

Innovations and Ideas

Innovative Low-cost Home-made Iontophoresis Device

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Palmoplantar hyperhidrosis is a chronic, socially disturbing condition, usually idiopathic in nature. Iontophoresis is a procedure in which an electrical current is passed through skin soaked in tap water, normal saline (0.9%) or a solution containing an anticholinergic medication, which allows ionised particles to cross the normal skin barrier. It reduces sweating and enhances the delivery of drugs into the skin. It is safe, effective and inexpensive.^[1] Due to the high cost of the procedure, it remains underutilised in a low-income country such as India.

A 25-year-old gentleman presented with idiopathic palmoplantar hyperhidrosis of 5 years duration, which was not relieved by several topical as well as oral treatments, including oral oxybutynin. He was started on our innovative home-made iontophoresis, which gave satisfactory results within 6 weeks [Figure 1].

The materials used are easily accessible at a very affordable price for poor people and those in remote areas [Table 1]. For palmar hyperhidrosis, place the stainless-steel trays on a non-conductive surface without them touching each other. Fill the trays with enough tap water to submerge the palms completely. The patient can sit on a wooden chair or stand with shoes on. Each hand is placed in a tray of water containing active and indifferent electrodes. It is recommended to apply petroleum jelly to the skin at the water line and any small cuts or wounds to prevent discomfort

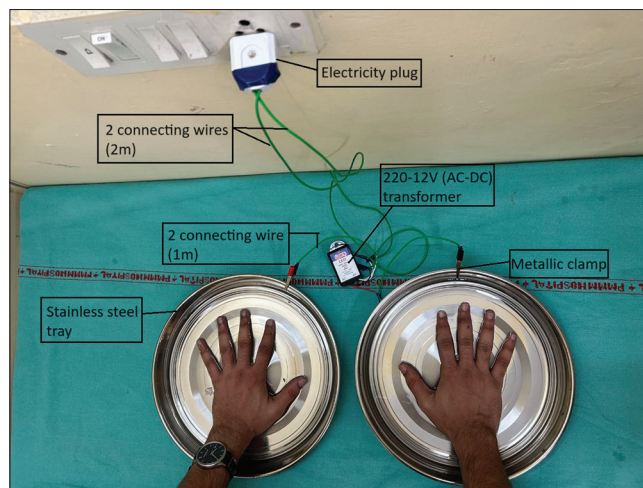


Figure 1: Instructions to assemble the low-cost home-made iontophoresis device.

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The transformer has four ends – two input ends (AC supply) and two output ends (DC supply).

The input end (AC) is connected to the domestic current supply with the help of 2 m of connecting wire and electricity plug, while the output end (DC) is connected to the metallic clamps with the help of 1 m of connecting wire. Metallic clamps are put on the stainless-steel trays (one each).

The electricity plug is connected with one end of the two connecting wires (2 m), and then the other ends of both connecting wires (2 m) are connected to the two input (AC) ends of the transformer



The two output (DC) ends of the transformer are connected to one of the ends of the two connecting wires (1 m) and then the other end of both connecting wires (1 m) is connected to one clamp each



One metallic clamp is placed at the edge of each stainless-steel tray



The trays are filled with tap water and the electricity plug is put inside the domestic current supply



When the current is switched on, the device is ready to use

Figure 2: Innovative low-cost home-made iontophoresis device. AC: Alternating current, DC: Direct current.

Table 1: Various materials utilised and their respective costs in INR (purchased in Oct 2023).

S. No.	Component	Quantity	Cost (INR)
1.	220–12V (AC to DC) transformer	1	90
2.	Thin stainless-steel tray	2	200 (100 each)
3.	Connecting wire	4 (two -2 m long and two -1 m long)	20
4.	Metallic clamps	2	10 (5 each)
5.	Electricity plug	1	10
	Total cost		330

AC: Alternating current, DC: Direct current, INR: Indian National Rupee

and localised inflammation. The device is activated, allowing current to pass through the water between the electrodes. Initially, three sessions of 15 min each are conducted on alternate days, 3 times a week for 1 month, followed by weekly maintenance sessions. This schedule is ideal for balancing effectiveness and minimising patient inconvenience. If the patient does not respond to tap water iontophoresis alone, anticholinergics like a 2 mg glycopyrrolate tablet can be added to the water tray [Figure 2].^[2]

DO'S AND DON'T S

Do's

1. Put the trays at a flat horizontal surface
2. Apply moisturiser or jelly over both hands before dipping the hands into water for the uniform spread of current

3. Patient must wear rubber footwears and sit comfortably on an insulated plastic chair.

Don'ts

1. There should not be any cuts/erosions/fissures over the hands of the patient
2. Patient should not be wearing any metallic ornaments over hands and fingers
3. Patient should not have a pacemaker.

Ethical approval

Institutional Review Board approval is not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

Dr. Niti Khunger is on the Editorial Board of the Journal.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the

writing or editing of the manuscript and no images were manipulated using AI.

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