

COMPARISON OF TOPICAL METHENAMINE, GLUTARALDEHYDE AND TAP WATER IONTOPHORESIS FOR PALMOPLANTAR HYPERHIDROSIS

VA Phadke, RS Joshi, US Khopkar, SL Wadhwa

Sixty patients with palmo-plantar hyperhidrosis were studied to compare the efficacy and safety of topical methenamine in the treatment of palmo-plantar hyperhidrosis with established therapies like glutaraldehyde and tap water iontophoresis. Patients were randomly allocated to 3 treatment groups: topical Methenamine (10%) solution, topical Glutaraldehyde (5% for palms and 10% for soles) and tap water iontophoresis.

Hyperhidrosis was graded into 4 grades. The total duration of therapy was 4 weeks for all the 3 groups. Patients were followed up weekly for 4 weeks and 2 weeks after completion of therapy. Response to therapy was evaluated by the change in the grade of hyperhidrosis. Side-effects like irritation and pigmentation were looked for at every follow up.

Wilcoxon's rank sum test was used for comparison between changes in grading of 2 groups. It showed that methenamine is superior to tap water iontophoresis and acts faster than glutaraldehyde. Fewer side effects were noted with methenamine.

Key Words : Palmoplantar hyperhidrosis, Methenamine, Glutaraldehyde, Iontophoresis

Introduction

Palmoplantar hyperhidrosis, though a benign condition is often the cause of social embarrassment and may adversely affect scholastic and job performance. Since systemic medications are barely effective and cervical sympathectomy is fraught with significant complications,¹ topical therapy and iontophoresis are presently the preferred remedies for palmoplantar hyperhidrosis. Many topical agents have been used including aluminium chloride, potassium permanganate, formaldehyde, glutaraldehyde, various anticholinergic substances and methenamine.

We report the results of a randomized clinical trial comparing topical methenamine, glutaraldehyde and iontophoresis in the treatment of palmoplantar hyperhidrosis.

Materials and Methods

This study comprised of 60 patients with palmoplantar hyperhidrosis attending our dermatology outpatient department. No restriction was made as to age or sex. Therapy with any product that might influence the hyperhidrotic state, such as sedatives, tranquilizers, anticholinergics was not permitted.

All the cases were clinically evaluated and were graded (Grade 1-Dry, Grade 2-Moist, Grade 3-Wet and Grade 4-Dripping wet) according to the degree of sweating so as to subsequently quantify the improvement or worsening. Patients were randomly allocated to 3 treatment groups of 20 cases each.

Group I- Methenamine Therapy: A 10% aqueous solution was prepared from white crystalline powder of methenamine. Patients were asked to apply the methenamine solution with a cotton swab once daily on palms and soles.

Group II- Glutaraldehyde Therapy:

From the Department of Skin and STD, BYL Nair Charitable Hospital, Bombay - 400008.

Address correspondence to : Dr Vaishali, 3-Anandvan, Sahitya Sahawas, Gandhi Nagar, Bandra (E), Mumbai - 400051.

Preparation of Glutaraldehyde: Aqueous buffered (pH 7.5) solution of 5% and 10% was prepared from a 25% stock solution. 20 patients were asked to dip their palms and soles in the 5% and 10% solution respectively, once daily. The duration was 5 minutes to begin with and then gradually increased according to response upto 10 minutes after one week.

Group III- Iontophoresis: Tap water iontophoresis was done on alternate days. With the help of potentiometer the current was increased till patients felt discomfort (approx. 15 to 20 mA); then it was slightly reduced and permitted to flow for 10-15 minutes.

All the 3 therapies were given for a period of 4 weeks and response to therapy was evaluated at weekly intervals. Response was determined according to shift of the patient's grade before and after therapy. (Grades of response: no change in grade - poor response, decrease in grade by 1 - moderate response, decrease in grade by 2 - good response, decrease in grade by 3 - excellent response)

A final assessment was made 2 weeks after completion of therapy to see the residual benefit.

Results

Response of the three groups (methenamine, glutaraldehyde and iontophoresis) at 2, 4, and 6 weeks is shown in Table I. Wilcoxon's rank sum test for comparison between changes in grading of 2 groups (Z test) was used. Z value of more than 1.96 is considered significant. Methenamine was superior to iontophoresis at both 2 and 4 weeks (Z value 3.91 and 2.45 resp.). Response of methenamine over glutaraldehyde was significant at 2 weeks but not at 4 weeks, suggesting that methenamine acts faster than glutaraldehyde (Z value 3.83 and 1.79 resp.). Side effects observed with different therapies are shown in Table II. No patient developed contact allergic dermatitis.

Comments

Methenamine is a condensation product of formaldehyde and ammonia and in solution it releases formaldehyde at a rate depending on the acidity of the medium.² The resultant

Table I. Response to Different Therapies

Group	Total No of patients	2 Weeks			
		Excellent	Good	Moderate	Poor
Methenamine	20	5	12	3	0
Glutaraldehyde	20	0	5	3	6
Iontophoresis	20	0	5	7	8
4 Weeks					
Methenamine	20	5	14	1	0
Glutaraldehyd	20	3	10	3	4
Iontophoresis	20	2	9	5	4
2 Weeks after therapy					
Methenamine	18	5	13	0	0
Glutaraldehyd	12	3	7	2	0
Iontophoresis	14	2	7	5	0

Table II. Side Effects of Different Therapies

Side effects	Methenamine	Glutaraldehyde	Iontophoresis
Pigmentation	8	12	0
Scaling	5	0	2
Irritant dermatitis	1	0	0
Erythema	0	0	1
Thickening	0	1	0

anhidrosis is essentially the result of precipitated protein plugs in the sweat duct.³

Davis studied the effectiveness of a methenamine conjugate, methenamine undexylenate, as a topical agent for hyperhidrosis and bromhidrosis. Topical methenamine 13% (Antihydral) has been marketed as an over-the counter product in Germany and Austria. Cullen in 1975 successfully used methenamine for the treatment of palmoplantar hyperhidrosis.³

The mechanism of action of glutaraldehyde might be due to partial occlusion of the sweat duct, increasing the intraluminal pressure, thereby diminishing sweat formation. A direct effect of glutaraldehyde on the sweat gland acini is also likely. Juhlin and Hansson observed good clinical response to topical glutaraldehyde in 25 patients.⁴

There are two theories to explain the mechanism of action of iontophoresis: (1) *Electric gradient theory*-Normal movement of sweat along the sweat duct is the result of an electric gradient. Iontophoresis disturbs this gradient in such a way that sweat no longer flows. (2) *Plug theory*-Iontophoresis induces formation of plugs in the lumina of eccrine sweat glands. Stolman and Mitgard found good clinical response in 83% and 84% of

patients respectively with tap water iontophoresis.^{5,6}

There are remarkably few studies carried out using methenamine for volar hyperhidrosis. To the best of our knowledge there are no prior studies comparing the different modalities of treatment. Our study showed methenamine to be superior to other known modalities with minimal side effects.

In conclusion, methenamine is safe, faster acting, highly effective drug which results in lasting benefit for patients.

References

1. Dobson RL. Treatment of Hyperhidrosis. Arch Dermatol 1987; 123: 883-4.
2. Antibacterial Agents. In: Martindale The Extra Pharmacopoeia, (James E.F. Reynolds, Kathleen Parfitt, eds) 30th Edition. London, The Pharmaceutical Press, 1989; 173.
3. Cullen, SI. Topical Methenamine For Hyperhidrosis. Arch Dermatol 1975; 111: 1158-60.
4. Juhlin L, Hansson H. topical Glutaraldehyde for Plantar Hyperhidrosis. Arch Dermatol 1968; 97:327-30.
5. Stolman LP. The Treatment of Excess Sweating of the Palms by Iontophoresis. Arch Dermatol 1987; 123:893-6.
6. Midtgaard KA. New Device for Treatment of Hyperhidrosis by Iontophoresis. Br J Dermatol 1986; 114:485-8.0