

Comparative Study of Marketed Kajal as per Bureau of Indian Standards

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ABSTRACT

The eyes are not only the windows to the human soul but also a powerful tool for communication. Kajal is a widely used traditional cosmetic products. It is mainly used for lining the base of lower and upper eyelashes. The raw materials of the Kajal give the stick its properties. There are properties of the Kajal sticks that are ideal for their acceptance. There are many varieties of Kajal available in the market and consumers usually get confused by the varieties available in the market. Consumers are unaware of the proper concentration level of the raw materials or the toxicity levels of the additives. Many consumers are blindly buying and applying these products. They are also unaware of the parameters of required standards to be maintained by the company. They believe in the information claimed by the advertisement. The aim of the present study was to carry out the evaluation of marketed sample along with a formulated laboratory sample on different parameters given by the Bureau of Indian Standard and Indian Pharmacopeia for Kajal Specification and to bring awareness to the consumers.

Keywords: Eye makeup, Heavy metal, Kajal, Toxicity.

INTRODUCTION

For centuries, eye makeup has played an important role in highlighting the eyes. Kajal is a product used for eye makeup. It is worn mostly by women, but also by some

men and children. The content of Kajal and various ways to prepare it differ based on tradition and country.^[1] Kajal is available in different forms like pencil, gel, cream, liquid, and cake. Pencil and crayon Kajal are supplied in either mechanical plastic cases or wooden cases. Kajal is further classified into a different form they can be cake, stick, pencil, and crayon. All these varieties are available in the market in different packaging. All these types are chosen according to the convenience to use by individuals. Further varieties are available according to their properties like water-proof, smudge-proof, long-lasting, etc.^[2]

Kajal is emulsions consisting of texturizers, emollients, pigments, emulsifiers, and water. All the properties of Kajal which are given by the basic raw materials and additives are so far unknown to the consumers. They are unaware of the proper concentration level of the raw materials or the toxicity levels of the additives. They are also sometimes unaware of the special properties that are claimed by the brands. Many consumers are blindly buying and applying these products. They are also unaware of the parameters of required standards to be maintained by the company. They believe what is claimed by the advertisement.

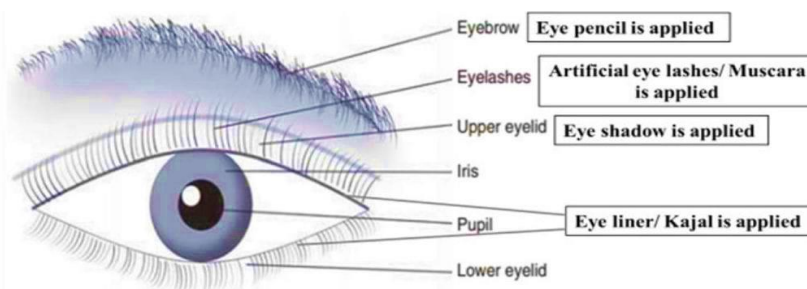


Figure 1 Eye-make-up on different parts of the eye

The literature survey was done through many books and it indicated that the Kajal as an eye make-up should possess many ideal properties for its acceptance. Few research articles indicated that the predominance of lead in Kajal preparations tested is of major concern due to the documented adverse effects on humans.^[3] Along with that, it should not promote any microbial growth throughout its shelf-life. According to the Bureau of Indian Standard of Kajal, a few standard requirements are necessary for the formulation to match through some tests before its topical use.^[4]

MATERIALS & METHODS

A laboratory sample was formulated with basic raw materials and Vitamin E for comparison with the marketed product. The formulation of the laboratory sample Kajal stick is mentioned in Table No 1.

Preparation of Laboratory sample- Sufficient dispersion medium was added to the charcoal powder and mixed nicely to give it a smooth texture. The waxes were allowed to melt completely and then the properly dispersed mixture was transferred to a suitable greased mold and allowed to cool at room temperature. It was then kept in a refrigerator for 20 minutes for setting then transferred to a suitable container.

Table 1 Formulation table of laboratory sample Kajal stick^[5]

Sr. no	Ingredient	The quantity given (100%)
1	Beeswax	25-35
2	Lanolin	5-6
3	Hard Paraffin	20-25
4	Silicon oil	10-20
5	Mineral oil	15-18
6	Charcoal	15-20
7	Camphor	1-5
8	Vitamin-E	1.0-01
9	Propyl Paraben	Q.S.

All six samples were evaluated based on subjective evaluation as well as qualitative and quantitative parameters given by The Bureau of Indian Standard specification and Indian Pharmacopeia for Kajal^[6] as well as Cosmetic pencil^[7]

1) Determination of Melting point^[8]

A melted sample was inserted into a melting point tube so that a column of the material about 1mm long was formed. The same end was fused with the flame. It was kept in the refrigerator overnight. The tube was then attached with a thread to the bulb of the thermometer and suspended in a tube containing water. The temperature was increased at the rate of 0.5⁰C. Heating was continued until the liquid was clear throughout and the temperature at which it melted was noted.

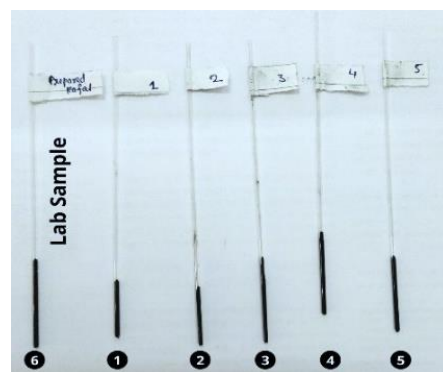


Figure 2 Capillary tubes used for Melting point

2) Determination of Peroxide value^[9]

5gm of the sample was weighed and dissolved in 50ml of petroleum ether with the aid of heat. To the residue 30ml of acetic acid- chloroform mixture (3:2) was added and heated if required. 0.5ml of freshly made saturated potassium iodide solution was added. The flask

was stopped and allowed to stand for 1 minute with occasional stirring. Then 30ml of distilled water was added and then titrated with 0.01N sodium-thiosulphate solution using starch as an indicator.

3) Determination of Freedom from grits^[10]

Approximately 0.5gm of Kajal paste was taken and spread on butter paper on a high molecular mass high-density polythene sheet. The paste was tested by pressing it along the length with a finger for the presence of any hard and sharp-edged abrasive particles.

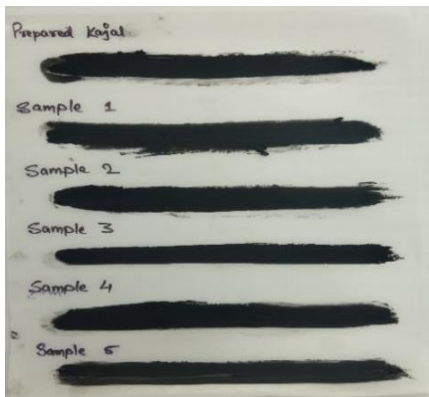


Figure 3 Kajal sample spread on butter paper

4) Test for Heavy metal (as lead)^[11]

1gm of sample in a crucible was taken and heated on a hot plate in a muffle furnace to ignite it at 600°C to constant

mass. 3ml of dilute HCl was taken, warmed, and made up to a volume of 50ml. After filtering, 25ml of the filtrate was transferred into a Nessler's cylinder. In the second Nessler's cylinder 2ml of dilute acetic acid, and 1ml standard lead solution was added and the volume was made with water to 25ml. 10ml of sodium sulphide solution to each cylinder was added and made up the volume with water to 50ml. the contents were mixed and allowed to stand for 10 minutes and then compared to the color produced in the two cylinders.

5) Microbial examination^[12]

0.5gm of the sample was weighed and placed in two Petri-dishes. 1ml of diluent was added and spread with help of a sterilized spatula. The melted SCDA medium was transferred while hot in the first petri-dish and the SDA medium in the second petri-dish. This was done in between two burners so that there should be microbial growth from the atmosphere. Both petri-dish was incubated. The SCDA medium was incubated at 37±0.5°C for 48 hours and growth was observed. The SDA medium was incubated at 20±0.5°C for 7 days and growth was observed.

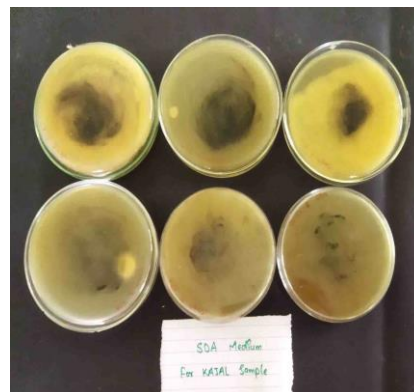
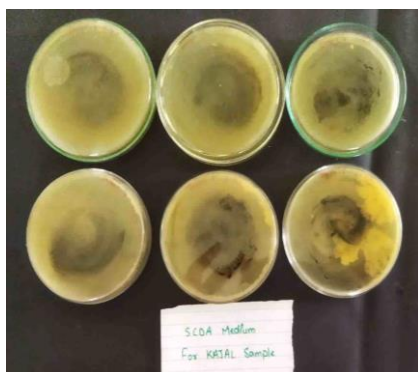


Figure 4 Petri-dish for Total Viable Count

6) Softening point^[13]

The stick was placed in a suitable chuck and then into the flat bottom tube. With a suitable cork, the thermometer bulb

was so arranged that it just touched the tip of the stick. The temperature at which the salve started bending and losing shape was noted.

7) Breaking load point test^[14]

The Kajal stick container with protruded salve was fixed on a burette. A plastic cup attached with a string was hung on the Kajal salve midway. Slowly water was then released into the plastic cup till the salve broke. The total weight which led the stick to break was noted down.



Figure 5 Apparatus assembly for Breaking load point

8) Pay-off test^[15]

The stick was chopped off from the top so that a cylindrical shape remained. Then stick was run on 100cm paper. Then the mass of the stick was measured again before and after the test.

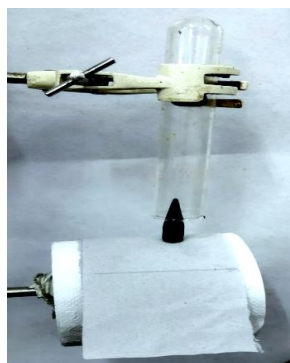


Figure 6 Apparatus assembly for Pay-off

9) Comparison of the color intensity of Kajal after application

All six samples were applied to the forearm. It was kept for 4, 8, and 12 hours and compared.

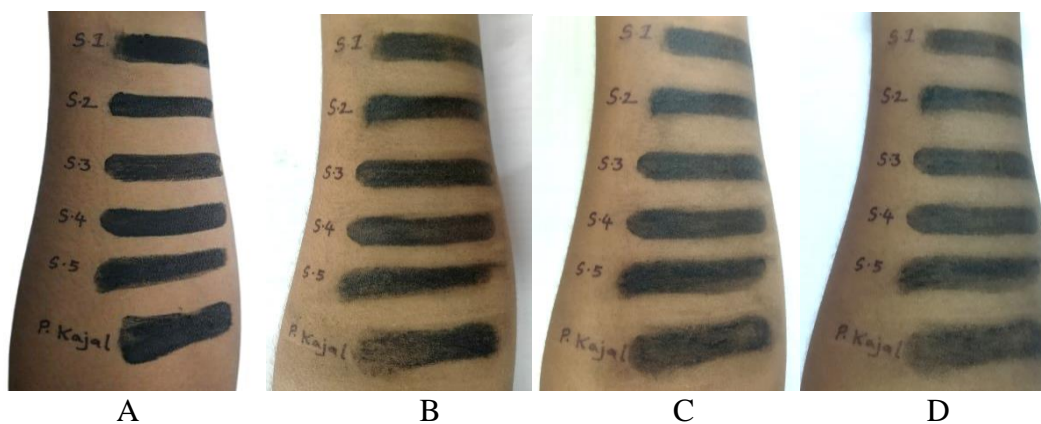


Figure 7 A- At the time of application, B- after 4 hours, C- after 8 hours, D- after 12 hours

10) Stability test^[16]

The prepared stick along with all five marketed Kajal was kept at 4⁰C ±0.5, 27⁰C ±0.5, and 45⁰C ±0.5, and changes if any in its properties till 4 weeks (28 days) were observed for color, odor, and appearance.

11) Subjective analysis

To evaluate the performance on various parameters of the products, all six Kajal

were given to 10 subjects each. They were asked to use daily one product. They were asked to note down their experience after the application of each product. They were simply asked to fill the Questionnaire. The parameters for evaluation were smoothness, pay-off, cooling effect, irritation, and overall product performance.



Figure 8 Subjective evaluation of Sample 1



Figure 11 Subjective evaluation of Sample 4



Figure 9 Subjective evaluation of Sample 2



Figure 12 Subjective evaluation of Sample 5



Figure 10 Subjective evaluation of Sample 3



Figure 13 Subjective evaluation of Laboratory sample

QUESTIONNAIRE

► Personal Information

Name : _____

Age : _____

Sex : Male Female

Occupation : _____

Do you use Kajal daily : Yes No

Method of application : Directly Using Finger

Do you like to use new products : Yes No

Eye problem (if any) : _____

► Evaluation

Sample 1 Sample 2 Sample 3 Sample 4 Sample 5 Laboratory Sample

1. Spreading : Good Not Good

2. Pay-off : Dark Light

3. Cooling Effect : Yes No

4. Irritation : Yes No

5. Overall Product Performance : Acceptable Not Acceptable

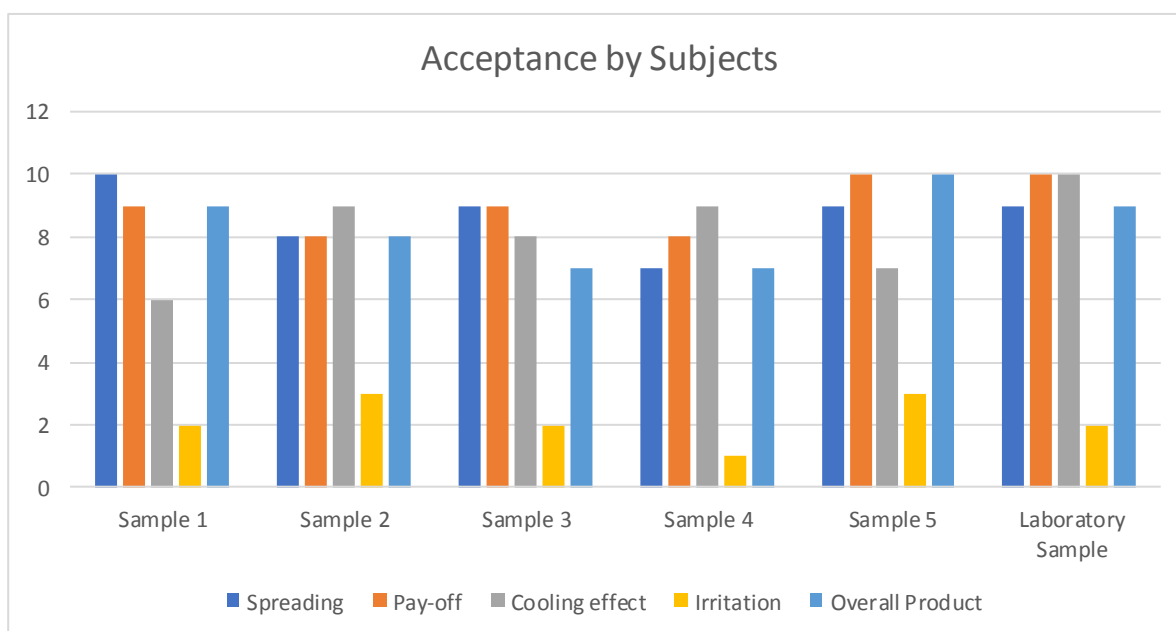
Table: 2 Acceptance of performance on various parameters of the products by 10 subjects

Kajal tested	Parameters				
	Spreading	Pay-off	Cooling effect	Irritation	Overall product
Sample 1	10	9	6	2	9
Sample 2	8	8	9	3	8
Sample 3	9	9	8	2	9
Sample 4	7	8	9	1	7
Sample 5	9	10	7	3	10
Laboratory sample	9	10	10	2	9

RESULT

Table 3 Combined results of parameter tested as per Bureau of Indian Standard^[6-7]

Sr. no.	Evaluation parameters	Observation and Result						
		Requirements	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Laboratory sample
1	Melting point	50°	65	67.5	63	68.5	66	64.5
2	Peroxide value	Less than 10	5.4	7.3	4.1	1.7	2.1	3.4
3	Freedom from grits	To pass the test	Free	Free	Free	Free	Free	Free
4	Heavy metal (as Pb), ppm	20	Less than standard	Less than standard	Less than standard	Less than standard	Less than standard	Less than standard
5	Microbial examination	100CFU	No colonies	No colonies	No colonies	No colonies	No colonies	No colonies
6	Softening point	55°	67	79	81.5	78	74	68
7	Breaking load point	200ml	253	240	237	234	264	226
8	Pay off test, gm/cm ²	To pass the test	0.0006	0.0015	0.0006	0.0004	0.0008	0.0011
9	Color intensity of Kajal after application	To pass the test	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
10	Stability test	To pass the test	Stable	Stable	Stable	Stable	Stable	Stable



Graph 1 Subjective evaluation of performance of Kajal on various parameter

DISCUSSION AND CONCLUSION

The present study aimed to formulate a Kajal stick using Vitamin E along with basic raw materials and evaluating it on different parameters along with its comparison with marketed Kajal which already contains Vitamin-E. The study was to develop a Laboratory sample that would have harmful chemicals like arsenic and lead within the specified level (as per Kajal Specifications) because during a literature survey it was found that these chemicals have harmful effects on people and infants. There is no awareness about it among the

consumer. They usually get confused while purchasing because of the vast variety of products available in the market and the advertisement and claims done by the company. They often purchase the product which is popular in the market or the product which they are been recommended by someone. They are not aware of what suits them and what they should be using. They are blindly purchasing those products. All six samples were evaluated based on subjective evaluation as well as qualitative and quantitative parameters given by The Bureau of Indian Standard specification and

Indian Pharmacopeia for Kajal [6] as well as Cosmetic pencil [7] which concluded that- Sample 4 has the highest stiffness compared to other samples and all six Kajal samples passed its requirement. It was found out with the help of determining melting point, softening point, and breaking load point test. The pay-off test concluded that sample 2 transferred a large amount of Kajal compared to others and all Kajal samples passed the test for its requirement. The rancidity parameter of all the samples was determined with the help of the peroxide value standard and all six Kajal passed the test with the lowest value given by sample 4. All six Kajal samples have neither hard nor sharp edge abrasive particles as found with the help of freedom from grits standard. All six Kajal samples have Lead (as Pb) under the required specification as found out with the help of the determination of heavy metal. The microbiological examination concluded that all six Kajal samples have the required total viable count as per specification and they do not promote any microbial contamination. The laboratory sample was more intense than the marketed sticks at the time of application. After 12 hours the color intensity of all the samples faded and the laboratory sample had the lowest intensity of color than the marketed products in the end. They all started to smudge with every encounter. The stability study concluded that all six Kajal samples are stable under specific conditions along with their organoleptic properties for 28 days.

The subjective evaluation of all six Kajal was carried out. Sample 1 was accepted for spreading properties by most of the subjects, sample 5 and laboratory sample was accepted for better pay-off by most of the subjects, laboratory sample was accepted for giving a cooling effect after application by most of the subjects, and sample 4 was accepted for non-irritation by few numbers of subjects, and sample 5 was accepted as the overall good product by most of the subjects. Thus, all six Kajal samples were found to be useful and acceptable under the

specification of Bureau of Indian Standard of Kajal specification.

The role of a manufacturer during marketing a product is to market good quality product confirming the minimum requirements as per BIS and bring awareness amongst the consumers about the product. They should not only provide advantages to the consumers through advertisement and labeling but they should also take charge of educating the consumers about its use, limitations and demerits. Consumers should also educate themselves about selection of eye product safe and suitable for eyes. It helps them to select products available in the market according to their preference.

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