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Development of a Postburn Pruritus Relief Protocol

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Abstract

Background: Postburn pruritus is a syndrome of stressful symptoms that is pervasive and occurs in over 90% of burn patients and continues for years after the burn has healed. Postburn pruritus is experienced by burn survivors that may require medical management and effective interventions.

Purpose: This article shows how to effectively relieve postburn pruritus by developing a postburn pruritus relief protocol.

Design: A descriptive literature review was conducted, and relevant empirical articles written during the years 2000–2014 were appraised to create a postburn pruritus relief protocol. Twenty-six of 79 articles were selected using preestablished inclusion criteria: any age group experiencing burn-related pruritus after second- or third-degree burns. Databases were Cochrane Central Register of Controlled Trials, CINAHL, EBSCO, PubMed, the National Guideline Clearinghouse, Google Scholar, and the American Burn Association website.

Conclusions: This protocol included both nonpharmacological and pharmacological interventions that have been delineated for use and was developed to apply based on the healing stage: prehealing, healing, and posthealing.

Keywords: Burn(s); itching; pruritus.

Introduction

Postburn pruritus (PBP), a severe itching sensation associated with burn injury, has been identified as one of the most debilitating symptoms postburn survivors experience (Ahuja, Gupta, Gupta, & Shrivastava, 2011; Carrougher et al., 2013; Goutos, 2010; Goutos, Eldardiri, Khan, Dziewulski, & Richardson, 2010; Otene & Onumaegbu, 2013). Pruritus appears the first 2 weeks following burn injury (Ahuja et al., 2011; Goutos et al., 2010). The prevalence of PBP has been noted in over 90% of burn patients and can persist in greater than 40% of patients for 4–10 years after burn injury (Carrougher et al., 2013). Several studies showed that the incidence of onset of PBP varies from 80% to 100%, with the onset during the early healing phase and sustaining for many years after injury (Ahuja & Gupta, 2013; Baker et al., 2001; Whitaker, 2001). Research findings have recurrently proposed that PBP management should be one of the top priorities for burn research (Bell & Gabriel, 2009; Brooks, Malic, & Judkins, 2008). Burn-associated pruritus, when persistent, can cause disabling symptoms such as sleep disturbances, anxiety, and interruption of daily activities (Goutos, Dziewulski, & Richardson, 2009).

Although pruritus in postburn patients is well recognized, there is no consensus on standardized treatment (Bell & Gabriel, 2009; Otene & Onumaegbu, 2013; Richardson, Upton, & Rippon, 2014). Single treatment may be ineffective, but most often therapies focus on either pharmacological or nonpharmacological interventions. However, pharmacological interventions have adverse effects in some populations with kidney problems, liver diseases, or allergies to specific medicines, which causes pharmacological interventions to be of limited use. Therefore, the purpose of conducting this literature review was to establish a protocol for PBP relief with the integration of evidence-based practices, primarily focused on nonpharmacological interventions.

Literature Search

A keyword search was performed to identify relevant literature via Cochrane Central Register of Controlled Trials, CINAHL, EBSCO, PubMed, the National Guideline Clearinghouse, Google Scholar, and the American Burn Association website. The key words were burn(s), itching, and pruritus. Because of limited publications, database searches were expanded to all peer-reviewed and published studies written in English during the years

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2000–2014, conducted with all second- and third-degree burn populations experiencing postburn-related pruritus. As a result, 79 articles were initially listed from search engines, and 26 of 79 articles were found relevant to the purpose of this review, developing a PBP relief protocol.

Results

The process of finalizing 26 relevant articles is shown through the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flow diagram (Figure 1). All relevant articles for the treatment of PBP were summarized including the study design, setting, result, and limitation (Table 1). Treatments are categorized in pharmacological and nonpharmacological interventions.

Pharmacological Interventions

Thirteen of 26 articles identified pharmacological effects on PBP that included both single oral medicine use and two or three combining oral medicine. Examples of effective oral pharmacological interventions include (1) pregabalin (Lyrica) alone, (2) gabapentin (Neurontin, Gralise, Horizant, Fanatrex FusePag) alone, (3) pregabalin and two different antihistamines (histamine1 [H1] and histamine2 [H2] blockers), (4) gabapentin and one antihistamine (H1 blocker), (5) gabapentin and two different antihistamines, and (6) combination of two different antihistamines. According to the randomized controlled trial (RCT) by Ahuja and Gupta (2013), pregabalin alone or combination of two kinds of antihistamines decreased PBP, but adding more antihistamines did not decrease PBP additionally. Gabapentin alone or combination of one or two antihistamines reduced PBP in several studies (Ahuja et al., 2011; Goutos et al., 2010; Mendham, 2004). Combination of two different antihistamines also lowered PBP more than using one antihistamine (Baker et al., 2001). Two experimental studies show that naltrexone (Vivitrol, Revia, Depade) is supportive in decreasing duration and frequency of itching in patients with PBP and can be used before sleeping as a supplementary method to other antipruritic medicine (Jung et al., 2009; LaSalle, Rachelska, & Nedelec, 2008).

Oral medications are more effective when given as scheduled than being given as needed (Baker et al., 2001). However, oral pharmacological interventions have adverse effects. For example, antihistamines are well known for drowsiness (Vallerand, Sanoski, & Deglin, 2016). Pregabalin has withdrawal symptoms such as insomnia, headache, agitation, nausea, anxiety, diarrhea, flu-like symptoms, nervousness, major depression, pain, convulsions, hyperhidrosis, and dizziness when abruptly stopped (Vallerand et al., 2016). In addition, most pharmacological interventions are not as effective as nonpharmacological interventions once wounds begin granulating toward the healing stage when pruritus is more concerned (Goutos, 2013).

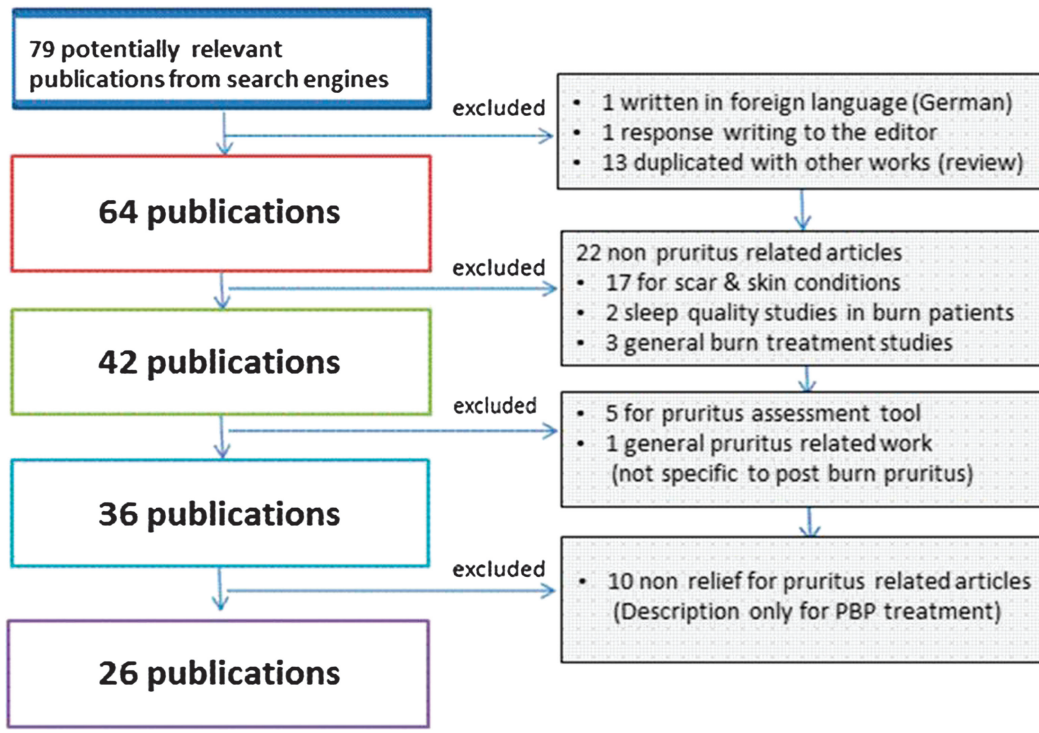

Figure 1. Flow diagram for selection of studies.

Table 1 Table of evidence

No.	Authors (year)	Setting/Participants	Study Design/Intervention Time	Characteristics of Burn Wound	Itching Assessment Tool	Study Result and Limitations
1	Ahuja and Gupta (2013)	Outpatient setting/80 adult burn pts	RCT/28 days	TBSA > 5%, 2nd degree burns, and wound either in healing or healed.	VAS	Pregabalin alone or combined with antihistamine → ↓ PBP. Adding antihistamines does not decrease PBP. Limitation: The study did not define end point of antipruritic therapy.
2	Ahuja et al. (2011)	Department of burns/20 burn pts with age of 12–70 years	RCT/28 days	TBSA > 5%, 2nd degree burns, over 80% of wound epithelialized or healed.	VAS	Gabapentin alone or combination w/cetirizine → ↓ PBP. Certirizine only does not decrease PBP. Limitation: Too small sample size, limited period of data collection, graft size more than 1% excluded, single site study.
3	Akhtar and Brooks (2012)	Outpatient setting/8 pts with failure of managing PBP in the past	Prospective and experimental study/one time	All healed areas after 2nd- to 3rd-degree burns.	VAS	Botox → ↓ PBP in population who failed in managing PBP with conventional therapies. 50% had no PBP within 2 weeks after Botox and no itching up to 9 months after treatment. Limitation: Difficult to expect who will require multiple injections to control their symptoms.
4	Baker et al. (2001)	Setting not stated/17 pts with age of 10–60 years	Double blind, crossover trial/16 days	Partial thickness and any percentage of TBSA burn. Not described in wound healing stage.	VAS	Combining H1 and H2 antagonists: More effective in ↓PBP than H1 antagonist alone during the first stage of treatment. More effective to treat PBP with scheduled medication than as needed medication. Limitation: Small size of sample, high attrition rate (47%).
5	Brooks et al. (2007)	Inpatient and outpatient settings/5 cases	Case study/2 weeks	TBSA of 7%–65% with unhealed burn wound.	VAS	2-week Acticoat application is effective in ↓PBP. Limitation: This study did not indicate the condition of wounds whether they were healed or unhealed. However, it is assumed they were unhealed or in the healing process because Acticoat is used for unhealed wounds in current practice.
6	Campanati et al. (2013)	Unclear setting/ 30 pts	Non-RCT/12 weeks	2nd-degree burns in healing stage.	Unknown	Ozonated oil and hyaluronic acid: Same effect in ↓PBP 12-week topical application. Ozonated oil: More effective than hyaluronic acid in preventing posthyperpigmentation. Limitation: Lack of a histological comparison between two agents.
7	Cho et al. (2014)	Rehabilitation hospital/146 pts with hypertrophic scars	RCT/average 34.69 days	All healed burn wound (scar).	VAS	Massage therapy ↓ in pain, pruritus, and scar characteristics in patients. Limitation: Massage given only for short period (average: 34.7 days), so long-term effects not identified. Evolution of hypertrophic scar not considered.

(continues)

Table 1 Table of evidence, Continued

No.	Authors (year)	Setting/Participants	Study Design/Intervention Time	Characteristics of Burn Wound	Itching Assessment Tool	Study Result and Limitations
8	Farahani et al. (2013)	Inpatient setting/110 pts	Quasiexperimental study/1 month	2nd-degree burn wounds. Stage of wound healing not clear—possibly not healed wound considering population.	VAS	20-minute Benson muscle relaxation: effective in ↓PBP. Limitation: No explanation if other methods to reduce pruritus along with relaxation tx. No explanation of frequency of relaxation tx.
9	Field et al. (2000)	Outpatient burn center/20 pts with PBP	RCT/5 weeks	Healed burn wound.	VAS	Massage therapy decreased itching, pain, depression, and anxiety in burn population with severe itching. Limitation: Further study needed for larger sample and long-term use of massage therapy.
10	Gaida et al. (2004)	Outpatient setting/19 burn pts with scars	Pretest–posttest design/8 weeks	Healed burn wound (scar).	VAS	Low Level Laser Therapy decreased pain and pruritus among all participants. Limitation: Further study needed with higher number of sample and control site from different people rather than each person with different sites.
11	Goutos et al. (2010)	Inpatient setting/91 burn pts (50, 1st part; 41, 2nd part of the study)	Cohort, observational studies/ intervention time not specified	Partial to full thickness burn injury. Healing stages not specified.	VAS/Itch Man Scale	Monotherapy in PBP: Gabapentin monotherapy is more effective than chlorpheniramine. Polytherapy in PBP: Combination of gabapentin, cetirizine, and cyproheptadine is more effective than combination of three antihistamines. Limitation: Needs further studies incorporating long-term follow up of comparing peripherally and centrally acting agents in late phases of wound healing.
12	Parlak Gürol et al. (2010)	Inpatient setting/63 adolescent burn pts	Experimental study/5 weeks	2nd- to 3rd-degree burn wound. Healing stage not specified.	VAS	15-minute massage twice per week for 5 weeks applied to healthy skin around wounds and surface of wound decreased PBP in adolescent population. Limitation: Small sample size and the study did not specify wound conditions, whether it is healed or not—it is assumed that not all wounds are healed according to the fact some pts were getting standard tx including pain and they were enrolled in the study right after admission.
13	Hettrick et al. (2004)	Outpatient clinic/20 pts with age of 18–75 years	RCT (pilot study)/3 weeks	2nd- to 3rd-degree recently healed burn wound.	VAS	TENS reduced PBP. Limitation: Hard to generalized to population <18 or >75 years of age. Can't apply to inflammatory or proliferative stage of wound healing.

(continues)

Table 1 Table of evidence, Continued

No.	Authors (year)	Setting/Participants	Study Design/Intervention Time	Characteristics of Burn Wound	Itching Assessment Tool	Study Result and Limitations
14	Hultman et al. (2013)	Outpatient surgical center/147 burn pts with hypertrophic burn scars	Cohort study/6 months	All healed burn wounds.	VAS	Laser therapy decreased pain, pruritus, pliability, and paresthesia in the population. Limitation: Long-term effect is unknown, scar component unspecified, evaluator bias not excluded, no control group exists, and order of different lasers not examined.
15	Jung et al. (2009)	Inpatient rehabilitation/ 19 pts treated for burn injury	Retrospective, experimental study/2 weeks	Healed burn wounds.	VAS	With Naltrexone therapy, 14 pts reported improvement in itching, 5 pts reported no change in itching, and 7 pts had side effects. Limitation: Small sample size to generalize, uncertain to use Naltrexone as the first line of tx.
16	LaSalle et al. (2008)	Inpatient and outpatient settings/13 burn pts of ages 19–78 years	Experimental study/ 2 weeks	TBSA of 7%–70% and all grafted burn areas. Healing stages not specified.	VAS	Naltrexone ↓PBP, frequency and duration of itching. Limitation: Small sample size, itch intensity or qualification of scratching activity to be frequently measured, broader range of burn pts, long-term f/u, and a placebo controlled tx group needed.
17	Lewis et al. (2012)	Inpatient setting/52 burn pts, mean age of 35 years	RCT, pilot study/ 24 hours	Mean TBSA:7.2%, mostly partial thickness burn wound and newly healed scar.	VAS	Medilixir was more effective to minimize PBP than aqueous cream. Limitation: Small sample size.
18	Li-Sang et al. (2006)	Outpatient clinic/45 burn pts	RCT/6 months	Posttraumatic hypertrophic scars.	VAS	SGS was effective to reduce thickness, pain, itchiness, and pliability of the severe hypertrophic scar. Limitation: Generalization issue due to small size sample and all Chinese participants. Only 16 burn scars out of 45 scars—can the result be applied specifically to burn scar pts?
19	Li-Tsang et al. (2010)	Participant's routine area/104 burn pts	RCT/6 months	Burn scars.	VAS	SGS ↓pain and ↓pruritus than ↓scar thickness. CTG and PG showed improvement in scar thickness after 6-month intervention (CTG > PG). Limitation: High drop rate of participants (19%).
20	Mendham (2004)	Inpatient setting/35 pediatric wound pts	Experimental study/4 weeks to 18 months	Burn wounds and skin loss from meningitis. Not healed wound.	Unknown	Gabapentin ↓itching in healing wound and ↓antihistamine intake in pediatric population. Limitation: Gabapentin tx needs cautions for worsening behaviors in pediatric population and RCT is necessary.
21	Nedelec et al. (2012)	Not clear/18 pts having PBP treated in the hospital	RCT, pilot study/4 weeks	All healed burn wounds (scars).	Yosipovitch's questionnaire	Provase ↓PBP in frequency and episode of itch, and duration of itch. Limitation: Small pilot study, single center, and convenience population, short period of data collection (4 weeks), and no classification between acute and chronic pruritus in postburn population.

(continues)

Table 1 Table of evidence, Continued

No.	Authors (year)	Setting/Participants	Study Design/Intervention Time	Characteristics of Burn Wound	Itching Assessment Tool	Study Result and Limitations
22	Ogawa and Hyaku-soku (2007)	Inpatient setting/14 pts with hypertrophic scars from burns	Prospective, cohort study/2 months	All healed burn wounds (scars).	VAS	Mugwort lotion decreased itching and sleep disturbance. Limitation: Need to continue to evaluate effects and mechanism of Mugwort lotion. Further studies needed for evaluating this lotion.
23	Ratcliff et al. (2006)	Inpatient setting/286 burn children	Retrospective chart review/varied	All burn wounds: Various wound stages.	Itch Man Scale	Management protocols for pain, anxiety, stress, and itching in pediatric population offers data to reduce burn-related symptoms in the future. I.e., itching management protocol for children: (1) Moisturizing body shampoo, lotions, and topical ointments (not hydrocortisone creams) (2) Diphenhydramine 1.25 mg/kg/dose po q6h (3) If itch remains poorly controlled, subsequently add hydroxyzine 0.6 mg/kg/dose po q6h, then cyproheptadine 0.1 mg/kg/dose q6h so that one of the medications is given q2h. Limitation: Possibility of incomplete data due to study design
24	Roh et al. (2007)	Outpatient clinic/35 burn pts	Pretest–posttest/3 months	Burn scars from partial or full thickness burns on forearm or hand.	Itch Man Scale	SRMT decreased PBP in burn victims with scars on forearms or hands. Limitation: Small sample size and needs more reliable and objective burn scar assessment tools.
25	Waked et al. (2013)	Inpatient setting/40 burn pts	RCT/1 month	2nd- and 3rd-degree burn wounds, 10%–15% TBSA—all healed scars.	5-D Itch Scale	TAP was as useful as TENS to reduce PBP. Limitation: No control group in the study and small sample noted.
26	Whitaker (2001)	Inpatient setting/one case	Case study/2 weeks	Healed 70% TBSA flame burn wound (scar).	VAS	2 weeks of TENS was effective in ↓PBP. Day 1: 62.5% decreased in itching within 4 hours of application. Day 2: 88% decreased within 4 hours of application. Day 3: No itching within 4 hours of application. Limitation: More case studies or full-scale study needed.

Note. CTG = combined pressure therapy and silicone gel sheeting group; H1 = histamine 1; H2 = histamine 2; LLLT = low level laser therapy; PBP = postburn pruritus; PG = pressure therapy group; po = orally; pts = patients; q = every; RCT = randomized controlled trial; SGS = silicone gel sheeting; SRMT = skin rehabilitation massage therapy; TAP = triamcinolone acetonide phonophoresis; TBSA = total body surface area; TENS = transcutaneous electrical nerve stimulation; VAS = Visual Analog Scale; ↓ = decreased.

Administering topical agents in both healing and healed stages of wounds are beneficial to the population with PBP according to several researches (Campanati et al., 2013; Lewis et al., 2012; Nedelec, Rachelska, Parnell, & LaSalle, 2012; Ogawa & Hyaku-soku, 2007). Campanati et al. (2013) reported that ozonated oil and hyaluronic acid gel applied to burn-associated wounds decreased PBP. The study by Ogawa and Hyaku-soku (2008) revealed that Medilixir and mugwort lotion were effective in relieving PBP. Mugwort lotion is comprised of mugwort extract, l-menthol, absolute ethanol, and distilled water. Provase (dimethicone) cream was also reported in relieving PBP (Nedelec et al., 2012). Medilixir (a beeswax and herbal oil cream) reduced PBP when applied to burn-associated wounds (Lewis et al., 2012). Moisturizing body shampoo showed effective decrease of PBP (Ratcliff et al., 2006). Botulinum toxin (Botox) is shown to reduce PBP effectively by using a one time dose in those who failed in managing PBP with conventional therapies (Akhtar & Brooks, 2012).

Nonpharmacological Interventions

Another 13 of 26 articles reported nonpharmacological methods in relieving PBP. Examples of effective nonpharmacological interventions included massage therapy, laser therapy (either regular or low-level laser), transcutaneous electrical nerve stimulation (TENS), triamcinolone acetonide phonophoresis (TAP), muscle relaxation, silicone gel sheeting (SGS), pressure garment (Unna Boot), and nanocrystalline silver (Acticoat). Most nonpharmacological interventions showed antipruritic effects, specifically during the healed stage of burn wounds, whereas massage and Benson muscle relaxation therapy can be used regardless of the stage of healing.

The study by Parlak Gürol, Polat, and Akçay (2010), a single RCT, exhibited that massage therapy to intact skin decreased PBP among adolescent burn patients at the early phase of burn injury (prehealing stage). The experimental group's itching level (range: 0–10) was averagely 6.1 before the message therapy and then significantly decreased to 2.5, whereas control group's average itching level slightly decreased from 5.59 to 5.50 (Parlak Gürol et al., 2010). They also showed that this therapy significantly reduced anxiety and pain in the experimental group (Parlak Gürol et al., 2010). There are three other studies showing effective reduction in PBP with message therapy applied directly to healed burn wounds (Cho et al., 2014; Field et al., 2000; Roh, Cho, Oh, & Yoon, 2007). The study by Cho et al. (2014), an RCT, showed that massage therapy led to significant improvement in pain and itching as well as positive changes in scar characteristics. Another RCT is the study by Field et al. (2000), reporting that massage therapy resulted in the significant decrease in itching, pain, depression, and anxiety among those with PBP. Roh et al. (2007) conducted an RCT demonstrating that massage therapy improved pruritus, scar status, and depression among burn patients. The study by Farahani, Hekmatpou, and Khani (2013), a quasiexperimental study, reported that Benson muscle relaxation therapy lowered PBP in any healing stages in burn patients. The researchers supported that Benson muscle relaxation therapy was significantly effective in relieving the pain, pruritus, and vital signs of patients with burns (Farahani et al., 2013).

Gaida et al. (2004) showed that low-level laser therapy significantly decreased PBP. The study by Hultman, Edkins, Wu, Calvert, and Cairns (2013) demonstrated that regular laser therapy relieved PBP effectively as well. The experimental study by Hultman et al. (2013) was designed as pretest–posttest. The study's control group was the intact skin of participants, and the experimental group was the participants' burn wounds (Hultman et al., 2013).

Transcutaneous electrical nerve stimulation was proven to reduce itching in patients with PBP (Hettrick et al., 2004; Whitaker, 2001). The pilot RCT by Hettrick et al. (2004) stated that TENS was significantly effective in PBP reduction when TENS was provided an hour per day for 3 weeks. The case study by Whitaker (2001) revealed that receiving TENS for 9 hours a day for 2 weeks relieved pruritus, which resulted in not needing treatment for itching after 2 weeks. In detail, PBP decreased from 100% to 0% after 2 week of TENS therapy (Whitaker, 2001).

The RCT by Waked, Nagib, and Ashm (2013) reported that TAP reduced PBP as effectively as TENS did. In their study, 20 patients received TAP and another 20 students received TENS (Waked et al., 2013). The effectiveness in relieving PBP in both groups was shown to be significantly positive, but there was no difference regarding the relief of PBP between two groups (Waked et al., 2013).

A case study by Brooks, Phang, and Moazzam (2007) demonstrated that 2 weeks of applying nanocrystalline silver to unhealed wound reduced PBP in five cases with different burn-associated wound sizes. This intervention was reported to decrease the pruritus from 7.4 to 3.1 of Visual Analog Scale, which means significant reduction in PBP (Brooks et al., 2007). The researchers also reported that nanocrystalline silver improved wound healing as well as reduction in PBP (Brooks et al., 2007).

Wearing SGS was reported as the effective way in reducing PBP (Li-Tsang, Lau, Choi, Chan, & Jianan, 2006; Li-Tsang, Zheng, & Lau, 2010). The RCT by Li-Tsang et al. (2006) showed that the experimental group had significantly decreased itching compared to the control group. The study demonstrated that participants wearing

SGS also had significant improvement in scar thickness and pliability (Li-Tsang et al., 2006). Another RCT by Li-Tsang et al. (2010) showed that wearing pressure garment significantly reduced pruritus, as well as SGS did. The study also revealed that wound was significantly improved when both pressure garment and SGS were applied together (Li-Tsang et al., 2010).

Development of the PBP Relief Protocol

The outcome of this literature review was synthesized according to the best evidence-based outcomes from both combined pharmacological and nonpharmacological interventions. Accordingly, a PBP relief protocol was developed (Figure 2). This protocol was designed according to the three different stages of wound healing: prehealing (no granulation tissue), healing (partly granulated tissue), and healed stages (scar formation) with recommended dosages and period for each intervention (Table 2). Nonpharmacological interventions were recommended before pharmacological interventions, considering established effectiveness and possible adverse effects of pharmacological interventions.

Utilization of the PBP Relief Protocol

Each stage of wound healing can be managed by both nonpharmacological and pharmacological interventions.

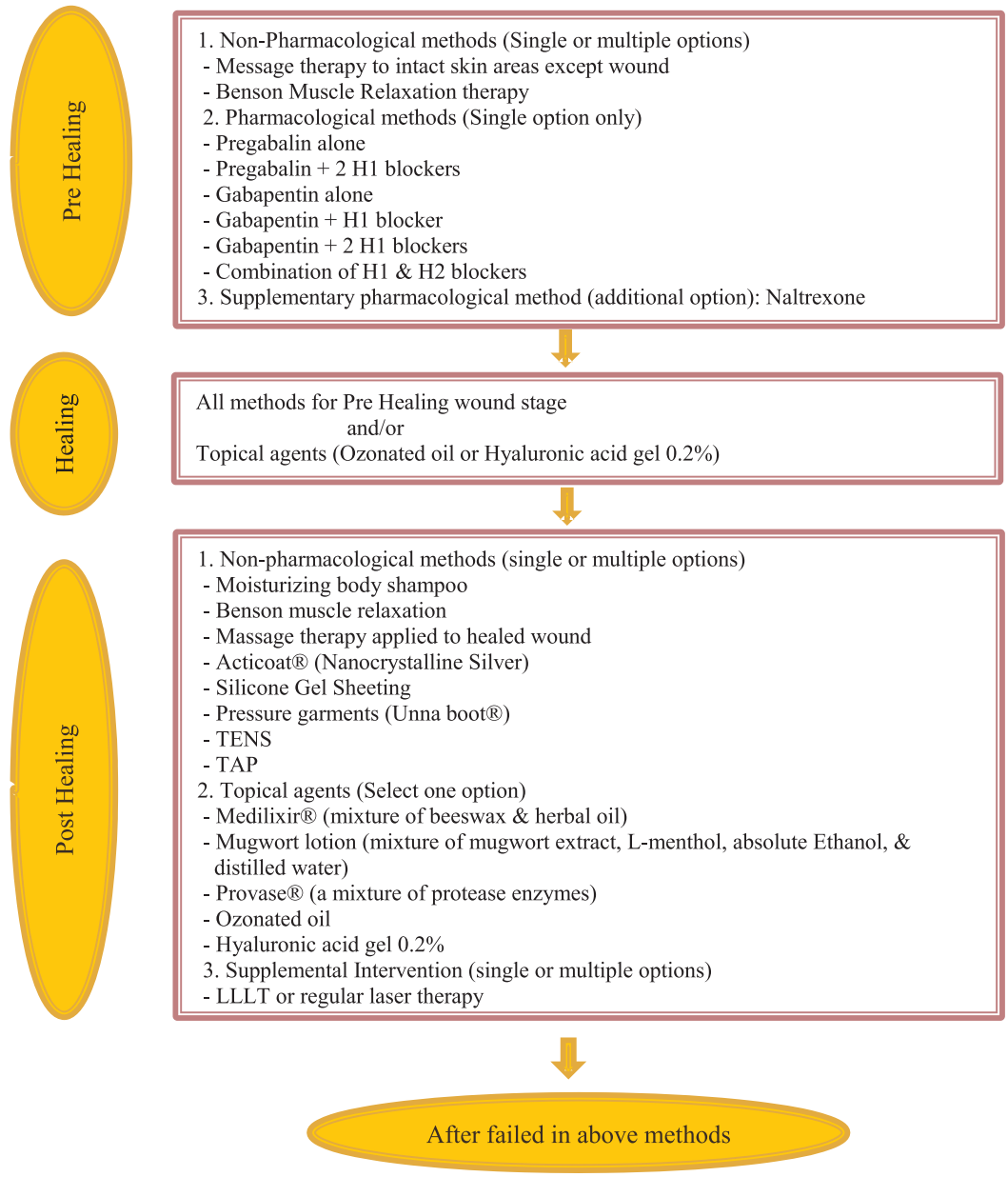

Figure 2. Postburn pruritus relief protocol.

Table 2 Postburn pruritus relief protocol guideline (recommended dosage)

Wound Stage	Treatment Plan	Recommended Dosage (Refer to Article No. in Table 1)
Prehealing stage	Massage to intact skin	15 minutes/day, 2 days/week, 5 weeks or as needed. (12)
	Benson Muscle Relaxation therapy	20 minutes daily for 1 month or as needed (8)
	Pharmacological treatment	(1, 2, 4, 11, 20, 23)
	- Pregabalin alone	- 150–300 mg/day (divided by 2 or 3 times)
	- Pregabalin and two antihistamines	- Pregabalin (same dose), Cetirizine 10–20 mg/day (one or twice a day), and Pheniramine 25 mg/day before sleep
	- Gabapentin alone	- 300–900 mg/day (adult), 5–10 mg/kg/day (child)
	- Gabapentin and H1 blocker	- Gabapentin (same dose) and Cetirizine 10-20 mg/day
	- Gabapentin and two H1 blockers	- Gabapentin and Cetirizine (same doses) and Cyproheptadine 4 mg every 6 hours
	- Combination of H1 and H2 blockers	- Cetirizine: 20 mg/day (adult) and 10 mg/day (pediatric patient), and Cimetidine: 1200 mg/day, divided by 4 (adult); 30 mg/kg/day, divided by 4 (child)
	Naltrexone (supplemental pharmacological treatment)	25–50 mg/day before sleep for 2 weeks (15, 16)
Healing stage	All treatments for prehealing stage and topical agents (ozonated oil or hyaluronic acid gel 0.2%)	Ozonated oil 2 drops/cm^2once a day or hyaluronic acid gel ½ finger tip/cm^2daily
		For 12 weeks or as needed (6)
Healed stage	Benson muscle relaxation	Same dose as above (8)
	Massage to healed wound	15–30 minutes, 1–3 times/week for 5–12 weeks (7, 9, 24)
	Nanocrystalline silver	for 2 weeks (5)
	LLLT or regular laser therapy	LLLT: 2 times/week for 8 weeks (10)
		Regular laser therapy: once per month for 6 month (14)
	TENS	Once a day for 2–3 weeks (13, 26)
	TAP	3 times/week for 1 month (25)
	SGS	Wear 12–24 hours/day for 6 months (18, 19)
	Pressure garments	Apply as needed (19)
	Topical agents	
	- Medilixir	- Once daily for 2 weeks (17)
	- Mugwort lotion	- 2 times/day for 2 months (22)
	- Provase	- 3 times/day for 4 weeks (21)
	- Ozonated oil	- 2 drops/cm^2 once daily (6)
	- Hyaluronic acid gel 0.2%	- ½ finger tip/cm^2 daily (6)
After failure with above	Botulinum toxin	One time dose (3)

Note. H1 = histamine 1; H2 = histamine 2; LLLT = low level laser therapy; SGS = silicone gel sheeting; TAP = triamcinolone acetonide phonophoresis; TENS = transcutaneous electrical nerve stimulation.

Nonpharmacological interventions are less invasive and should be considered as the primary intervention. On the other hand, pharmacological interventions are more invasive and should be used only as a supplement to potentiate the therapeutic effect of nonpharmacological interventions or to minimize possible adverse effects of pharmacological interventions.

Because nonpharmacological interventions are versatile and can be combined with other nonpharmacological and pharmacological interventions, nonpharmacological interventions should be considered first. So pharmacological interventions are recommended only when nonpharmacological interventions are ineffective. In this case, only single pharmacological intervention is initially to be used with any nonpharmacological interventions (Table 2). When single pharmacological intervention is not effective, two or three different medication can be combined. For example, at prehealing stage, all nonpharmacological interventions (both massage and Benson muscle relaxation therapy) can be used with one or more pharmacological interventions (pregabalin alone, pregabalin and two antihistamines, gabapentin alone, gabapentin and one or two H1 blockers, or a combination of H1 and H2 blockers; Figure 2).

Discussion

This PBP protocol is the first evidence-based protocol that uses nonpharmacological interventions as the primary method of choice to reduce PBP. Nonpharmacological and pharmacological interventions for PBP have been identified and presented in an easily understood protocol to improve patient outcomes and clinical practice. Recommended dosage and duration of each intervention are included to clearly guide clinicians (Table 2). A

rehabilitation nurse may utilize this protocol by encouraging patients to use nonpharmacological interventions as a primary intervention for PBP in collaboration with interdisciplinary team members.

This protocol was drawn from mostly RCTs, which are Level II evidence. However, each individual therapy of nonpharmacological interventions has one to three articles that support it (Table 2). Accordingly, clinicians need to validate the efficiency of this suggested protocol by conducting a pilot study for the patients with PBP. Their pilot study should demonstrate that this protocol significantly relieved PBP. The pilot study researchers can use the 5-D Itch Scale (Figure 3), the visual Analog Scale (Figure 4), and the Itch Man Scale as valid and reliable instruments for PBP (Elman, Hynan, Gabriel, & Mayo, 2010). In addition, they need to validate the efficacy of this PBP protocol by determining if the protocol: (1) relieved pruritus discomfort; (2) reduced cognitive dysfunctions such as low concentration, agitation, anxiety, and/or flat affect; and (3) increased quality of life.

1. Duration: During the last 2 weeks, how many hours a day have you been itching?

Less than 6 hrs/day	6-12 hrs/day	12-18 hrs/day	18-23 hrs/day	All day
☐	☐	☐	☐	☐
1	2	3	4	5

2. Degree: Please rate the intensity of your itching over the past 2 weeks?

Not present	Mild	Moderate	Severe	Unbearable
☐	☐	☐	☐	☐
1	2	3	4	5

3. Direction: Over the past 2 weeks, has your itching gotten better or worse compared to the previous month?

Completely resolved	Much better, but still present	Little bit better, but still present	Unchanged	Getting worse
☐	☐	☐	☐	☐
1	2	3	4	5

4. Disability: Rate the impact of your itching on the following activities over the last 2 weeks.

Sleep: Never affects sleep ☐ 1

Occasionally delays falling asleep ☐ 2

Frequently delays falling asleep ☐ 3

Delays falling asleep and occasionally wakes me up at night ☐ 4

Delays falling asleep and frequently wakes me up at night ☐ 5

	N/A	Never affects this activity	Rarely affects this activity	Occasionally affects this activity	Frequently affects this activity	Always affects this activity
Leisure/ Social	☐ 1	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Housework/ Errands	☐ 1	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Work/ School	☐ 1	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. Distribution: Mark whether itching has been present in the following parts of your body over the last 2 weeks. If a body part is not listed, choose the one that is closest anatomically.

Head/Scalp	☐	**Soles**	☐	**Lower legs**	☐
Face	☐	**Palms**	☐	**Tops of Feet/Toes**	☐
Chest	☐	**Tops of Hands/Fingers**	☐	**Groin**	☐
Abdomen	☐	**Forearms**	☐		
Back	☐	**Upper Arms**	☐		
Buttocks	☐	**Points of Contact w/ Clothing**	☐		
Thighs	☐	**(e.g waistband, undergarment)**			

Figure 3. 5-D Itch Scale (adapted from Elman et al., 2010).

Key Practice Points

- It is important to relieve post burn pruritus by using less invasive interventions among the post burn population.
- Quality of life in post burn populations can be improved by decreasing intractable pruritus.
- Following a post burn pruritus relief protocol can reduce severe itching related to burns.

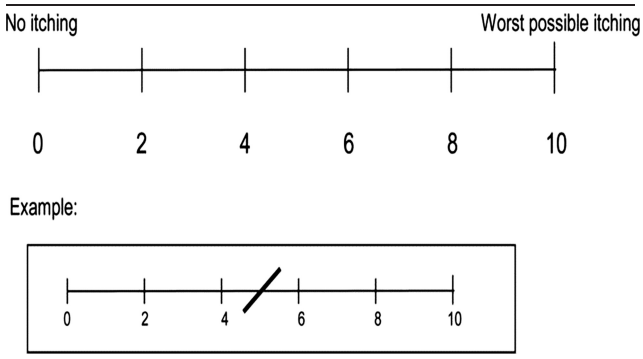

Figure 4. Visual Analog Scale (adapted from Elman et al., 2010).

Conclusion

This suggested protocol was developed to use nonpharmacological interventions primarily and pharmacological interventions as a secondary treatment. Accordingly, this protocol can be beneficial to patients by minimizing possible adverse effects of oral medications. Another benefit of this protocol is to provide a wide range of interventions with recommended treatment dosages and period. The rehabilitation nurse needs to play a key role in collaborating with the interdisciplinary team to utilize this protocol. However, the protocol needs to be verified through a pilot study ideally with an RCT design.

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