



Review Article

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The Effectiveness of Polarized Light in Musculoskeletal, Skin Problems and Burns

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Abstract

Introduction: The purpose of this systematic review is to demonstrate through studies that have investigated the therapeutic power of polarized light in musculoskeletal, skin problems and burns. We will see through reviews how each question is answered individually and what problem gives the best therapeutic results. Bioptron Light is a patented non-invasive optical device and technology based on the biostimulatory effects of polarized and inconsistent light in the visible and infrared spectrum.

Method: After a comprehensive strategic search, articles were searched through computerized databases Health and medical complete Pro Quest, Ebsco, Google Scholar in the years 2002-2019 and in English only. The effects of polarized light on musculoskeletal, skin, and burns were compared and evaluated, which yields exactly as well as lagging behind as research evidence. A total of nineteen randomized clinical trial studies were collected, two of which were pilot studies in English only. The effects of polarized light were compared and evaluated in eleven studies of polarized light therapy in musculoskeletal, five in dermatological and ulcer treatment, and in three in treatment of pregnancy. Individuals, children, women, and men were included in the studies. The methodological quality of these studies was assessed using the 12 quality assessment criteria of each randomized controlled study by Furlan et al. [1] and the composite best evidence by Van Tulder et al. [2].

Results: Only 19 randomized, high-quality, randomized studies were collected from the search.

Conclusions: Studies of high methodological quality appear to respond positively to the purpose and investigation of this review. They always support the efficacy of polarized light to overcome musculoskeletal problems, but it is also important for its action on skin problems and burns.

Keywords: Polarized light; Muscles; Skin problems; Burns

Introduction

Existing knowledge (bibliography review)

The effect of polarized light on the musculoskeletal system: A review of the literature has

found that studies investigating the relationship between polarized light in skeletal, skin and burns are poor in terms of treatment as monotherapy but how it can be used as monotherapy and / or as adjunctive therapy to treat pain. In the following indications: Rheumatology (osteoarthritis, rheumatoid arthritis, chronic arthritis), Physiotherapy (low back pain, shoulder and neck pain, carpal tunnel syndrome, scar tissue, muscle [3].

Generally known from studies in the literature to date on this topic, refer to a pilot study by Stasinopoulos in 2015, how the use of polarized multicolored non-cohesive light is a respectable treatment in musculoskeletal in Acute epicondylitis in the elbow, but nevertheless refers to this study how while Bioptron light is a reliable, safe and effective treatment option in pregnant patients, it is necessary to perform controlled clinical trials in order to determine the absolute and relative effective HLA this intervention. In his study, Stasinopoulos and his colleagues in 2008 reported that polarized light had effects on elbow tendonitis and ankle sprains.



In a 2014 study by Seyed and colleagues, however, Bioptron's application of different treatment protocols and light parameters different from those used in this study, perhaps longer duration of treatment and long-term evaluation may reveal different results in favor of treatment with Bioptron. But in the 2016 study of Michos, he argued that more research is needed to determine whether polarized light is a powerful tool for treating tendonitis in general [4].

Interesting is the study of Song in 2015, which reported that the combination of type A allantoin infusion with ultrasound and infrared polarized light showed a significant clinical effect on migraine treatment [5].

It is supported in a study on how phototherapy including low-level lasers as a cohesive light source and polarized UV-free multicolored without coherent light is recommended as a non-aggressive, safe and cost-effective treatment option for the treatment of various musculoskeletal disorders and skin conditions.

It is argued that Bioptron® phototherapy can be beneficial for people of all ages, including children and infants. Bioptron® Light phototherapy can be used in children as a complementary treatment to reduce pain and promote healing in various types of conditions, such as: Skin disorders, upper airway infections (common cold, vaginal infections) and tonsils, tonsils bones [3].

Bioptron® phototherapy can be used as monotherapy and / or as adjunctive therapy for pain treatment in the following indications: Rheumatology (osteoarthritis, rheumatoid arthritis, chronic arthritis), Physiotherapy (low back pain, shoulder and neck pain, neck and neck pain, syndrome) scar tissue, muscle. In the 2019 Svenda study, you report how the tibial fracture as one of the most common fragments of the population that mainly affects women and often leads to a complex peripheral pain syndrome. He concludes that Bioptron light therapy combined with conventional therapy improves the patient's outcome after fracture in gerontology, compared to conventional therapy alone [6].

The search for new therapeutic approaches for back pain requires a need for physiotherapy practice. The polarized light emitted by the Bioptron device causes the skin to heat up because it contains infrared light. This exogenous light is interpreted as irritation by thermo-receptors and leads to activation of reflex and local reactions, improves microcirculation and nutrition of exposed tissues and has anti-inflammatory action. Light changes the sensitivity of the skin, increases tactile sensitivity and reduces sensitivity to pain. These results are confirmed by Ballyzek and his colleagues, who studied the change in the amount of unidentified pain in the neck and lower back when treated with low light energy. They believe that changing the sensitivity of receptors, hydrolyzing exchange products, reducing muscle tone and increasing tissue elasticity play a role in relieving pain.

The effect of polarized light on skin and burns: Clinical research has shown that BIOPTRON

has a positive stimulating effect on specific skin cells known as fibroblasts, resulting in the production of collagen and elastin. Safe and non-invasive treatment with BIOPTRON for only ten minutes a day reduces wrinkles, without side effects. A 2015 study by Mageed reported that the effects of polarized light as adjuvant therapy for deep second-degree deep burns were not satisfactory and statistically insignificant. But it showed little improvement in the wound healing process. Therefore, it is considered necessary to conduct a critical research literature review in order to summarize the findings that will refer to the relationship between bioptron therapy in skeletal, skin and burns [7].

However, a 2018 study by Nesrein showed that purple filtered light polarized light has a special and beneficial effect on reducing scarring in children after burning.

Problem description

There is a need to conduct a systematic review of the research literature on this topic due to the poor bibliographic study of bioptron therapy in skeletal, skin and burns, which is exactly the superior treatment. The gaps in the literature and the lack of guidelines, the summary of existing scientific knowledge and the identification of contradictions or gaps in the literature and the lack of guidelines were serious reasons for this study [8-24].

Purpose and individual goals

The purpose of this critical bibliographic review is to analyze the prospective studies examining the relationship between polarized light therapy in skin skeletons and burns.

Methodology

Search strategy description

a) The present work is a systematic review study. In this systematic review, the databases used in this particular systematic review are related to the search in the relevant international bibliographies and the electronic databases Medline, Google Scholar, Pub med.

b) The key words and their combination are: polarized light, muscles, skin problems, burns.

The bibliography was also searched through the literature of other articles and reviews related to the subject under investigation.

Methodological Quality

For the evaluation of the methodological quality of each randomized study, the 12 criteria of Furlan et al. [2] were used, in an independent and methodological way. Each item was rated as "yes", "no", or "I don't know/we're not sure/there is ambiguity".

“High quality” studies were defined with the most positive yes answers and with a score of > 50%.

Data Synthesis

Composition of data the quantitative analysis of studies will be measured whether or not it is possible due to the heterogeneity of the measures of the results. Therefore, the results will be summarized using a better compound proof of results according to

van Tulder et al. [1].

Results

At this stage, the results of the research studies that were reviewed are presented

Study Flow Diagram

Presentation and interpretation of the results of a study flow diagram which meet the criteria [Figure 1].

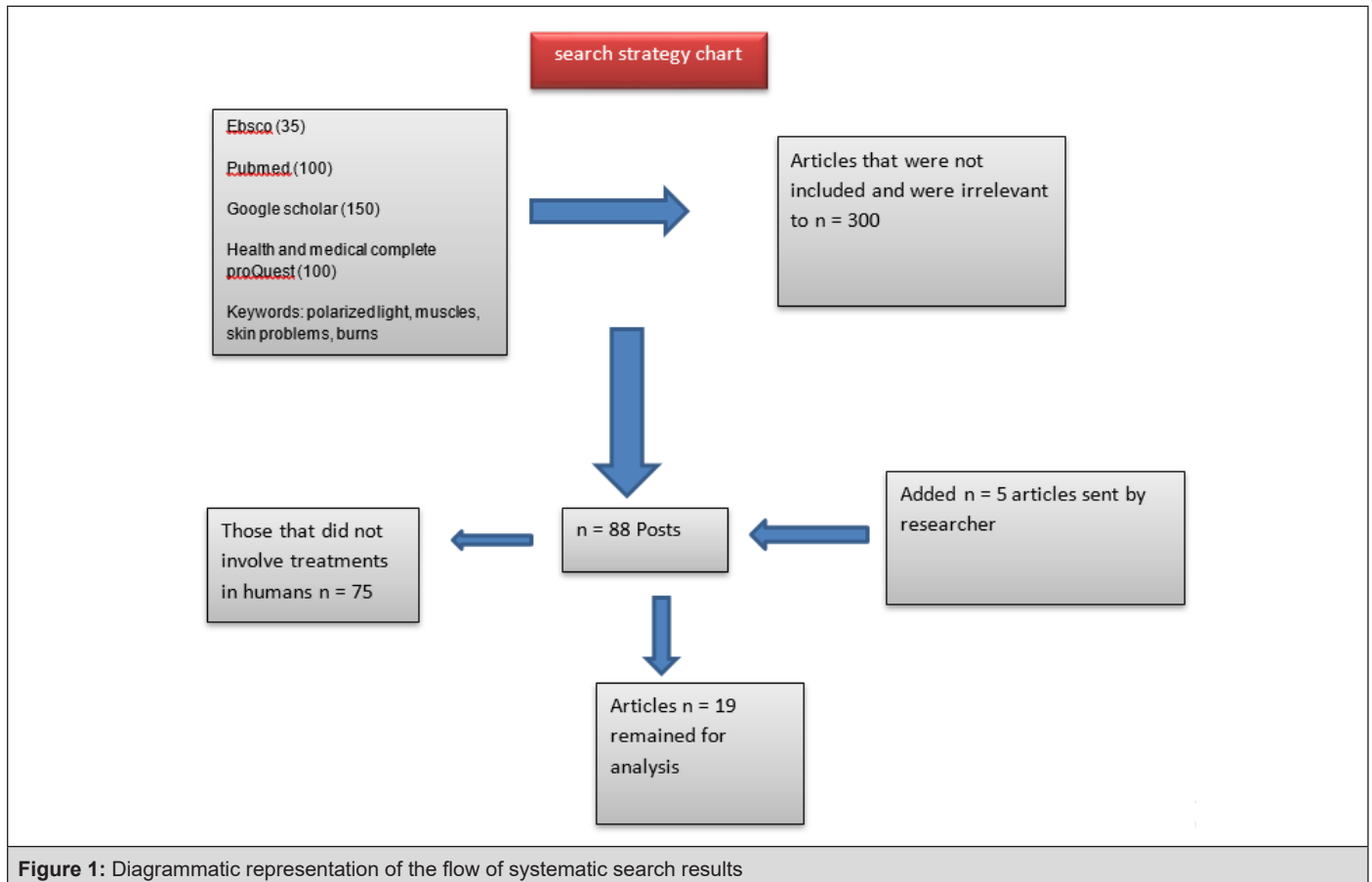


Figure 1: Diagrammatic representation of the flow of systematic search results

Score of methodological quality of the studies under review. Score SCOR of the methodological quality of the studies under review [25-30].

The Evaluation of the methodological quality of the studies

Outcome measures reported in eleven studies with musculoskeletal pain include pain assessment using a VAS analog scale and muscle paraesthesia as well as Caldwell-Sierra electrophysiological testing in a dynamometer with a dynamometer and its body in studies of syndromes. Complex peripheral pain syndrome (Sudeck Atrophy) after fracture. In a study on migraine research, a MIDAS disability assessment questionnaire and a quality of life scale were used. And Roland-Morris quality of life test in a patient with back pain.

Characterized by Studies

The results will be summarized using a better compound proof of results according to Van Tulder et al. [1]. Expect the healing power of polarized light in musculoskeletal problems, skin problems and burns. We will see through reviews how each question is answered separately but also to which problem it gives the best therapeutic results.

Ten were of high methodological quality Van Tulder et al. [1] to describe the reduction of musculoskeletal pain in peri-arthritis and epicondylitis in the tibial fractures in the elderly, the quality of life-enhancing acupuncture by reducing back pain and improving mobility by using polarized light. In leather the three showed high methodological quality in its leather applications [8,9]. Only one showed a high methodological quality in reducing bed

sores, a moderate methodological study showed that nocturnal pain and paraesthesia associated with idiopathic carpal tunnel syndrome improved during polarization. incoherent light [10-13]. In Durović's [9] study, after a four-week polarized light treatment, 20 patients with stage I-III ulcer had a significant improvement in wound healing, so it could be useful to apply polarized light to their

treatment. pressure ulcers. While in the study of Deen [14] report how More effective treatment of polarization in accelerating the healing of diabetic foot grade II ulcer from diode laser treatment [31-39].

Description of Studies Van Tulder et al. [1] Table 1, The polarized light in the musculoskeletal system.

Table 1: The polarized light in the musculoskeletal system.

Subscribers	Subjects	Treatment Method	Output Measures	Intervention Parameters	Efficiency	SKOR
Stasinopoulos [16].	Pregnant women n = 46	Bioptron light in the carpal tunnel in pregnant women from January 2006 to January 2010.	Pain Vas analog scale of pain and paraesthesia	Bioptron light 2 times a day for 5 days a week 90w 480-3400nm 40mw 2.4j / cm ² For 2 weeks	Improving finger strength and reducing pain	75%
Svenda et al. [6]	Women n: 52 Group A n1: 26 B n2 group: 26 Complex peripheral pain syndrome (Sudeck Atrophy)	A = cryotherapy B = cryotherapy and bioptron	VAS and range of motion	A = anti-inflammatory exercises 30 minutes ball compression cryotherapy B = anti-inflammatory exercises cryotherapy and Bioptron for a total of 10 minutes a day in five places	Bioptron photon therapy in combination with conventional therapy improves patient outcome after DRF in gerontology, compared to conventional therapy only	61%
Stasinopoulos et al. [16]	N=50 A=27 B=23 18-35 years	B = cryotherapy A = cryotherapy + bioptron	Vas analog pain scale, swelling and range of motion.	Cryotherapy with patches for 20min on the ankle every 2 hours for 5 days and the second group + bioptron for 10 minutes once a day for 5 days.	No significant difference was observed between the two groups at the end of treatment.	92%
	N = 44	A = splint and bioptron light	Vas scale pain	10 sessions of Bioptron treatment 3 times a week for 8 minutes wavelength: 480-3400 nm accompanied by 8 weeks splint in the Bioptron group The wrist splint in a neutral position was applied for 8 weeks to the control group.	Improvement of both teams but	84%
Seyed et al. [15]	With carpal tunnel syndrom	B = splint	Caldwell-Sierra electrophysiological test		No significant difference was observed between the two groups at the end of treatment.	

Huang et al. [5]	N = 52 patients with either peri-arthritis in the shoulder or chronic musculoskeletal pain syndrome or lateral epicondylitis	A = group I were treated with NB or LB plus LPNIR. B = group I underwent treatment with NB or LB.	Visual analog scales (VAS) were measured in all patients 6 months before treatment for the pain clinic between August 2007 and January 2008.	Group I was treated with NB or LB plus LPNIR. Patients in group II, in turn, were treated with her procedures in group I, but without using LPNIR.	In both groups, the intensity of pain (VAS score) decreased significantly immediately after treatment compared with treatment. There was a significant difference between the control and control groups immediately after treatment ($p < 0.05$), while it has no effect 6 months later. No side effects were observed. It is concluded that LPNIR is an effective and safe method for treating various chronic pains.	67%
Stasinopoulos [12]	A=25 B=25 Γ=25 30-60 years	Group A (n / 25) was treated with Cyriax physiotherapy. B = supervised exercise program C = polar multicolored non-cohesive light (Biopton light).	1, Two researchers they participated 2, specialized dermatologist VAS and functionality with grip strength	A = Cyriax physiotherapy from 10 minutes of deep transverse friction immediately followed by an intervention by Mill's B = supervised exercise program consisted of slow progressive eccentric wrist exercises and static extensive ECRB exercises tendon. C = polar multicolored non-cohesive light (Biopton light) in three positions for 6 minutes in each position (ie 18 minutes in total) Each treatment was given three times a week four weeks.	There were no significant differences between the groups in terms of pain. Cyriax and exercise and polarized multicolor incoherent light reduces pain and improved function at the end of treatment, in between and long term.	67%

Stasinopoulos et al. [16]	N=50	aser (LLLT) and polarized multicolored inconsistent lighting as exercises in an exercise program	VAS, dynamometer	<p>Group A exercise with LLLT program or an exercise program with polarized multicolored incoherent light. The exercise program consist of eccentric and static stretching exercises of the relaxed wrists. In the LLLT group a Ga-As 904 nm. In the team receiving polarized multicolored incoherent light used Bioptron 2 to administer the dose vertically the lateral epicondyle at three points at a working distance of 5-10 cm for 6 minutes in each position.</p>	<p>There were no significant differences in pain relief and improvement in function between groups at the end of treatment and follow-up for 3 months</p> <p>there was a decrease in pain and an increase in the function of both groups compared to the initial value (p <0.0005)</p>	67%
Song et al. [5]	N = 91 patients with chronic migraine	infrared polarized light in treatment chronic migraine combination of allantoxin type A	MIDAS Immigrant Disability Assessment Questionnaire MIDAS Score and Quality of Life Scale	<p>group A, 22 cases in total), nimodipine for two months, group B, a total of 22 cases), infrared</p> <p>polarized light was adopted for its treatment</p> <p>chronic migraine for 50-60d and the study time lasted six months.</p> <p>Group C, 24 cases in total), type A with ultrasound and suspicion</p> <p>botulism toxin injected into frontal, temporal and occipital muscles to treat chronic migraine; Group D, 23 cases in total), infusion of allantoxin with ultrasound and subcutaneous type A</p> <p>group C and infrared polarized light</p>	<p>Ο συνδυασμός αλλαντίασης-και-υπονοούμενου-οδηγούμενου τύπου Α αλλαντίασης</p> <p>την ένεση τοξίνης και το υπέρυθρο πολωμένο φως</p> <p>η θεραπεία της χρόνιας ημικρανίας κατέδειξε σημαντική κλινική επίδραση.</p>	75%

Aragona et al. [19]	N = 30 19 women 11 men	Patients were first exposed to Bioptron® light for 20 minutes after the lesion had cleared	Pain: (assessed on the Vas scale)	24 sessions: twice a week for 12 weeks.	Pain reduction was felt in 21 patients in 1 month (70%) and in 100% of cases in 3 months	42%
Stasinopoulos et al. [10]	N = 25 patients (22 women and three men)	Polarized multicolored inconsistent light (Bioptron light) was given vertically in the area of the carpal tunnel.	Total participants' estimates for nocturnal pain and hallucinations, respectively, at 4 weeks and 6 months	Multicolor polychromatic non-cohesive light (Bioptron light) was administered vertically in the carpal tunnel area. The irradiation time for each session was 6 minutes at a working distance of 5-10 cm from the carpal tunnel area, three times a week for 4 weeks.	Nocturnal pain and paraesthesia associated with idiopathic carpal tunnel syndrome improved during polarized multicolored inconsistent light (Bioptron light)	50%
Mihaylova et al. 2017	N = 30 33 men and 27 women., ages 18-55.	Group A = basic treatment Group B = basic treatment and bioptron	(VAS) quality of life with the Roland-Morris test at the beginning, at the end and 1 month in patients with low back pain	A group = basic treatment Group B = basic treatment once a day as follows: 'LFMF with characteristics 16 000 A / m.1 Hz, 0.2 seconds, 15-20 minutes. "Ultrasound treatment of the lumbar spine from L1 to S1 with a parameter of 0.4W / cm, 5 minutes on each side, 'Light treatment by Bioptron device for 10 minutes. + 10 minutes. Fragments in lumbar region	Both methods reduced pain, improved lumbar mobility and improved the quality of life of patients with lower back pain.	67%

Result through the measures of exit of the van tulder scale 2003. This study concludes how through Powerful Indicators of Efficacy in Musculoskeletal Effects where studies excel at yielding polarized light with consistent positive (significant) findings in ten of the eleven studies analyzed within multiple high-quality randomized trials. With exit measures the Vas scale for musculoskeletal pain.

Main findings of clinical review studies predominate in musculoskeletal studies mainly through studies and mainly in Stasinopoulos' study, 2017 the use of bioptron as monotherapy without control group in pregnant women, however, although it showed a significant reduction in pain and paraesthesia through analogous scale pain randomized controlled trials with virtual therapies should be performed. This as an attempt to conceive the

long-term benefits of bioptron therapy compared to other therapies [16].

Also, the effectiveness of bioptron in the management of epicondylitis has been evaluated and in the pilot study of Stasinopoulos in 2005 it showed how treatment with Bioptron for 4 weeks led to a significant functional improvement and improvement of pain in patients with epicondylitis. However, the Stasinopoulos et al study in 2017 showed strong evidence for the effectiveness of Bioptron light therapy as an adjunct to cryotherapy in acute ankle sprains that offers significant pain and swelling reduction, but mention how stronger studies are required to confirm these results.

In Stasinopoulos' 2005 study, nocturnal pain and paraesthesia associated with idiopathic carpal tunnel syndrome improved

during polarized multicolored non-coherent light through the Vas scale (Biopton light) but still required controlled clinical trials.

Discussion

The therapeutic use of polarized light has deservedly gained its place in literature through various studies as a promising treatment equal to that of lasers [17]. However, Stasinopoulou's [17] study provides preliminary evidence for the effectiveness of cryotherapy-supplemented Biopton phototherapy for the treatment of ankle sprains. However, more studies are needed to confirm these results [40-43].

Even in Seyed's 2014 study, treatment with Biopton in patients with carpal tunnel syndrome showed exactly the same results as the group that wore only the splint, justifying the fact by stating that perhaps longer-term treatment with biopton was superior in results. We found that light therapy significantly accelerated pain relief and improved, compared to conventional therapy where svenda's study. Study by Medenica [18], showed that it significantly reduced the diameter of a wound from an ulcer, but its exact mechanism of action is still unknown, although there are even reports that it may be superior to the healing effect of laser therapy.

Conclusions

It is important for our science to clarify and explain how today is no longer the time for monotherapy applications, especially in regenerative medicine, and the adoption of biophysical therapies can play a positive anti-inflammatory and regenerative role, enhancing the function of non-invasive treatments [19].

Direction for future research, practice, results dissemination, education, health policy, clinical directions: In order for studies to be considered valid and effective in the treatment of biopton polarized light in musculoskeletal, skin and burns, the studies should be numerous in number: randomized control tests and so that the results are compared with each other in various problems of musculoskeletal pain, functional pain, skin problems and burns.

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