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اصول تنظیم قراردادها

آموزش مهارت های کاربردی در تدوین و چاپ مقاله
The Effect and Persistency of 1% Aluminum Chloride Hexahydrate Iontophoresis in the Treatment of Primary Palmar Hyperhidrosis

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Abstract

Primary focal hyperhidrosis is an idiopathic disease defined by excessive sweating exceeding the needs of thermoregulation that typically affects the axillae, palms, soles, and face. In most of the cases, there is no underlying disease and generally it is worsened by emotional stress rather than heat or exercise (1). The primary defect in patients with hyperhidrosis may be hypothalamic hypersensitivity to emotional stimuli from the cerebral cortex (2). The disorder, which affects up to 1% of the general population, is associated with considerable physical, psychosocial, and occupational impairments. Current therapeutic strategies include topical aluminum salts, tap-water iontophoresis, application of anticholinergic agents such as Botulinum toxin, local surgical approaches, and sympathectomies. These treatments, however, have been limited by a relatively high incidence of adverse effects and complications.

Aluminum chloride is commonly used for the treatment of hyperhidrosis. Palmar hyperhidrosis however, is less responsive to aluminum chloride therapy and successful treatment may require 6-8 h application of high concentrations up to 30% that commonly leads to skin irritation. The purpose of this study is to investigate the effect of 30 min iontophoretic application of low concentration (1%) aluminum chloride solution in patients with palmar hyperhidrosis.

Iontophoresis of 1% aluminum chloride was applied to one hand of twelve patients with palmar hyperhidrosis for four successive days. The subjects’ other hand was treated topically with the same solution at the same time. Gravimetric and iodine-starch tests were performed at baseline, 3 days, 1, 2, 3 and 4 weeks after the last treatment. Experimental hand showed significant hypohidrosis from the 3rd day until the 4th week post-treatment (p < 0.04) which was lower than the control hand throughout the follow-up period. Iontophoresis of low concentration aluminum chloride hexahydrate can induce hypohidrosis that is more persistent than its topical application and with no side effects.

Keywords: Iontophoresis; Aluminum chloride; Palmar hyperhidrosis; Hexahydrate.
A mechanism underlying this obstruction has been proposed as: the metal ions precipitate with mucopolysaccharides, damaging epithelial cells along the length of the duct and forming a plug that blocks sweat output. While it is used in regular antiperspirants, hyperhidrosis sufferers need a much higher concentration to be able to treat the symptoms of the condition effectively. A 15% aluminum chloride solution or higher usually takes about a week of nightly use to stop axillary sweating, with one or two nightly applications per week to maintain the results (6). The solution is usually not effective for palm or plantar hyperhidrosis (7) and successful treatment may require 6-8 h application of high concentrations up to 30% (8). An aluminum chloride solution can be very effective; some people, however, cannot tolerate the dermatitis that the high concentration solution can cause.

Although the ionic composition of aluminum chloride solution and the suggested mechanism of its effect make it suitable for iontophoresis, investigated yet. Therefore, we investigated induced by low concentration of aluminum chloride hexahydrate (1%) delivered by 30 min iontophoresis in patients with primary palmar hyperhidrosis.

Experimental

Twelve subjects (6 females and 6 males) with primary hyperhidrosis, aged 20-32 years (23.17 ± 3.6) participated in this experimental study. Patients were selected and referred according to the following criteria by a dermatologist: Excessive palmar perspiration and excessive sweating for more than one year. Patients with organic disease, such as hyperthyroidism were excluded in this study. Informed consent was obtained from all patients after full written and oral explanation. The research followed the tenets of the Declaration of Helsinki promulgated in 1964 and was approved by the ethics committee of Shahid Beheshti University of Medical Sciences.

Iontophoresis of aluminum chloride hexahydrate was applied to one hand, selected randomly from the dominant and non-dominant side (5 non-dominant and 7 dominant hands), using a galvanic stimulator (Euralonionius, Dynatron 438, Netherlands) with the intensity of 12 mA for 30 min. The iontophoretic treatment was repeated for four successive days. The other hand was regarded as control and treated with topical method. The active electrode covered the palmar surface of the hand from metacarpophalangeal crease to distal wrist crease. The indifferent electrode was placed on the anterior surface of the forearm. Anode was selected as the active electrode. In this study, 1% aluminum chloride hexahydrate solution in ethyl alcohol was used for treatment. This low concentration of aluminum salt was selected to curtail the possible side effects (9). Twenty milliliter of solution was delivered by iontophoresis to the experimental hand in each session. A thin layer of absorbent pad was used to retain the solution under the electrodes. The same amount of solutions was also used for the control hand and the remaining was washed out after 30 min.

All patients underwent one pre-treatment and 5 post-treatment evaluation at 3 days, 1, 2, 3, 4 and 5 weeks after the final treatment session. In the control hand, however, the sweat reduction was only about 1 week post-treatment (p < 0.05). The least sweating rate was at 3rd day and 1st week after the treatment in the experimental hand (mean reduction of 77% and 65% respectively) and 3rd day after the treatment in the control hand (mean reduction of 72%). The mean sweating rate of the experimental hand was lower than the control hand at all post-treatment evaluations, however, the differences between the hypohidrosis induced by iontophoresis and topical application of aluminum chloride was not statistically significant at any time point (p < 0.03) (Figure 2).

No skin irritation was observed during the trial except for one subject who experienced a mild and transient itching sensation.

Iontophoresis is a recognized therapeutic method for delivering ionic and also neutral compounds, i.e. drugs, into and through the skin by applying electrical current. Iontophoresis enhances the transdermal delivery of ionized drugs through the skin's outermost layer (stratum corneum) which is the main barrier to drug transport. The absorption rate of the drug is increased, however, once the drug passes through the skin barrier, natural diffusion and circulation are required to shuttle the drug to its proper location. The mechanism, by which the iontophoresis works, is based upon the knowledge that similar electrical charges repel. Applying a positive current from an electrode to a solution applied to a skin surface, will drive...
patients with palmar hyperhidrosis (9) which delivered by iontophoresis for the treatment of glycopyrrolate and aluminum chloride was used for many years to deliver drugs through the skin and the aluminum chloride is considered as an effective treatment for palmar hyperhidrosis with a wide range of use in dermatological practice (8, 14), no study has been published yet about the iontophoretic application of pure aluminum salt in treatment of focal hyperhidrosis. In the only published study, a combination of aluminum salt to penetrate directly into the sweat glands: hyperhidrosis: unapproved treatments. J. Cosmet. Dermatol. (2002) 21: 219-223.

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