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Original article

Effect of physical rehabilitation combined with hypnotic anesthesia in burn treatment

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SUMMARY

Burns are one of the most serious traumas a human can suffer due to their severity and severe pain. Given the insufficient theoretical and practical knowledge regarding



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the use of hypnotic anesthesia in physiotherapy treatments for burn patients, a quasi-experimental study was conducted to determine the effect of conventional physical therapy combined with hypnotic anesthesia on the variables of pain, strength, and muscle, joint mobility, and wound healing during the treatment process of burn injuries. A control group was designated that received routine conventional physical therapy, and another study or experimental group, which received conventional physical therapy combined with hypnotic anesthesia during physiotherapy sessions. Patients were assigned to each group from the population consisting of patients admitted to the Plastic Surgery and Caumatology Service of the Celia Sánchez Manduley Clinical-Surgical Teaching Hospital and then followed up in an outpatient clinic from February 2020 to February 2023. For both groups, dermal AB and hypodermal B burns in the shoulder region were taken into account for assignment. Five patients were selected in each group. Hypnosis was an effective complement in the physiotherapeutic treatment of burns, due to its influence on severe pain and the severity of the injury.

Keywords:Anesthesia; Hypnosis; Burns; Physiotherapy Modalities; Therapeutic Routine.

ABSTRACT

One of the greatest traumas that man can suffer are burns, due to their severity and severe pain. Based on the insufficient theoretical and practical knowledge about the application of hypnotic anesthesia within the physiotherapeutic treatments in the burned patients, a quasi-experimental study was carried out with the objective of determining the effect of conventional physical therapy combined with hypnotic anesthesia in treatments on the variables pain, muscle strength, joint mobility and wound healing during the process of treating burn injuries. A control group that received routine conventional physical therapy was designated, and another study or experimental group that received conventional physical therapy combined with hypnotic anesthesia during physiotherapy sessions. The patients were assigned to each group from the universe made up of patients admitted to the Plastic Surgery and

Caumatology Service of the Celia Sánchez Manduley Clinical Surgical Teaching Hospital and then followed up by outpatient consultation in the period from February 2020 to February 2023. For both groups, the fact that they had AB dermal and B hypodermal burns in the shoulder region was taken into account for the assignment. 5 patients were selected in each group. Hypnosis was an effective complement in the physiotherapeutic treatment of burns, due to its influence on severe pain and the severity of the injury.

Keywords:Anesthesia; Hypnosis; Burns; Physiotherapy Modalities; Therapeutic routine.

SUMMARY

One of the biggest traumas that a man can suffer is burns, due to his gravity and intense pain. Based on insufficient theoretical and practical knowledge regarding the application of hypnotic anesthesia in physiotherapy treatments in burned patients, a quase-experimental study was carried out with the objective of determining the effect of conventional physiotherapy combined with hypnotic anesthesia in treatments on the variations in pain, muscle strength, joint mobility and wound healing during or after surgery. burn treatment process.A control group was designated, which received conventional routine physiotherapy, and another study or experimental group, which received conventional physiotherapy combined with hypnotic anesthesia during the physiotherapy sessions. The patients were assigned to each group of the universe formed by inpatients in the Plastic Surgery and Caumatology service of the Hospital Clínico Cirúrgico Universitário Celia Sánchez Manduley and, immediately, followed by outpatient consultation in the period from February 2020 to February 2023. For both groups, dermal AB and hypodermic B burns in the region of the ombro foram raised in consideration for attribution. Foram escolhides 5 patients in each group. Hypnosis was an effective complement to the physiotherapy treatment of burns, due to its influence on intense pain and the severity of the injury itself.

Keywords:Anesthesia; Hypnosis; Burns; Physiotherapy Modalities; Therapeutic routine.

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Introduction

The skin is an organ whose most important function is to protect the interior of the body from harmful radiation, physical and chemical agents, and also to prevent the loss of water and extracellular fluid. (1) Burns are injuries produced in the skin or other tissues by physical, chemical or biological agents. (2)

The pain in severe burns is intense, distressing, and a significant problem that can persist for a long time, even after the wound has healed. Chronic, pathological, and neuropathic pain may develop. Therefore, pain management in this type of wound is essential. There have been major advances in the treatment of severe burns, but they can be lengthy and costly. These treatments should be multimodal and provide additional background analgesia if necessary during dressing changes, wound care, surgical procedures, etc. (3)

Specialized literature reports the use of hypnosis on clinical function in various pathologies, as it provides changes in neuronal activity and alterations in systemic behavior. Benefited clinical areas have been described, such as psychiatry, endocrinology, gynecology, oncology, cardiology, among others. (4) This usefulness for the treatment of countless health problems is already a fact that no one questions in Cuba. In the health system, it is used by physicians of the most diverse specialties, by psychologists, stomatologists, and nurses; and research and training in this area increase every day. (5) The benefit of using hypnosis with other conventional physiotherapeutic techniques for the management of sports injuries of the osteomyoarticular system, psychological states, treatment of childbirth pain, and

hypnotic anesthesia as an analgesic procedure in tooth extractions has been scientifically proven. (6-9)

In the words of Dr. Pedro Manuel Rodríguez Sánchez, making a reasoned critique of the concepts of the American Psychological Association (APA), he proposes the following concept of hypnotic state: Physiological modality of consciousness in wakefulness, which is innate in all human beings, in which the brain functions temporarily in a subconscious way and which is initiated, generated and maintained by hypnotic communication as an external stimulus that enhances pre-existing functioning capacities while causing a conditioning of the state reached and can evoke it later. (10)

However, the integration of knowledge that includes physical rehabilitation with neurophysiological processes in burned patients is a rarely cited element with very little evidence in the scientific literature consulted, which provides care models for the explanation of hypnotic therapies in the direct patient setting, applied from the enhancement of compensatory mechanisms that can promote physical rehabilitation combined with hypnotic therapy, which give theoretical and practical support to the application of hypnotic anesthesia within physiotherapeutic treatments in burned patients with AB dermal and B hypodermic injuries that help in the psychophysical preparation of the patient and in the early execution of therapies and interventions of high therapeutic complexity.

Likewise, there are no reports of research on the subject of burns that would allow for the production of validated models on the specific hypnotic technique that would provide assurance of the state of consciousness in which the procedure is operated on and that would provide control of neural and psychological markers in stages. This makes it impossible to repeat the procedure and provide a generalizable technique that would produce sufficient analgesia for the execution of therapies with certain complexities in severely burned patients with considerable extensions of scar tissue that often advise against the use of traditional means due to the discomfort and pain reported by patients with their application.

The main theoretical and practical contribution of this work was the combined use of specific variables from the practice of physical rehabilitation with those of neurophysiology in burn treatments using hypnotic anesthesia, using a transdisciplinary approach.

From this perspective, the research aimed to determine the effect of conventional physical therapy combined with hypnotic anesthesia on the variables of pain, muscle strength, joint mobility, and wound healing during the treatment process of burn injuries.

Methods

A quasi-experimental study was conducted, in which a control group was designated that received routine conventional physical therapy, and another study or experimental group, that received conventional physical therapy combined with hypnotic anesthesia. Patients were assigned to each group from the universe formed by patients admitted to the Plastic Surgery and Caumatology Service of the Celia Sánchez Manduley Clinical Surgical Teaching Hospital and then followed by outpatient consultation in the period from February 2020 to February 2023. The data pairs to be analyzed were made up of 4 evaluations in each group. In both groups, the fact that they had AB dermal and B hypodermal burns in the shoulder region was taken into account for the assignment. 5 patients were chosen in each group. The application of the sign test has been systematized for this type of studies by Rodríguez Sánchez. (9) Four variables specific to burn rehabilitation practice were used as comparative markers of effectiveness: degree of pain, muscle strength, joint mobility, and healing progression during the injury treatment process.

A visual analogue scale (VAS) was used for self-assessment of pain before and one day after the treatment session. (11) The DeLorme-Watkins method was used to evaluate the evolution of muscle strength, (12) applying increasing direct loads for muscle strengthening; joint mobility was assessed using a universal goniometer; values were

expressed in degrees, taking into account the degree of severity in the shoulder flexion range of motion, which was classified as medium, moderate, and severe. (13) The evaluation of skin quality in both treatment modalities with respect to the evolution of scars was performed using the Vancouver Scar Scale (VSS). The overall assessment results from the sum of the individual assessments. (14)

The exhaustive and stepwise modeling of the very deep neutral hypnosis stage with signal conditioning described by Rodriguez Sanchez was adopted, (10) and then the preparatory therapeutic utilization technique was also specifically modeled to produce deep anesthesia and sufficient analgesia to perform painful movement patterns; three preparatory hypnosis sessions were applied before the physical therapy session with verification of peripheral anesthesia, forced movements as well as exercises directly involved in the injured area. Physical therapy sessions were held twice a week with a duration of 45 minutes. Evaluation of the applied treatments was performed individually. The following criteria were taken into account: absence of pain one day after the therapy sessions, increase in muscle strength with progressive weights ≥ 4 kg, decrease in the degree of severity in joint mobility of the shoulder flexion movement, and skin quality evaluated after one year of treatment, a period in which scar remodeling allows for better results, with a score ≤ 5 , according to the VSS.

Statistical hypotheses

For the pain marker the day after performing the exercises

- ✓ Ho: The degree of pain perception in patients with routine conventional physical therapy the next day is the same as in those with the use of conventional physical therapy combined with hypnotic anesthesia.
- ✓ H1: The degree of pain perception of patients with routine conventional physical therapy the next day is greater than in those with the use of conventional physical therapy combined with hypnotic anesthesia.

For the marker Muscle strength



✓ Ho: Muscle strength, as determined by progressive increases in weights lifted in patients with routine conventional physical therapy, is the same as in those with the use of conventional physical therapy combined with hypnotic anesthesia.

✓ H1: Muscle strength, as determined by progressive increases in weights lifted by patients with routine conventional physical therapy, is greater than in those with the use of conventional physical therapy combined with hypnotic anesthesia.

For the degree of severity marker in joint mobility

✓ Ho: The degree of severity in joint mobility, as assessed by shoulder flexion range of motion in patients with routine conventional physical therapy, is the same as in those with the use of conventional physical therapy combined with hypnotic anesthesia.

✓ H1: The degree of severity in joint mobility, as assessed by shoulder flexion range of motion in patients with routine conventional physical therapy, is greater than in those with the use of conventional physical therapy combined with hypnotic anesthesia.

Healing Scale

✓ Ho: The quality of the skin in wounds, as assessed by pigmentation, vascularity, and height/thickness indicators in patients with routine conventional physical therapy, is the same as in those with the use of conventional physical therapy combined with hypnotic anesthesia.

✓ H1: The quality of the skin in wounds, as assessed by pigmentation, vascularity, and height/thickness indicators, in patients with routine conventional physical therapy is higher than in those with the use of conventional physical therapy combined with hypnotic anesthesia.

Results

The lack of a clear and explicit approach to burn pain management has been linked to undesirable levels of patient discomfort, leading to increased resistance and anxiety



during physical therapy and other treatments. Traditionally, narcotics have been the primary analgesic agents in burn care due to their high analgesic efficacy. However, their extensive use has been observed to subtly hinder patient recovery due to a higher incidence of adverse effects (paralytic ileus and gastrointestinal irritation that limit nutritional intake; as well as mild respiratory depression that can lead to atelectasis and subsequent pneumonia). (15)

In the present investigation, as can be seen in Table 1, the degree of pain perceived one day after the execution of physical exercises in patients who received conventional physical therapy combined with hypnotic anesthesia, was much lower than in those who received routine conventional therapy. The concentration of substances produced by the catabolic processes caused by physical exercise causes many patients to report pain days after executing the same. In the present investigation it was evidenced that the degree of pain perceived one day after physical therapy in patients who received the combined use of hypnotic anesthesia with physiotherapeutic procedures was practically null and in all cases much lower than in those who received routine conventional therapy. Therefore, H_0 was rejected.

Table 1. Degree of pain perceived one day after physiotherapy procedures.

Degree of pain	Routine conventional therapy (x)	Hypnotic anesthesia combined with physical therapy (and)	* sign
Patient # 1	7	1	+
Patient # 2	8	1	+
Patient # 3	6	2	+
Patient # 4	7	1	+
Patient # 5	8	3	+

* If $x > y \rightarrow +$, If $x < y \rightarrow -$, If $x = y \rightarrow d$ (discarded). Sign Test. $n = 5$, positive differences = 0.
 H_0 is ruled out. For $\alpha = 5\%$. Significant at 95%

Physiotherapeutic practice confirms that physical exercise achieves changes that counteract the effects of inactivity and muscle atrophy, which are directly related to the loss of muscle strength caused by burn injuries. It was particularly noteworthy, as shown in Table 2, that after the implementation of physiotherapeutic procedures for developing muscle strength, patients who received conventional physical therapy

combined with hypnotic anesthesia showed better muscle strength development than those who received routine conventional therapy. The statistical sign test allowed us to reject H_0 .

Table 2.State of muscle strength after the execution of physiotherapeutic procedures.

Muscle tone status	Routine conventional therapy (x)	Hypnotic anesthesia combined with physical therapy (and)	* sign
Patient # 1	3 Kg	4 Kg	+
Patient # 2	2 Kg	4 Kg	+
Patient # 3	3 Kg	4 Kg	+
Patient # 4	5 Kg	6 Kg	+
Patient # 5	3 Kg	7 Kg	+

*If $Y < X \rightarrow -$; If $Y > X \rightarrow +$; c. If $Y = X \rightarrow d$ (discarded). Sign Test. $n = 5$, Negative differences=0; Positive differences = 5; Ties = 0. H_0 is ruled out. For $\alpha = 5\%$. Significant at 95%

The degree of injury caused by a burn in the shoulder region leads to loss of elasticity in muscles and loss of movement of the anatomical structure, contractures often appear due to this lack of mobility during the recovery process, which leads many patients to report restrictions in their daily living activities due to limitation of movements and permanent pain, however, in the present study it was shown that the degree of severity in the range of motion of shoulder flexion was lower in patients who received hypnotic anesthesia combined with physical therapy, by presenting a higher degree in the articular arc of this movement, than in those who received routine conventional therapy. So H_0 was rejected. (Table 3)

Table 3.Degree of severity in joint mobility in shoulder flexion after the execution of physiotherapeutic procedures.

Patients	Routine conventional therapy (x)	Hypnotic anesthesia combined with physical therapy (and)	* sign
Patient # 1	Severe (55o)	Moderate (100o)	+
Patient # 2	Severe (50th)	Medium (120o)	+
Patient # 3	Moderate (70o)	Medium (120o)	+
Patient # 4	Moderate (90o)	Medium (140o)	+
Patient # 5	Moderate (100o)	Medium (140o)	+

* If $Y < X \rightarrow -$; If $Y > X \rightarrow +$; $Y = X \rightarrow d$ (discarded). Sign Test. $n = 5$, Negative differences=0; Positive differences = 5; Ties = 0. H_0 is ruled out. For $\alpha = 5\%$. Significant at 95%

Scar management is very important for burn patients. Scars can develop into hypertrophic scars, which can lead to limited movement and also cause aesthetic problems. Therefore, different techniques are currently used to achieve a mature scar that does not cause disturbances or deformations to adjacent normal structures, and has a positive impact on the patient's quality of life. Considering the results obtained after the treatment period, patients who received hypnotic anesthesia combined with physical therapy presented better skin quality resulting from the healing process. The scores obtained were directly proportional to the appearance of the epidermis, that is, the lower the score, the better the quality. These patients presented post-burn scars with normal pigmentation and vascularization, were flexible, with good sensitivity, and with normal height/thickness. Therefore, H_0 was rejected (Table 4).

Table 4. Wound healing behavior after physiotherapy intervention.

Patients	Routine conventional therapy (x)	Hypnotic anesthesia combined with physical therapy (and)	* sign
Patient # 1	7	3	+
Patient # 2	8	5	+
Patient # 3	6	5	+
Patient # 4	5	4	+
Patient # 5	8	5	+

* If $x > y \rightarrow +$, If $x < y \rightarrow -$, If $x = y \rightarrow d$ (discarded). Sign Test. $n = 5$, Positive differences = 0. H_0 is ruled out. For $\alpha = 5\%$. Significant at 95%

Discussion

Previous studies in patients with severe burns have shown the relationship between some psychoaffective responses (such as anxiety, depression, fatigue, stress disorder, perception of deformity, among others) and higher scores on pain intensity scales. (15) The routine use of high doses of analgesics leads to more frequent adverse effects, leading to delayed return to work and prolonged hospital stays. Therefore, in an effort

to find therapies with fewer complications, great effectiveness has been demonstrated in pain control with the use of non-pharmacological methods such as relaxation therapies, multimodal distraction devices, cognitive therapies, behavioral therapies, hypnosis, electrotherapy, among others. (15)

Hypnosis is a technique that, although many patients and therapists have misconceptions about it, evidence-based scientific data consistently support its effectiveness as an adjunct procedure for managing a wide variety of symptoms. This does not imply that existing therapies should be replaced, but rather that they should be incorporated more frequently into clinical care to improve patient outcomes. (5)

The hypnotic state, in addition to producing very powerful analgesia, is capable of causing singular changes in the state of consciousness of the patient, which causes other effects of great importance that deserve to be analyzed independently. In this sense, the somatosensory dissociation, the loss of consciousness about the external and internal environment, as well as the modification of behavior and thought, are very significant, so that hypnotic anesthesia has greater similarity with general chemical anesthesia, without strictly being it. (9)

It is worth highlighting that, in addition to the positive effects recorded in the treatment of pain in burned patients, the authors of this work fully agree with the experience of extractions under hypnotic anesthesia, (9) since the modulations in motor functions, dissociations from reality, tranquility recorded in this research were also observed in the present work, resulting in great comfort for the therapist to be able to perform complex and often painful exercises that patients are unable to perform without the application of this therapeutic method, therefore, it is the opinion of the authors of this study that by eliminating the manifestations of pain during the execution of exercises, it may affect other aspects that are vital for the complete rehabilitation of this patient.

Furthermore, taking into account the impact on the state of muscle strength within the rehabilitation of burned patients allows, during the first weeks of treatment, neural adaptations to originate that enable changes in muscle protein, demonstrating that longer-term treatments produce muscle hypertrophy. When working on strength

exercises from the hypnotic processes, an increase in their values is demonstrated, which indicates a very significant improvement.

With regard to joint range of motion measurements, they often have a stimulating effect on the patient, who becomes interested in their personal figures, especially when progress is made in desirable directions. Post-hypnotic suggestions also ensure a very positive emotional state.

All of the above validates the proven effectiveness of hypnosis as an effective complement to the physiotherapy treatment of burns, due to its influence on severe pain, muscle strength, joint mobility, and wound healing during the treatment process for burn injuries.

It should also be considered that the aforementioned elements should not be observed independently, but rather as a multidimensional system. and transdisciplinary therapeutic exercises that, when combined with hypnotic anesthesia, achieve their effectiveness by acting together and not separately, since one gives way to the other simultaneously, so the patient receives greater benefit from the systematic exercise regimen if certain requirements for its application are taken into consideration.

Within this framework, hypnotic anesthesia produces an immobility that could be totally comparable to that achieved with general pharmacological anesthesia, in this state also called catalepsy, the physiotherapist works without any interference from the patient, due to which he can perform more complex maneuvers, movement patterns that are difficult to execute actively by the patient due to their limitations, it does not cause injuries to the muscles because reflex contractions of this in the face of pain are avoided and it allows him to correct analgesic postures that patients adopt, as a response to pain.

By performing treatment sessions combined with this technique, the patient is calmer, it is more comfortable for the therapist to maneuver over the scars especially with the Cyriax deep transverse massage, proprioceptive neuromuscular facilitation techniques and exercises performed at the limit of pain, ideal techniques, but often painful, that allow to reduce the most reported effects of post-traumatic complications of burns

such as ligament retractions, muscle shortening, tendon desiccation, muscle fibrosis, hypertrophic and keloid scars, joint limitations, tendon and muscle adhesions and joint subluxations, which allows better patient cooperation since the intensity of pain is lower during the intervention. After 24 hours of applying the procedures, patients do not report pain or discomfort.

This means that the complications described above were not evident in any patient, the progression and multisystemic effect of the burns were halted, and a better prognosis for the success of rehabilitation was achieved, which enabled better physical and therapeutic maneuverability and patient cooperation, supported by the state of consciousness to which he was subjected.

Viewed from this perspective, the combined use of conventional physical therapy with hypnotic anesthesia, based on scientific data, consistently supports its effectiveness as an adjunctive procedure for managing a wide variety of symptoms. It is worth noting that the Plastic Surgery and Caumatology and Physical Medicine and Rehabilitation Services, using this innovative method, allow burn patients to experience more comprehensive rehabilitation, ensuring consistent treatment adherence and ensuring their return to social and work life as quickly as possible.

Conclusions

Considering the data obtained, the use of conventional physical therapy combined with hypnotic anesthesia in burn treatment is beneficial in pain management, improving muscle strength and joint mobility, and in improving scar progression during burn injury treatment. For future studies, it would be advisable to analyze this phenomenon in more representative samples of the study population and thus combine quantitative and qualitative methodologies.

Bibliographic references



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1. Mohamed H, Mohamed A, Gamal G. Effect of Physiotherapy Protocol on Post Burn Upper Limbs' Function. *Int J Physiother Res* 2019;9(8):24-34.
2. Eid MM, Abdelbasset WK, Abdelaty FM, Ali ZA. Effect of physical therapy rehabilitation program combined with music on children with lower limb burns: A twelve-week randomized controlled study. *Burns*. 2021; 47(5):1146-52.
3. Lobera-Salvatierra E, Vizcaíno-Bricio B, Otín-Guarga N, Garasa-Rivarés L, Mongío-Pardo AB. Literature review on existing treatments and therapies for pain in severe burns. *Nuber Científ*. 2022; 5(35):23-7.
4. Johan-Dojaquez, A, López-García CA, Zenteno-Covarrubias G. Hypnosis as a treatment: a compilation of clinical evidence: a systematic review. *Sal Jal*. 2024; 11(2):78-87. doi: 10.35366/115687.
5. Pérez-Almoza G, Guerrero-Ballester Y, Ramírez-González Y. Hypnosis as a therapeutic alternative applied to psoriasis. *Rev. cuban. med*. 2022;61(4):e2878.
6. Márque-Gurrola VA, Gallegos-Sánchez JJ, Lares-Bayona EF, Castañeda-Lechuga CH, Torrecillas-Lerma J, Talamantes-Martínez A, et al. Ericksonian self-hypnosis in sports injury care on stress, anxiety, depression, and pain factors. *Retos*. 2023; 47:326–33.
7. Franquelo MA, Hernández-Mendo A, Capafons A. The Effectiveness of Hypnosis in Sports Psychology: A Systematic Review. *Journal of Sports Psychology*. 2022; 22(1):81-99.
8. Luis Roldán L. de. Pain management using non-pharmacological measures during childbirth [Thesis]. Cantabria: University of Cantabria; 2022 [cited 03/13/2023]. Available at: https://repositorio.unican.es/xmlui/bitstream/handle/10902/25049/2022_LuisL.pdf?sequence=1
9. Rodríguez-Sánchez PM, Rodríguez-Bring K, Rodríguez-Rodríguez M, Santandreu-Gallardo JE, León-Aragoneses Y. Hypnotic anesthesia as the only procedure for analgesia in extraction. *Stomatological and neurophysiological modeling. MULTIMED*. 2020; 24(6):1312-31.

10. Rodríguez Sánchez PM. Hypnosis: Physiological and Research Foundations [Thesis]. Manzanillo: Celia Sánchez Manduley University of Medical Sciences; 2011 [cited 03/13/2023]. Available at: <http://tesis.sld.cu/index.php?P=FullRecord&ID=371>
11. Gallardo Vidal MI, Calleja Delgado L, Tenezaca Marcatoma JC, Calleja Guadix I, Yllera AD, Morales Tejera D. Physiotherapy and health education protocol for chronic shoulder pain of musculoskeletal origin. Experience in primary care. Primary Care. 2022; 54(5):1-74.
12. Leao Souza L, Duarte Cabral F. Methods for Hypertrophy. Ibero-American Journal of Humanities, Science and Education .2022;8(11):2803-12.
13. Schneider JC, Holavanahalli R, Helm P, Goldstein R, Kowalske K. Contractures in burn injury: defining the problem. J Burn Care Res. 2006;27(4):508-14.
14. Franco Mora MC, Robinson Rodríguez RJ, Sera García JT. Clinical and histopathological effects of platelet lysate in deep second-degree burns. International Health Convention. Cuba Salud 2022 [Internet]. Havana: MINSAP; 2022. [cited 03/13/2023]. Available at: <https://convencionsalud22/2022/paper/download/994/1598>
15. Cruz-Nocelo EJ, Zúñiga-Carmona VH, Serratos-Vázquez MC. Pain management in patients with severe burns. Rev. mex. anestesiología. 2021; 44(1):55-62.

Conflict of interest

The authors declare no conflicts of interest.

Authorship contribution

Conceptualization: Juan Nicolás Soriano Justiz, Pedro Manuel Rodríguez Sánchez.

Formal analysis: Roberto Frías Banqueris.

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I, Juan Nicolás Soriano Justiz, on behalf of all the co-authors, declare the veracity of the content of the article "Effect of physical rehabilitation combined with hypnotic anesthesia in burn treatment."