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Effect of external application of traditional herbal medicine on burn wound ulcers: A meta-analysis

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ABSTRACT The aim of the meta-analysis was to assess and contrast the effects of externally administered traditional herbal medicine on burn wound ulcers. This meta-analysis utilized dichotomous or contentious random or fixed-effect models to examine the outcomes. The odds ratio (OR) and mean difference (MD) were calculated, along with 95% confidence intervals (CIs). The present meta-analysis incorporated a total of 13 studies conducted between 1999 and 2020, which collectively had a sample size of 1282 individuals diagnosed with burn wound ulcers. Overall evaluation of traditional herbal medicine showed significantly shorter wound healing times (MD, -6.81; 95% CI, -8.81,-4.81, p<0.001) compared to standard treatment in personnel with burn wound ulcers. Traditional herbal medicine alone had a significantly shorter wound healing time (MD, -5.74; 95% CI, -8.00- -3.49, p<0.001) compared to standard treatment in personnel with burn wound ulcers. Traditional herbal medicine and Basic Fibroblast Growth Factor had significantly shorter wound healing times (MD, -9.93; 95% CI, -11.18- -8.68, p<0.001) compared to standard treatment in patients with burn wound ulcers. The examined data revealed that traditional herbal medicine with or without Basic Fibroblast Growth Factor had a significantly shorter wound healing time compared to standard treatment for burn wound ulcers. However, it is important to be mindful of its values, as a considerable portion of the chosen studies featured a small sample size.

INDEX TERMS Cis, OR, MD and meta analysis.

I. INTRODUCTION

One of the most frequent injuries is burns, and the number of burn patients has been gradually rising in recent years. The death rate from severe burns is known to be rather high when compared to other diseases, despite numerous study findings and improvements in the care of burn victims [1]. Even if someone survives a serious burn, the scars that are left behind, the ongoing pain, and the restricted range of motion not only give the patient significant bodily and psychological suffering but also put off their return to society [2]. In connection with this, recent domestic studies include a review of the literature on topical medication used for burns that are treated externally [3]. The recent trend toward oriental medicine research and acupuncture treatment for burns has been well-reviewed in the literature. However, there is a dearth of clinical data on oriental medicine's efficacy in treating burns, as well as a very small number of study on burn treatment with herbal medicine [4]. Additionally, since the majority of people currently rely on Western medical facilities for burn treatment, including burn specialty hospitals, the number of patients who visited oriental medical facilities for burn-related treatment is based on data submitted to the National Health Insurance Corporation for review. It only affects 0.174% of those who visit medical facilities [5]. To investigate the efficacy and safety of treatment techniques employing herbal medicine among oriental medicine treatment methods for skin damage induced by burns, we thoroughly reviewed related literature using domestic and international databases. Based on this, a thorough assessment of the literature was done, and elements that could be quantitatively analyzed underwent meta-analysis.

II. METHODOLOGY

A. DESIGN OF THE EXAMINATION

The meta-analyses were incorporated into the epidemiological statement and underwent a predetermined assessment procedure. For the purpose of data collection and analysis, a range of databases were accessed, including OVID, PubMed, the Cochrane Library, the Cochrane Central Register of Controlled Trials, the Chinese Biomedical Database, the Cumulative Index to Nursing, Allied & Complementary Medicine Resources, Allied Health Literature, Embase, and Google Scholar. The aforementioned datasets were utilized in order to collect research that evaluated the effects of traditional herbal medicine on the duration of wound healing for persons suffering from burn wound ulcers.

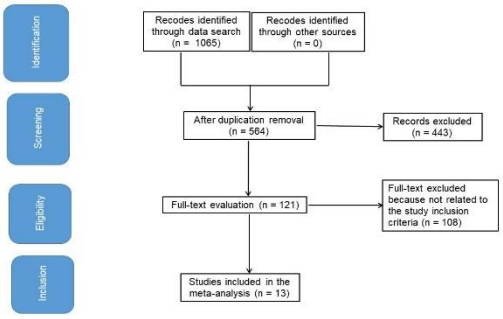
B. DATA POOLING

Various clinical outcomes emerged when comparing traditional herbal medication to standard care in the treatment of burn wound ulcers. The primary inclusion criterion in these findings was the healing time. Language restrictions were not considered when screening candidates and determining which study to include. The trials did not impose any restrictions on the number of people that might be recruited. The synthesis conducted in our study eliminated reviews, editorials, and letters due to their lack of intervention. The comprehensive procedure for examination identification is outlined in Figure 1.

FIGURE 1. Diagrammatic representation of the examination process.

III. IDENTIFICATIONS OF STUDIES

A collection of search strategies was devised based on the



PICOS concept, an acronym that represents: The study focused on a community of persons with burn wound ulcers, where traditional herbal medication was regarded as the "intervention" or "exposure." C (comparison): A comparative analysis of the efficacy of traditional herbal medicine in contrast to conventional treatment methods. O (outcome): wound healing time; S (study design): The research design was well developed and did not have any constraints. A comprehensive exploration of pertinent databases was undertaken until July 2023, employing the specified keywords and linked terms as delineated in Table I. All publications, encompassing titles and abstracts, were incorporated into a reference management software. Furthermore, a comprehensive analysis was conducted on studies that did not establish a correlation between the specific intervention and the resulting clinical results. Two authors were also engaged in the role of reviewers in order to discover relevant tests.

TABLE I

Database Search Technique for Examining Content

Database	Search strategy
Google Scholar	#1 "burn wound ulcer" OR "wound healing time" #2 "traditional herbal medicine" OR "Basic Fibroblast Growth Factor" #3 #1 AND #2
Embase	#1 'burn wound ulcer' /exp OR 'wound healing time' #2 'traditional herbal medicine'/exp OR 'Basic Fibroblast Growth Factor'/ #3 #1 AND #2
Cochrane library	#1 (burn wound ulcer):ti,ab,kw (wound healing time):ti,ab,kw (Word variations have been searched) #2 (traditional herbal medicine):ti,ab,kw OR (Basic Fibroblast Growth Factor):ti,ab,kw (Word variations have been searched) #3 #1 AND #2
Pubmed	#1 "burn wound ulcer"[MeSH] OR "wound healing time"[All Fields] #2 "traditional herbal medicine"[MeSH Terms] OR "Basic Fibroblast Growth Factor"[All Fields] #3 #1 AND #2
OVID	#1 "burn wound ulcer"[All Fields] OR "wound healing time" [All Fields] #2 "traditional herbal medicine"[All fields] OR "Basic Fibroblast Growth Factor"[All Fields] #3 #1 AND #2

IV. SCREENING OF STUDIES

The dataset was structured based on predetermined criteria, which involved the standardization of both examination and personal characteristics in a consistent way. The information that was mentioned above included the last name of the first author, the date and year of the examination, the country in which the examination was carried out, the gender of the individuals who participated, the type of population that was recruited, the total number of people who were involved, the qualitative and quantitative methods that were utilized for evaluation, demographic particulars, as well as clinical and treatment characteristics. The potential bias and quality of procedures applied in each selected test were appraised by two unidentified reviewers for further research. The approach employed in each assessment was subjected to a rigorous evaluation completed by two independent reviewers.

V. STATISTICAL ANALYSIS

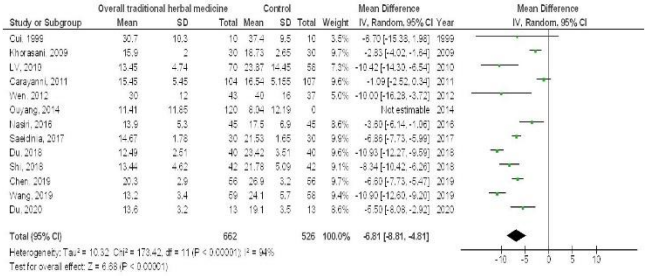
The present meta-analysis involved the calculation of odds ratio (OR) and mean difference (MD) along with a 95% confidence interval (CI). These calculations were performed using random- or fixed-effect models for dichotomous or continuous data, respectively. The researchers utilized the I2 index, which ranges from 0 to 100, to evaluate the level of heterogeneity. Higher values on the I2 index indicate greater heterogeneity, whereas an I2 value of 0 indicates the absence of heterogeneity. The choice to utilize a random effect model was made in response to the I2 statistic surpassing or equaling 50%. In contrast, when the value of I2 was less than 50%, there was a stronger inclination towards favoring the fixed effect [6]. As mentioned before, the results of the initial inquiry were categorized using subcategory analysis. The evaluation of publication bias was conducted by the utilization of Begg's and Egger's tests for quantitative analysis. The identification of publication bias was determined if the p-value above 0.05. The p-values were computed by a two-tailed analysis. Graphs and statistical analysis were conducted using Jamovi 2.3.ve 0.05. The p-values were computed by a two-tailed analysis. Graphs and statistical analysis were conducted using Jamovi 2.3.

VI. RESULTS

After evaluating a total of 1065 pertinent exams, a selection was made to include 13 studies that were published between 1999 and 2020 in the meta-analysis. These studies were chosen based on their adherence to the specified inclusion criteria, as shown by references 7-19. The results of these investigations are summarized in Table 2. The initial participant pool in the included studies consisted of 1282 individuals with burn wound ulcers, with 549 of them receiving traditional herbal medicine and 633 undergoing standard treatments. The sample sizes varied between 20 and 240 individuals. Overall evaluation of traditional herbal medicine revealed significantly shorter wound healing times (MD, -6.81; 95% CI, -8.81- -4.81, p<0.001) with high heterogeneity (I2 = 94%) compared to standard treatment in patients with burn wound ulcers, as revealed in Figure 2. Comparing traditional herbal medicine alone to standard treatment in patients with burn wound ulcers, it was found that the wound healing time was considerably shorter (mean difference, -5.74; 95% confidence interval, -8.00- -3.49, p<0.001), with a high degree of heterogeneity (I2 = 94%). This was demonstrated in Figure 3. In patients with burn wound ulcers, the results indicate that traditional herbal medicine and Basic Fibroblast Growth Factor exhibited significantly shorter wound healing times (mean difference, -9.93; 95% confidence interval, -11.18- -8.68, p<0.001) with low heterogeneity (I2 = 44%) as compared to standard treatment. The results obtained from the quantitative Egger regression test and the visual study of the funnel plot suggest that there is no evidence of examination bias (p = 0.89).. A significant portion of the relevant examinations exhibited subpar practical quality and without any indication of biased selective reporting.

FIGURE 2. The overall effect's forest plot of the traditional herbal medicine compared to standard treatment on wound healing time in personals with burn wound ulcers.

FIGURE 3. The effect's forest plot of the traditional herbal medicine alone compared to standard treatment on wound healing time in personals with burn wound ulcers.



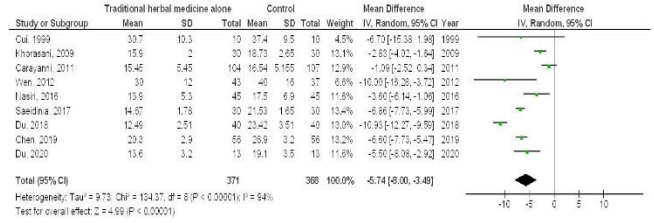


TABLE II

Characteristics of Studies

VII. CONCLUSION

Study	Country	Total	Traditional Chinese medicine	Control
Cui, 1999 [7]	China	20	10	10
Khorasani, 2009 [8]	Iran	60	30	30
LV, 2010 [9]	China	128	70	58
Carayanni, 2011 [10]	Greece	211	104	107
Wen, 2012 [11]	China	80	43	37
Ouyang, 2014 [12]	China	240	120	120
Nasiri, 2016 [13]	Iran	90	45	45
Saeidinia, 2017 [14]	Iran	60	30	30
Du, 2018 [15]	China	80	40	40
Shi, 2018 [16]	China	84	42	42
Chen, 2019 [17]	Korea	112	56	56
Wang, 2019 [18]	Korea	117	59	58
Du, 2020 [19]	China	26	13	13
	Total	**1282**	**649**	**633**

The present meta-analysis included a total of 13 examinations conducted between 1999 and 2020. Out of these examinations, 549 utilized traditional herbal medicine as a treatment approach, while 633 employed modern treatments. The study's sample size ranged from 20 to 240 individuals [7-19]. The findings from the data analysis suggest that the use of traditional herbal medicine, either alone or in combination with Basic Fibroblast Growth Factor, led to a notable reduction in the duration of wound healing for burn wound ulcers when compared to the conventional therapy approach. Nevertheless, it is crucial to exercise prudence when interpreting these findings, given that a significant portion of the chosen studies had a limited sample size (8 out of 13 investigations had a sample size greater than 100). Burn sufferers frequently experience scarring, discomfort, and itching, and healing takes longer the more extensive the burn's damage is. Infection risk is increased in burns that take longer than 2-3 weeks to re-epithelialize. Additionally, there is a very good chance that it will develop into a hypertrophic scar, thus skin transplant surgery is frequently used to treat it. This is why it is thought that the most often utilized markers to evaluate the efficacy of burn treatment were wound recovery time, pain, and scar formation rate. Based on these findings, herbal medicine created by mixing many medications might be thought of as more helpful in shortening wound recovery time than a single medication when the burn area is not extensive. In light of the aforementioned research findings, it is evident that complex drug treatments involving many herbal medicines are more effective than single drugs, and that treatment utilizing herbal medicine has a substantial impact on the treatment of burn patients. Additionally, herbal medicine treatments were typically highly efficient at reducing pain around the wound. One of the most frequent side effects that burn patients experience is pain [20], and pain in burn patients is not only brought on by the injury itself but also by interventional treatments such as surgical treatment, eschar removal, and wound cleaning [21]. Additionally, if patients are suffering from psychological illnesses such as severe anxiety and depression, dressings must be applied every day when the pain is not well controlled. Therefore, it's crucial to manage discomfort during treatment. It was notable that the Basic Fibroblast Growth Factor was frequently used combined use of herbal medicine and Western medicine. These studies sprayed Basic Fibroblast Growth Factor on the wound area, which is crucial for the development of wound granulation tissue and the regeneration of capillaries and nerves. It was employed to encourage window surface union. It is believed that herbal remedies or treatments with comparable efficacy can be used in place of or in addition to the Basic Fibroblast Growth Factor to produce the following synergistic effect [22]. It is possible to use oral drugs to actively restore this and encourage regeneration because there is a large fluid loss after a burn in addition to a generalized drop in immune function. By correctly diluting it to the intended use and the patient's physical condition, it can be used in treatments for things like clearing heat, oxidizing blood vessels, purifying the diaphragm, and treating inflammatory illnesses [23]. Due to edema, congestion, and exudative fluid in the capillary walls beneath the dermis in severe burn regions, swelling and tension of the window surface and surrounding tissues rise, creating a vicious cycle of "external pressure" and "internal blockage" in the window surface microcirculation. Due to this, it is challenging for oral medications to reach an effective concentration in the area around the local wound [24]. As a result, one might attempt herbal acupuncture, which is a technique for delivering the drug close to the wound area. Drugs employed as intervention strategies in the control group, in addition to Basic Fibroblast Growth Factor, included silver sulfadiazine 1% cream applied eight times, rifampicin once, and bepanthenol cream once. Ointments containing antibiotics like silver sulfadiazine or rifampicin are frequently used for their antibacterial effects since burn wounds are susceptible to infection. However, there are reports that topical silver-containing medications, such as silver sulfadiazine ointment, can hinder wound healing [25] and that, after prolonged use, bacteria become resistant to the medication's sterilizing effects and the quantity of wound-infecting microbes increases. Additionally, hepatic and nephrotoxicity, as well as leukopenia, may arise in the event of wounds with

a significant surface area. Dexpanthenol, the primary component, is absorbed via the skin and changed into pantothenic acid, which is a part of coenzyme A, a coenzyme that is crucial for cell metabolism. Coenzyme A is only effective as an adjunctive treatment for sunburn since it aids in the synthesis of substances that rebuild damaged skin tissue but does not relieve pain or inflammation [26]. Dressings of all kinds have recently been created and utilized to make up for these inadequacies. The meta-analysis had certain limitations: There might be an assortment bias due to the exclusion of some selected studies; however, these excluded studies did not meet the criteria for inclusion in the meta-analysis. Furthermore, we required additional data to assess whether variables such as age, gender, and ethnicity influenced the results. The objective of the meta-analysis was to investigate the conventional treatment of individuals with burn wound ulcers involving traditional herbal medicine. The utilization of erroneous or incomplete data from a previous study may have enhanced bias. The predominant elements that can contribute to instances of prejudice encompass the individual's nutritional state, in conjunction with their ethnic background, gender, and age. The fluctuation of values can occur inadvertently as a result of inadequate data and the omission of certain unpublished investigations.

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