Available Online at www.jddt.in

ISSN: 2320 - 4230

Journal of Drug Discovery and Therapeutics 1 (7) 2013, 91-96

RESEARCH ARTICLE

EVALUATION OF COSMETIC PROPERTIES OF DIFFERENT BRANDS OF SHAMPOOS FROM MULTINATIONAL BRANDS IN OMAN

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Received 28 June 2013; Revised 07 July 2013; Accepted 10 July 2013

ABSTRACT

Shampoo is a hair care product used for the removal of oils, dirt, skin particles, dandruff, environmental pollutants and other contaminant particles that gradually build up in hair. Shampoos are products which remove surface grease and dirt from the hair shaft and scalp. The cleansing or detergent action of a shampoo is a primary function. However, the foaming characteristic of a shampoo has an important role in its acceptability.

Originally, soap and shampoo were very similar products; both containing the same naturally-derived surfactants a type of detergent. Modern shampoo as it is known today was first introduced in the 1930s with *Drene*, the first shampoo with synthetic surfactants. In this study, the cosmetic properties of different brands of shampoos available in Oman were evaluated by using different lab tests.

The best result was found with Clear Shampoo because of having good percentage of solids, excellent foam former with stable foam and highly viscous nature.

KEY WORDS: Shampoo; pH; viscosity, hair, marketed shampoo

INTRODUCTION:

Evaluation of shampoos comprises the quality control tests including visual assessment and physiochemical controls such as pH, density and viscosity. Sodium lauryl sulfate based detergents are the most common but the concentration will vary considerably from brand to brand and even within a manufacturer's product range. Cheap shampoos may contain a high detergent concentration while expensive shampoos may contain very little of a cheap detergent[1] Shampoos for oily hair can have exactly the same detergent at the same concentration as shampoos for dry hair. The difference is more likely to be a reduced amount of oil or conditioning agent in the shampoo for oily hair or the difference may even just be the packaging.

Shampoo is a hair care product used for the removal of oils, dirt, skin particles, dandruff, environmental pollutants and other contaminant particles that gradually build up in hair.

ACCORDING TO BRITISH PHARMACOPOEIA:

It is liquid or semisolid preparation intended for application to the scalp & subsequent washing away with water. Upon rubbing with water they form foam[2].

Herbs are used since from the since the beginning of civilization to maintain health and treat disease. Various literatures provides lots of information on the folklore practices in different parts of country and traditional aspect of therapeutically important natural products and also their use in skin care and hair care. There is immense opportunity to use the photochemical ingredients in the hair care; even they are responsible to provide the nutrition to the body[3].

HISTORY:

Before the advent of shampoos, people typically used soap for personal care. However, soap had the distinct disadvantages of being irritating to the eyes and incompatible with hard water, which made it leave a dull-looking film on the hair. In the early 1930s, the first synthetic detergent shampoo was introduced, although it still had some disadvantages. The 1960s brought the detergent technology we use today.

Over the years, many improvements have been made to shampoo formulations. New detergents are less irritating to the eyes and skin and have improved health and environmental qualities. Also, materials technology has advanced, enabling the incorporation of thousands of beneficial ingredients in shampoos, leaving hair feeling cleaner and better conditioned.

The word shampoo in English is derived from Hindi and dates to 1762[4]. The Hindi word referred to head massage, usually with some form of hair oil. Similar words also occur in other North Indian languages. The word and

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the service of head massage were introduced to Britain by a Bengali entrepreneur Dean Mohammed. Dean Mahomed introduced the practice to Basil Cochrane's vapor baths while working there in London in the early 19th century, and later, together with his Irish wife, opened "Mahomed's Steam and Vapor Sea Water Medicated Baths" in Bright on, England. His baths were like Turkish baths where clients received an Indian treatment of champi (shampooing), meaning therapeutic massage. He was appointed 'Shampooing Surgeon' to both George IV and William IV.[5]

In the 1860s, the meaning of the word shifted from the sense of massage to that of applying soap to the hair[6]. Earlier, ordinary soap had been used for washing hair. However, the dull film soap left on the hair made it uncomfortable, irritating, and unhealthy looking. So, during the early stages of shampoo, English hair stylists boiled shaved soap in water and added herbs to give the hair shine and fragrance. *Kasey Hebert* was the first known maker of shampoo.

Originally, soap and shampoo were very similar products; both containing the same naturally-derived surfactants, a type of detergent. Modern shampoo as it is known today was first introduced in the 1930s with *Drene*, the first shampoo with synthetic surfactants.[7]

Hair cleansers or shampoos are used not only for cleansing purpose but also for imparting gloss to hair and to maintain their manageability and oiliness for hairs[8].

Shampoos are of various types, like powder shampoo, clear liquid shampoo liquid shampoo, lotion shampoo, solid gel shampoo, medicated shampoo, liquid herbal shampoo etc. Depending upon the nature of the ingredients they may be simple or plain shampoo, antiseptic or antidandruff shampoo and nutritional shampoo containing vitamin, amino acids proteins hydrolysate[9].

COMPOSITION OF SHAMPO[10]:

Water, Detergents (surfactants), Foam boosters, Thickeners, Conditioning agents, Preservatives, Modifiers and Special additives

MECHANISM OF ACTION[10]:

Surfactants are surface active ingredients, meaning they can interact with a surface. The chemical nature of a surfactant allows it to surround and trap oily materials from surfaces. One portion of the molecule is oil compatible soluble while the other is water soluble. When a shampoo is applied to hair or textiles, the oil soluble portion aligns with the oily materials while the water soluble portion aligns in the water layer. When a number of surfactant molecules line up like this, they form a structure known as a micelle. This micelle has oil trapped in the middle and can be washed away with water, thus giving the shampoo its cleansing power[10].

Anionic surfactants are mostly used (good foaming properties). The hydrophilic portion carries a negative charge which results in superior foaming, cleaning and end result attributes. Non-ionic surfactants have good cleansing properties but do not have sufficient foaming power. Cationic surfactants are toxic and are hence not used. However, they may be used in low concentration in hair conditioners[11].

MATERIALS AND METHODS: [12]

1- Eleven samples of different types shampoos were collected as following:

a. Medicated shampoos:

Vavo (ketoconazole) and T Gel shampoo (Salicylic Acid)

b. Baby shampoos:

Johnson and Cussons.

c. Chemical shampoos:

Clear, Dove, Head & shoulders and Pantene.

d. Herbal shampoos:

C-LAND (Dead Sea products), Fatma (Gensing) and Himalaya (Fenugreek & Sesame)

2- each sample was checked for the following properties:

a. pH
b. Percentage of solids
c. Foam formation
d. Foam quality
e. Viscosity
f. Dirt dispersion

3- All results were obtained and analyzed with help of tables, graphs, figures, charts.

1. Determination of pH: The pH of 1% shampoo solution in distilled water for eleven brands was determined at room temperature 25°C [13.]

2. Determine percent of solids contents: A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo was calculated only and put the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated.

3. Rheological evaluations: The viscosity of the shampoos was determined by using burette. 1ml of shampoo of each brand was placed in a burette and measured the time required to fall from the burette.

4. Dirt dispersion: Two drops of shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was Stoppard and shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.

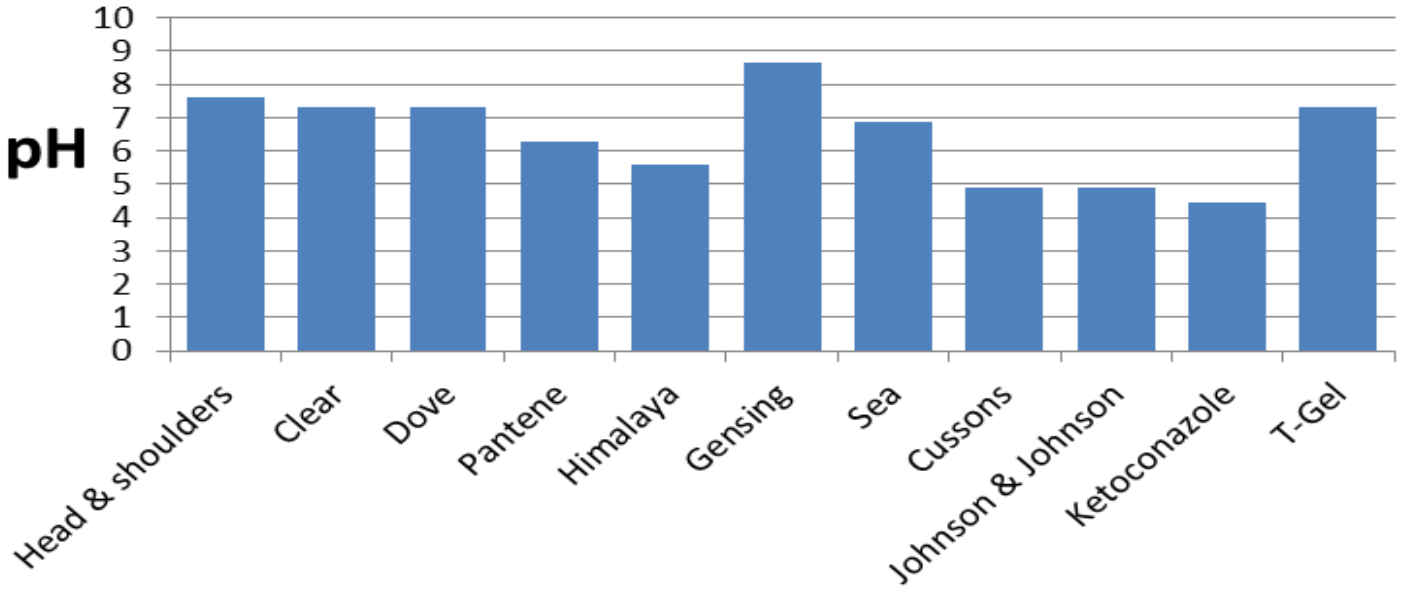
5. Foaming ability and foam stability: Cylinder shake method was used for determining foaming ability. 50ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded. The foam volume was calculated only. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded[14].

Test A: Determination of pH
Test B: % solid
Test C: Shake Test - Determination of Foam Formation
Test D: Foam Quality and Retention:

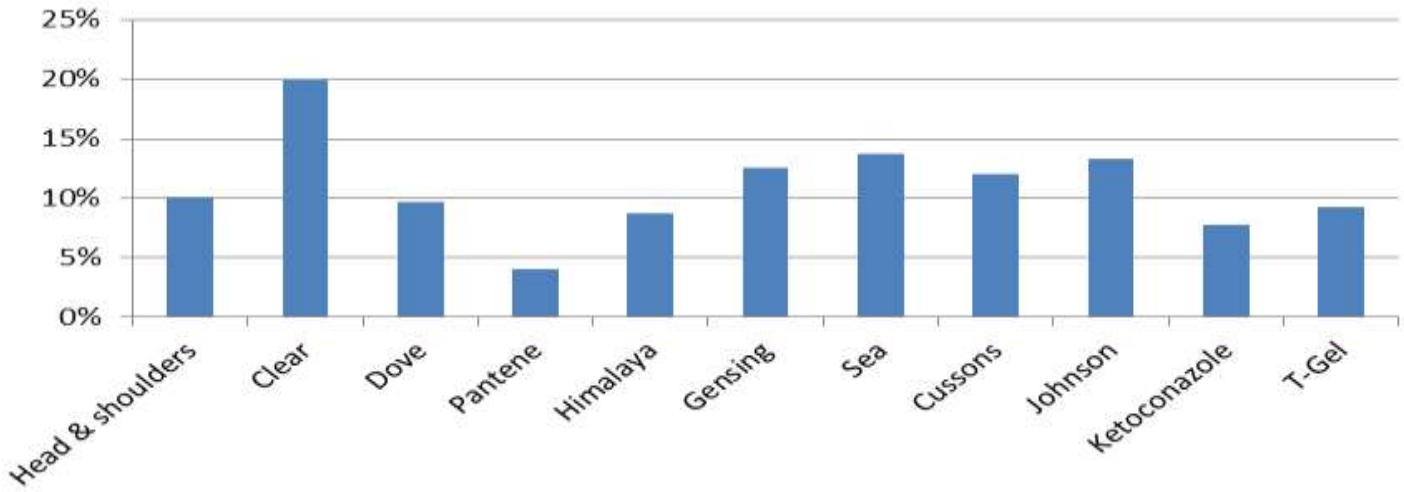
Table 1: Evaluation of pH and %Solids, Viscosity, Foam Capacity, and Dirt dispersion

Sr. No.	Brands	pH	Solid %	Foam formation ml	Foam quality	Viscosity ml / min	Dirt dispersion (foam)
1	Head & shoulders	7.6	10%	145	Stable	18.91m	NO
2	Clear	7.3	20%	170	Stable	73.26m	NO
3	Dove	7.33	9.7%	100	Stable	9.5m	NO
4	Pantene	6.3	4%	140	Stable	5.78m	NO
5	Himalaya	5.6	8.7%	100	Stable	20m	NO
6	Gensing	8.64	12.5%	75	Not stable	23m	LOW
7	Sea	6.86	13.7%	140	Stable	7.83m	NO
8	Cussons	4.9	12%	70	Stable	5.16m	NO
9	Johnson	4.88	13.3%	106	Stable	1.56m	NO
10	Ketoconazole	4.47	7.8%	100	Stable	13.5m	NO
11	T-Gel	7.3	9.3%	110	Not stable	12.7m	NO

Graph 1: pH

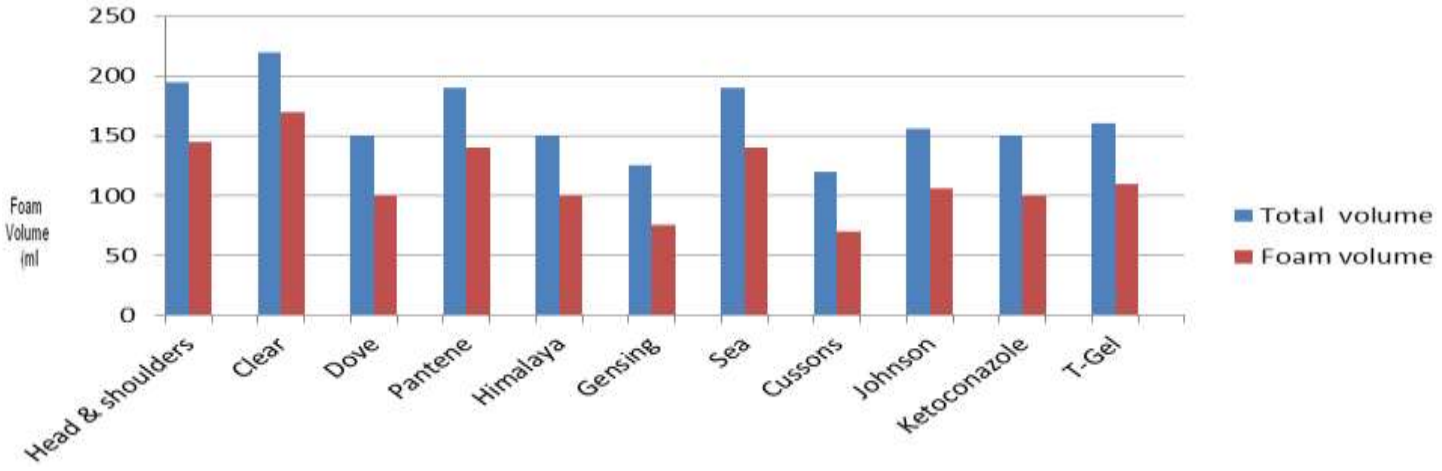


Graph 2: Percentage of solid



Graph 3: Foam formation and bubble size

RESULTS AND DISCUSSION:



1. pH

The pH of shampoos has been shown to be important for improving and enhancing the qualities of hair, minimizing irritation to the eyes and stabilizing the ecological balance of the scalp10. The current trend to promote shampoos of lower pH is one of the ways to minimize damage to the hair. Mild acidity prevents swelling and promotes tightening of the scales, there by inducing shine. As seen from Table 1, Gensing has the highest pH which is 8.64, Ketoconazole, Johnson, Cussons & Himalaya have the lowest pH which is 4.47, 4.8, 4.9 & 5.6 respectively which is near to the skin pH.

- Clear, Dove, T-Gel and head & shoulders are nearly neutral with pH of 7.3, 7.33, 7.3 & 7.6 respectively.
- Pantene and Dead Sea are slightly acidic with pH of 6.3 & 6.86 respectively.

Most shampoos are neutral or slightly acidic. Acidic solutions cause the cuticle (outer layer) of the hair to shrink and lay flatter on the shaft of the hair. Basic solutions cause the cuticle to swell and open up. Acidic solutions make the hair seem smoother. Basic solutions make hair seem frizzier.

2. PERCENT OF SOLIDS CONTENT:

If the shampoo has too many solids it will be hard to work into the hair or too hard to wash out. The result of percent of solids contents is tabulated in table 1, and was found between 4-20%. As a result, some of the shampoos were easy to wash out. If it doesn't have enough it will be too watery and wash away quickly

According to lab condition, the results were found as following:

- Clear has the highest percentage of solids (20%) which is within the range while others are below the required range. Pantene has the lowest percentage of solids (4%).

1. FOAMING ABILITY AND FOAM STABILITY:

Although foam generation has little to do with the cleansing ability of shampoos, it is of paramount importance to the consumer and is therefore an important criterion in evaluating shampoos. All the eleven shampoos showed different foaming characteristics in distilled water.

The foam retention ability of eleven shampoos is given in figure 3. Five shampoos showed comparable foaming properties. The foam stability of herbal shampoos is listed in table 1. A point to be noted here is that there does not seem to be any direct correlation between detergency and foaming, which only confirms the fact that a shampoo that foams well need not clean well. The final formulation produced stable foams there was little bet change in foam volume

- Clear has the highest foam formation with 170 ml and Pantene & Sea are 140ml.
- Dove, Himalaya, Johnson, ketoconazole & T-Gel have accepted foam formation.
- Gensing & Cussons have low foam formation.

Also, all formed small foam bubbles except Gensing formed medium bubbles. A good shampoo should have a foam volume of 100 ml or more in the shake test. Bubbles should be small. The smaller the bubbles the longer the foam will persist. All shampoos have good foam stability except Gensing and T-Gel have low foam stability. In a good shampoo, foam retention should remain stable for at least 5 minutes

2. **VISCOSITY:**

Viscosity is the thickness or stickiness of a liquid. For example, maple syrup is has a higher viscosity than water. The viscosity of a shampoo is related at least in part to the amount of solids that are present. Many shampoo manufactures make tout the viscosity of their product

although it probably has little to do with how well the shampoo actually works.

- Clear has the highest viscosity (very thick) so, it takes 73.26 min for 1ml to fall from the burette.
- Johnson has the lowest viscosity (watery) so, it takes 1.56 min for 1ml to fall from the burette.

5. DIRT DISPERSION:

Shampoo that cause the ink to concentrate in the foam is considered poor quality, the dirt should stay in water. Dirt that stays in the foam will be difficult to rinse away. It will redeposit on the hair.

All shampoos showed good results in dirt dispersion test because there was no ink distribution in foam part except Gensing showed low ink distribution in foam which can be accepted.

CONCLUSION:

Evaluation tests of shampoos are a set of studies and experiments undertaken during production and occasionally ought to be undertaken post production by regulatory agencies and researchers.

In the present scenario, Eleven different brands of shampoos have been evaluated using some test of pH, foam formation, foam stability, viscosity and dirt dispersion with aim to assess whether eleven brands of shampoos or good or not. The results obtained have been compared with standards (reference). The results indicated that all the brands of shampoos have met the requirements of the evaluation tests (pH, foam formation, foam stability, viscosity and dirt dispersion) according to Standards which indicated that they are chemically good. Although, there were slight differences between the brands due the various manufacturing process, laboratory conditions and some other reasons.

Based on all the tests performed or discussed above, it is clear that, Clear Shampoo is the best because it has the following properties: (Table 1)

- Has nearly neutral pH 7.3 (should be neutral or slightly acidic)
- Good percentage of solids 20% (should be from 20% - 30%)
- Excellent foam former 170 ml (should be 100ml or more)
- Stable foam
- Highly viscous (Not affect shampoo work)
- Dirt dispersion in water part not in foam

And Gensing is the least because it has following properties: (Table1)

- Has basic pH 8.64 (causes swelling of hair and make it frizzy)
- Low percentage of solids 12.5% (watery and washed easily)
- Very low foam formation 75ml (should be 100ml or more)
- Unstable foam
- Low dirt dispersion in foam part

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