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Research

Detergent properties of aqueous extract of Aatreelal (*Ammi majus* L.) and Babchi (*Psoralea corylifolia* L.)

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ABSTRACT

Aim of the study: To evaluate the detergent activity of aqueous extract of *Ammi majus* L. and *Psoralea corylifolia* L.
Materials and methods: The detergent activity of aqueous extract of test drugs was evaluated by using a standard physicochemical test with Sodium lauryl sulfate (SLS) as a standard drug. Surface tension was measured by Du Nouytensiometer; Dirt dispersion by using Indian ink; Cleaning ability by greasy wool yarn test; Foaming properties by cylinder shake method and Wetting ability by canvas disc method. pH values and total saponin was also determined. Both the test and standard drugs were analyzed in 1% and 5% concentrations.
Results: The aqueous extract of both the test drugs produced a significant detergent effect at both the concentration but less than SLS as it exhibited a pronounced effect in all the parameters except detergency. The test drugs were found to be acidly balanced; exhibited a prominent surface tension reduction, high foaming, wetting, and cleaning ability with a good quantity of saponin.
Conclusions: Based on the above results it can be concluded that the aqueous extract of test drugs has significant surface-active properties thus these drugs can be used as a natural surfactant.

Introduction

A detergent is a chemical substance that is equipped with a cleansing property. A good detergent is soluble in water, allows the water solution to enter the capillaries by lowering the interfacial tension, breaks up the particles that have agglomerated, links the dirt or oil particles with the water rather than the substance being cleansed.[1] Natural surfactant can be obtained either from sources of plant or animal origin. Natural surfactants possess several advantages over chemically synthesized ones, and they have low environmental risk due to their natural origin. Some of the advantages of such compounds over synthetic ones are their biodegradability, low toxicity, biocompatibility, low cost, and specificity. They are available in large quantities and are also very effective in extreme conditions like temperature, pH, and salinity.[2] Natural surfactants are found in many Unani medicinal plants.

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Chemically, the properties of the natural surfactants are due to the presence of 'Saponin' which allows the formation of stable soap-like foam when shaken in an aqueous solution.[3]

Unani system of medicine is evidence-based medicine. Since the beginning, this system has been using medicines to beautify the skin, face, hair, eyes, and nails. A large number of tested single drugs, compound formulations, and various prescriptions in which *jali* (detergent) drugs were used as an ingredient are found to be effective in clinical practice and presently, some of them are scientifically proven.[4] Unani physicians were very well acquainted with the *jali* (detergent) drugs; they frequently used them to treat certain dermatological disorders.[5] According to the Unani concept detergents are drugs that remove sticky fluids from the skin pores. They flow amidst the sticky material or fluid and the surface on which they are being used, thus separating the morbid matter from the affected part. *Jali* drugs can unblock the pores of the skin.[6,7] Unani detergents are not only used to treat skin diseases but also in cosmeceutical preparations, hair care, etc.

Aatreelal and Babchi are the two most important detergent drugs of the Unani system of medicine. Aatreelal consists of the dried ripe fruits of *Ammi majus* L. (Umbelliferae) commonly known as Bishop's flower[8] and *Psoralea corylifolia* Linn (Leguminosae) is an annual herb growing throughout the plains of India, commonly known as Babchi. All parts of both plants are used to treat a variety of skin problems, such as leucoderma, skin rashes, infections, and others. It is an ancient and useful remedy for leucoderma. The psoralen, a furanocoumarin, promotes pigmentation.[9] Fruits are also enriched with 0.4% xanthotoxin. Xanthotoxin is the chief active principle in the fruit.[8] The drug has been reported for its antioxidant[10] anti-inflammatory, antimicrobial, cytotoxic, antiviral, anticarcinogenic, antiatherosclerotic, and anti-inflammatory activities.[8,11] As per Unani physicians, *Psoralea corylifolia* is an important remedy for treating vitiligo and they incorporated it into various formulations as an ingredient. It is used both internally as well as externally.[12] Coumarins, flavonoids, and monoterpene phenols are the main active components of *Psoralea corylifolia* seeds.[13] This drug has been reported for its antifungal,[14] antibacterials,[15] antifilarial,[16] anti-tumor,[17] antiviral, antiprotozoal, Insecticidal and genotoxic activities.[18] Despite their use in skin diseases, both the drugs have not been investigated for their surface-active properties. The term surfactant covers surface-active compounds, in which interfacial and solution behavior leads to the following key surface-active properties viz. emulsification, wetting, foaming, detergency, and solubilizing.[19,20] because of the above properties, the detergent activity of the two drugs was evaluated by adopting those methods which are commonly used to analyze the synthetic and natural detergent as well as plant-derived saponins.

Materials and Methods

Procurement and identification of test drugs

The *Psoralia corylifolia* Linn and *Amm majus* Linn were procured from the NIUM (National Institute of Unani Medicine) Pharmacy, Bangalore. It was identified and authenticated by Pharmacognosist, Senior Assistant Prof. S. Noorunnisa Begum, Centre for Repository of Medicinal Resources (C-RMR), Trans-Disciplinary University (TDU), Attur, ViaYelahanka, Bangalore (identification no. *Ammi majus* L (5039) and *Psoralia corylifolia* L.(5041). A sample of test drugs has been submitted to the Herbarium / Museum of NIUM, Bangalore (Voucher specimen No. 67/IA/Res/2019) for future reference.

Procurement of other materials, chemicals, and reagents

Chemicals used in this study were of analytical grade and procured from authentic sources. Sodium Lauryl Sulfate and Indian ink were procured from Nice Chemical Pvt. Ltd, P.B. No. 2217, Manimala Road, Edappally, Kochi, Kerala. The wool yarn was procured from the city market, Aligarh, India. Canvas paper and grease were procured from the local market of Bangalore.

Preparation of extract

The test drugs (Aatreelal and Babchi) were cleaned from dirt and other extraneous matter and dried at 45^{0}C in a hot air oven.[21] It was powdered by an electric grinder and sieved with sieve no. 80. The aqueous extract of the test drugs was obtained by the cold maceration method.[22] Sixty gm coarsely powdered air-dried material was accurately weighed and kept in a glass-stoppered conical flask and macerated with 600 ml of distilled water for 24 h, shaken frequently, during first 6 h and allowed to stand for 18 h. It was filtered rapidly but carefully to prevent any loss of solvent. Further, it was dried on a water bath at 105^0 C for 6 h, cooled in a desiccator for 30 min, and then weighed without any delay. The yield percentage of the extract was calculated concerning the weight of crude drug and found to be 8.05%. The extract was stored in airtight containers at 4^{0}C. A fresh solution of the test drug was prepared in distilled water at the time of the experiment. Each experiment was repeated at least thrice and the mean values were used for further analysis.

Determination of detergent activity by Surface tension measurement

The outmost property of surfactants in an aqueous solution is the reduction of surface tension. The measurement of the reduction in surface tension can be carried out using many instruments, the easiest being the Du Nouytensiometer.[23] Therefore, the mentioned instrument was used for the present study. The test drugs in various concentrations were measured for their effect on reduction of surface tension at room temperature (25°C) using a Du Nouytensiometer (DST-60 Surface Tension Analyzer, Model: DST-60, Brand: SEO-Korea), along with a 0.5% solution (w/v) in distilled water. The surface tension of the added distilled water was 72.0mN/m. The test solutions were aged for 30 min before further measurements.[24]

Dirt Dispersion

The cleaning of dirt is the primary aim of a detergent. Dirt dispersion activity was evaluated by the method of Saad and Kadhim (2011).[25] In this test two drops of 1% and 5% solution of test drug extracts were added in a large test tube containing 10 ml of distilled water. One drop of Indian ink was added; the test tubes had been stoppered and shook ten times. The amount of ink in the foam was estimated as none, light, moderate, or heavy.[26]

Cleaning Action

Many methods are developed to test the cleaning ability of detergent such as the Greasy wool yarn test by Barnett and Powers (1951)[27] Hair tresses soiled by sebum etc.[28] Since the aim of the present study was only to determine the relative efficacy of the test drugs detergency, therefore, the easy one method was adopted for our study.[23] One gm of wool yarn was placed in 5g grease, after that, it was placed in 100 ml of water containing one g and five gm of drug extract in a flask. The temperature of the water was maintained at 35 ^{0}C. The flask was shaken for 4 min at the rate of 50 times a minute by a magnetic stirrer on a hot plate. The solution was removed and a sample was taken out, dried at a constant temperature (90 ^{0}C) for 6 hours, and weighed till it became constant. The equation was used to calculate the reduction percentage of grease is $DP= 100(1-T/C)$

In which, DP is the percentage of detergency power, C is the weight of sebum in the control sample and T is the weight of sebum in the test sample.[29]

Foaming Properties (foaming power and foam stability)

This test was carried out by the Cylinder shake method with minor modification of the Ross and Miles method.[30,31] For determining foaming ability, 50 ml of the 1% and 5% drug solutions were put into a 250 ml graduated cylinder and covered the cylinder with hand and shook 10 times. The total volumes of the foam contents after a minute shake were recorded. The foam volume was calculated immediately after shaking at '0' min and at '5' min.[32]

For estimating the foam stability, the R_5 parameter was used. It represents the quotient of the foam[31]. So the initial foam height at '0' min and residual foam height after '5' min were measured for the test drugs. The residual foam ratio was calculated as: $R_5 = (h_5 / h_0) \times 100$.

Wetting Ability

Wetting plays a crucial role in the removal of soil, dye, and oils. The comparative efficacies of different surfactants are determined by their wetting abilities. Although Drave's test[33] has been adopted as the standard test, the Canvas disc wetting test [34] offers many advantages over it. It is more accurate and time-saving than the former one. This test does not require any sophisticated instrument or equipment and can be done easily in any laboratory. Therefore, the method of Mainker and Jolly (2000)[23] was adopted. Initially different types of canvas were tested and the one who showed the effective balance between time saving and testing efficiency was selected for the study. The canvas was cut into 1-inch diameter discs having an average weight of 0.32 gm. The disc was floated on the surface of the drug solution and the stopwatch was started immediately. The time required for the disc to begin to sink was noted accurately and the wetting time was calculated.[26]

Determination of pH

The pH of the detergent is an important factor for improving and enhancing the quality of skin and hair, minimizing irritation, and stabilizing the ecological balance of the skin. The pH of 1% and 5% test drug solutions in distilled water were determined by using a digital pH meter (7007 Digisun Electronics) at 25 ^{0}C. Each sample was measured thrice to acquire an average pH value.[32]

Qualitative test for Saponins

Froth test: The aqueous extracts of the test drugs and SLS in 1% and 5% concentration was vigorously shaken with distilled water and allowed to stand for 10 minutes and classified for Saponin content as follows: no froth indicated the absence of saponins, a stable froth of more than 1.5 cm indicated the presence of Saponins.[35]

Foam test: Two ml of extract was taken in a test tube and 6 ml of distilled water was added to it. The mixture was shaken vigorously for the formation of foam and observed for 5 min. The persistence of foam is an indication of the presence of saponins.[35]

Quantitative Estimation of Saponin by HPLC

The analysis was made in isocratic mode with the mobile phase acetonitrile and water in the ratio 7:3 with the RP-HPLC C-18 column at a flow rate of 1.0 mL/min. The standard quillaja saponin with the concentration (1mg/mL) and sample (1mg/mL) was dissolved in the mobile phase and 20µL was injected and the elution was monitored at 203 nm.

Statistical analysis

Statistical evaluation of the data was performed by one-way ANOVA followed by Tukey Kramer multiple comparison test. The results were expressed as mean ± SD using Graph Pad Instat 3.

Result and Discussion

The term surfactant covers surface-active compounds, in which interfacial and solution behavior leads to the following key surface-active properties viz. emulsification, wetting, foaming, detergency, and solubilizing.[19,20] because of the above properties, a battery of tests were carried out that included measurement of surface tension, dirt dispersion, cleaning activity, foaming power and stability, wetting ability and pH. The most common property of surfactants in an aqueous solution is the reduction of surface tension.[23] The detergent property of the test drugs were checked by estimating their surface tension. The aqueous solutions of the test drug extracts including SLS in various concentrations were tested for their effect on Surface tension. The reduction in surface tension was found to be directly proportional to the concentration of the drug as a gradual decrease in surface tension was observed after increasing concentration with each drug. The surface tension in the range of 32 m N/m-37mN/m is considered good for shampoo. This reduction is due to the breakage of hydrogen bonds caused by higher adsorption at the air-water interface that permits an increase in interfacial area with a much less overall increase in energy.[36] In the present findings the reduction in surface tension was observed by *Psoralea corylifolia,* and *Ammi majus* was 43.60mN/m and 42.96 mN/m respectively, whereas SLS showed a more pronounced effect and reduction in surface tension was observed to 26.76 mN/m (Table 1 & Figure 1,2,3).

Sr. No.	Conc. (%)	Surface tension of SLS (mN/m)	Surface tension of Aatreelal (mN/m)	Surface tension of Babchi (mN/m)
1	0	70.56	70.56	70.56
2	0.83	31.72	46.58	48.36
3	1.40	31.25	43.68	46.42
4	1.88	30.39	43.28	45.45
5	2.22	30.16	43.12	44.48
6	2.50	26.76	42.96	43.60

Table 1: Effect of test drug on surface tension at different concentrations (mN/m)

The test drugs and SLS at 1% concentration were found to be good in dirt dispersion activity as they showed very light froth. At 5 % concentration both the test, drugs showed a more pronounced effect on dirt dispersion (Table 2). Detergent that causes the ink to remain in the foam is considered to be of poor quality; the dirt should stay in the water. Dirt that stays in the foam will be difficult to rinse away, it will redeposit on the hair.[25] The dirt dispersion activity is due to a combined property of surface tension. It is inversely proportional to surface tension; lower the surface tension more is the dirt dispersion activity.[37]

Interestingly, *Psoralea corylifolia* L. and *Ammi majus* L. established a correlation between detergency and dirt dispersion activity. There is a dearth of surfactant for the foam to form at a very low concentration, which results in less amount of dirt to be carried, hence very little dirt in the foam.

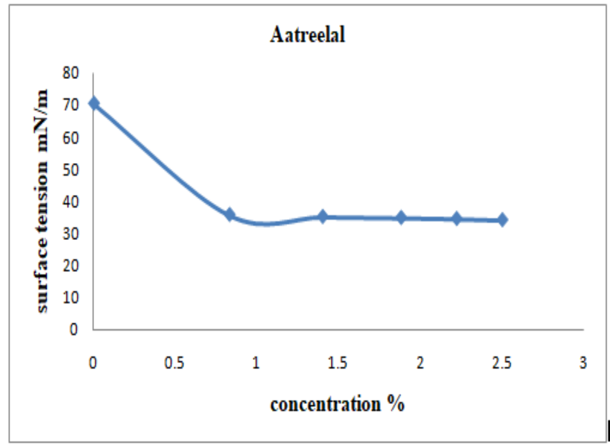

Figure: 1a

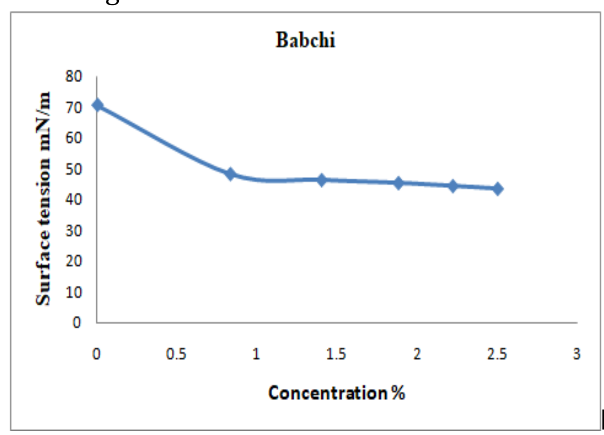

Figure: 1b

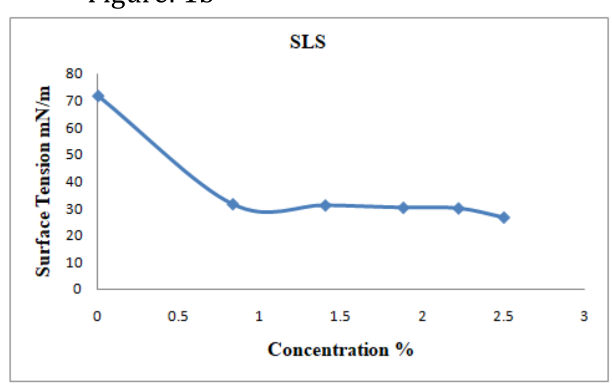

Figure: 1c

Figure 1 (a,b,c): Effect of test and standard drug on surface tension in different concentration

Table 2: Effect of test drugs on dirt dispersion

Sr. No.	Drug Name	Dirt Dispersion	
		1%	5%
1	SLS	Light	Light (+)
2	Aatreelal	Light	Light (+)
3	Babchi	Light	Light (+)

Table 3: Cleaning ability of test drugs

Sr. No.	Drug Name	Mean percentage of grease reduction	
		1%	5%
1	DW	0.00	0.00
2	SLS	41.04	53.1
3	Aatreelal	63.87	59.53
4	Babchi	64.45	61.27

Table 4a: Effect of test drugs on foaming power and stability

Sr. No.	Drug Name	Foaming Power (1%)		Foaming Stability
		0 min	5 min	R5*
1	SLS	41.04	53.1	260±0.00^{***a}
2	Aatreelal	63.87	59.53	76.67±3.055
3	Babchi	64.45	61.27	69.33±5.03

Table 4b: Effect of test drugs on foaming power and stability

Sr. No	Drug Name	Foaming Power (5%)		Foaming Stability
		0 min	5 min	R5*
1	SLS	275±0.00^{***a}	265± 0.00	96.36%
2	Aatreelal	84±3.464	54.67±1.1	65.08 %
3	Babchi	79.67±4.5	69.33±9.8	87.02%

Results are expressed as mean ± SD (n=3); analyzed by one-way analysis of variance (ANOVA) with Tukey Kramer multiple comparison test.
a= SLS VS Aatreelal and Babchi at 1% and 5% concentration (p<0.001).

Table 5: Effect of test drugs on wetting ability

Sr. No.	Drug Name	1%		5%
		Mean ±SD (in second)	Mean ± SD (in second)	Mean ±SD (in second)
1	DW	35.83± 10.25	35.83± 10.25	35.83± 10.25
2	SLS	6.567± 1.041$^{***a, ***b}$	4.5± 0.7937$^{***a, ***b}$	6.567± 1.041$^{***a, ***b}$
3	Aatreelal	10.03± 0.95$^{***a, ***c}$	6.16± 0.152$^{***a, ***c}$	10.03± 0.95$^{***a, ***c}$
4	Babchi	40.06± 3.322	32.310± 1.793	40.06± 3.322

Results are expressed as mean ± SD (n= 3); analyzed by one-way analysis of variance (ANOVA) with Tukey Kramer multiple comparison test.
a= DW vs SLS, Aatreelal and Babchi, b= SLS vs Aatreelal and Babchi, c= Aatreelal vs Babchi
* p<0.05, ** p< 0.01, ***p<0.001

Table 6: pH values of test drugs

Sr. No.	Drug Name	pH at 25^{0}C	
		1% (Mean ± SD)	5% (Mean ± SD)
1	SLS	8.27 ± 0.02	9.32 ± 0.06
2	Aatreelal	5.92 ± 0.005	5.66 ± 0.005
3	Babchi	6.40 ± 0.03	6.25 ± 0.01

Table 7: Total percentage of saponin in aqueous extract of test drugs with comparison to quillaja saponin by HPLC

Sr. No.	Drug Samples	Amount (µg/ 10 mg of Quillaja Saponin)
1	Aatreelal	419.0
2	Babchi	538.8

As the concentration increases more surfactant is attracted to the foam and very little stays in the bulk. Hence the dirt is attracted to foam, this continues till micelles start forming. Once the critical micelle concentration is crossed, there is a surfactant in the solution, which keeps the dirt in suspension. Hence, we can say that there is a gradual decrease in the amount of dirt in the foam as the concentration increase.[30]

The aqueous extract of the test drugs and SLS in 1% and 5% concentrations were tested for their cleaning ability. *Psoralea corylifolia* L. showed the highest effect than *Ammi majus* L. as the reduction percentage of grease was noted to be 64.45%, 63.87% (Table 3). The cleansing ability of a detergent is assisted by a reduction in surface tension in two ways firstly by facilitating the spread of aqueous solution and increasing its wetting ability for the surface and secondly by facilitating the removal of environmental dirt from the hair or skin by keeping it in surfactant suspension.[38] The cleaning ability of the test drug solutions at 5%

concentration was found in *Psoralea corylifolia* (61.27%) and *Ammi majus* (59.53%) showed a good cleaning effect but less than 1% concentration.

Foaming and control of foam is an important factor in the application of cleaners. The foam properties of the products are mainly governed by the surfactant system. Foaming ability and foam stability are very important for consumer satisfaction regarding shampoos, even if they don't have a great influence on the cleaning properties of the product however this may reduce hair deterioration during the washing process, by reducing friction.[28] Many methods have been developed to test the foaming ability e.g. Ross and Miles[39] introduced 'Pour foam test' which was widely accepted for the measurement of foaming power of shampoo then a lather meter was developed to generate foam by Barnett and powers.[40] It was further modified by Hart and De George[41] and Sorkin[42] while Neu[43] used a kitchen blender to produce foam. Cylinder shake method[32] is an easy and widely used technique for foam volume evaluation because of its fast results and reproducibility. The foaming power of *Ammi majus* at 1% and 5% concentration was found to be (76.67±3.055 ml), and (84±3.46ml), and *Psoralea corylifolia* (69.33±5.033ml) and (79.67±4.50ml) and of SLS (260±0.00 ml) and (275± 0.00 ml) respectively. SLS showed excellent foaming stability at 1% and 5% concentration i.e. 100% and 96.36% respectively. Babchi also showed foaming stability as 73.07% and 87.02% at low and high concentrations was observed respectively. Moderate foaming stability produced by Aatreelal i.e. 68.69% and 65.08 % at both the concentration respectively. Values of the R5 parameters higher than 50% indicate the high stability of the foam. The foam properties of the detergent are mainly governed by the surfactant system, soil, temperature, pH, and mechanical input. Surface tension directly correlates to the foam stability of the surfactant water systems (Table 4a & 4b).[44]

The rate of wetting and the wetting ability of surface-active agents are commonly used to determine the comparative efficiencies of detergents. Many tests such as Drave's test[33] and canvas disc test[34] are developed for determining wetting time. Although Drave's test has been adopted as the official test, in this study, the Canvas disc method was used because it has numerous advantages over the former. It is accurate, efficient and the apparatus required for this test is easily available, moreover, it can be easily carried out with limited facilities in any laboratory unlike Drave's test which requires cotton skein, anchors and weight are not easily available. The aqueous extract of the test drugs and SLS at 1% and 5% concentrations were tested for their wetting ability. When the results were compared with the wetting ability of distilled water (35.83±10.25 sec.) it was noted that at 1% Aatreelal and SLS showed significant difference as Aatreelal took only 10.03±0.95sec ($p<0.001$), and SLS only 6.567±1.041 sec ($p<0.001$). SLS took very little time than 6.567±1.041 to wet and sink the canvas disc in comparison to test drug extract. On intergroup comparison, when the wetting ability of the test drugs was compared to each other, Aatreelal showed a significant difference ($p<0.001$) when compared with the wetting time of another drug such as Babchi took 40.06± 3.322 sec. When 5% aqueous extract of the test drugs including SLS were compared with distilled water SLS showed a highly significant difference ($p<0.001$) as it took only 4.5±0.7937 sec. to sink the canvas disc. Aatreelal took 6.16±0.152 sec ($p<0.001$).

On intragroup comparison, both the test drug extract including SLS at 5% took much less time to sink the canvas disc, however, it was not found to be statistically significant (Table 5). Fazlolahzadeh and Masoudi, (2015)[45] reported the wetting time of five different herbal shampoos in the range of 26.5 sec. to 41.3 sec. The wetting time of the test drug at a lower concentration corresponds to these findings. The wetting ability of the substance depends on several processes and factors such as diffusion, surface tension, concentration, and the nature of the surface being wet[32] A solution can penetrate through a surface and completely wet it only if the surface tension is low.[24] Good wetting by SLS, indicates that surface tension was efficiently reduced and enabled the solution to penetrate the surface. The concentration of detergent is directly proportional to detergency power and inversely proportional to wetting time,[23] similar results were observed in our study.

The pH is considered to be an important factor in assessing the quality of a detergent especially in cosmetic products and shampoos and also for those drugs which are used topically. The pH should be in a range that suits the skin and hair and minimize irritation to the eyes, moreover, stabilize the ecological balance of the scalp and skin.[26] Usually the pH values of shampoos are kept between 5 and 7 in accordance to match with skin pH. Shampoo with pH above and beyond the high side of the range can cause eye irritation more readily than those within the range. The pH of the test drugs at 1% and 5% concentration was analyzed at 25^{0}C. At both the concentration it was found to be acid balanced, at 1% *Ammi majus* showed 5.92±0.005 at 5% 5.66±0.005 and at 1% *Psoralea corylifolia* showed 6.40±0.03 and at 5% 6.25±0.01. Whereas the pH of SLS showed alkaline in nature, at 1% it was 8.27 ± 0.02 and at 5% 9.32 ± 0.06 (Table 6).

Since both the drugs showed a desirable range of pH hence it can be said that the test drugs have a good quality of detergency which suits to skin. Based on the above results it can be concluded that all the drugs are skin-friendly since the use of detergents with a high pH level causes an increase in the skin pH which in turn reduces the hydration of skin, causes irritability, and alteration in bacterial flora.[46] Furthermore, change in pH is reported to play a role in the pathogenesis of various skin diseases. Many dermatologists believe that maintaining the skin surface at its physiological pH (4-6.5) during cleansing prevents the overgrowth of certain microorganisms viz. *Propionibacterium acnes.*[47] Therefore, the use of drugs or skin cleansing agents with a pH of about 5-7 may be of relevance in the prevention and treatment of skin diseases.[47,48] As both the test drugs are used in the treatment of various skin disorders so the effectiveness of the drugs may be due to their desirable pH.

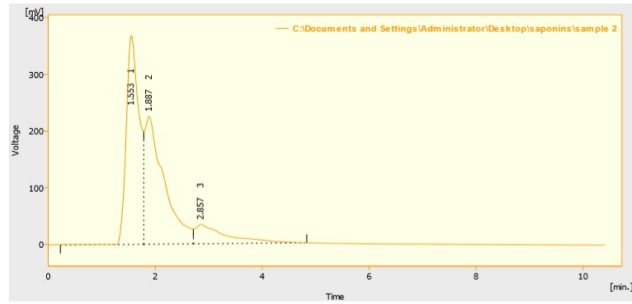

Figure 4: HPLC Chromatogram of Aatreelal

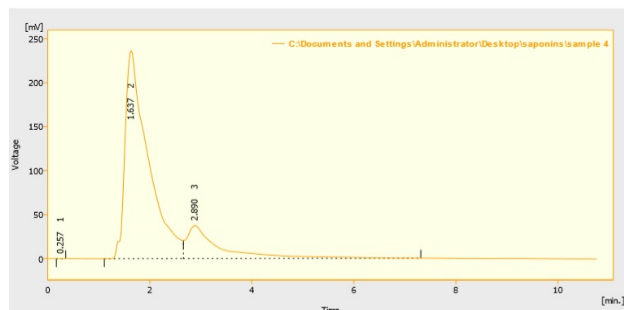

Figure 5: HPLC Chromatogram of Babchi

Since saponin is the main constituent behind the detergent effect of plant-derived drugs therefore the quantitative estimation of saponin was also carried out in comparison to quillaja saponin by the HPLC method (Figure 4 & 5). Preliminary HPLC analysis showed the presence of a good amount of saponin in both drugs. *Ammi majus* showed 419.0 and *Psoralea corylifolia* showed 538.8 (Table7). Further work on the isolation and characterization of the test drug extracts will give a better understanding of their potential and will enhance their use.

Both the drugs were found to be acid balanced and exhibited a significant surface tension reduction, high foaming, wetting, and cleaning effect but less than sodium lauryl sulfate since it exhibited a more pronounced effect in all the parameters.

Since *Jali* drugs have a broad spectrum of activity, therefore, a particular set of tests that are exclusively used for analyzing the detergency power of laundry detergent or shampoo are not enough to prove the efficacy of *Jali* drugs. Hence, it is recommended that these drugs should be further studied by using such a method that can further verify the detergent activity such as the sebum removal from skin or hair tresses or by *in vivo* models and clinical trials.

Conclusion

After observation of the above findings, it was noted that *Ammi majus* L. and *Psoralea corylifolia* L. are acid balanced and exhibited a prominent surface tension reduction, high foaming, wetting, and cleaning with a good quantity of saponins.

Conflict of interest

The authors declare that they have no conflict of interest.

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