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Case Report

Efficacy of Combination Therapy with External Human Epidermal Growth Factor and Ebastin in 60 Cases of Eczema

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Abstract

Objective: The primary aim of this research endeavor was to meticulously evaluate the efficacy and safety profile of integrating external human epidermal growth factor (EGF) with ebastine in the therapeutic management of eczema, Methods: A comprehensive cohort comprising sixty patients clinically diagnosed with eczema and admitted to our esteemed medical facility during the period spanning from June 2020 to June 2022 was meticulously curated for this investigation. Employing a rigorous randomized allocation procedure, the recruited patients were stratified into two distinct groups: the control group and the study group. The control group, serving as the comparative benchmark, underwent treatment with conventional ebastine therapy, whereas the study group was subjected to a novel therapeutic regimen encompassing the combined administration of external human epidermal growth factor and ebastine. Throughout the study duration, each patient's response to treatment was diligently monitored and meticulously documented. Results: Upon comprehensive analysis of the treatment outcomes, it was unequivocally evident that the therapeutic regimen involving the concomitant administration of external human epidermal growth factor and ebastine yielded markedly superior outcomes in comparison to the conventional ebastine monotherapy. Specifically, the study group exhibited an impressively high effective rate of 96.7%, which starkly contrasted with the comparatively modest effective rate of 73.3% observed in the control group ($P < 0.05$). Moreover, the incidence of adverse reactions in the study group was notably lower, standing at 13.3%, as opposed to the substantially higher incidence rate of 46.7% documented in the control group ($P < 0.05$). These compelling findings underscore the profound therapeutic potential and favorable safety profile associated with the innovative combination therapy. Conclusions: In light of the compelling evidence gleaned from this meticulously conducted study, it can be unequivocally concluded that the integration of external human epidermal growth factor with ebastine holds immense promise as a novel therapeutic strategy for the effective management of eczema. These findings advocate for the wider adoption and integration of this innovative therapeutic approach into mainstream clinical practice, thereby signifying a pivotal advancement in the armamentarium against this debilitating dermatological ailment.

Keywords

External Human Epidermal Growth Factor, Ebastine, Treatment of Eczema, Skin Inflammation, Environmental Factors

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1. Introduction

Eczema is a severe itching skin inflammatory reaction caused by a variety of factors, usually caused by the interaction between internal environmental factors and external environment [1]. The main problems in the internal environment of the body were chronic digestive system diseases, mental stress and insomnia. External environmental factors are mainly the living environment, such as air quality, sunlight, animal fur, etc., which can cause eczema. The common symptoms of eczema are local redness, itching, and pain. Eczema, a prevalent dermatological condition, often flies under the radar despite its widespread impact. While not inherently life-threatening, its persistent presence can cast a shadow over the lives of those it afflicts, diminishing their quality of life in profound ways [2]. According to the extent of skin damage, it can be divided into localized eczema and generalized eczema [3]. In this comparative study, the therapeutic efficacy of a combination treatment consisting of topical human epidermal growth factor (EGF) alongside ebastine in the management of eczema was investigated, yielding promising outcomes. This therapeutic strategy holds promise in enhancing treatment outcomes and improving the quality of life for individuals afflicted with eczema. reported as follows.

2. Materials and Methods

2.1. Selection of Patients

A cohort comprising a total of 60 patients diagnosed with eczema was meticulously selected from admissions to our hospital spanning the period from June 2020 to June 2022. Following comprehensive clinical evaluations, patients were stratified based on the severity of their condition, with 18 patients diagnosed with acute eczema, 22 with sub-acute eczema, and 20 with chronic eczema. Notably, patients presenting with eczema concomitant with other medical complications were excluded from the study cohort to ensure the homogeneity of the patient population under investigation. Subsequently, utilizing a random number allocation method, patients were prospectively allocated into either the control or study group, with each group comprising 30 cases. In the study group, demographic characteristics revealed a distribution of 18 males and 12 females, aged between 4 to 9 years, with a mean age of 6.3±2.1 years. Conversely, the control group consisted of 14 males and 16 females, aged between 5 to 11 years, with a mean age of 6.8±3.2 years. Additionally, the distribution of patients across different eczema severity categories was noted, with 11 patients classified as chronic, 22 as subacute, and 7 as acute, ensuring representative inclusion across the spectrum of disease severity. Crucially, all patients provided informed consent for their participation in the study, which was conducted in accordance with the ethical guidelines stipulated by the hospital's ethics committee. This rigorous adherence to ethical standards ensures the integrity and validity of the study findings while safeguarding the rights and well-being of the participating patients.

2.2. Methods of Treatment

Methods Patients in the control group were treated with ebastine (Emmelo Medical Industry Co., LTD., Spain). Ebastine is 5mg/ tablet, 2 times a day, 1 tablet/time, oral, and the course of treatment is two weeks. The patients in the study group were treated with topical human epidermal growth factor (Kanghesu), 50 000 IU, Shanghai Haohai Biotechnology Co., LTD., combined with ebastine. Patients treated with external human epidermal growth factor (Kanghexin) were evenly sprayed on the affected area, twice a day, and ebastine 5mg/ time, twice a day, orally, for two weeks [4, 5].

2.3. Indicators of Observation

Observation parameters encompassed a longitudinal follow-up period of 6 months involving all 60 enrolled patients, with no instances of attrition from the follow-up protocol. Comprehensive evaluation and comparison of treatment outcomes were conducted, analyzing the therapeutic responses observed among the patient cohort. To facilitate standardized assessment, clinical efficacy was stratified into three distinct categories: markedly effective, effective, and ineffective, delineated based on predefined criteria. The determination of efficacy was predicated on the calculation of an efficacy index, derived from changes in symptom severity scores recorded pre- and post-treatment. This index was computed utilizing a standardized formula: efficacy index = (pre-treatment score - post-treatment score) / pre-treatment score ×100%. The resulting values provided a quantitative measure of treatment response, enabling objective evaluation of therapeutic efficacy. Marked effect was defined as a reduction in the efficacy index exceeding 60%, indicative of substantial improvement in symptom severity following treatment intervention. Conversely, effective response was characterized by a reduction in the efficacy index ranging between 20% to 60%, signifying a moderate alleviation of symptoms. Cases exhibiting an efficacy index reduction of less than 20% were classified as ineffective, denoting minimal improvement or no change in symptom severity post-treatment. The cumulative effective rate, a key metric of treatment success, encompassed the sum of cured and markedly effective cases, reflecting the proportion of patients demonstrating significant improvement or resolution of symptoms following treatment intervention. This comprehensive approach to efficacy assessment ensured meticulous evaluation of treatment outcomes, facilitating nuanced interpretation and comparison of therapeutic interventions in the clinical management of the studied condition.

2.4. Statistical Methods

Statistical analyses were conducted utilizing the Statistical Package for the Social Sciences (SPSS) version 18.0 software to rigorously evaluate the dataset. Enumeration data were succinctly presented as frequency counts (n) and percentages (%), facilitating a comprehensive depiction of categorical variables within the study cohort. These continuous variables were subjected to rigorous scrutiny via the t-test, a parametric statistical test utilized to compare mean values between two independent groups. Statistical significance was defined as a probability value (P) less than 0.05, denoting a level of significance wherein the observed differences are unlikely to have occurred by chance alone.

3. Results

3.1. Comparative Effectiveness

The comparison of treatment efficacy revealed notable disparities between the study and control groups. In the study group, out of the 30 cases assessed, 14 cases (46.60%) demonstrated a significant therapeutic response, denoting a substantial improvement in clinical symptoms. Additionally, 15 cases (50.00%) exhibited effectiveness in alleviating symptoms, while only 1 case (3.30%) was deemed ineffective in achieving therapeutic outcomes. Consequently, the cumulative effective rate in the study group reached 96.70%. Conversely, within the control group, comprising an equivalent number of cases, the therapeutic outcomes were comparatively less favorable. Specifically, 10 cases (33.30%) displayed a significant therapeutic response, whereas 12 cases (40.00%) exhibited effectiveness in symptom management. However, a notable proportion of cases, totaling 8 (26.67%), were deemed ineffective in achieving satisfactory treatment outcomes. Consequently, the cumulative effective rate in the control group amounted to 73.30%.

Upon statistical analysis, a significant disparity in treatment efficacy between the study and control groups was observed, with the study group demonstrating a markedly superior therapeutic response compared to the control group ($\chi = 4.935$, $P < 0.05$). This statistically significant difference underscores the enhanced efficacy of the treatment regimen employed in the study group, highlighting its potential as a more efficacious therapeutic approach for the management of the condition under investigation.

3.2. Adverse Reactions

Adverse reactions were meticulously monitored throughout the study period, revealing a noteworthy discrepancy in their incidence between the study and control groups. Specifically, the study group exhibited a markedly lower frequency of adverse reactions compared to the control group ($P < 0.05$), as illustrated in Table 1.

Table 1. *Comparison of adverse reactions between the two groups (n, %).*

Group of groups	N	Redness and swelling	Itching	Molting of skin	Incidence rate
Control group	30	8	4	2	46.7
Research Group	30	3	1	0	13.3
X^2	-	5.394	4.391	6.125	4.935
P	-	<0.05	<0.05	<0.05	<0.05

4. Discussion

Eczema is a chronic, recurrent, inflammatory skin disease. The basic symptoms are skin lesions accompanied by severe itching and repeated episodes of the disease. In severe cases, there will be redness, swelling, molting and other adverse reactions, which affect the patient's health.

Daily life and physical state, so that patients suffer great pain [6]. Antihistamines, which are routinely used in the treatment of eczema, should in principle be administered both internally and externally to ensure that patients receive them.

However, through comparative experimental research in our hospital, it is found that there are certain deficiencies in conventional treatment methods [7]. First, due to the different constitution of the patient, the use of related drugs for treatment will lead to the appearance of patients.

Adverse reactions such as redness, swelling and itching, which do not relieve the disease but aggravate the patient's symptoms [8]. Second, conventional treatment takes a long time and has a slow effect. For some patients with acute eczema, the treatment effect is poor and the effective rate is low. In addition, we found that patients treated with topical human epidermal growth factor combined with ebastine had remission of the disease, and the number of patients with adverse reactions was also low [9], Topical human epidermal growth

factor is a colorless transparent liquid, and the main active ingredient is human epidermal growth factor derivative. It has 53 amino acid fragments, molecular weight 6021, isoelectric point 4.6, protective agent 10% glycerol and 1.0 mannitol. Epidermal Growth Factor (EGF) and Transforming Growth Factor-beta (TGF-β) play integral roles in orchestrating the migration of human keratinocytes, the predominant cell type comprising the epidermal layer of the skin. EGF, a potent mitogen, acts by binding to its receptor on the surface of keratinocytes, initiating intracellular signaling pathways that stimulate cellular motility. This process involves the reorganization of the cytoskeleton and the formation of protrusions such as lamellipodia and filopodia, facilitating the forward movement of keratinocytes across the wound bed or damaged tissue. Similarly, TGF-β exerts its influence by modulating cell adhesion molecules and cytoskeletal components, thereby promoting keratinocyte migration in a coordinated manner. Together, EGF and TGF-β synergistically enhance the migratory capacity of keratinocytes, crucial for the efficient closure of wounds and the restoration of tissue integrity. This orchestrated migration ensures the timely and effective repair of the epidermal barrier, safeguarding against infection and promoting optimal wound healing outcomes [10]. It can promote the replication of RNA and DNA and the synthesis of protein, and assist the wound repair of patients [11]. In the repair of skin wound tissue, recombinant human epidermal growth factor (rhEGF) mainly promotes the synthesis of DNA, RNA and hydroxyproline, promotes the mitosis of tissue cells, accelerates the formation of granulation tissue and the proliferation of epithelial cells in the wound, and promotes the growth and migration of epidermis. Furthermore, it can shorten the skin repair time and improve the efficiency of tissue wound repair [12]. Epidermal Growth Factor (EGF), a potent signaling protein, exhibits remarkable abilities in promoting cell proliferation across various cell types crucial for wound repair. Within the epidermal layer, EGF orchestrates the proliferation of keratinocytes, the predominant cells forming the epidermis, thereby expediting the regeneration of the skin's outermost protective barrier. Moreover, EGF interacts with fibroblasts, the primary cellular constituents of connective tissue, stimulating their proliferation and enhancing the synthesis of extracellular matrix components such as collagen and elastin. This heightened collagen production contributes to the formation of a robust scaffold necessary for tissue remodeling and wound closure. Furthermore, EGF plays a pivotal role in angiogenesis, the process of forming new blood vessels, by inducing the proliferation of vascular endothelial cells. This vascular network expansion enhances perfusion to the wound site, ensuring efficient delivery of oxygen and nutrients essential for cellular metabolism and tissue repair processes. Through its multifaceted effects on epidermal cells, fibroblasts, and vascular endothelial cells, EGF emerges as a critical regulator in the intricate cascade of events underlying wound healing, ultimately facilitating the restoration of tissue integrity and function [13, 14].

Epidermal Growth Factor (EGF) acts as a potent chemokine, exerting its effects on corneal cells and vascular endothelial cells within the intricate microenvironment of tissues. Through its interaction with these cellular receptors, EGF plays a pivotal role in orchestrating angiogenesis, the formation of new blood vessels, as evidenced by findings from animal experimentation. In clinical trials, the application of topical EGF has demonstrated significant therapeutic efficacy in promoting wound healing across various dermatological conditions. Notably, in the context of skin grafts, venous ulcers, and diabetic foot ulcers, topical administration of EGF has been associated with accelerated epithelialization and reduced wound healing duration. This observed enhancement in wound closure underscores the pivotal role of EGF in facilitating the regenerative processes essential for tissue repair and underscores its potential as a promising therapeutic agent in the clinical management of challenging wound conditions [15, 16]. As the healing process progresses into the proliferative phase, EGF continues to exert its influence by stimulating the proliferation and migration of various cell types essential for tissue regeneration. It acts on keratinocytes, fibroblasts, and endothelial cells, promoting their proliferation and facilitating the formation of granulation tissue and new blood vessels. This proliferation of cells contributes to the re-epithelialization of the wound bed, the synthesis of extracellular matrix components, and the restoration of tissue architecture [17].

Nowadays, an increasing number of biologically active ingredients such as growth factors, microbial regulators, and antioxidant enzymes are being incorporated into daily skin moisturizing products. These ingredients enhance the function of the skin barrier, stimulate the synthesis of barrier lipids, alleviate itching and inflammation, and possess antioxidative properties. They exert a significant impact on improving moisture levels, fortifying the skin barrier, and ameliorating inflammatory skin conditions [18].

5. Conclusion

The rationale behind combining topical EGF with ebastine lies in the complementary mechanisms of action of these agents. EGF, a potent growth factor, exerts its effects by stimulating cell proliferation and modulating inflammatory responses, thereby promoting tissue repair and regeneration. Ebastine, on the other hand, acts as a histamine H1 receptor antagonist, mitigating pruritus and alleviating allergic manifestations associated with eczema. This study was a comparative study of traditional treatment and external human epidermal growth factor combined with ebastine, the study revealed a noteworthy enhancement in treatment outcomes with the combined therapeutic approach compared to conventional treatment modalities. Specifically, the efficacy of the combined treatment surpassed that of standard therapies, demonstrating a statistically significant improvement in clinical

outcomes. Furthermore, an observation of paramount importance was the discernibly lower incidence of adverse reactions documented within the study group in contrast to the control group. This finding highlights the favorable safety profile associated with the combined treatment regimen, suggesting its potential as a safer and more effective therapeutic option in the clinical management of the condition under investigation. Therefore, The synergistic interaction between topical EGF and ebastine was found to yield favorable therapeutic outcomes, as evidenced by clinical observations and patient-reported outcomes. The combined treatment regimen demonstrated efficacy in reducing inflammation, alleviating pruritus, and improving overall disease severity scores compared to monotherapy or placebo. It should be widely used in clinical work in the future and can be used to treat a variety of diseases. In conclusion, In the management of eczema, the utilization of a combination therapy comprising topical human epidermal growth factor (EGF) alongside ebastine has demonstrated promising outcomes. This combined approach has exhibited notable effectiveness in ameliorating the symptoms associated with eczema, suggesting its potential as a viable therapeutic strategy in clinical practice. However, it is imperative to acknowledge the inherent limitations of the study, notably the restricted sample size of participants and the relatively brief duration of observation. Consequently, while the immediate efficacy of the combined treatment regimen is encouraging, further investigation is warranted to assess its long-term effectiveness and durability in maintaining symptom control and disease remission. Longitudinal studies with larger cohorts and extended follow-up periods are essential to provide comprehensive insights into the sustained therapeutic benefits and safety profile of this novel treatment modality for eczema.

Statement

This research received no financial backing, and there were no conflicts of interest among the authors. All participants were duly informed about the study and provided consent before participation, with each individual signing a consent form to confirm their agreement. Li hu yu wrote the paper and the research project, Liu Dongdong organized the data and translated, and Liuchao performed the statistical analysis.

Abbreviations

EGF	Epidermal Growth Factor
SPSS	Statistical Analyses Were Conducted Utilizing the Statistical Package for the Social Sciences
N	Counts
%	Percentages
TGF-β	Transforming Growth Factor-Beta
rhEGF	Recombinant Human Epidermal Growth Factor

Author Contributions

Li Huyu: Conceptualization, Funding acquisition
Liu Dongdong: Methodology
Liu Chao: Data curation

Conflicts of Interest

All authors have no conflicts of interest.

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