

The pH of skin cleansers for acne

Sir,

The effectiveness of cleansers is influenced by many factors including the pH, nature, and the composition of cleansers, especially surfactants. Our purpose was to study the pH of commonly available cleansers in the market for acne patients. The pH values of cleansing bars, liquid cleansers, foams, and scrubs promoted for acne patients were measured and compared with cleansers that are marketed for use on oily skin, baby skin, or sensitive skin (mild cleansers), as well as with general cleansers and antiseptic cleansers. All cleansers were dissolved to make a 5% solution (weight by volume) as per the actual usage condition. The pH was determined using a pH meter (Thermo Scien Oion 2 Star, Thermo Fisher Scientific Inc., Beverly, MA, USA) and pH indicator strips (pH 0–14 Universal indicator strips; Merck, Darmstadt, Germany). Each sample was measured twice to obtain an average pH value.

The average pH values of cleansers are shown in Tables 1–3. All acne cleansing bars had an alkaline pH (pH 9.0–10.4), as was found in all other types of cleansing bars, except for syndet bar, which gave a

neutral pH, and a cleansing bar for oily skin, which had an acidic pH [Table 1]. The pH of liquid cleansers for acne ($n = 9$) ranged between 3.0 and 8.0 (5 = acidic pH, 3 = neutral pH, 1 = alkaline pH). Most of the other types of liquid cleansers had neutral pH, except for antiseptic cleansers [Table 2].

Table 3 shows the pH of foams and scrubs. Most foams available in the market had an alkaline pH. The pH values of two acne foams were found to be similar to that of normal healthy skin (pH 5.4–5.9). Three acne scrubs were found to have an acidic pH and one each had a neutral and an alkaline pH [Table 3].

Alteration of the skin pH is proposed to be one of the important factors for acne development, which may be due to the change of skin resident microflora. The skin pH can be influenced by many factors, i.e. genetics, age, gender, anatomical sites, skin moisture, sweat, sebum, soaps, detergents, cosmetics, and occlusive

dressings.^[1] Since the skin has an acidic pH, facial washing with soap can increase the pH level by 1.5–2.0. The increase in pH of cleansers potentiates skin dryness and tightness and also enhances the risk of cutaneous reactions. On the other hand, lowering the pH is supposed to benefit antibacterial effect. Goodman suggested that acne cleansers should be “soap-free,” “acidic” or “pH-balanced,” and free of abrasives or alcohols, and should also have high rinsibility.^[2] It has been proposed that in order to control acne, the optimal value of skin pH should be 5.4–6.0 for females and 5.5 for males.^[3]

In our study, it was found that all acne cleansing bars, in spite of various compositions, had an alkaline pH. Korting *et al.* compared the efficacy of an alkaline soap bar with an acidic syndet in 120 acne patients (a randomized controlled study) and found that after 3 months, the number of acne lesions and cutaneous irritation were lower in patients using an acidic syndet.^[4]

Table 1: Comparison of the pH values of acne cleansing bars and other cleansing bars

Type of cleansers	Sample	Composition and properties													Average pH by pH indicator strips	Average pH by pH meter strips	
		Chemical exfoliant			Mechanical exfoliant (scrub)			Antibacterial					Oil control				
		Alpha hydroxyl acids	Lactic acid	Salicylic acid	Ground fruit pits	Aluminum/magnesium oxide	Polyethylene beads	Sulfur	Triclosan	Triclocarban	Benzoyl peroxide	Tea tree extracts	Zinc salts	Niacinamide			Soy
Acne cleansing bars	1	✓														10.0	10.24
	2	✓														10.0	9.95
	3		✓													9.5	9.75
	4		✓	✓												10.0	10.08
	5							✓								10.0	10.36
	6							✓								10.0	10.32
	7									✓						9.0	9.13
	8											✓				10.0	10.37
Cleansing bars for oily skin	9															6.0	5.91
	10															10.0	10.03
Baby cleansing bars	11															10.0	10.17
	12															10.0	10.18
Syndet cleansing bars	13	✓														7.0	7.09
General cleansing bars	14															10.0	11.31
	15															10.5	10.58
Antiseptic cleansing bars	16	✓								✓						10.0	10.25
	17									✓						9.5	9.87

Table 2: Comparison of the pH of acne liquid cleansers and other liquid cleansers

Type of cleansers	Sample	Composition and properties											Average pH by pH indicator strips	Average pH by pH meter		
		Chemical exfoliant			Mechanical exfoliant (scrub)			Antibacterial							Oil control	
		Alpha hydroxy acids	Lactic acid	Salicylic acid	Ground fruit pits	Aluminum/magnesium oxide	Polyethylene beads	Sulfur	Triclosan	Triclocarban	Benzoyl peroxide	Tea tree extracts			Zinc salts	Niacinamide
Acne liquid cleansers	18	✓	✓	✓									a	✓	7.0	6.91
	19	✓		✓											5.5	5.63
	20	✓							✓						7.0	6.80
	21	✓												✓	4.5	4.20
	22	✓													7.0	6.90
	23		✓											a	6.0	6.11
	24			✓											3.0	3.0
	25			✓								✓			6.0	5.84
Cleansers for oily skin	26							✓							8.0	7.99
	27	✓													7.0	7.12
	28														6.0	6.22
Baby cleansers	29														7.0	7.04
	30														7.0	6.90
Syndet cleansers	31														7.0	7.38
	32														7.0	7.06
General liquid cleansers	33														7.0	6.91
	34	✓													7.0	6.98
Antiseptic cleansers	35									✓					8.5	8.94
	36								✓						9.0	9.35

^aZinc gluconate

In general, liquid cleansers have more acidic pH than those of cleansing bars since their compositions include amphoteric, anionic, non-ionic, and silicone surfactants. They also contain emollients and humectants which lower the pH of products.^[5] In this study, liquid cleansers for acne were found to have a lower pH (pH 3.0–8.0) than those of acne cleansing bars (pH 9.0–10.0).

Foams are triphasic liquids composed of oil, organic solvents, and water. They are formulated with a hydrocarbon propellant (either butane or propane), and also contain various fatty acids and alkalis which influence their wide range of pH.^[5] In this study, except for two brands, which had the pH of normal skin, all the others had an alkaline pH.

Facial scrubs are mechanical exfoliants. They contain small granules in a cleansing base for enhancing

corneocyte desquamation. The proposed anti-acne property of scrubs is that the abrasion may unroof closed comedones. However, a vigorous scrub can damage the skin surface. Therefore, scrub should not be used more than once a week and is not recommended for patients with sensitive skin. Sixty percent of the tested scrubs for acne patients in this study showed an acidic pH.

In summary, the pH values of facial cleansers depend on their formulation and composition. The increase in pH potentiates skin dryness and tightness and also enhances the risk of cutaneous reactions. Apart from pH, other properties should be considered in selecting the proper cleansers for acne patients.^[6]

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Table 3: Comparison of the pH of acne cleansing foams and scrubs and other cleansing foams and scrubs

Type of cleansers	Sample	Composition and properties											Average pH by pH indicator strips	Average pH by pH meter			
		Chemical exfoliant			Mechanical exfoliant (scrub)			Antibacterial							Oil control		
		Alpha hydroxy acids	Lactic acid	Salicylic acid	Ground fruit pits	Aluminum/magnesium oxide	Polyethylene beads	Sulfur	Triclosan	Triclocarban	Benzoyl peroxide	Tea tree extracts			Zinc salts	Niacinamide	Soy
Acne cleansing foams	37	✓		✓												5.5	5.32
	38	✓		✓												7.0	7.13
	39	✓		✓				✓								10.0	9.80
	40	✓		✓												10.0	10.03
	41		✓													10.0	10.01
	42		✓													6.5	6.28
	43			✓												10.0	10.26
	44		✓						✓							7.0	6.82
	45								✓							10.0	10.35
	46								✓							8.5	8.67
	47								✓			✓				10.0	9.87
	48								✓			✓				10.0	9.78
	49								✓							8.5	8.52
	50											✓				10.0	10.15
51											✓				5.5	5.31	
52											✓				4.5	4.63	
Cleansing foams for oily skin	53															10.0	10.22
	54	✓														10.0	10.09
General cleansing foams	55															10.0	10.22
	56															10.0	9.94
Acne cleansing scrubs	57	✓		✓												4.5	4.38
	58		✓													6.5	6.33
	59			✓												10.5	10.59
	60								✓							7.0	7.13
	61										✓					4.5	4.52
General cleansing scrubs	62	✓														7.5	7.54
	63				✓											6.5	6.56
	64					✓										10.0	10.36

^aZinc gluconate; ^bzinc sulfate

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