# THE IMPORTANCE OF PHYSICAL THERAPY AND KINESITHERAPY IN THE INJURED IN THE FIRE IN KOCANI – A CASE REPORT

Nikola Kostadinov, Lence Nikolovska

PhD student in Basic and Clinical Research in Medicine at the Faculty of Medical Sciences, Goce Delcev University, Stip, North Macedonia

PhD, Professor, Faculty of Medical Sciences, Goce Delcev University, Stip, North Macedonia

Medicus 2026, Vol. 31 (2): 224-228

## ABSTRACT

Objective: To present the effect of physical rehabilitation in a patient with burns of the upper limb.

Methods: Case report of a 30-year-old patient with surgically treated burns of IIA–IIB degree of the left hand and forearm, suffered in a fire in Kocani. Physical rehabilitation was carried out with kinesitherapy, manual massage, occupational therapy and ultrasound therapy. The assessment of the functional status was performed by measuring the mobility of the joints and the DASH index at several time intervals.

Results: A gradual improvement in the mobility of the wrist and fingers was noted. The DASH index decreased from 55 points two months after the injury to 5 points after 12 months, indicating significant functional recovery.

Conclusion: Early, continuous and individualized rehabilitation significantly contributes to better functional outcomes, prevention of contractures and improvement of quality of life in burn patients.

Keywords: burns, physical therapy, kinesitherapy

## INTRODUCTION

Burns are a type of injury to the skin or other organic tissues that is primarily caused by exposure to heat or other agents such as electricity, radiation, chemicals, etc., but most of them are the result of contact with hot liquids, solids, and flames. According to the World Health Organization (WHO, 2023), burns represent a global public health problem accounting for an estimated 180,000 deaths annually, with non-fatal burn injuries remaining a leading cause of long-term morbidity and functional impairment [10]

Burns are often underestimated as a type of trauma, which besides skin damage, cause complex disorders of other tissues, organs and organ systems. In the case of a burn injury, an assessment is performed with the most important goal of determining its severity, and the four-degree classification allows for a differentiated approach to treatment and interventions. Rehabilitation begins from the moment of injury and continues until the return to everyday activities and is necessary for all patients with superficial or deep burns. Failure to provide adequate rehabilitation results in functional deficits such as reduced mobility, difficulty or inability to perform activities of daily living and return to the work environment.

Rehabilitation procedures include edema reduction, breathing exercises, patient positioning, range-of-motion exercises, and muscle strengthening exercises, which require a multidisciplinary approach and collaboration between the patient, physiotherapist, physicians, nurses, occupational therapists, dietitians, psychologists, and

plastic surgeons.

Recently, the importance of physical rehabilitation is additionaly confirmed through the analysis of cases from the mass accident at the Pulse disco in Kocani, where people suffered burns of varying degrees.

Objective: to demonstrate the effect of physical rehabilitation, including kinesitherapy, manual massage and ultrasound therapy, on improving the mobility and functionality of the upper limb in a patient with surgically treated burns of IIA–IIB degree.

Case report: Patient A.M., aged 30, was admitted to the Department of Plastic and Reconstructive Surgery on 16.03.2025 after burns sustained in a fire in a disco in Kocani. Upon admission, a burn of the right upper arm, left hand and dorsum was diagnosed, with an extension of 15% TBSA and a depth of IIa/b degree. Surgical treatment with debridement and local wound treatment was performed, but due to the severity of the injuries she was referred to Zagreb. After completing hospital treatment in Zagreb, she was again registered at the Plastic Surgery Department with a diagnosis of post-combustio of the head, chest, right upper arm, left forearm and hand, with an assessment of the remaining surface area of approximately 10% TBSA, with IIA–IIB degree. The advanced phase of healing was recorded, with a granulating base and superficial epithelialization.





Figure 1. Thermal burns on the left hand on admission

With a stabilized local and general status and without active complications, the patient was discharged from Plastic Surgery and began a rehabilitation process at the Department of Physical Medicine in the PHI OB with extended activity - Kocani, where she was treated several times for 21 days. Measurements of the mobility of the injured left arm were made (Table 1, Table 2 and Table 3) and a DASH index was performed, at the first examination (2 months after the injury), at 4 months after the injury, and 11 months after the injury (Table 4). At the first examination, the local finding showed the presence of scars in the neck area, both shoulders, right upper arm and left wrist and hand. Wrist movements were severely limited in palmar flexion, with slight limitation in dorsiflexion, and various limitations were registered in the fingers: in the base joint, impossible movements, PIP of the first finger with limited flexion, the second finger limited or impossible, and the remaining fingers moved within a normal range. Opposition of the thumb was possible to normal, while abduction was limited. Kinesitherapy was started, which includes active, corrective and actively assisted exercises, occupational therapy and manual massage.



Figure 2. Left hand 4 months after thermal injury

During follow-up examinations, the local finding gradually improved in terms of movements in the wrist and fingers, with extension from possible to normal, except in the PIP of the second finger, while the remaining fingers showed a gradual increase in flexibility, so that in the following period the movements in the wrist became almost normal, with additional progress in the flexibility of the fingers and thumb. With continued treatment 11 months after the injury, the patient showed almost normal movements in all joints



Figure 3. Left hand 11 months after injury

Table 1. Table 1. Mobility of the left hand wrist during physical treatment

| | Wrist | |
|---|---|---|
| | Flexion | Extension |
| First examination (2 months after injury) | 85 | 50 |
| 4 months after injury | N | 60 |
| 11 months after injury | N | N |

Table 2. Flexion of left gand fingers during physical treatment

| Left hand - FLEXION | Finger I | | Finger II | | | Finger III | | | Finger IV | | | Finger V | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MCF | DIP | MCF | DIP | PIP | MCF | DIP | PIP | MCF | DIP | PIP | MCF | DIP | PIP |
| 2m after injury | 30 | | 34 | 95 | 51 | 60 | 95 | 65 | 60 | 100 | 45 | 40 | 100 | 80 |
| 4m after injury | 35 | 50 | 60 | 70 | 20 | 60 | 65 | 40 | 60 | 65 | 40 | 55 | 45 | 50 |
| 11m after injury | 55 | 80 | 80 | 95 | 60 | 80 | 95 | 75 | 80 | 95 | 70 | 65 | 95 | 70 |

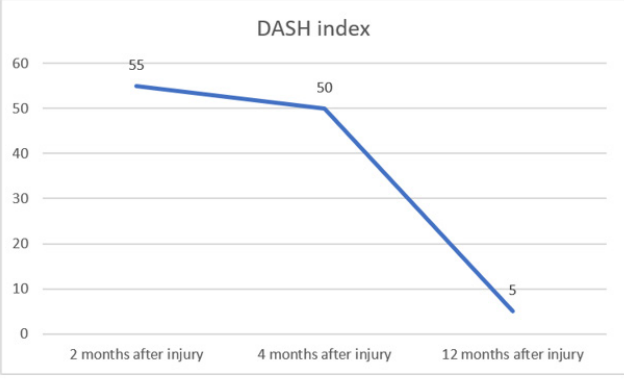
Table 3. Extension of left hand fingers during physical treatment

| Left hand - EXTENSION | Finger I | | Finger II | | | Finger III | | | Finger IV | | | Finger V | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MCF | DIP | MCF | DIP | PIP | MCF | DIP | PIP | MCF | DIP | PIP | MCF | DIP | PIP |
| 2m after injury | N | N | 30 | -45 | N | N | N | N | N | N | N | N | N | N |
| 4m after injury | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| 11m after injury | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

Table 4. DASH index during physical treatment

| Left hand | DASH index |
|---|---|
| 2 months after injury | 55 |
| 4 months after injury | 50 |
| 12 months after injury | 5 |

Chart 1. DASH index during physical treatment




Conclusion: Early, continuous and individually tailored physical rehabilitation is an important and necessary part of the treatment of burn patients, especially when the upper extremities are affected and there is a risk of developing contractures, limited mobility and functional deficit. The application of physical therapy contributes to improving the range of motion, reducing scarring and improving the functional ability and quality of life of patients.

The presented case confirms that a multidisciplinary approach and regular rehabilitation treatment enable significant functional recovery and an easier return to daily activities. The obtained results demonstrate the importance for clearly defined and clinically applicable rehabilitation protocols in burn patients, in order to achieve optimal functional outcomes and prevent long-term complications.

Discussion: The therapeutic protocol initiated at the PHI OB Kocani–comprising active-assisted and corrective exercises, manual scar massage, occupational therapy, and ultrasound therapy–directly contributed to reversing initial severe ROM restrictions. At the initial evaluation (2 months post-injury), the patient exhibited severe limitation in wrist palmar flexion (85°) and dorsiflexion (50°), alongside complete immobility in the metacarpophalangeal (MCP) joints of the second digit and constrained proximal interphalangeal (PIP) joint flexion. This clinical presentation aligns with findings by Dunpath et al. (2016), who reported that post-burn immobilization primarily impairs complex multi-joint hand mechanics.

By implementing structured kinesitherapy and manual massage, mechanical stress was systematically applied to the remodeling connective tissue. As demonstrated in the literature by Procter (2010) and Edgar (2009), early dynamic mobilization prevents pathologically rigid collagen cross-linking during scar maturation. Over the 11-month rehabilitation period, patient A.M. achieved near-normal range of motion across all wrist and digital segments, with full recovery of wrist flexion/extension and resolution of digital extension deficits (from -45° at 2 months to normal at 11 months).

Quantitative functional assessment using the DASH (Disabilities of the Arm, Shoulder and Hand) outcome measure further confirms the success of this comprehensive approach. The patient's DASH score declined dramatically from 55 points (indicating severe upper extremity disability) at 2 months post-injury to 50 points at 4 months, ultimately reaching 5 points at 12 months, which represents near-complete restoration of functional independence in activities of daily living. These numerical gains mirror the outcomes described by Gomez et al. (2017) and Rrecaj et al. (2015), who highlighted that continuous, long-term physical rehabilitation is directly correlated with significant improvements in upper extremity functional indexes and overall patient quality of life.

Furthermore, the multidisciplinary approach–combining acute surgical management (debridement and graft site care) with tailored outpatient physical therapy–was essential in managing both the primary skin injury and secondary musculoskeletal sequelae. As noted by Jeschke et al. (2020) and Mudawarima et al. (2017), holistic rehabilitation strategies that combine joint mobilization, scar management, and functional retraining are mandatory to achieve complete physical and psychological recovery in severe burn survivors.

In summary, the substantial functional recovery demonstrated in this case report highlights that early, individualized, and sustained physical rehabilitation is vital to preventing contractures, restoring joint range of motion, and ensuring complete functional reintegration following deep dermal hand burns.

## REFERENCES


1. Brusselaers, N., Monstrey, S., Vogelaers, D., Hoste, E., & Blot, S. (2010). Severe burn injury in Europe: A systematic review of the incidence, etiology, morbidity, and mortality. Critical Care, 14(5), R188.
2. Dunpath, T., Chetty, V., & Van Der Reyden, D. (2016). Acute burns of the hands – Physiotherapy perspective. African Health Sciences, 16(1), 266–275.
3. Edgar, D. (2009). Active burn rehabilitation starts at time of injury: An Australian perspective. Journal of Burn Care & Research, 30(3), 367–368.
4. Gomez, M., Tushinski, M., & Jeschke, M. G. (2017). Impact of early inpatient rehabilitation on adult burn survivors' functional outcomes and resource utilization. Journal of Burn Care & Research, 38(1), e311–e317.
5. Jacobson, K., Fletchall, S., Dodd, H., & Starnes, C. (2017). Current concepts in burn rehabilitation, part I: Care during hospitalization. Clinics in Plastic Surgery, 44(4), 703–712.
6. Jeschke, M. G., van Baar, M. E., Choudhry, M. A., Chung, K. K., Gibran, N. S., & Logsetty, S. (2020). Burn injury. Nature Reviews Disease Primers, 6(1), 11.
7. Mudawarima, T., Chiwaridzo, M., Jelsma, J., Grimmer, K., & Muchemwa, F. C. (2017). A systematic review protocol on the effectiveness of therapeutic exercises utilised by physiotherapists to improve function in patients with burns. Systematic Reviews, 6(1), 207.
8. Procter, F. (2010). Rehabilitation of the burn patient. Indian Journal of Plastic Surgery, 43(Suppl), S101–S113.
9. Rrecaj, S., Hysenaj, H., Martinaj, M., Murtezani, A., Ibrahimi-Kacuri, D., Haxhiu, B., et al. (2015). Outcome of physical therapy and splinting in hand burns injury: Our last four years' experience. Materia Socio-Medica, 27(6), 380–382.
10. World Health Organization. (2023, October 13). Burns (Fact sheet). World Health Organization. https://www.who.int/news-room/fact-sheets/detail/burns