

## IONTOPHORETIC TREATMENT OF HYPERKERATOSIS WITH SODIUM SALICYLATE

Soma Mukherjee, A B Gupta, S Malakar and B Haldar

Ten patients having hyperkeratosis with moderate to severe fissures on palms and soles were treated with iontophoresis using 5-10% aqueous solution of sodium salicylate. The results were excellent within a period of 3-4 weeks (6-8 sittings, each for a period of 10-15 minutes). The treatment was free from the problems of salicylism. Follow-up in some of the recalcitrant cases for 4 months after stopping the treatment, and with no local application, showed neither any relapse nor deterioration. Sodium salicylate iontophoresis in hyperkeratosis seems to be safe, well tolerated and far more effective than the usual local applications of salicylic acid.

**Key words :** Hyperkeratosis palms and soles, Salicylic acid, Treatment, Iontophoresis.

Iontophoresis consists of therapeutic introduction of ionised substances into the superficial tissues by means of a carefully controlled direct electrical current. Iontophoretic applications of drugs for the treatment of various skin diseases have been reported in the past. The published works are mostly single case reports or uncontrolled series with anecdotal observations.<sup>1-4</sup> Local application of salicylic acid in hyperkeratosis is well-known. But unfortunately, such an application often proves unsatisfactory. In some cases, it takes an unusually long period to correct the disorder. It was in this context that the present study was undertaken.

### Materials and Methods

The study was conducted on 10 subjects of both sexes, in the age range 11 to 55 years. They were all having fungus-free hyperkeratosis with moderate to severe fissures on palms and soles. Even with prolonged treatment with salicylic acid, with or without urea, no satisfactory improvement was

obtained. Patients having tylosis were not included.

A commercial unit that could deliver a current of upto 25 mA in a range of 0-40 V was used for administering the ionised substance. The unit was also provided with a switching arrangement for reversing the direction of the current and a number of accessories for control.

The drug used was an aqueous solution (5-10%) of sodium salicylate taken in a suitable tray. The affected part (palm or sole) was placed in the solution against the properly designed appropriate electrode. With the switching 'on' of circuit, the salicylate ions began to migrate to the anode. The current was gradually increased to a strength of 25 mA by adjusting the voltage that ranged between 3-5 volts, the ions were allowed to penetrate into the surface tissue. The duration of treatment was 10-15 minutes at each sitting.

### Results

The results could be stated only in a semi-quantitative way. Clinical improvement of the concerned site and diminution of pain at the fissures occurred even after the second sitting. With 6-8 sittings (twice a week at equal intervals), a two-third to complete resolution was observed in all the cases. Figs. 1 and 2 depict

---

From the Physics Unit, Indian Statistical Institute, Calcutta-700 035, and Calcutta Skin Institute, Calcutta-700 054, India.

Address correspondence to: Dr. A.B. Gupta, Indian Statistical Institute, 203 BT Road, Calcutta-700 035.



the condition of a recalcitrant case before treatment and after 5 sittings. Of the 10 cases, 3 cases could be followed-up for about 4 months after stopping the treatment or any local application, and none showed any relapse or deterioration.

### Comments

The subjects who participated in our study were some of the worst cases of hyperkeratosis. The improvement that resulted within 3-4 weeks was extremely encouraging. None of the subjects complained of any uncomfortable feeling, giddiness, nausea etc during the treatment or after it. The treatment was thus free from the problem of salicylism. It appears that iontophoretic treatment of hyperkeratosis with sodium salicylate is safe, well tolerated and far more effective. However, in order to decide the eventual superiority of the iontophoretic treatment over the traditional one, a prolonged follow-up is imperative. Salicylate ions are

antihyperplastic only on pathological epidermal proliferation<sup>5</sup> while the normal area remains unaffected. The mechanism of healing is yet to be completely understood. Effectiveness of the method however, may be attributed to increased penetrability due to the kinetic energy  $qV$  acquired by the ions carrying a charge  $q$  in the applied voltage  $V$ .

### References

1. Cornwall MW: Zinc iontophoresis to treat ischemic skin ulcers, *Phys Therap*, 1981; 61 : 359-360.
2. Gordon NH and Weinstein MV: Sodium salicylate iontophoresis in the treatment of plantar warts, *Phys Therap*, 1969; 49 : 869-870.
3. Tannenbaum M: Iodine iontophoresis in reducing scar tissue, *Phys Therap*, 1980; 60 : 792.
4. Sloan JB and Soltani K: Iontophoresis in dermatology, *J Amer Acad Dermatol*, 1986; 15 : 671-684.
5. Griffiths WAD, Ive FA and Wilkinson JD: Topical therapy, in: *Textbook of Dermatology*, Fourth ed, Editors, Rook A, Wilkinson DS, Ebling FJG et al: Oxford University Press, Delhi, 1987; pp 2529-2573.