

## Bathing Practices in Dermatology: Uses and Implications for Patient Management

### History

Bathing is defined as a set of skincare practices that usually involves the use of washing the skin with the help of water and often other chemical and therapeutic agents. The prehistoric men often bathed in large water bodies such as rivers and natural lakes, often as a means of temperature control and to get rid of dust and other debris. With time, however, the practice of bathing became more sophisticated.<sup>[1,2]</sup>

### Dermatological Benefits of Bathing

- A chlorhexidine bath is known to reduce colonization by staphylococcus aureus, enterococcus, and micrococcus up to 95%.<sup>[3]</sup>
- Bathing is an excellent way to hydrate the skin—in fact, no other intervention can hydrate the full body surface as a bath, which is beneficial for a number of dry skin conditions like eczemas, psoriasis, ichthyosis, and palmoplantar keratodermas.<sup>[4]</sup>
- A warm bath can have a relaxing and soporific effect by regulating the calcitonin gene-related peptide which serves as the link between skin and brain.<sup>[5]</sup> A recent study has also revealed a 30-minute warm bath can reduce dramatically stress like PTSD (Post Traumatic Stress Disorders), anxiety neurosis, and many other conditions.<sup>[5]</sup>
- A bath is one of the most effective ways to deliver medications topically all over the body—they are typified by Bath PUVA (Psoralen with Ultraviolet 'A') and Condy's bath for a number of conditions like vitiligo, prurigo, lichen planus, and crust removal.<sup>[6]</sup>
- A bathing can also be used to remove medications after their application. This

principle is used in the treatment of scabies and pediculosis.

- A cold tepid sponging can be used to quickly lower the temperature when antipyretic drugs cannot be used such as DRESS (Drug Rash with Eosinophilia and Systemic Symptoms) syndrome, drug-induced adverse cutaneous reactions, etc.
- A bath is one of the most effective means for exfoliation—removal of scales as in erythrodermic psoriasis.
- A bath is also an effective way to maintain hygiene—conditions such as bromhidrosis, osmidrosis, and terra firma-forme dermatosis are treated with a scrub bath.

### Specialized Baths for Different Conditions Commonly Encountered in Dermatology

#### Bath PUVA<sup>[6]</sup>

##### Indications

Bath PUVA is successfully used for

- Psoriasis—if disabling and involving a body surface area of more than 10%
- Vitiligo—involving large areas of the body
- Prurigo nodularis
- Atopic dermatitis
- Some variants of cutaneous T cell lymphoma.

##### Method

The concentration of PUVA required is 3.75 mg of 8-methoxypsoralen per liter of water. This is achieved by dissolving 37.5 mL of 1 percent of psoralen in 100 liters of water taken in a bathtub. The patient lies prone for 10 minutes and then supine for the next 10 minutes. Then the skin is patted dry with the help of soft

### Atreyo Chakraborty

Department of Dermatology,  
Venereology and Leprosy,  
All India Institute of  
Medical Sciences, Rishikesh,  
Uttarakhand, India

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#### Address for correspondence:

Dr. Atreyo Chakraborty,  
26 C Selimpore Lane, Dhakuria,  
Kolkata - 700 031, West Bengal,  
India.

E-mail: [chakraborty.atreyo@gmail.com](mailto:chakraborty.atreyo@gmail.com)

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linen, and the patient is exposed to ultraviolet A (UV A) light as per his or her skin phototypes. It is usual, to begin with, 1 J/cm<sup>2</sup> to 2 J/cm<sup>2</sup> for Fitzpatrick type 1 skin and gradually increases by 0.5 J/cm<sup>2</sup> depending upon tolerance. This is generally administered thrice per week. There is no post-PUVA bathing required. As per standard protocols, the bathtub should be cleaned with soap and water after every patient to prevent the spread of infections. After the requisite exposure to UV A, strict photoprotection is recommended for the day.

### Mechanism of Action

Bath PUVA basically acts as a way to deliver the active agent, that is psoralen throughout the skin surface. The hydration enhances the penetration of the active agent into deeper layers, thereby enhancing the effects of the UV A. The mechanism of action of PUVA itself involves localized photosensitization of the skin, generation of free radicals which cause a localized immunosuppression. A stimulatory effect on melanocytes is also seen and has been implicated in vitiligo.

### Contraindications

- Large open wounds in the body that can get infected following exposure to water
- Patients with aquagenic urticaria, water-induced anaphylaxis, uncontrolled seizures, and other conditions where prolonged contact with water is dangerous
- Nonavailability of large amounts of water as is required in this case

### Bleach baths

- This is the use of household bleach in bathing water for a number of conditions. Bleach contains 3–6% available chlorine (Cl<sub>2</sub>), approximately 0.5–1.5% sodium hydroxide (NaOH) as a stabilizer, and small quantities of surfactants.
- At pH 11–13, it is an alkaline aqueous solution with major oxidizing properties.
- Sodium hypochlorite 0.0006% is also available as a convenient wash suitable to use in a shower.<sup>[7-9]</sup>

### Indications

#### Table 1

#### Method

#### Preparation of a household bleach solution

A 2 ml of 2.2% household bleach is added to every 1 liter of water to make a 0.005% solution. About half a cup of this solution, that is 160 mL, is added to a bathtub in 80 liters of water. The body should be soaked for a minimum of 15 minutes. It can be administered longer if more scales are desired to be soaked. The head and neck are kept out of the tub to avoid irritation. The skin is patted dry after use.

### Frequency

This bath is usually administered twice weekly. However, it can be given even daily for better scale removal.

**Table 1: Indications of bleach bath**

Ichthyosis
Infected eczema
Non-infected atopic dermatitis
Generalized pruritus
Prurigo nodularis
Generalized skin infections like furunculosis and carbuncles
Impetigo
Acne
Scabies and pediculosis to reduce secondary colonization

### Benefits

- Reduction in odor
- Reduction in bacterial colonization
- Reduction in the number of cutaneous infections
- Reduction in scaling
- Helping in better retention of moisture
- Reduction in erythema and itchiness
- Better quality of sleep.

### Adverse reactions

- Irritation of nasal mucosa and eyes
- Burning sensation
- If systemic exposure to chlorine by accidental drinking of large amounts of water, it can lead to vomiting, nausea, respiratory collapse, etc.

### Salt baths

This is the addition of sodium chloride or the common salt in bath.

### Indications

- Papulosquamous diseases like psoriasis and eczema
- Crust removal in pemphigus, Stevens-Johnson syndrome, etc.
- Pruritic conditions like prurigo nodularis.

### Method

The target concentration is 3% of sodium chloride, which almost reaches the sodium level in oceans. This equals 1/4 pound of salt added to one gallon of water. An equal concentration can also be achieved by adding 5 pounds in 20 gallons or 7.5 pounds in 30 gallons. The patient soaks for almost one hour. It is safe for everyday use, and the skin is patted dry after use.<sup>[7-14]</sup>

### Variations:

*Epsom salt bath:* This is the addition of magnesium sulfate with little amounts of sulfur and oxygen added to simulate Dead Sea condition. Two cups of salt are added to warm water. The American Academy of Dermatology recommends soaking for no more than 15 minutes every day for use in psoriasis.

*Balneotherapy:* This commonly employs the combination of salt baths with adequate exposure to UV A rays often in a natural setting in the treatment of psoriasis.

**Efficacy:** In an observation-based study on eighty psoriasis patients, a mean reduction of PASI (Psoriasis Area Severity Index) score from 7.15 to 2.62 was seen at 3 weeks. CRP levels also declined significantly in this period.<sup>[10]</sup> A systematic review involving 24 well-designed randomized controlled trials showed that hydrotherapy is effective in psoriasis in reducing both severity and markers of inflammation.<sup>[11]</sup>

**Level of Evidence: Ia**

#### Uses

- Generalized body psoriasis
- Hand psoriasis.

#### Mechanism of action

The exact mechanism of action is not yet known. It is thought that Dead Sea salts like Epsom salts help repair barrier defects. It might be that Dead Sea salts and Epsom salts deliver cations to the skin and restore the ionic balance needed for the immunological functioning of the skin. They can also help in scale removal and softening of the skin.

#### Epsom salt bathing vs Dead Sea salt bathing

A study done in 2005 suggested that bathing in Dead Sea salt solution improved skin barrier function and hydration and reduced inflammation which was due to salts being rich in magnesium. Similar conclusions have been reached by various other authors in 2017 and beyond. In sharp contrast, no such study exists for Epsom salt bathing.<sup>[10-13]</sup>

#### Baking Soda Baths

Simply put, this is the use of baking soda to raise the pH of bathing water.<sup>[4-6]</sup>

#### Indications

- Ichthyosis
- Palmoplantar keratoderma
- Psoriasis, Reiter's syndrome, etc.

#### Method

A pH of 7.9 is aimed. The amount of baking soda to add may vary with the quality (pH) of tap water.

In most cases, adding one-third cup to a tub one-third full of water will raise the pH to 7.9. A pH paper is often used to test for the resultant pH. The bath is given for 45 minutes. The bath may be used every day.

#### Mechanism of action

The mechanism of action in detail is not known but believed that alteration of pH alters the signaling mechanism of certain enzymes since cell signaling is highly pH-dependent. It is also believed that intracellular and intercellular communications are altered, resulting in less retention hyperkeratosis.

#### Condy's bath

This is the use of potassium permanganate in bath. Modified protocols entail the use of Condy's compresses and soak primarily for crust removal.<sup>[15]</sup>

#### Indications

- Eczema with lots of exudation
- Crusting in Steven-Johnson syndrome
- Crusting in pemphigus and pemphigoid
- Crusting in oral herpes/zoster
- Generalized bacterial and viral skin infections
- Tinea infections
- Impetigo.

#### Sitz Bath

This is a special modification of the potassium permanganate bath used for hemorrhoids.

#### Mechanism of action

Potassium permanganate is a bacteriostatic, astringent agent that works by releasing oxygen free radicals that cause the ultimate killing of contaminated wounds. It also precipitates proteins and thereby causes coagulation of exudates.

#### Method

1 mg of potassium permanganate crystals are added to 1000 mL of water to get a 0.1% solution. This is the most common concentration used. If used properly, it is the color of one's nails, which is light pink. The patient bathes for around half an hour, and the skin is patted dry. The head and neck are kept above the bathtub to prevent irritation. This can be repeated daily as per need.

**Infected Eczema:** The dilution recommended is 1:10000. There is potential for burns in infected wounds, and hence, the dilution is usually lesser than for other conditions.

**Tinea Infections:** Repeated bathing is encouraged with slightly higher concentrations.

#### Adverse Effects

- Burns—even diluted concentrations on prolonged exposure can result in burns
- Eye irritation
- Large amounts of systemic absorption can result in nausea, vomiting, and even systemic toxicity
- Discoloration of nails
- Has unpleasant smell.

#### Chlorhexidine gluconate bathing

It is the addition of chlorhexidine gluconate, which is a potent antibacterial and antiviral agent during bathing. Its chief use is in healthcare workers and patients in intensive care units who are at higher risk of resistant organisms.<sup>[16]</sup>

It has been proven to be safe against

- Methicillin-resistant *staphylococcus aureus* (MRSA)

- Vancomycin-resistant *enterococcus* (VRSE)
- Pathogens associated with ventilator use
- Pathogens associated with central venous catheter use.

### Method

The bath is performed using 4% solution of chlorhexidine solution. The head and neck are kept above the tub. The skin is patted dry. The bath can be repeated every day.

### Adverse Effects

Rare irritation, allergic reactions, etc.

## Soap Bath

Arguably one of the most common forms of bath that can be tried for almost any skin infections.<sup>[17]</sup> Viz Table 2.

### Indications

- Tinea—superficial dermatophytosis
- Recurrent bacterial infections
- Bromhidrosis
- Removal of deposits of TFFD (Terra firma-forme dermatitis)
- Oil control in acne-prone skin
- To remove active agents after treatment of scabies and pediculosis
- After a PUVA therapy, according to some authorities.

### Method

The body is rubbed with soap thoroughly. The duration of keeping the soap foam is a matter of debate, but the consensus is around 15 minutes. Then the soap is washed, and the skin is patted dry. The choice of soap depends on the following factors, viz. Table 2.

## Sulfur bath

Sulfur, a naturally occurring element in many volcanic streams and other hot springs, is available in two forms—dimethyl sulfoxide (DMSO) and methylsulfonylmethane (MSM). About 15% of DMSO breaks down into MSM in the body.

### Indications

Recurrent skin infections like furunculosis, carbuncles, impetigo, etc.

Dry skin conditions like psoriasis and atopic eczema

Itchy skin conditions like prurigo nodularis

Arthritis and other neuralgias.

### Method

The products are added to hot to warm water in varying concentrations and then soaked for varying amounts of time. The skin is patted dry. The therapy can be repeated once or twice weekly.

**Table 2: Types of soaps used in soap baths**

Soap	Description
Superfatted soap	Has fats up to 10% and can be used especially for dry skin conditions
Castile soap	Has olive oil as the main ingredient; can be used on dry skin
Deodorant soap	With added deodorants; useful for bromhidrosis
French milled soaps	With additives to reduce alkalinity
Floating soap	With extra air added to create a superficial floating layer
Oatmeal soap	Comes in two variants—coarsely grounded oatmeal to produce desquamation while finely grounded oatmeal is for the addition of moisture
Acne soap	Contains sulfur, resorcinol, benzoyl peroxide, salicylic acid
Facial soap	Smaller grain size; no special ingredients
Bath soap	No special ingredients—regular use
Aloe vera soap	Most studies have found no added benefit
Vitamin E soap	No added benefit
Cocoa butter soap	Cocoa butter is used as the major ingredient
Nut or fruit oil soap	Nut oil or fruit oil is used as major ingredient
Transparent soap	Glycerin or sucrose added.
Abrasive soap	Pumice, oatmeals, etc., added
High impact soap	Lasting fragrances added

## Acetic acid baths

This is used predominantly for epidermolysis bullosa, especially dystrophic types.<sup>[18]</sup>

### Method

Two options are possible—if 3% vinegar is taken, 1 part of it is added to 12 parts of water. If 5% vinegar is taken, 1 part is added to 20 parts of water. The patient is allowed to bath in the prepared solution, then the solution is washed away with normal water, and the skin is patted dry.

**Mechanism of action:** It is bactericidal to *pseudomonas*, other gram-positive and gram-negative pathogens in general which cause wound colonization. It also exerts inhibitory effect on yeasts.

## Oatmeal baths

This is the addition of oatmeal, which is grounded oats into water. It is used for a variety of dermatoses like atopic dermatitis, prurigo nodularis, and a variety of itchy dermatoses. The bath is typically administered by adding a cup of grounded oats (oatmeal) to a bathtub full of water. The bath is administered daily.

## Conclusion

Although a wide variety of bathing practices exist worldwide, medically a few of them offer advantages.

**Table 3: Indications, contraindications, and concentration of active substance used in different baths of dermatological significance**

Bath	Concentration of active agent used	Indications	Contraindications
Bath PUVA	3.75 mg of 8-MOP per liter of water	Psoriasis involving large body surface area Vitiligo	Large open wounds Nonavailability of large amounts of water Aquagenic urticaria
Bleach Bath	2 mL of 2.2% household bleach added to 1 liter of water to get a stock solution of 0.0005%. Now, 160 mL (half a cup) is added to 80 liters of bathwater	Atopic dermatitis Infected eczema Recurrent folliculitis Dystrophic and junctional epidermolysis bullosa Impetigo	Aquagenic urticaria Large open wounds Uncontrolled seizure disorders
Baking Soda Bath	Add 1/3 <sup>rd</sup> to ½ cup of baking soda to a bathtub (80 liters) of water. Resultant pH should be 7.9	Ichthyosis vulgaris Other disorders of cornification Palmoplantar keratodermas	Large open wounds Disorders where acid mantle of stratum corneum is needed (e.g., many eczemas)
Condy's Bath	1 mg of potassium permanganate added to 1000 mL of water The color should be of one's nails	Infected eczemas Crust removal in pemphigus foliaceus, Stevens-Johnson syndrome, etc. As a general measure to prevent skin contamination	Severe mucositis such as ophthalmological complaints Large open wounds
Soap Bath	Any soap scrubbed on the body, kept for 2–5 minutes and washed off	Recurrent dermatophytosis Scabies, pediculosis, etc., to remove the active agent after treatment Bromhidrosis Oil control in acne-prone patients	Dry skin conditions Many alkylating soaps tend to raise pH, and hence unsuitable for atopic skin conditions
Sulfur Bath	Dimethyl sulfoxide and methoxyl sulfur monomethyl are added in varying concentrations in hot water	Recurrent folliculitis and other skin infections Also useful for psoriasis, ichthyosis, and other scaly skin conditions Itchy conditions like prurigo nodularis	Known hypersensitivity to sulfur Aquagenic urticaria and angioedema
Chlorhexidine Bath	4% chlorhexidine in 4 mg of chlorhexidine per 100 mL of water. Head and neck to be kept out of water	VRSA/MRSA-induced skin and soft tissue infections	Can predispose to fungal overgrowth Potential for irritation if gets to the eye and nose
Epsom salt Bath	2 cups of Epsom salt (magnesium sulfate) with 1 tub full of water. Maximum soaking time is 15 minutes.	Psoriasis	Irritation if used for more than the recommended duration

MRSA=Methicillin-resistant staphylococcus aureus, VRSA=Vancomycin-resistant staphylococcus aureus

Easy application of the desired substance over a large body surface area is the biggest benefit of this mode of therapy. By correctly choosing the target population, this cheap yet effective method can be put to great use, both clinically and socioeconomically, especially in developing nations like India and elsewhere. A summary of the various baths, the concentration of the active substances, and indications/contraindications is presented in Table 3.

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