The Pharma Innovation Journal 2023; 12(4): 409-412

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(4): 409-412

www.thepharmajournal.com
Received: 14-01-2023
Accepted: 17-02-2023

Mukesh Gangwar
Division of Livestock Products Technology, ICAR-IVRI, Izatnagar, Bareilly, Uttar Pradesh, India

Rajiv Ranjan Kumar
Division of Livestock Products Technology, ICAR-IVRI, Izatnagar, Bareilly, Uttar Pradesh, India

SK Mendiratta
Division of Livestock Products Technology, ICAR-IVRI, Izatnagar, Bareilly, Uttar Pradesh, India

Ashim Kumar Biswas
Division of Livestock Products Technology, ICAR-IVRI, Izatnagar, Bareilly, Uttar Pradesh, India

Sagar Chand
Division of Livestock Products Technology, ICAR-IVRI, Izatnagar, Bareilly, Uttar Pradesh, India

Suman Talukder
Division of Livestock Products Technology, ICAR-IVRI, Izatnagar, Bareilly, Uttar Pradesh, India

Corresponding Author:
Mukesh Gangwar
Division of Livestock Products Technology, ICAR-IVRI, Izatnagar, Bareilly, Uttar Pradesh, India

Quality evaluation of different commercial available market pet soap sold in India

Mukesh Gangwar, Rajiv Ranjan Kumar, SK Mendiratta, Ashim Kumar Biswas, Sagar Chand and Suman Talukder

Abstract
Six soaps were purchased from the main market in Bareilly, Uttar Pradesh, India. The soaps are Polytox (T1), Ticknil (T2), Vetkil (T3), Petlife (T4), Zoivan (T5), and Pet Empire (T6). The qualities of soaps were assessed based on the following parameters: pH, moisture, total fatty matter, free caustic alkali, and total alkali properties. The pH, moisture, total fatty matter, free caustic alkali, and total alkali content were 9.37 to 9.91, 13.34 to 34.72%, 31.38 to 77.99%, 0.00 to 0.056%, and 0.43 to 1.24%, respectively. The results obtained showed that all the soaps except Zoivan (T6) were good-quality and safe for pet skin.

Keywords: Pet soaps, total alkali content, total fatty matter, matter insoluble in alcohol, moisture

Introduction
Soaps are natural-source surfactants that are part of the essential cleaning supplies used in residential activities. They are necessary to get rid of dirt, pollutants, and pathogens. When oil and alkali are saponified, soap is created. Coconut oil, marine oil, palm kernel oil, and other oils are frequently used in India. The most popular oils at the moment are palm oil and palm kernel oil. Depending on the alkali used, there are two different types of soap produced by the procedure. KOH is used to make liquid soap because it forms "soft soap," while NaOH forms "hard soap." Both soaps, however, are easily soluble in water, cold or warm (Chirani *et al*., 2021) [1]. In order to make soap, a variety of fatty acids are used. However, the varieties that are frequently used in the production of soap include palmitic, lyric, stearic, linoleic, and oleic acids. Most people are aware that a combination of fatty acids is used to create high-quality soap (Oghome *et al*., 2012) [2]. However, in order to consistently manufacture high-quality soap, it is necessary to be consistent in choosing the right oils and fats with their various fatty acids. Nevertheless, some manufacturers create soap that is of doubtful quality, in part because they use inferior oils and fats, like beef fat. These poor-quality oils mostly have unsaturated fatty acids in them. A lot of unsaponifiable fatty acids reduce soap's quality. Fillers, which are normally dry powders, tend to make soap tougher, which makes it rougher on the skin; when used in high quantities, fillers influence the texture of the soap, leading it to quickly become mushy when kept in water for a predetermined amount of time. Several factors influence the physicochemical properties of soap, including the kind and strength of the alkali, the type and saponification value of the oil used to manufacture soap, and others (Mwanza and Zombe, 2020) [3]. The population's safety and health are supported by quality control and standard assurance of all commercially manufactured consumables and non-consumable goods, including soap products. A number of articles have recently been written to discuss the problem of the safety and quality of commercially made soap all over the world. It is important to note that low-quality soap has been linked to a variety of skin issues, including acne, eczema, hives, rashes, skin irritation, and perhaps even cancer. According to many authors, inadequate preparation techniques and complete negligence on the part of the makers throughout the production stage are to blame for the poor quality of soap. Many nations have established standard regulatory bodies, such as the Bureau of Indian Standards (BIS), the Standard Organization of Nigeria (SON), and others, whose goal it is to create standards for a variety of items, including soaps, in order to ensure that manufacturers adhere to producing goods of acceptable quality. Total fatty matter (TFM), free caustic alkalinity, pH, moisture content, and emulsification may be some of the main physiochemical characteristics of soaps. One of the most crucial elements in establishing the quality of soap is TFM. It basically serves as a measure to determine how much fatty stuff is present in soap.

A low TFM value is typically linked to hardness and poorer soap quality. Generally speaking, low-TFM soap is caused by the use of a lot of fillers in the manufacturing process (Vivian *et al*., 2016) [4]. Based on the amount of total fatty content in toilet soaps, the BIS divide them into three grades. Grade I materials are considered to be of very high quality if TFM is greater than 76%. Grades II and III are appropriate for TFM values of 60% and 50%, respectively. So the current study was designed to evaluate the physiochemical characteristics of pet soap sold in India.

Materials

The six soaps, namely: Polytox (T1), Ticknil (T2), Vetkil (T3), Petlife (T4), Zoivan (T5), and Pet Empire (T6), were purchased from the main market in Bareilly, Uttar Pradesh, India. The chemicals and reagents of analytical grade were used in experimentation and procured from Hi-media Laboratories (P) Ltd. (Mumbai, Maharashtra, India), CDH (New Delhi, India), and Sisco Research Private Ltd. (Mumbai, Maharashtra, India).

Methods

Evaluation of physiochemical properties of market pet soap

The physiochemical properties of the market pet soap were analyzed using standard procedures described by Vivian *et al.* (2014) [4]. The parameters measured were moisture content, pH, total alkali content, free alkali content, and total fatty matter (TFM).

pH of soap

Two gram of soap was accurately weighed and diluted in 10 mL of distilled water to determine the pH. The pH measurements were obtained using a digital pH meter (Eutech Instruments Pvt. Ltd. Singapore).

Moisture content

In dried moisture dishes, 5 g of soap samples were precisely weighed using an analytical balance with a sensitivity of 0.1 mg; model YAC01LP-Sartorius AG Gottingen, Germany. For approximately 6 hours, samples were dried at 105 °C in a hot air oven to achieve a consistent sample mass. The following formula was used to get the moisture percentage:

$$\text{Percenatge moisture} = \frac{\text{Weight of sample} - \text{Weight of dried sample}}{\text{Weight of sample}} \text{x100}$$

Total alkali content

The total alkali was determined by titrating surplus acid in the aqueous phase with NaOH solution. For this 10 g of soap sample was accurately weighed, and 100 mL of neutralized ethanol and 5 mL of 1N H_2SO4 solution were added into it. The soap mixture was heated until complete dissolution occurred and titrated with 1N NaOH using the phenolphthalein indicator. The following formula was used to calculate the total alkali.

$$\%\ \text{Total alkali} = \frac{\text{Va} - \text{Vb}}{\text{Weight of sample}} \text{x3.1}$$

Va- Volume of acid in experiments
Vb- Volume of acid at end point

Free Caustic Alkali

The free alkali content of soap samples was determined as per the procedure describe by Vivian *et al.* (2019) [4]. This procedure involved weighing 5 g of soap sample and dissolving it in 30 mL of ethanol. 10 mL of 20 percent $BaCl_2$ and a few drops of phenolphthalein indicator were also added. The resultant solution was titrated against 0.05 M H_2SO_4.
Free Caustic Alkali (FCA) = the volume of the acid obtained was calculated using the formula:

$$\text{FCA} = \frac{0.31}{\text{W}} \times \text{VA}$$

Where
VA = Volume of acid,
W = Weight of soap

Total fatty matter content

The total fatty matter was measured by dissolving the sample in hot ethanol and measuring the insoluble matter in alcohol. A 10 g soap sample was weighed, mixed with 150 mL of warm neutralized ethanol, and heated; the soap materials were dissolved. The dissolved solution was filtered, and the remaining residues on the filter were dried in the oven at 110 °C for one hour and weighed again. The total fatty matter was obtained using following formula:

% Total fatty matter = 100 − (Moisture content + Matter insoluble in alcohol)/1.085

Statistical analysis

Duplicate samples were taken for each parameter, and 3 trials were conducted for each experiment. A total of six observations were taken (n = 6) for consistency of the results. The results were analyzed statistically for variance and the Least Significant Difference (LSD) test as per Snedecor and Cochren (1989) [5], and Means were compared using Duncan's multiple range test (Duncan, 1995) [6]. Statistically analyzed data using SPSS-25 software were tabulated and interpreted.

Result and discussion

The pH of all the market soap samples was similar to each other; they ranged from 9.37 to 9.91. There was a significant (p<0.05) difference in the pH values of all the market soap samples except the T5 and T6 samples. The outcomes are consistent with Sanaguano-Salguero *et al.* (2018) [7] investigation, which used pH values ranging from 9.96 to 11.30. The pH range of the commercial soaps Tarun *et al.* (2014) [8] examined ranged from 9 to 10. The Mendes *et al.* (2016) [9] investigation verified that commercial soap bars made for children had pH values as high as 11.34. Dog skin's typical pH ranges from 5.7 to 6.5, therefore any introduction of soaps with a high pH can have an impact on both the skin's protective function and flora.

All of the pet soap samples had greater moisture contents. In the T1, T2, and T3 soap samples, the moisture content did not differ significantly (p<0.05). The moisture levels of the T4, T5, and T6 soap samples, however, varied greatly (p<0.05). The moisture content of all soap samples varies from 13.74 to 34.72. The moisture contents in the other investigations ranged from 24.90% to 43.24%, which were substantially higher (Sanaguano-Salguero *et al*., 2018) [7]. Adane (2020) [10] determined the moisture content in a soap sample that was made from waste cooking oil and found that moisture content values vary from 6.67 to 14.47%. A new formula for making soap and the addition of any ingredients or additives that aid in water retention and its moisturising effect could account for the greater moisture content found in the current study. The increased moisture content encourages hydrolysis and other internal changes in the soap. Some of the greatest soap manufacturers state that their products contain no more than 14% moisture (Betsy *et al*., 2013) [11].

One of the most crucial elements describing the quality of soap is total fatty matter (TFM). It is described as the overall volume of fatty matter, primarily fatty acids, that may be extracted from a sample following splitting with a mineral acid, often HCl. Since fatty acids have a favorable impact on skin rehydration and cleansing, a greater score denotes a higher level of soap quality. There was no significant difference in the total fatty matter value of T1 and T2 soap, as well as no significant difference observed in the total fatty matter content of T3, T4, and T5 soap samples, except for the T6 soap sample. The amount of total fatty matter in locally produced neem soap and branded soap was evaluated by Mandokhail *et al*. (2014) [12]. Local neem soap had a total fatty matter level that ranged from 24.6 to 46.4%, while branded soap had a range of 92.5 to 97.5%. According to Sarasan *et al*. (2014) [13], market soap and soap prepared from non-edible oil had different TFM contents. They found that the TFM concentration ranged from 63 to 77% for market soap while it was 65.60% for soap prepared from non-edible oil.

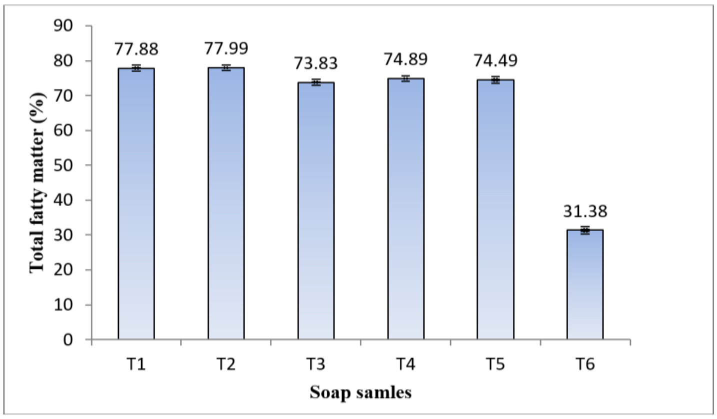
To prevent the soap from becoming oily, a certain amount of free caustic alkali is required; nevertheless, too much of it could irritate the skin. It evaluates the level of abrasiveness of the soap. According to ISO requirements, soaps should have free caustic alkali levels below 2%. There was no discernible (p<0.05) difference in free alkali concentration between T1 and T3 market pet soaps. The free alkali concentration of T5 and T6 market soaps did not differ much either. Market soap has a free alkali concentration that ranges from 0.00% to 0.026%. The amount of free alkali in conventional soap and native Nigerian soap was measured by Oyekunle *et al*. (2021) [14]. They discovered that whereas the free caustic alkali in soaps manufactured from palm bunches ranged from 2.49 to 9.98%, it ranged from 5.74 to 11.41% in soaps made locally from cocoa pods. The percentages of free caustic alkali in Lux and Joy soaps (used as standards) were substantially lower (1.24 and 0.99%, respectively). The amount of free caustic alkali in soap sold in Bangladesh was measured by Ashrafy Habib *et al*. (2016) [15]. They discovered that the free caustic alkali in laundry soaps ranged from 0.14% to 0.99% and that it ranged from 0.00% to 0.62% in toilet soaps. The free alkali content of Bhutanese herbal soap was also examined by Dema & Subba (2022) [16], who discovered that every soap should have a free alkali value of zero. Excessive free caustic alkali itch the skin.

The total amount of alkaline substance in soap is referred to as total alkalinity. They consist primarily of alkaline substances such hydroxides, sodium (II) oxide, carbonates, and bicarbonates. In terms of the total alkali concentration, there was no discernible (p<0.05) difference between T1 and T3 market pet soaps. The total alkali concentration of T5 and T6 market soaps did not differ much either. Market soap has a total alkali concentration that ranges from 0.43 to 1.24%. The results obtained in the T2 pet sample were lower than those obtained by Warra *et al*. (2011) [17], who found total alkali content in cotton seed oil soap to be 0.57%; however, the results obtained in the all-market pet soap sample were higher than those obtained by Mak-Mensah and Firempong (2011) [18], who determined the total alkali content in neem seed oil soap at 0.24%; Asemave and Edoka (2021) [19] analysed the total alkali content in soap made from mango kernel and coconut oil. They found that the total alkali content varied from 0.16 to 0.36%.

Table 1: Quality evaluation of market soap through physiochemical characteristics

Sample	pH	Moisture (%)	Total fatty matter (%)	Free alkali content (%)	Total alkali content (%)
T1	9.51±0.02^C	21.34±0.26^B	77.88±0.46^C	0.026±0.002^B	0.80±0.005^B
T2	9.46±0.01^B	20.22±0.20^B	77.99±0.46^C	0.003±0.003^A	0.43±0.004^A
T3	9.37±0.01^A	20.26±0.33^B	73.83±0.47^B	0.027±0.001^B	0.81±0.003^B
T4	9.70±0.01^D	13.34±0.21^A	74.89±0.36^B	0.056±0.003^C	1.08±0.076^C
T5	9.70±0.01^D	34.72±0.60^D	74.49±0.55^B	0.007±0.003^A	1.04±0.026^C
T6	9.91±0.01^E	22.67±0.48^C	31.38±0.70^A	0.000±0.000^A	1.24±0.069^D

Mean ± S.E. between different soap sample with different alphabetic superscript differs significantly (p<0.05); T1-Polytox, T2-Ticknil, T3-Vetkil, T4-Petlife, T5-Zoivan, T6-Pet empire



T1-Polytox, T2-Ticknil, T3-Vetkil, T4-Pet life, T5-Zoivan, T6-Pet Empire

Fig 1: Comparison of total fatty matter of different market soap

Conclusion
In the current investigation, the physiochemical characteristics of Indian market pet soap were analyzed, and the result concluded that all the market pet soap samples had some physiochemical characteristics, like free alkali content, free caustic alkali content, and total fatty matter content, that fell within the standard specified by BIS with the exception of the T6 soap sample. But the moisture content of all soap samples was higher than the BIS standard. So we should select a soap that keeps a balance among the physicochemical properties. High levels of total fat matter help lubricate the skin when washing, and soaps with little to no moisture will last longer on the shelf. Additionally, it should contain higher pH levels to make the soap basic and easy to lather, as well as lower levels of caustic alkali to lessen roughness on skin and fabric. Any soap that satisfies these standards is thought to be of high quality.

Conflict of interest
Authors declare there was no conflict of interest.

References

1. Chirani MR, Kowsari E, Teymourian T, Ramakrishna S. Environmental impact of increased soap consumption during COVID-19 pandemic: Biodegradable soap production and sustainable packaging. Science of the Total Environment. 2021;796:149013.
2. Oghome P, Eke MU, Kamalu CI. Characterization of fatty acid used in soap manufacturing in Nigeria: laundry, toilet, medicated and antiseptic soap. International Journal of Modern Engineering and Research. 2012;2(4):2930-2934.
3. Mwanza C, Zombe K. Comparative Evaluation of Some Physicochemical Properties on Selected Commercially Available Soaps on the Zambian Market. Open Access Library Journal. 2020;7(3):1-3.
4. Vivian OP, Nathan O, Osano A, Mesopirr L, Omwoyo WN. Assessment of the physicochemical properties of selected commercial soaps manufactured and sold in Kenya. Open Journal of Applied Sciences. 2014;4:433-440.
5. Snedecor GW, Cochran WG. Statistical Methods, 8th edition New Delhi: oxford and IBH Publishing Company. 1995, p. 72-148.
6. Dunkan DB. Multiple ranges and multiple F test”. Biometrics. 1995;1:1-8.
7. Sanaguano-Salguero H, Tigre-Leon A, Bayas-Morejon IF. Use of waste cooking oil in the manufacture of soaps. International Journal of Ecology and Managements. 2018;33:19-27.
8. Tarun J, Susan J, Suria J, Susan VJ, Criton S. Evaluation of pH of bathing soaps and shampoos for skin and hair care. Indian journal of dermatology. 2014;59(5):442.
9. Mendes BR, Shimabukuro DM, Uber M, Abagge KT. Critical assessment of the pH of children's soap. Jornal de pediatria. 2016;92:290-295.
10. Adane L. Preparation of laundry soap from used cooking oils: Getting value out of waste. Scientific Research and Essays 2020;15(1):1-0.
11. Betsy KJ, Jilu M, Fathima R, Varkey JT. Determination of alkali content & total fatty matter in cleansing agents. Asian Journal of Science and Applied Technology. 2013;2(1):8-12.
12. Mandokhail F, Jamil N, Riaz M, Masood Z, Ahmed S, Asif B, *et al*. Study of physica; and chemical properties of local neem (*Azadirachta indica*) soap with branded soaping relation to their impact on skin. Am-Euras. Journal of Toxicology Science. 2015;7(4):239-242.
13. Sarasan GE, Rangwala JA. Synthesis of soap from non-edible oils and a comparative study of quality parameters. International Journal of Chemical Sciences. 2014;12(1):306-314.
14. Oyekunle JA, Ore OT, Ogunjumelo OH, Akanni MS. Comparative chemical analysis of Indigenous Nigerian soaps with conventional ones. Heliyon 2002;7(4):e06689.
15. Ashrafy Habib SK, Sorowar MS, Karmoker J, Khatun MK, Al-Reza SM. Study on the physicochemical properties of some commercial soap available in Bangladeshi Market. International Journal of Advanced Research in Chemical Science. 2016;3(6):9-12.
16. Dema N, Subba JR. Physiochemical Properties of the Commercial Herbal Soaps of Bhutan. Sherub Doenme: The Research Journal of Sherubtse College. 2022;15(1):18-23.
17. Warra AA, Wawata IG, Gunu SY, Atiku FA. Soap preparation from soxhlet extracted Nigerian cotton seed oil. Advances in Applied Science Research. 2011;2(5):617-23.
18. Mak-Mensah EE, Firempong CK. Chemical characteristics of toilet soap prepared from neem (*Azadirachta indica* A. Juss) seed oil. Asian Journal of Plant Science & Research. 2011;1(4):1-7.
19. Asemave K, Edoka FA. Comparative Analysis of Soap made from different composition of Mango Kernel Oil and Coconut Oil with two other Commercial Soaps. Chemistry Research Journal. 2021;6(3):75-83.