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# A Review on Formulation and Evaluation of Herbal Kajal

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**Abstract:** *Kajal is used as an eye-catcher and was formerly known as kohl or surma. The idea behind the creation of herbal kajal using medicinal herb for enhancement is a fresh and creative method. The main advantages of these cosmetics are improved patient compliance, increased durability, water resistance, and an affordable shaping curve. Using two medicinal herbs and viz. In order to produce herbal kajal, Rosa rubiginosa and Triphala set out to assess each other's capacity for prolonged ocular administration. Using particular physiochemical criteria, standardised herbs were used to find the values that fell within the given ranges. The herbal kajal's anti-microbial efficacy has been assessed using certain criteria in comparison to reference goods.*

**Keywords:** Kohl, kajal, Rosa rubiginosa, Triphala, herbal kohl

## I. INTRODUCTION

The vital link between the outside and interior worlds is the eye. In Ayurveda, the element of fire and light that governs our eyes is represented by the pitta dosha. As a result, the eyes are a vital organ in our body. For maintaining and enhancing eye beauty Vedic science provides a number of organic, secure, and efficient methods. Many plants and herbs were employed to create Ayurvedic cosmetics with the aid of the science of Ayurveda, which protected the body from external influences while also improving the appearance of the skin. Plant materials are also utilised in cosmetics for practical uses such moisturising, whitening, colouring, sunscreen, antioxidants, immune stimulants, cleaning, thickeners, and preservatives [20].

The importance of kajal in eye products cannot be overstated because it is one of those products. Kajal is worn for a variety of reasons, including tradition, beautification, and protection against the "evil eye." It is widely held that kohl is medically beneficial to the eyes, and that wearing kohl is encouraged within the sunna, the Islamic religion's traditional behavioural guidelines [2]. As mentioned in ancient Indian books such as Charak Samhita, Sushrut Samhita, Bhav Prakasha, Ras Tarang, Nayan Drastam, and Astanghriday, there are a number of plants that are used to treat opthalmic disorders, either single or in compound formulations. In Ayurveda, an Indian medical system, numerous eye conditions and illnesses, such as Abhishyand (conjunctivitis), Adhimanth (glaucoma), Timir (cataract), etc., have been extensively documented1.Treatments and their aetiology have also been explained. It has also been common practise to prescribe a variety of herbal medications in various dosage forms, such as extract, arkas (aqueous distillate), kajal (collerium), fomentation, and washing with various extracts [3]. This area of concern extends beyond the use of animals in laboratory testing to include the use of materials and ingredients derived from animal sources. The Drugs and Cosmetics Act addresses the standards and calibre of medications and cosmetics produced and distributed in India[4].

### 1.1 History

Numerous plants are used to treat ocular disorders. Ayurvedic medicines are based on single or compound formulas, as mentioned in old Indian texts like Astanghriday, Ras Tarang, Bhav Prakash, Charak Samhita, and Sushrut Samhita. Ayurveda, the Indian medical system, has also defined a number of eye conditions and illnesses in detail1. Their diagnosis and aetiology have also been determined. a variety of ocular issues, including glaucoma and conjunctivitis (abhishyand and adhimanth). Particular herbal remedies, like powder, arka (aqueous distillate), kajal (collerium), and

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fomentation and washing with different extracts, were frequently advised for different dosage forms. In this field, using materials and ingredients derived from animal sources in addition to using animals in lab research is crucial. The pricing and safety of products made and sold in India are related to the medicines and cosmetics act. Regulation of 'natural' products used in different preparations is therefore imperative. These days, the fundamental idea that can boost consumer importance and build trust in the products is standardisation. The manufacturer's confirmation of the product's consistency, safety, and effectiveness is also anticipated by the professional and the consumer [11].

**1.2 The benefits and drawbacks of using herbal medicine**

Herbal medicines have been used for many centuries. Here are some advantages and disadvantages of using herbal remedies. Alternative medicine, including homoeopathy, naturopathy, ayurveda, and herbal remedies, is more popular nowadays. It should be mentioned that these medications were in use thousands of years ago. Archaeological evidence indicates that ancient civilizations included herbal plants into their traditional medical practises. The first records pertaining to herbal remedies were written down in China around 2800 BC. For approximately 5000 years, herbal remedies have been utilised to treat a variety of illnesses. It was developed into a distinct industry today because a lot of people prefer herbal medicine to synthetic medicine. 3.1 Benefits of herbal medications Herbal medicine is more wholesome and safer than obtained an allopathic medication. The fact that herbal products can be purchased over-the-counter is another advantage. We are available in all health stores. Allopathic medicines are less effective than herbal remedies and medications for specific ailments. A chemist may recommend specific harmful side effects of the chemical medication. Nonetheless, a lot of natural drugs and therapies don't have any negative side effects. But still. For some, allopathic remedies are more potent than pharmaceutical ones [8].

**1.3 Advantages of using herbal components**

It is simple to use herbal medicine to naturally detoxify the body. Plantago, psyllium seeds, rhubarb juices, aloe vera, alfalfa juice, chlorella, carrot concentrates and garlic are a few more herbs that can be used to strengthen the immune system, improve digestion and food absorption and purify the spinal cord. Numerous Herbs can be used to treat gastrointestinal disorders such as indigestion, peptic ulcers, colitis, and bowel disease. Herbal remedies for circulatory problems, such as asthma, varicose ulcers, etc., often involve ginger, capsicum, garlic, and motherwort. Various herbal remedies are used to treat elevated serum cholesterol and to prevent coronary heart disease. Obesity is the root cause of many health problems. Herbal medications have the potential to reduce weight and regulate appetite. Herbal Remedies [33].

**1.4 The drawbacks of using herbal products**

Negative aspects Herbal medicine, like other complementary therapies, has certain drawbacks. They're all present here. Treating natural medications and supplements will take some time. It takes a great deal of courage. Numerous elements make up herbal treatment to ensure you won't get the body is allergic to it. It's important to remember that, in certain cases, both prescription drugs and natural therapies can have unfavourable side effects. It may take months or even years before these side effects are readily reported. If you are not comfortable with the herbal remedy, it is best to avoid using it during the initial stages. Recall that the industry for herbal medicines is unregulated by law. Consequently, there is no consistency control for herbal products. It's advisable to find an effective herbal medicine practitioner before continuing with herbal medicine because there aren't many of them [35].

**1.5 Benefits of medicated Herbal Kajal**

Medicated kajal, also known as herbal kajal, is a type of eye makeup that is made with natural ingredients and medicated herbs. There are several benefits associated with using medicated kajal, including:

**1. Soothing and cooling effect:**

Medicinal herbal such as aloe vera, camphor, and rose water have a cooling effect on the eyes, which can help to reduce eye strain and fatigue.

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**2. Anti- bacterial and anti-inflammatory properties:**
Some herbs used in medicated kajal such as triphala have anti-inflammatory properties that can help to prevent eye infections and reduce inflammation.

**3. Nourishing and moisturizing:**
Herbal kajal often contains ingredients like almond oil and coconut oil, which can help to nourish and moisturize the skin around the eyes.

**4. Safe for sensitive eyes:**
Medicated kajal is often made with natural ingredients, making it a safer choice for people with sensitive eyes or those who are prone to allergies. Overall, medicated kajal can provide a variety of benefits for the health and appearance of the eyes. However, it is important to choose a high- quality product that is made with natural and safe ingredients [23].

## II. MATERIAL & METHOD

### 2.1 Composition of Herbal Kajal

#### 2.1.1 Bases

- Waxes : Beeswax, Carnauba wax, Ozokerite wax
- Oils : Coconut oil, Almond oil,
- Dill Seeds • Colouring agents: Acai, Avacado, Blue Tansy, Hemp
- Moisturizing agents: Aloe vera, Ghee
- Cooling agents: Castor oil, Camphor

**2.1.1.1 Bases A**. Liquids A broad class of organic compounds known as waxes are lipophilic, malleable solids at temperatures close to room temperature. Higher lipids and alkanes are among them. Water does not dissolve waxes, but nonpolar organic solvents like hexane, benzene, and chloroform do. Different kinds of natural waxes are found in petroleum and are produced by both plants and animals. 

**2.1.1.2 Beeswax**: The natural wax known as "beeswax" is created by Apis honey bees.Eight wax-producing glands in the worker bees' abdominal segments form the wax into scales, which the bees then discard inside the hive. The workers in the hive gather it and use it to create cells that store honey and protect larvae and pupae inside the hive. Since prehistoric times, beeswax has been utilised as the first plastic, as a waterproofing and lubricating agent, used in the lost wax casting of metals and glass, as an artistic medium in encaustic painting, as an ingredient in cosmetics, and as a polish for wood and leather.[7]

**2.1.1.3 Carnauba wax**: To produce a firmer, waterproof product, carnauba wax is frequently found in mascaras and eyeliners. The oil glands at the base of your lashes may clog if you use carnauba wax or other types of wax on them or in close proximity to your eyes. Since oil secretions are required to keep your eyes properly lubricated, this could lead to dry eyes. Ozokerite wax It serves as a binder, emulsion stabiliser, and viscosity-increasing agent in cosmetic products. Research indicates that ozokerite waxes help to keep emulsions from separating into their liquid and oil components by thickening the oil component of cosmetics and personal care products. Mineral wax ozokerite is used in cosmetics to improve texture, particularly to give Kajal stick foundations support and maintain their blend.[7]

**2.1.1.4 Oils**: Almond oil: Almond oil helps minimise puffiness and lighten dark circles under the eyes. These are the antioxidant and anti-inflammatory qualities. Retinol, vitamin E, and vitamin K are additional ingredients in almond oil that help maintain the delicate skin under your eyes smooth and unirritated. These organic components might also aid in constricting the dilated blood vessels that are the source of the discolouration.[8]  Coconut oil: This oil reduces evaporation by creating a protective layer over the layers of the tear film, making it ideal for people with dry eyes. The properties of coconut oil include antiviral, antibacterial, antiparasitic, and anti-inflammatory effects. [9]

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**2.1.1.5 Seeds of Dill** Because of its high vitamin A content, dill weed is excellent for maintaining the health of our eyes and preventing retinal damage. Due to its antioxidant qualities, dill weed is one of the foods high in vitamins that has been shown in numerous studies to both improve vision and prevent a number of eye-related conditions, including cataracts and macular degeneration. Color-adjusting agents:

**2.1.1.6 ACAI:** The colour of acai berries is a deep purple. Their primary chemical constituents are anthocyanins, which are primarily found in açaí fruits and include cyanidin-3-rutinoside and cyanidin-3-glucoside. These fruits also contain phenolic acids, flavanol derivatives, and a number of flavone and flavonol glycosides. Additionally, the fruit produces a deep green oil that is extracted from the Brazilian Açaí palm's fruits, or pulp [16].

**2.1.1.7 Avocado**: Lutein, one of the 600 known naturally occurring carotenoids, is one of the primary pigments in avocado oil. Like other xanthophylls, lutein is exclusively synthesised by plants and is abundant in green vegetables like avocado, kale, and spinach.

**2.1.1.8 Blue tansy**: Blue tansy is related to chamomile because it belongs to the Asteraceae family. The list that follows shows that German chamomile produces a substance known as chamazulene. This compound, which is produced during steam distillation, is also present in Blue Tansy (17–38% Chamazulene in the essential oil). Use Blue Tansy essential oil to add a hint of blue to your formulation [12].

**2.1.1.9 Hemp**: The high chlorophyll content in hemp oil gives it a vibrant green colour. In comparison to cold-pressed hemp oil, hemp oil produced through supercritical CO2 extraction has three times more chlorophyll and four times more total carotene (Aladić, et al., 2014). While it is insoluble in water, chlorophyll is soluble in alcohol and oil. Agents Moisturising

**2.1.1.10 Aloevera**: To help heal or repair damaged skin, aloe vera is frequently applied around the eyes. reduce edoema or puffiness. Hydrate parched or brittle skin. Aloe vera's water and enzymes can help moisturise your skin and lessen itching and flakiness. In cold weather, aloe vera may help prevent dry skin. Aloe vera may also help oily skin by acting as a mild cleanser. [17]

**2.1.1.11 Ghee**: It's critical that you understand that pure cow ghee is renowned for its incredible lubricating properties and contains vitamin A. It treats vision issues and is a rich source of omega 3 fatty acids, which support good eye health. Agents of Cooling

**2.1.1.12 Castor oil**: Castor oil has long been regarded as a mild, useful oil that is loaded with health advantages. Try this quick castor oil massage if your eyes are tired and overworked. It soothes the eyes. It aids in hydrating the skin beneath your eyes.[16]

**2.1.1.13 Camphor**: Camphor has a cooling effect on the eye and eases pain and discomfort. Waxy, flammable, transparent, and strongly scented, camphor is a solid. It's a terpenoid. Discovered within the camphor laurel wood, the kapur tree, a tall timber tree native to South East Asia, and the el, a large evergreen tree found in East Asia. Kinds of herbal eye makeup Therapeutic intent These are used to treat eye conditions and illnesses. Aesthetic intent This momentarily altered human body [15].

- Medicinal intent Herbal Kajal is a natural product with strong medicinal herb content that works well as both an eyeliner and a therapeutic agent. It has a natural blend that is made using a time-honored Ayurvedic technique to enhance vision and encourage eyelid growth. Herbal Kajal reduces swelling of the eyelids, purges the eyes of potentially dangerous pollutants, and has strong antiseptic and anti-inflammatory qualities. They relieve eye fatigue, hasten the growth of thick eyelashes, and subtly enhance vision.

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- Beautifying Intention Indian civilization has always included the idea of beautification. One of the most successful applications of cosmetic technology is herbal makeup. Herbal beautifying kajal is used to promote attractiveness, beautify, and clean the eyes [25].

**2.2 Methodology**

Take dried powder of triphala for preparing the soot then add camphor powder.

↓

Take muslin cloth piece, in this piece triphala powder and Almond powder was taken and used as a wick and was lighted in a mud lamp containing ghee

↓

Now lit the lamp and put the inverted copper plate on it.

↓

Then scrape the black soot and collected in a clean, dry porcelain dish. Preparing the rose water. Add Rose water and Coconut oil in black Soot.

↓

Make a paste form, kajal is ready.

**Table 1: Method of preparation of kajal [10].**

Fig. Formulated Herbal Kajal.

**2.3 Evaluation Test of Herbal Kajal**

**2.3.1 Physical Evaluation**

The formulations of medicated herbal kajal were evaluated for physical parameter like colour, odour, texture and consistency [32].

**2.3.2 pH determination**

The pH of the prepared formulation is measured by a pH meter. 1gm of kajal sample was measured and dispersed in 25 ml of DMSO (Dimethyl Sulfoxide) & stored for 2 hours. The pH value of the kajal composition was recorded three times and average taken [5].

**2.3.3 Antimicrobial Activity**

Antimicrobial activity of prepared formulation kajal was performed using the agar well diffusion techniques. For 48 hr. at 37°C sterile agar was incubated with the bacterial culture (Staphylococcus aureus) for. The bores was made by using the sterile bores diameter 8mm. and the bores was loaded with the diluted kajal solution prepared using the DMSO. The plate was incubated for 48 hr. at 37°C. Zone of inhibition was measured [33].

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**2.3.4 Spreadability –**

To obtain a spreadability of kajal formulations take an excessive amount of kajal sample was taken in glass slides and the weight was placed on the slides for 5 minutes to press the kajal samples to the same thickness. Weight is added on pan. The time required for the split of two slides was taken as a measure of the spread [34].

Calculated using the formula: S = M. L / t

Where, M =the weight (g) tied to the upper glass slide

L = the length (cm) moved on the slide

T = time to separate the slide.[31].

**2.3.5 Stability Studies**

Physical parameters such as color, odour, texture and consistency were determined at room temperature and 40°C [12].

**2.3.6 In-Vitro Study**

**Inhibition of protein denaturation assay for Anti-inflammatory Activity:**

In this activity either egg albumin or bovine serum albumin are used for protein denaturation of assay. Control solution is prepared: 0.45 ml egg albumin, 1.4 ml phosphate buffer whose pH is 6.4.The standard solution is prepared by using the marketed Diclofenac sodium gel various concentration. 0.45 ml fresh egg albumin and 10 ml phosphate buffer saline whose pH is 6.4. A reaction mixture consists of various concentration of triphala of 100- 400µg/ml, take 10 ml of each concentration. Take 0.45 ml egg albumin. 1.4 ml phosphate buffer saline, the mixtures is incubated at 37 °C for 15 min and then heated at 70°C for 5 min. After the cooling reaction mixture the absorbance is measured at 660nm. Using the following formula percent inhibition for protein denaturation is calculated:

% Inhibition of denaturation = (1- D/C) X 100

Where, D is the absorbance of test sample C is the absorbance of control [9].

**2.3.7 Evaluation of Base-**

The evaluation of base that is ghee was evaluated by Acid value and Saponification value.

**2.3.7.1 Acid value**

The acid value is to neutralize the free acid in 1 g of substance the number of mg of potassium hydroxide is required. Determined by the following method Weigh accurately about 10 g of the substance in the 250 ml of conical flask and add 50 ml of alcohol and add 1 ml of phenolphthalein. Warm up on water bath if necessary until substance was dissolved. Titrate with 0.1 N potassium hydroxide. Shake constantly shake until pink colour is obtained. Note the number of ml required and calculate the acid value by using the formula:

Acid value = a x 0.00561 x 1000/W

Where, a = number of ml of 0.1 potassium hydroxide required W = weight of g of substance taken[8].

**2.3.7.2 Saponification value-**

The Saponification value is the number of mg of potassium hydroxide required to neutralized fatty acid determined by following method .Add 40 gm of potassium hydroxide in 20 ml water and add sufficient alcohol to make volume 1000ml. Allow it overnight. Weigh 4g of ghee in 250 ml of conical flask add alcoholic solution of potassium hydroxide , attach to the reflux condenser set another reflux condenser as blank with other reagents. For hr boil on water bath. Add 1ml of phenolphthalein. Titrate with o.5 N hydroxide acid. Note the number of ml required and calculate the Saponification value by using the formula:

Saponification value = (b-a) x28.05/W

Where, W = weight in g of substance taken

a = sample solution reading.

b = blank solution reading [5].

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## III. CONCLUSION

Over 70% of people in India get their medical care from herbal cosmetics. When formulating herbal kohl, scientific consideration is given to the selection of ingredients. Herbal kajal products are made with a variety of natural ingredients, such as plant parts like leaves, waxes, oils, and natural colours and fragrances. Herbal kohl has several benefits, including being safer to use, inexpensive, and free of negative effects on the environment. In addition, it has a bright future ahead of it when compared to synthetic makeup. The field of herbal cosmetics will grow tremendously and significantly if these herbs are properly regulated and standardised[20].

## REFERENCES

[1]. Roy S, Chand B, overview on herbal kajal; International Journal of Innovative Science, Engineering & Technology , 2020 [7],( www.ijiset.com)
[2]. Parry C, Eaton J. Kohl: A lead- hazardous eye makeup From the third world to the first world. Environmental Health Perspectives 1991
[3]. Gupta R, Ahmad H, Sehgal S, Dwivedi H, International Journal of Phytocosmetics and Natural Ingredients 2016
[4]. Waghulde S, Pawar A, Kadav M, Khade P, Kale M, Tekade B, Gorde N, Naik P. Konkan Gyanpeeth Rahul Dharkar College of Pharmacy and Research Institute, Karjat, University of Mumbai.
[5]. Waghulde S, Pawar A, Kadav M, Khade P and Kale M, Innovation development and standardization of Novel Herbal Formulation(2018, 24-25,) DOI: https://doi.org/10.22271/phyto.2018.v7.isp6.1.08
[6]. The Textbook of Cosmetics formulation, manufacturing and quality control.By PP SHARMA vandana publications Delhi-110034 5th edition ; 459
[7]. Sandford M.T, Alfred D. The Fine Structure Of The Wax Gland Of The Honey Bee (Apis Melliferal) Apidologie, Springer Verlag, 1976,7 (3).
[8]. Cynthia Cobb, Medically reviewed, DNP, APRN, WHNP-BC,FAANP-by Ana Gotter – Updated 2019. [ 8]
[9]. Medically reviewed by Debra Rose Wilson, Ph.D., MSN,R.N., IBCLC, AHN-BC, CHT-By Valencia Higuera2020 [9]
[10]. Randive D. J, Bhinge S.D , Jadhav. N . Bhutkar M. A, Shirsath M.k. Assessment of Antimicrobial Efficacy of Kohl / Kajal Prepared by different Indian methods against selected microbial strains. International Journal of Current Pharmaceutical Research, 2020 12[3]
[11]. Varpe P. V, Telangi G. M ,Wakale M.T, Jadhav A. P, Lokhande R. Formulation and Evaluation of Medicated Herbal Kajal. International Journal of Scientific Research in Science and Technology Print ISSN: 2395-6011 Online ISSN: 2395-602X (www.ijsrst.com) Doi : https://doi.org/10.32628/IJSRST2293115
[12]. Gupta B. P,Mishra A, Formulation & preliminary evaluation of herbal kohl. International journal on current trends in drug development & industrial pharmacy ,2019.3, [1]
[13]. Sohail T , Atiq-ur-Rahman , Imran H , Yaqeen Z , Fatima N , Zakir-ur-Rahman, Khula Shireen .Toxicological Studies Of Popular Eye Cosmetic Used World Wide, Bangladesh Journal of Medical science,2019,18.[1]
[14]. https://www.britannica.com/science/human-eye
[15]. https://formulabotanica.com/38-natural-colourantsskincare/
[16]. https://www.thehealthsite.com/diseases-conditions/waysto-use-castor-oil-for-healthy-eyes-k1117-530183/
[17]. https://www.healthline.com/health/beauty-skin-care/aloevera-for-eye
[18] A.R. Ali, O.R. Smales, M. Aslam, “Surma and lead poisoning”, British Medical Journal, Vol. 2, No. 6142, 1978, pp. 915-6.
[19] N.P. Fernando, M.A. Healy, M. Aslam, S.S. Davis, A. Hussein, “Lead poisoning and traditional practices: the consequences for world health”, A study in Kuwait, Public Health, Vol. 95, No. 5, 1981, pp. 250-60.
[20] A. Nir, A. Tamir, N. Zelnik, T.C. Iancu, “Is eye cosmetic a source of lead poisoning?”, Israel Journal of Medical Sciences, Vol. 28, No. 7, 1992, pp. 417-21.
[21] R.M. Al-Ashban, M. Aslam, A.H. Shah, “Kohl (surma): a toxic traditional eye cosmetic study in Saudi Arabia”, Public Health, Vol. 118, No. 4, 2004, pp. 292-8.
[22] I. Nuwayhid, M. Nabulsi, S. Muwakkit, S. Kouzi, G. Salem, M. Mikati et al., “Blood lead concentrations in 1-3-year-old Lebanese children: a cross-sectional study”, Environmental Health, Vol. 2, No. 1, 2003, pp. 5.

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[23] SA Boseila, AA Gabr, IA. Hakim, "Blood lead levels in Egyptian children: influence of social and environmental factors", American Journal of Public Health, Vol. 94, No. 1, 2004, pp. 47-9.
[24] I. Al-Saleh, N. Shinwari, A. Mashhour, G. El-Din Mohamed, M.A. Ghosh, Z. Shammasi et al., "Is lead considered as a risk factor for high blood pressure during menopause period among Saudi women?", International Journal of Hygiene and Environmental Health, Vol. 208, No. 5, 2005, pp. 341-56.
[25] J. Safi, A. Fischbein, S. El Haj, R. Sansour, M. Jaghabir, M.A. Hashish et al., "Childhood lead exposure in the Palestinian authority, Israel, and Jordan: results from the Middle Eastern regional cooperation project, 1996-2000", Environmental Health Perspectives, Vol. 114, No. 6, 2006, pp. 917-22.
[26] A. Shah-Farhat, M.J. Pari Zadeh, G.R. Khademy, M. Balali-Mood, "Blood lead concentrations in one- to seven-year-old children in Mashhad, Iran [2]", Clinical Toxicology, Vol. 45, No. 7, 2007, pp. 812-3.
[27] M.M. Kadir, N.Z. Janjua, S. Kristensen, Z. Fatmi, N. Sathiakumar, "Status of children's blood lead levels in Pakistan: implications for research and policy", Public Health, Vol. 122, No. 7, 2008, pp. 708-15.
[28] A.A. Al-Jawadi, Z.W. Al-Mola, R.A. Al-Jomard, "Determinants of maternal and umbilical blood lead levels: a cross-sectional study, Mosul, Iraq", BMC Research Notes, Vol. 2, 2009, pp. 47.
[29] A. Roy, D. Bellinger, H. Hu, J. Schwartz, A.S. Ettinger, R.O. Wright et al., "Lead exposure and behavior among young children in Chennai, India", Environmental Health Perspectives, Vol. 117, No. 10, 2009, pp. 1607-11.
[30] H.Y. Tomoum, G.A. Mostafa, N.A. Ismail, S.M. Ahmed, "Lead exposure and its association with pubertal development in school-age Egyptian children: pilot study", Pediatrics International, Vol. 52, No. 1, 2010, pp. 89-93.
[31] A. Rahman, H.A. Al-Rashidi, A.R. Khan, "Association of maternal blood lead level during pregnancy with child blood lead level and pregnancy outcome in Kuwait", Ecology of Food & Nutrition, Vol. 51, No. 1, 2012, pp. 40-57.
[32] L.D. White, D.A. Cory-Slechta, M.E. Gilbert, E. Tiffany-Castiglioni, N.H. Zawia, M. Virgolini et al., "New and evolving concepts in the neurotoxicology of lead", Toxicology & Applied Pharmacology, Vol. 225, No. 1, 2007, pp. 1-27.
[33] H.L. Needleman, J.A. Riess, M.J. Tobin, G.E. Biesecker, J.B. Greenhouse, "Bone lead levels and delinquent behavior" Journal of the American Medical Association, Vol. 275, No. 5, 1996, pp. 363-9.
[ 34] S.G. Selevan, D.C. Rice, K.A. Hogan, S.Y. Euling, A. Pfahles-Hutchens, J. Bethel, "Blood lead concentration and delayed puberty in girls" New England Journal of Medicine, Vol. 348, No. 16, 2003, pp. 1527-36.
[35] K.M. Stiles & D.C. Bellinger, "Neuropsychological correlates of low-level lead exposure in school-age children: a prospective study", Neurotoxicology & Teratology, Vol. 15, No. 1, 1993, pp. 27-35.
[36] S. Tong, P.A. Baghurst, M.G. Sawyer, J. Burns, A.J. McMichael, "Declining blood lead levels and changes in cognitive function during childhood: The Port Pirie Cohort Study", Journal of the American Medical Association, Vol. 280, No. 22, 1998, pp. 1915-9.
[37] DC. Bellinger, "The protean toxicities of lead: new chapters in a familiar story", International Journal of Environmental Research & Public Health, Vol. 8, No. 7, 2011, pp. 2593-628.
[38] P. Jain, Y. Ahuja, K. Chadha, "MILAP Cosmetics: Expanding Horizons & Exploring New Markets", Journal of Management & Public Policy, Vol. 11, No. 1, 2019, pp. 39- 46.
[39] AD Hardy, RI Walton, R Vaishnay, KA Myers, MR Power, D. Pirrie, "Chapter 5 Egyptian eye cosmetics ("Kohls"): Past and present", Physical Techniques in the Study of Art, Archaeology and Cultural Heritage, 2006, pp. 173-203.
[40] R. Bansal, "Consumer Behavior towards Herbal Cosmetics in India", International Symposium on Fusion of Science & Technology, Vol. 5, 2016, pp. 18-22