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## REVIEW ARTICLE

## THE EFFICACY OF CONSERVATIVE TREATMENT METHODS IN PRESSURE ULCERS

Orchan Impis<sup>1</sup>, Georgios Vasilopoulos<sup>2</sup>, Ioannis Kalemikerakis<sup>2</sup>, Georgios Argyriou<sup>3</sup>

1. RN, MSc, Euroclinic Athens, Greece
2. Assistant Professor, Nursing Department, University of West Attica, Greece
3. RN, PhD, General Hospital of Chest Diseases "Sotiria", Athens, Greece

DOI:

## Abstract

**Background:** Pressure ulcer is defined as the localised destruction of skin and the underlying tissues, caused by a combination of prolonged pressure, friction and shear forces, resulting in tissue ischemia and necrosis. In addition to prevention, treatment of ulcers has an important role. This study analyses, the effectiveness of conservative treatment methods.

**Aim:** The aim of the present study was to investigate the efficacy of conservative treatment methods in patients with ulcers and to evaluate these methods.

**Material and Methods:** The present study is a systematic review. The search was conducted in Greek and international bibliography on electronic databases: Pubmed, Cinahl, Sciverse Scopus Proquest, as well as in translations of major international scientific organisations such as EPUAP and NPUAP. The date of writing the articles ranges from 2010 to 2017. Articles were selected based on the title, summary, and content.

**Results:** The results of the present study revealed the efficacy of various conservative methods of dealing with pressure ulcers based on the publication of studies in medical data bases. The treatment is multifactorial and requires special knowledge from healthcare professionals, attention and assessment of a sprawl. The ineffective treatment of ulcers can lead to death, especially if not treated on time and in the right way.

**Conclusions:** The findings show that the treatment depends on the severity of the pressure ulcer in relation to the general condition of the patient (condition, age, diet, weight, immobility, personal hygiene). Nonetheless, it can be addressed by proper prognosis, timely assessment, and appropriate countermeasures. These require sufficient knowledge of doctors and nurses over the existing conservative therapies and what / when they should be applied.

**Key words:** Pressure ulcer, conservative therapy, treatment results, conservative treatment of ulcers.

**Corresponding Author:** Orchan Impis, e-mail: orchan\_92@windowslive.com

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## INTRODUCTION

In the health area, pressure ulcers remain a major problem, especially in patients with severe illnesses due to their prolonged immobilisation. Despite the evolution of science, there are still some situations where aetiology, prevention and treatment are under continuous research.<sup>1</sup>

In European countries, the prevalence of pressure ulcers is 7% - 18% among inpatients, while the general impact is 4% - 16%. According to the patient, pressure ulcer is a condition which affects his/hers quality of life.<sup>1,2</sup> In America about 60,000 inpatients are estimated to die every year from complications of hospital pressure ulcers.<sup>3</sup> The estimated cost of managing only one pressure ulcer is \$ 70,000, and the total cost for the treatment of pressure ulcers in America, is calculated at \$ 11 billions per year.<sup>4,5</sup>

Many factors can affect the patient's quality of life with pressure ulcers being one of them. Most of us are acquainted with the term ulcer, but our knowledge is usually based either on what is presented in the press or vague information from someone who has been in a similar situation.<sup>2</sup> Therefore, most of this work is devoted to ulcers caused by pressure and the effectiveness of conservative treatment methods.<sup>4,5</sup>

'Pressure ulcer' is defined as the localised destruction of skin and the underlying tissues, caused by a combination of prolonged pressure, friction and dragging forces, resulting in tissue ischemia and necrosis<sup>6</sup>. The justification of how ulcers are created, prevented and treated, lead nursing staff to a valid diagnosis and direct intervention, which results in decreasing the incidence especially in intensive care units.<sup>7</sup>

Analysis, regarding the treatment of ulcers by conservative methods and their effectiveness, will be performed in this study.<sup>8,9</sup> It is important to mention that before making any intervention, professionals should identify the stage of the ulcer, and assess it as a whole. Finally, the results of the studies, the discussion and the conclusion are presented.<sup>6,10</sup>

## AIM

The purpose of the present systematic review was to investigate the efficacy of conservative treatment methods in patients with pressure ulcers, as well as to evaluate these methods.

## MATERIAL AND METHODS

This study is a systematic review. The sources used for this review were Greek and international bibliography in electronic databases such as: Pubmed, Cinahl, Sciverse Scopus proquest.

Data were also retrieved from international scientific organisations, such as EPUAP and NPUAP. The main key words used were the following terms: "pressure ulcers", "conservative therapy", "treatment results", "conservative treatment of ulcers".

### *Inclusion criteria*

1. Published articles in peer-reviewed scientific journals and rank in Sciverse scopus, Pubmed, Cinahl.
2. The articles were written in Greek and English language.
3. The articles were published between 2010 and 2017.
4. The keywords which were used, were related to the title of the review.
5. Publications are original research studies.

### *Exclusion criteria*

1. The title of the article was not relevant to the object.
2. Published studies are not related to spills.
3. Do not belong to this type of research, for example randomised clinical studies, cross-sectional or retrospective studies.

### *Exclusion of studies*

The research resulted in 228 articles, 80 of which were rejected because they were bibliographic reviews, while 148 were selected for further evaluation. Subsequently, 102 studies were rejected after reading the title, and 46 were selected for further evaluation. Furthermore, 25 were rejected after reading the summary, while 21 were selected for further evaluation of the whole article, and 11 of them were rejected because they did not meet the predefined entry criteria. Therefore, 10 articles met the entry criteria. There was no Greek article found matching the entry criteria. In addition, the articles which were used as primary sources are dated from 2010 to 2017. The flowchart summarises the methodology of article selection. Quantitative synthesis of the results and studies' quality evaluation (based on specific tools) was not performed because the purpose of the review was descriptive.

## RESULTS

In this literature review, an attempt was made to present the efficacy of conservative methods in dealing with pressure ulcers. Skin ulcers are a major problem for the patient, often leading to numerous adverse effects such as infections, loss of skin functionality, and diminish the quality of life of the individual. There are several conservative methods of dealing with ulcers with satisfactory results. The bibliographic review compares studies proving the superiority of conservative methods over other methods of treatment. The results of this systematic review are presented in Table 1.

## DISCUSSION

This study aimed to mention the efficacy of conservative treatment methods in dealing with pressure ulcers. A valuable database used for research has been developed over the past decade, mainly in bibliographic databases such as Pubmed, Cinahl, and Scopus. Some articles were excluded based on the type of study, the title, the summary, and the date. In addition to the use of patches in the treatment of ulcers, other conservative methods such as current use, oxygen therapy, polarised light, negative pressure vac, larval use, diet, ultrasound use as well as various antimicrobial formulations, can be used.<sup>11,12</sup>

In Kaya et al.,<sup>13</sup> the efficacy of the hydrogel patch versus povidone-iodine impregnated gauze in the treatment of pressure ulcers was compared. A prospective study showed that the rate of healing and epithelialisation of ulcers treated with hydrogel patches is important.

In the Ozkaya et al.,<sup>14</sup> study, the local effect of N-acetyl-cysteine in stage III and IV chronic ulcers, proved to be statistically significant. In Gilligan et al.,<sup>15</sup> a comparison between the effect of clostridium collagenase ointment and pharmaceutical honey was performed. In conclusion, it was proven that the ulcers treated with clostridium collagenase ointment achieved faster rates of granulation and epitheliosis compared to the ulcers treated with pharmaceutical honey.

In the clinical trial of Saidkhani et al.,<sup>16</sup> an attempt was made to determine the healing properties of nitric oxide on pressure ulcers. It was found that nitric oxide ointment accelerated the healing of ulcers, considering also the reduced cost of this method.

In the randomized study by Li et al.,<sup>17</sup> published in 2017, it appeared that the MEBO ointment used for burns in Chinese patients was a promising conservative treatment for ulcers as well, due to an auxiliary role in their regeneration. Another study by Azimian et al.,<sup>18</sup> which evaluated the effect of transdermal oxygen therapy, showed through a blind controlled trial, that oxygen therapy in pressure ulcers could promote their healing. The study by Shahrokhi et al.,<sup>19</sup> at the Shahid Rajaei University Hospital regarding the efficacy of interference current in the healing of stage I and II ulcers, found that this method can accelerate the healing of ulcers without any side effects.

Also, the prospective study of Biglari et al.,<sup>20</sup> including twenty patients with chronic pressure ulcers, examined the use and effectiveness of pharmaceutical honey. It was found that pharmaceutical honey acted as a topical antibiotic and promoted healing of the ulcers. High voltage electrical stimulation and ultrasound use in the treatment of pressure ulcers were compared in a study conducted in 2016 by Polak et al.,<sup>21</sup> and both lead to promising results due to a statistically significant reduction in the size and surface area of the ulcers.

Another major study by Farsaei et al.,<sup>22</sup> conducted at a university hospital in Iran, researching the efficacy of atrovastatin, showed a decrease in the surface area of ulcers and promoted their healing after two weeks of application. Thus, it appeared that topical application of atrovastatin as well as acetylcysteine directly to the ulcer, both reduced the surface area of ulcers.<sup>17,22</sup>

Using high-voltage electrical excitation and ultrasound as well as interfering current, both showed a reduction in the surface area of the ulcers with better positive effects by interfering current application due to a further reduction in exudate and ulcer oedema. Therefore, based on these studies, the interfering current was superior to the use of high voltage current and ultrasound.<sup>15,17</sup>

Comparing the application of nitric oxide and topical MEBO ointment, it appeared in both studies that the ulcers were significantly improved.<sup>18</sup> Regarding the effectiveness of the hydrogel and gauze impregnated with povidone iodine compared to the application of CCO ointment and pharmaceutical honey, hydrogel predominantly improved epithelialisation of the ulcers as well as CCO ointment decreased the need for hospitalisation

and promoted successful granulation. Thus, in both cases, the application of these conservative methods has positive results.<sup>19</sup> Comparing the use of pharmaceutical honey and transdermal oxygen therapy, it appeared in the first study that the honey acts as an antibiotic in the ulcers leading to their healing, while transdermal oxygen therapy results in healing of the ulcers without affecting the microbial load. There seems to be a predominance of pharmaceutical honey. There were, therefore, therapeutic remedies for the treatment of complaints either by applying drugs directly to the ulcers or through other treatments such as administering transdermal oxygen therapy, using electricity, etc. with equally good results.<sup>5,20</sup>

It is therefore necessary and an obligation of the scientific community to carry out further randomised studies in order to gain new knowledge in the existing conservative methods.<sup>9</sup>

## CONCLUSIONS

Efforts and the growing interest of researchers in the treatment of decay in recent decades have been rising. The scientific community recognises the severity and the increasing incidence of pressure ulcers. The high treatment costs and the impact on the quality of life of the patients are important factors for acquiring new knowledge. Nowadays, there are many conservative methods of reducing pressure ulcers which, if properly implemented by health professionals, the quality of life and the cost will be greatly improved over the coming decades. From the studies presented above, the efficacy of conservative treatment methods and their continuous development is shown. The differences in the therapeutic agents and their degree of effectiveness vary. Pressure ulcer treatment strategies include assessing the patient's condition, spraying, removing necrotising tissues, and using a suitable patch to maintain proper moisture and absorb exudate. Choosing the appropriate patch depends on the stage, amount of exudate and the general picture of the ulcer. Some of these methods are more effective than others that have been reviewed in numerous studies. The use of appropriate conservative methods does not ensure excellent results but improves the quality of life and leads to a better outcome / prognosis.

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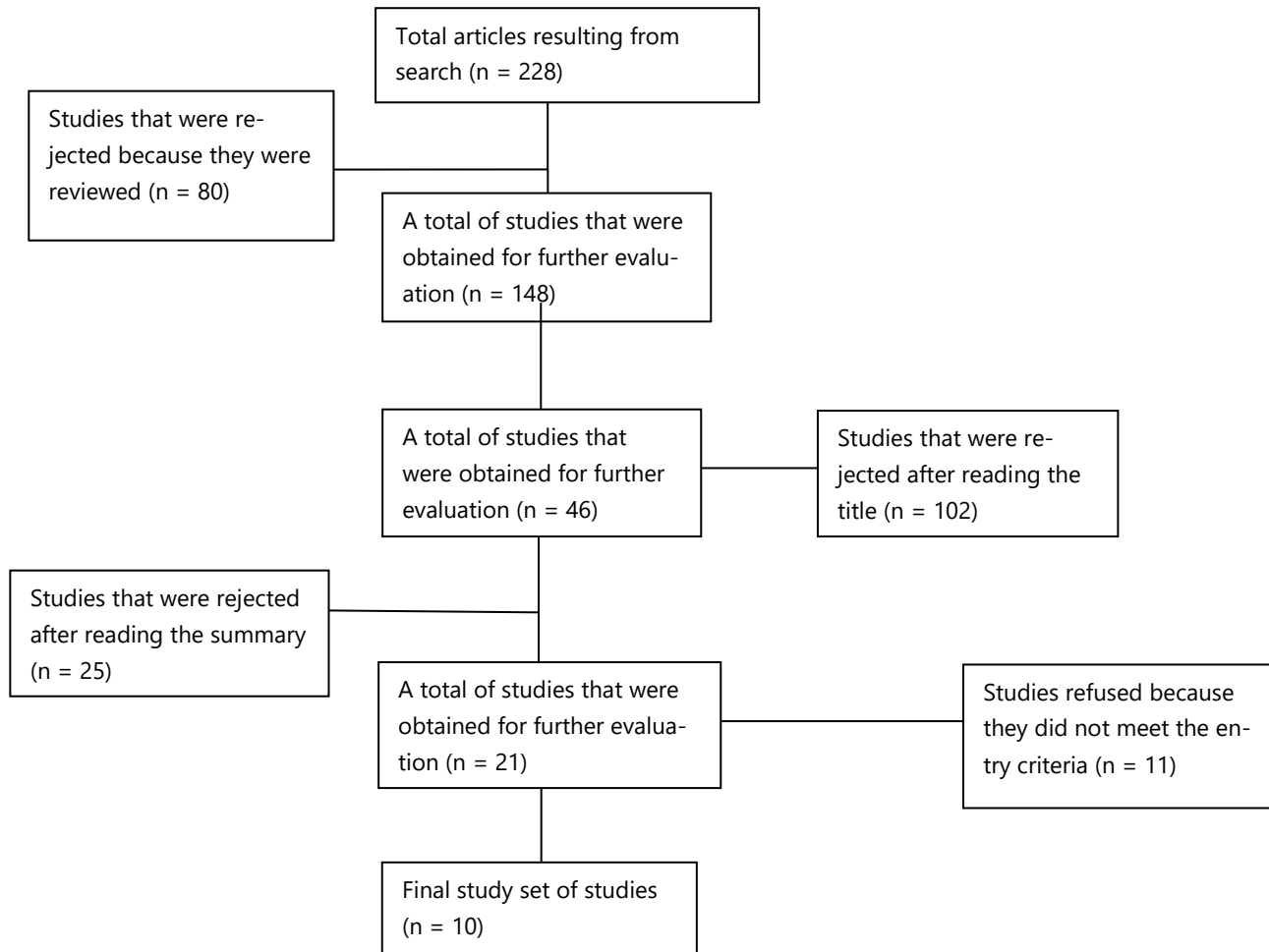
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## ANNEX

FLOW CHART 1. Study selection flowchart



**TABLE 1.** Results of the systematic review related to the efficacy of conservative treatment methods in dealing of pressure ulcers

Authors	Aim	Methodology	Tools	Results
Azimian J et al, 2015	Evaluation of the effect of transdermal oxygen therapy on healing of ulcers	Controlled randomized study of 100 patients divided into 2 groups (n = 50-intervention group) and (n = 50-control-group)	Data collection via the PUSH scale and calibrated ulcer measurement. Data analysis through SPSS	After 12 days of treatment with twot, complete healing of the ulcers was seen in 16 patients compared to the control group 1 patient (p = 0.01) <sup>7</sup>
Polak A et al, 2016	Estimation and comparison of the efficiency of high voltage electrical stimulation in relation to the use of ultrasound in the treatment of 3rd and 4th stage ulcers	A prospective controlled trial of 27 patients divided into 2 groups (n = 14-electric stimulation group) and (n = 13-ultrasonic group)	Use calibrated ulcer surface ruler and data analysis through SPSS	In the electrical stimulation group, a 63% and 43% reduction in the surface of the ulcers was seen in comparison to the ultrasound group (p <0.04) <sup>10</sup>
Shahrokhi A et al, 2014	Determination of the effect of the interference current (IF) on the first and second degree pressure ulcers	Clinical trial of 23 patients divided into 2 groups (n = 12-interference current group) and (n = 11 control group)	Calibrated ulcer measurement ruler and Cochran test. Data analysis through SPSS	In the treatment group with respect to the control group, there was a decrease in the surface of the ulcers (p <0.012), reduction of the exudate (p = 0.008), reduction in swelling (p = 0.000) and significant difference in color of the ulcers compared to the control group (p = 0.02) <sup>8</sup>
Saidkhani V et al, 2016	Determination of the effect of nitric oxide on healing of the sores	Clinical trial of 58 patients in 2 groups (n = 29-treatment group) and (n = 29-control group)	Data collection through the PUSH scale. Analysis by SPSS	The PUSH score scored a statistically significant score (p = 0.04) with regard to healing <sup>5</sup>
Li W et al, 2017	Estimation of the efficacy and eventual side effects of mebo in the treatment of ulcers	A randomized controlled clinical trial of 72 patients divided into 2 groups (n = 36-mebo group) and (n = 36-placebo group)	Data collection with VAS / PUSH scales and data analysis via SPSS	At the end of the study it was shown that patients treated with mebo healed the ulcers by 50% compared to the placebo group by 16.7% (p <0.05) <sup>6</sup>
Biglari B et al, 2012	Determination of the results of pharmaceutical honey in relation to healing and bacterial growth in pressure ulcers	Prospective study of 20 patients	Calibrated ulcer surface ruler and photographic material	After a treatment week the ulcers were sterile microbes and 18 out of a total of 20 patients (90%) showed complete healing of the ulcers after 4 weeks <sup>9</sup>
Farsaei S et al, 2014	Assessment of the effect of topical atorvastatin on the healing of pressure ulcers	Randomized double-blind, controlled clinical trial of 104 patients divided into 2 groups (n = 51-atorvastatin group) and (n = 53-placebo group)	STIRLING scale, photographic material and use of a calibrated ruler for ultraviolet measurement. Data	The 7th and 14th day showed a decrease in ulcer surfaces and their healing in the atorvastatin group compared to the placebo group statistically significant (p <0.01) <sup>11</sup>



			analysis through SPSS	
Kaya Az et al, 2010	Comparison of hydrogel and gauze impregnated with povidone iodine	Prospective study of 27 patients divided into 2 groups (n = 25 / n = 24)	Spss data analysis	The healing rate of the treatment group was higher without a statistically significant difference, whereas the total of the epithelialized complaints were 84% in the treatment group and 54% in the control group with a statistically significant difference (p = 0.04) <sup>2</sup>
Ozkaya H et al, 2015	The effectiveness of topical n-acetyl-cysteine therapy in the treatment of pressure ulcers	Case study of 2 patients with (n = 3) pressure ulcers	Use a calibrated ruler to measure the surface of the ulcers	After the treatment, it appeared that in the 1st patient the ulcer decreased in length to 0.5 cm from 5 cm, while in the 2nd patient the surfaces decreased and the second was 3 cm. and 4.5cm. from 7cm and 8 cm respectively pretreatment. <sup>3</sup>
Gilligan Am et al, 2017	Comparison of topical clostridium collagenase ointment in relation to medicinal honey in the treatment of pressure ulcers	US / Puerto Rico retrospective archives in the years 2007-2013 for a total of 517 patients	Retrospective files from the USWR database to outpatients in more than 100 hospitals	Patients treated with cco in relation to patients treated with medicinal honey required fewer visits to their ulcers (p <0.001), fewer surgical cleansings (p <0.001), and fewer spills treated with negative pressure (p & lt; 0.002). They were also 38% more likely to achieve 100% granulation compared to pharmaceutical honey. <sup>4</sup>