

Facial Burns and Theresienöl®

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Abstract: Background: Worldwide, annually, 11 million people seek medical assistance due to burn traumatic injuries. Most of the are attributable to natural disasters, work accidents and domestic burns, in some cases, they may indicate the presence of child abuse. Management of facial burns presents a challenge to surgeons as burn traumas involving the face result in both physical and psychological injury. **Objective:** The aim of the present study is to investigate the effect of Theresienöl® in cases of facial burns. **Method:** Over a period of two years, the study contingent was 53 patients. Patients were selected from those attending the Department of Burns, Plastic, Reconstructive and Aesthetic Surgery at "St. George" University Hospital, Medical University "Plovdiv". They were subdivided into groups according to age, gender, etiology and degree of burns as well as duration of treatment. Once per day our patients received treatment with Theresienöl® based on an open approach, with rubbing of the substance with massage movements, thus securing impregnation of the oil in the damages areas. **Results:** We monitored a very good penetration of the oil in the eschars and consequently – their more rapid separation and better esthetic results. Patients reported complete recovery with very good esthetic result to day 14. Based on our study protocol, it was used in the management of superficial facial wounds with a very good outcome. **Conclusions:** Theresienöl® is a patent product that is used in the treatment of difficult to heal wounds, burns, edemas and after surgery.

Highlights

The first application of Theresienöl® reduce the post-burn edema
Compared to other medical products used for treatment of facial burns, we monitored a very good penetration of the oil in the eschars and consequently – their more rapid separation and better esthetic results
Regardless of the short lived rubor of the underlying epithelium, no pigmentation was noted
Patients reported complete recovery with very good esthetic result to day 14
Based on this evidence, we consider the results and outcomes following treatment with Theresienöl® as very good

Key words: Face burn, Theresienöl®, natural product, conservative treatment, face scars.

List of Abbreviations

World Health Organization	WHO
trans-epidermal loss of water	TEWL
volume fraction of haemoglobine	vHb

1. Introduction

Worldwide, annually, 11 million people seek medical assistance due to burn traumatic injuries. Most of them are attributable to natural disasters, work accidents and domestic burns. In some cases,

they may indicate the presence of child abuse [1, 2]. In approximately 60% of the cases, burns involve the face and the neck. Management of facial burns presents a challenge to surgeons as burn traumas involving the face result in both physical and psychological injury. Facial and cervical burns could cause serious complications as upper respiratory tract edemas, visual loss, deafness, and loss of olfaction, skin color changes, microtomy, disfiguring, etc. The face is considered the center of our personality, therefore, facial trauma and disfigurement may cause post-traumatic stress disorders (PTSD).

Recent advances in medical knowledge and technology in the area of pathophysiology and

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pathology of tissue damage following burns have resulted in the development of new approaches to the management and treatment of burns. Moreover, surgical and conservative management of burns and post-burn complications have been thoroughly revised.

At present, various conservative methods for burns management are available and they are aimed at treatment of fresh burn injuries and at limiting the degree of post-burn complications. These problems require a complex approach, addressing functionality on one hand and on the other, esthetics, which is an irreplaceable part of patients' social adaptation. Thus, the application of various local treatments is gaining popularity. A number of naturally based products are available on the market. Theresienöl®, is among these products and it has become popular recently.

The aim of the present study is to investigate the effect of Theresienöl® cases of facial burns.

1.1 Product Characteristics

Theresienöl® is a natural medical agent based on a family recipe that has remained unchanged for 700 years. The recipe is kept secret, only the ingredients (Butyrumbovis, Skin Lipids, Pyrus Malus Fruit Extract, Pentylene Glycol, Stellarioides Longibracteata Leaf Extract, Tocopheryl Acetate, Tocopherol (Vitamin E)), not the exact proportions are known. Theresienöl® contains plant and animal extracts of a 100% natural origin – natural fats and healing substances grown in the region of Tyrol, Austria. Its components act as α -blockers and exert anti-inflammatory, regenerating and soothing effects on the broken skin. Some of these substances are Butyrumbovis (cowbutter) and fat-soluble vitamins – tocopherol acetate, and tocopherol (VitE), which have a beneficial effect on epithelization and prevent the formation of hypertrophic scars. The Pyrus Malus extract (apple juice extract) is a natural anti-oxidant, preventing the formation of free radicals; tannin and salicylic acid improve tissue acidity and thus augment

the anti-inflammatory and the anti-fungal properties of the product. The leaves of stellarioides longibracteata and the saponins reduce the tissue edema, have diuretic effects and improve blood supply even at low dosage. The good tissue perfusion increases the oxygen delivery and the related regeneration function of the skin lipids. The added Pentylene Glycolids in pain syndrome control [3].

2. Materials and Methods

Over a period of two years, patients were selected from those attending the Department of Burns, Plastic, Reconstructive and Aesthetic Surgery at “St. George” University Hospital, Medical University “Plovdiv”. The study contingent was 53 patients, of them 29 males and 24 females. They were subdivided into groups according to age, gender, etiology, degree of burns as well as duration of treatment (Table 1).

41 adults and 12 children required medical treatment. Flame burns are the most common.

In this study, there were 48 superficial burns (I-IIA) and 5 deep burns (IIB-III). Patients with IIB-III burns were further treated with surgery during the study.

Our patients regularly receive Theresienöl® based on the open method every day. For treatment, rub the

Table 1 Patients distribution.

Patients (n = 53)		
Parameters	Male	Female
Age		
Children	8	4
Adults	21	20
Etiology		
Flame	18	12
Scald	7	10
Contact	2	1
Chemical	1	1
Electrical	1	0
Depth of burn		
I-IIA	25	23
IIB-III	4	1
Treatment days		
Up to 10 days	23	19
Over 10 days	6	5

substance through massage action to ensure that the oil in the damaged part is soaked.

3. Results

During the study, Theresienöl® was applied for the first time, we established significant reduction in the post-traumatic edema. Pronounced erythema was noticed in the first 24 hours, which resolved completely after the second application of the oil. The patients reported that they felt alleviation of tension in the facial area, which is usually related with the skin dehydration and formation of eschars. Compared to other medical products used for treatment of facial burns, we monitored a very good penetration of the oil in the eschars and consequently – their more rapid separation and better esthetic results. Up to day 3 after the application of

Theresienöl®, the volume of the eschars reduced, they underwent partial separation, revealing well-developed pink re-epithelialization tissue. On the average, up to day 5-7, we observed, complete eschars shedding off with partial red areas beneath them. Within 14 days, the redness completely abated. Regardless of the short lived rubor of the underlying epithelium, no pigmentation was noted. Patients reported complete recovery with very good esthetic result to day 14. In 42 patients, treatment resulted in full epithelization to day 10, the remaining 11 patients reported a duration of recovery for more than 10 days. Figure 1-9 shows patients with epithelialization lasting more than 10 days (Figures 1-9).

Based on this evidence, we believe that outcomes following treatment with Theresienöl® are very good.



Fig. 1 Case 1. 13-year old boy on the 1st, 3rd, 5th, 7th, 9th and 11th day.



Fig. 2 Case 2. 5-year old girl on the 1st, 3rd, 6th and 9th day.



Fig. 3 Case 3. 37-year old woman on the 1st, 3rd, 6th and 9th day.

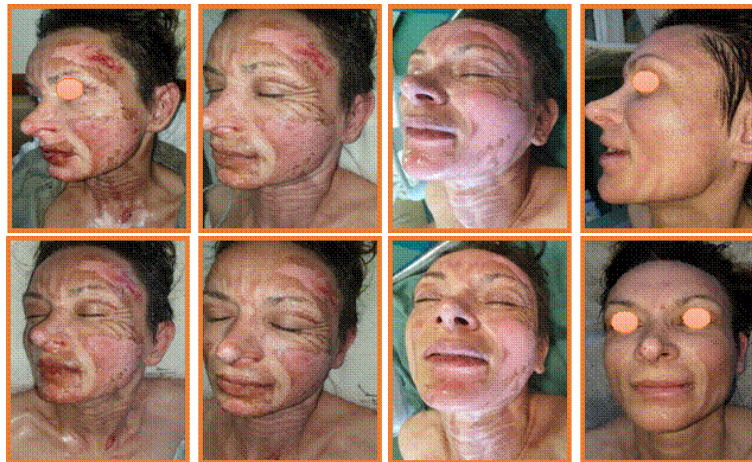


Fig. 4 Case 4. 29-year old woman on the 1st, 3rd, 6th and 9th day.



Fig. 5 Case 5. 58-year old man with IIAB degree facial burn (IIA perioralis and IIB in regio buccalis and frontalis) on the 1st, 3rd, 5th, 7th, 10th and 14th day.



Fig. 6 Case 6. 48-year old woman with I-IIA degree facial burn on the 1st to 10th day.



Fig. 7 Case 7. 43-year old man with I-IIA degree facial burn on the 1st, 2nd, 3rd, 5th, 7th and 10th day.

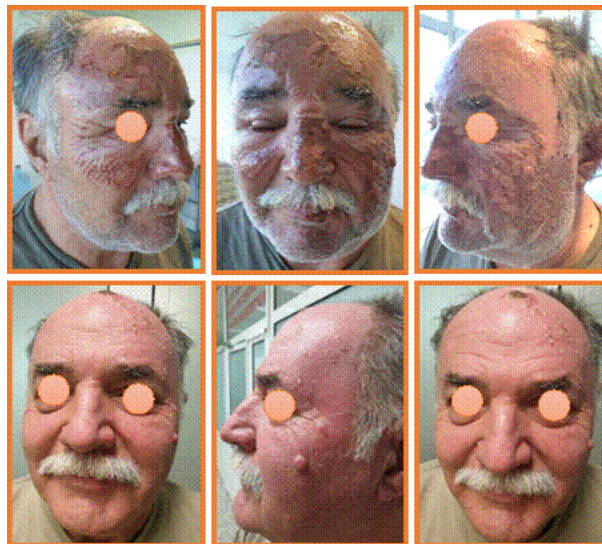


Fig. 8 Case 8. 71-year old man with eschars after facial burn on the 1st, 2nd, 3rd and 10th day.



Fig. 9 Case 9. 69-year old man with IIB-III degree facial burn on the 1st, 5th, 11th day. Further treatment included surgery.

4. Discussion

Facial burns are managed conservatively and/or surgically depending on the depth of injury and affected areas. Conservative treatment is based on open or closed approach.

The main target in the treatment of facial burns is recovery with a good anatomical balance, restored symmetry and facial expressiveness. Damage of the facial subunits due to the tissue injury and the traumatic pain and edema could result in temporary or definitive disfigurement, contractures, loss of function and psychological trauma.

Adequate treatment reduces the risk of microstomy formation, ectropion, nasal contractures and other post-traumatic injuries.

Burn wounds progress dynamically and when inadequately treated, quickly deteriorate [4]. Dehydration of the bottom of the wound and infection lead to compromised healing of the wound. Therefore, the choice of therapeutic agent plays a crucial role in preventing the deterioration of burn injuries [5].

As a rule, superficial burns - I-IIA degree are managed conservatively, whereas deep burns IIB-III degree - surgically.

The face has a unique blood supply, that aids in rapid healing, thus making local conservative management of deep facial burns (IIB) possible [6].

The primary surgical management of the burned face is important determinant of the final treatment success. Removal of devitalized tissue, antiseptic treatment and application of antimicrobials are

considered the “gold” standard [7]. Anti-septic products are the first method of choice during the primary surgical treatment. They reduce the risk of infection and prepare for subsequent wound management [8]. In Monafo’s opinion, the use of antimicrobials contributes to wound healing and reduces the areas of necrosis and stasis. Thus, a better functional and esthetic outcome is achievable. On the other hand, infection of the wound deepens the degree of the burn [9].

Various agents as silver compounds, antibiotic and antimicrobial unguents, epithelotonic and enzyme based creams as well as plant extract are applied in the treatment of facial wounds [10]. Synthetic wound dressings containing silver, chlorhexidine, corticosteroids, antibiotics etc. could also be applied. The use of non-adhesive and pain reducing products is also indicated as they help to maintain a moist environment [11]. The open approach is more commonly applied [12]. Recently, new naturally based products are gaining popularity in the clinical practice [13].

According to the World Health Organization (2011) [14], approximately 70–95% of the world’s population in the developing countries uses plants with healing properties mainly in the primary healthcare. A large number of modern therapeutic agents have roots in ethno pharmacology. Over the last decades, the application of medicinal plants in wound treatment has gained significant popularity among the scientific community [15, 16].

Plants with healing properties are widely used in the management of burns. This is likely due to their ability to stop bleeding and to promote wound healing.[17]. It is considered that the application of naturally based products in the treatment of burns gives better outcomes compared to those seen when silver sulphadiazin and jodine povidone are used [18].

Theresienöl® produces a film over the wound, thus preventing the penetration of microorganisms but allows exudate to flow off. The product is completely based on natural substances and reduces the initial edema in the wound. Its application is easy and pain free. It secures adequate hydration of the wound bottom and so far, no side effects or allergic reactions have been noted. It is considered, that the integration of natural fats and bio-components (Theresienöl®) improves epithelization and prevents formation of severe scars [3].

Via a hyperspectral camera, Strashilovet al. performed a spectrometric in depth analysis of the skin (epidermis, upper dermis, papillary and capillary systems, deep dermis and subcutis). It established the volume fraction (vHb) and the oxygen hemoglobin saturation in patients with burns, who have been treated with Theresienöl®. The increased oxygen saturation after application improves epithelization and augments the anti-inflammatory properties of the affected surfaces regardless of the desquamation, the TEWL and other limiting factors [3].

The use of enzymatic necrectomy instead of early escharectomy with skin grafting is recommended by some authors [19]. Enzymatic necrectomy aims at penetration through the eschars and their separation from the underlying healthy tissue. It has been applied for more than 50 years [20]. Rosenberg [21] distinguishes between two groups of enzyme agents: from plant and animal origin. This approach has a limited use in cases of facial burns because there is data on poor epithelization [22]. In our opinion, enzyme necrectomy followed by skin grafting often

leads to formation of pathological scars, ectropion, microstomy, etc.

We established that similarly to the enzymatic agents for necrectomy Theresienöl® also penetrates in the eschars but does not separate them from the bottom of the wound. This allows good epithelization sub crustam. Theresienöl® reduces the volume of the eschars for 2-3 days and they gradually fall off. Beneath them, a pink epithelium is seen without the presence of secreting wound zones that are pre-requisite for poor wound healing [23].

In burn wounds treated with Theresienöl®, there is early abatement of the acute inflammation better control of infection and more rapid healing compared to other similar agents.

The treatment of facial burns follows the established scheme. Many times, even short-term exposure and a small amount of breathing movement in a hot air environment are enough to cause burns to the oral and nasal mucosa. Moreover, frequently, the upper and lower respiratory tract are affected. The developing edema in the first minutes after the trauma, requires application of corticosteroids i.v. based on a special regimen in order to reduce lower respiratory tract edema and subsequent respiratory failure. In cases of severe and large burns, Theresienöl® could be used as an adjuvant therapy [24].

5. Conclusions

Theresienöl® is a patent product for the treatment of difficult-to-heal wounds, burns, hematomas, edemas and after surgery. Based on our study protocol, it was used in the management of superficial facial wounds with good results.

Theresienöl® improves the hydration of wounds, helps to liquefy the devitalized wound tissue, reduces fibrin deposits, and contributes to their evacuation. At the same time, it reduces bacterial invasion and inflammation. The resulting epithelization-surrounding wall promotes fibroblast and endothelial cellular migration and proliferation.

The newly formed granulations gradually fill up the wound with healthy tissue and epithelization is stimulated.

These properties of Theresienöl® are extremely valuable in the treatment of superficial facial burns. The good results in our study provide a basis for applying and recommending this approach for superficial facial wounds, provided indications exist and treatment algorithms for the affected area are strictly adhered to.

Declarations

- Ethics approval and consent to participate – all the patients/their parents have signed informed consent. In Medical University Plovdiv, is unnecessary to have more than informed consent when we use a legal product Theresienöl®

- Consent for photography- all the patients/their parents have signed informed consent

- Consent for publication – all the patients/their parents have signed informed consent

- Availability of data and materials – All data generated or analysed during this study are included in this published article [and its supplementary information files].

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Author Contributions

All authors contributed equally to this work.

References

- [1] Timonov, P., et al. 2018. "Child Abuse-knowledge, Attention and Diffusion in the University Hospital "Saint George", Plovdiv in Bulgaria." *J Public Health Policy*
- [2] Tsranchev, I., et al. 2018. "Determination of Child Abuse." *J Pub Health Catalog* 1 (2): 53-55.
- [3] Strashilov, S., Slavchev, S., Aljowder, A., et al. 2020. "Austrian Natural Ointment (Theresienöl®) with a High Potential in Wound Healing – A European Reiew." *Wound Medicine* Available in: <https://doi.org/10.1016/j.wndm.2020.100191>.
- [4] Zawacki, B. E. 1974. "Reversal of Capillary Stasis and Prevention of Necrosis in Burns." *Ann Surg* 180 (1): 98-102.
- [5] Fraulin, F. O., Illmayer, S. J., and Tredget, E. E. 1996. "Assessment of Cosmetic and Functional Results of Conservative versus Surgical Management of Facial Burns." *J Burn Care Rehabil* 17 (1): 19-29.
- [6] González-Ulloa, M. 1987. "Regional Aesthetic Units of the Face." *Plast Reconstr Surg* 79 (3): 489-90.
- [7] Дамян Дамянов and Огнян Хаджийски. 2008. Ръководство по хирургия с атлас - том 17: Изгаряния и измръзвания. (in Bulgarian)
- [8] Ward, R. S., and Saffle, J. R. 1995. "Topical Agents in Burn and Wound Care." *Phys Ther* 75 (6): 526-38.
- [9] Monafo, W. W., and West, M. A. 1990. "Current Treatment Recommendations for Topical Burn Therapy." *Drugs* 40 (3): 364-73.
- [10] Bitter, C. C., and Erickson, T. B. 2016. "Management of Burn Injuries in the Wilderness: Lessons from Low-Resource Settings." *Wilderness Environ Med* 27 (4): 519-525.
- [11] Gear, A. J., Hellewell, T. B., Wright, H. R., et al. 1997. "A New Silver Sulfadiazine Water Soluble Gel." *Burns* 23 (5): 387-91.
- [12] Jull, A. B, Cullum, N., Dumville, J. C, et al. 2015. "Honey as a Topical Treatment for Wounds." *Cochrane Database Syst Rev* doi: 10.1002/14651858.CD005083.pub4.
- [13] Maenthaisong, R., et al. 2007. "The Efficacy of Aloe Vera used for Burn Wound Healing: A Systematic Review." *Burns* 33 (6): 713-8.
- [14] THE WORLD MEDICINES SITUATION 2011 TRADITIONAL MEDICINES: GLOBAL SITUATION, ISSUES AND CHALLENGES Molly Meri Robinson Classifications, Terminology and Standards, WHO, Geneva Xiaorui Zhang Traditional Medicines, WHO, Geneva.
- [15] Salhi, N., Bouyahya, A., Fettach, S., et al. 2019. "Ethnopharmacological Study of Medicinal Plants Used in the Treatment of Skin Burns in Occidental Morocco (area of Rabat)." *South African Journal of Botany* 121: 128-142.
- [16] Subrahmanyam, M. 1998. "A Prospective Randomised Clinical and Histological Study of Superficial Burn

- Wound Healing with Honey and Silver Sulfadiazine.” *Burns* 24 (2): 157-61.
- [17] Bahramsoltani, R., Farzaei, M. H., and Rahimi, R. 2014. “Medicinal Plants and Their Natural Components as Future Drugs for the Treatment of Burn Wounds: An Integrative Review.” *Arch Dermatol Res* 306 (7): 601-17.
- [18] Banati, A., et al. 2001. “Topical Use of Sucralfate Creamin Second and Third Degree Burns.” *Burns* 27 (5): 465-9.
- [19] Cordts, T., et al. 2016. “Enzymatic Debridement for the Treatment of Severely Burned Upper Extremities—Early Single Center Experiences.” *BMC Dermatol* doi: 10.1186/s12895-016-0045-2.
- [20] Altemeier, W. A., et al. 1951. “Enzymatic Debridement of Burns.” *Ann Surg* 134 (4): 581-7.
- [21] Rosenberg, L., et al. 2004. “Safety and Efficacy of a Proteolytic Enzyme for Enzymatic Burn Debridement: A Preliminary Report.” *Burns* 30 (8): 843-50.
- [22] Klasen, H. J. 2000. “A Review on the Nonoperative Removal of Necrotic Tissue from Burn Wounds.” *Burns* 26 (3): 207-22.
- [23] Leon-Villapalos, J., Jeschke, M. G., and Herndon, D. N. 2008. “Topical Management of Facial Burns.” *Burns* 34 (7): 903-11.
- [24] Nischwitz, S. P., Luze, H., Popp, D., et al. 2021. “Global Burn Care and the Ideal Burn Dressing Reloaded — A Survey of Global Experts.” *Burns* doi: 10.1016/j.burns.2021.02.008.