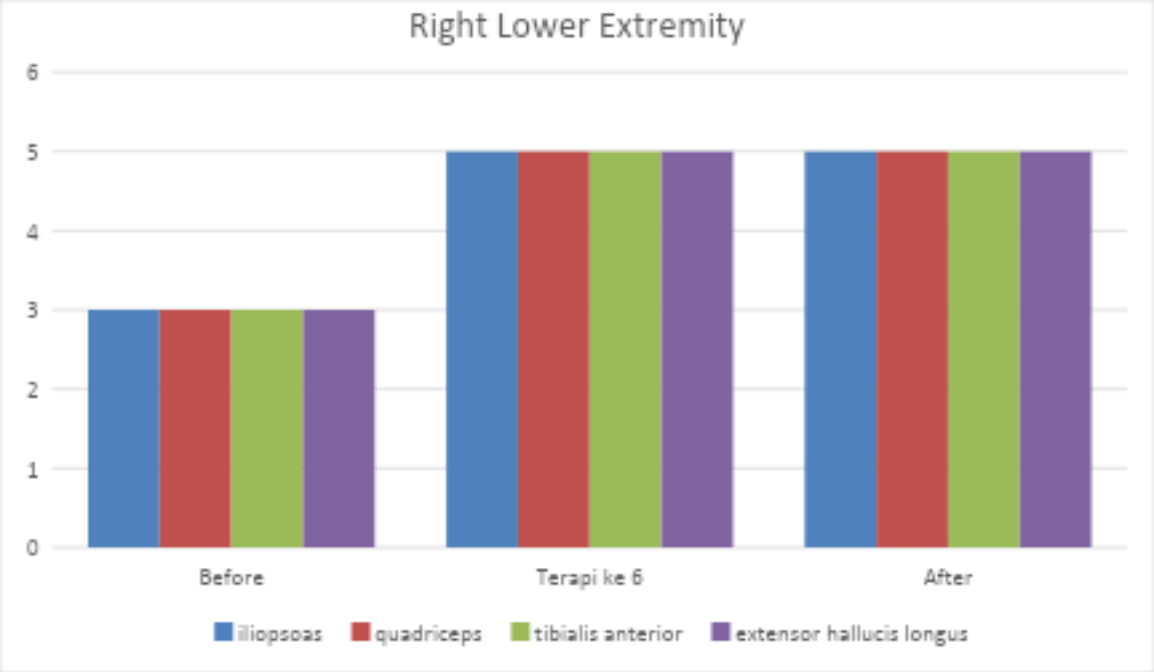

Figure 7: Muscle strength of right iliopsoas, quadriceps, tibialis anterior, extensor hallucis longus before and after acupuncture

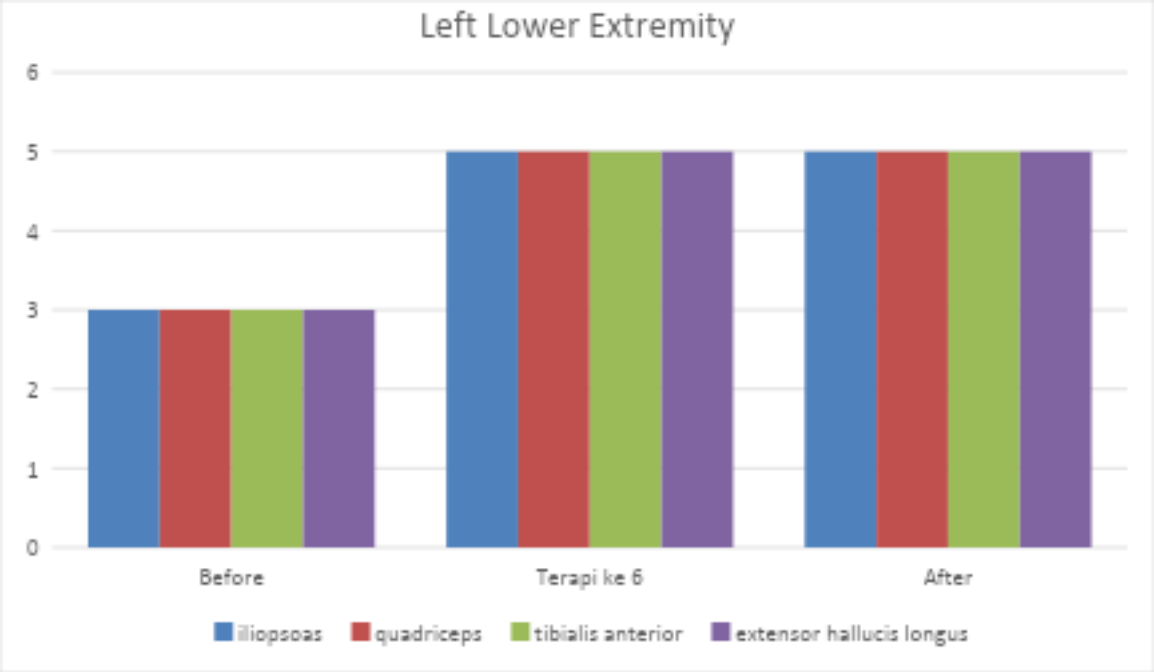

Figure 8: Muscle strength of left iliopsoas, quadriceps, tibialis anterior, extensor hallucis longus kiri before and after acupuncture

3 DISCUSSION

Peripheral neuropathy is a condition characterized by damage to peripheral nerve cells and fibers which can result from various pathologies. The damage affect the nerves, such as in patients with SLE. Numbness and tingling sensation are common manifestations of peripheral neuropathy. Patients may also experience pain, muscle weakness, and loss of deep tendon reflexes, which are frequently observe in this condition. (Remiche et al., 2013; Hanewinckel et al., 2016).

In patients with systemic lupus erythematosus (SLE), the scarce histopathologic data report chronic axonal degeneration with reduced density of myelinated fibers and demyelination; inflammatory changes with mononuclear cell infiltration among nerve fibers; immune complex deposition; and vasculitis characterized by vascular wall thickening, cellular infiltration, and intimal changes (Collins et al., 2013; Martinez et al., 2017).

Acupuncture is a treatment involving the insertion of fine needles which are adapted from Chinese acupuncture. This therapy proven effective and has minimal side effect. It works through complex, multilevel mechanisms, involving interactions with the central and peripheral nervous systems. (Yang, Wang, et al., 2023; Wang et al., 2023; Lin et al., 2022).

Acupuncture therapy administered to this patient proved effective and safe, as by the 6th session her motor strength had returned to normal. Although she still perceived a slight heaviness, on physical examination she was able to move against resistance and gravity.

Manual acupuncture was used at EX-HN3 and electroacupuncture at LI4, LI11, ST36, and SP6, combined with ISNSA scalp acupuncture at MS6–MS7. Manual acupuncture in EX-HN3 role in anxiolytic associated with MAPK/ERK activation and increased BDNF. (Kwon et al., 2018; Yu et al., 2020; Lai et al., 2019). Acupuncture at LI4 and LI11 were intended to enhance NGF/BDNF and reduce inflammation by glial cell modulation and suppressing the NF-κB pathway and proinflammatory cytokines (e.g., TNF-α, IL-1β, IL-6). (Yang, Rao, et al., 2023; Ma et al., 2022; Zhang et al., 2023). Anti-inflammatory effect of acupuncture in ST36 and SP 6 associated with inhibition of TLR4/NF-κB, activation of the vagal cholinergic anti-inflammatory pathway, and a shift in macrophage polarization from M1 to M2; both are also associated with increased neurotrophins. (Oh et al., 2023; Li et al., 2021; Wang et al., 2018; Ma et al., 2022; Zhang et al., 2023). MS6 (motor area) and MS7 (sensory area) were intended to

facilitate motor control and sensory integration. These protocol targets neurotrophic and anti-inflammatory mechanisms which is relevant to neuropathy (Chung et al., 2019; Liu et al., 2021).

These results are supported by the literature included in this case report. Wang et al. (2022) reported that electroacupuncture combined with beraprost sodium and α-lipoic acid (alpha-lipoic acid) is effective in treating diabetic peripheral neuropathy, reduces serum inflammatory factor levels, and is associated with a lower complication rate and a better safety profile. Ben-Arye et al. (2022) also showed that acupuncture, with or without integrative therapy, may be beneficial to symptoms of chemotherapy-induced peripheral neuropathy (CIPN) during cancer treatment, like numbness, tingling, and pain/discomfort in the hands, while also improving physical function. (Wang et al., 2022; Ben-Arye et al., 2022).

In 2023, Dietzel et al. investigated the role of acupuncture in diabetic peripheral neuropathy (DPN) with 62 participants. This study shows acupuncture significantly and sustainably reduced DPN symptoms, compared to standard care with mild adverse effects. In the same year, a systematic review and meta-analysis by Zhou et al. carried out of 25 randomized controlled trials (RCTs) including 1,561 participants. Based on the study, various acupuncture methods combined with conventional therapy were more effective in reducing pain and alleviating neurosensory symptoms than only conventional therapy. Overall, this evidence supports acupuncture as a pain management strategy for DPN. (Dietzel et al., 2023; Zhou et al., 2023).

4 CONCLUSIONS

Acupuncture has potential in adjuvant therapeutic option for peripheral neuropathy in patients with systemic lupus erythematosus (SLE). In this case report, there are meaningful clinically improvements in a combination of manual acupuncture, electroacupuncture, and scalp acupuncture administered over 12 sessions. The most notable gains emerged after session 6, when the patient began to show increased motor strength. This is also consistently in line with reductions in NSS and HAM-A scores and increase in the EQ-5D score. The intervention was well tolerated without significant adverse effects. However, this case report results cannot yet be generalized, so controlled trials with larger samples are needed to confirm its effectiveness.

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