

Determination the cortisone in some beauty care Cream samples

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ABSTRACT

This study aims to measure the levels of Cortisone in various of beauty cream samples collected from the local markets of Al-Bayda city (Libya), where ten types were purchased from different Al-Bayda markets from different companies. The concentrations of SLS in personal care products ranged between (124 – 844 ppm). The results recorded wide variations in the Hydrocortisone contents between the studied samples. Generally , the contents were ranged between (124 – 844 ppm). The higher value was recorded in the sample (844 ± 2.64) , No(2) .While the lower contents was recorded in the sample (124± 1) , No(10). The results showed some difference between the concentrations of cortisone in the studied samples.

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I. INTRODUCTION

A cosmetic agent is a preparation used for the purpose of increasing beauty and hiding the defects of something specially the face (Encyclopaedia Brit, 1979). Cosmetic preparations include skin care preparations; (creams, lotions, emollients and de-pigmentation agents such as hydroquinone, hair preparations, perfumes and fragrances). Cosmetics used on the skin and cutaneous therapeutic agents include sunscreen moisturizers and topical anti-aging products.

Dermatological therapeutic agents include ancient topical medications (with no theoretical basis for action) such as coal tar for psoriasis and agents developed through study of their structure-activity relationships and in-vitro pharmacokinetic parameters such as absorption, distribution, metabolism, excretion and toxicity. Products intended for treatment of abnormal conditions are not generally classified as cosmetics but as drugs (Encyclop. Brit, 1979).

Hydroquinone is indicated clinically as a 2 - 5% ointment for the gradual bleaching of hyper-pigmented skin in conditions such as melasma, freckles and senile lentigines as well as chloasma. On the eye, conjunctival changes and depigmentation, as well as opacification and staining of the cornea are known to occur (Physicians Desk Reference, 1998).

Hydroquinone, when applied to the skin, can cause dermatitis and allergy. Other local skin toxicities include corrosion, bleaching, pigmented colloid milium and ochronosis (Martindale, 1967). Occupational Safety and Health Administration (OSHA) U.S.A categorizes it as a mutagen. When administered to mice, benzene and its metabolite, hydroquinone causes granulocytic differentiation of myeloblasts. Some studies indicate that hydroquinone darkens certain areas of the skin permanently, and has cancer-causing potential making it potentially hazardous (U.S EPA, 1993).

Cortisone:

It is a pregnene (21-carbon) steroid hormone. It is a naturally occurring corticosteroid metabolite that is also used as a pharmaceutical prodrug. Cortisol is converted by the action of the enzyme corticosteroid 11-beta-dehydrogenase isozyme 2 into the inactive metabolite cortisone, particularly in the kidneys. This is done by oxidizing the alcohol group at carbon 11 (in the six-membered ring fused to the five-membered ring). Cortisone is converted back to the active steroid cortisol by stereospecific hydrogenation at carbon 11 by the enzyme 11 β -Hydroxysteroid dehydrogenase type 1, particularly in the liver.

The term "cortisone" is frequently misused to mean either any corticosteroid or hydrocortisone, which is in fact cortisol. Many who speak of receiving a "cortisone shot" or taking "cortisone" are more likely receiving hydrocortisone or one of many other, much more potent synthetic corticosteroids. Cortisone can be administered as a prodrug, meaning it has to be converted by the body (specifically the liver, converting it into cortisol) after administration to be effective. It is used to treat a variety of ailments and can be administered intravenously, orally, intra-articularly (into a joint), or transcutaneous. Cortisone suppresses

various elements of the immune system, thus reducing inflammation and attendant pain and swelling. Risks exist, in particular in the long-term use of cortisone. However, using cortisone only results in very mild activity, and very often more potent steroids are used instead.

The U.S Environmental Protection Agency has not established a reference dose (RfD) for hydroquinone. However, EPA has calculated a provisional RfD of 0.04 mg/kg/d. EPA estimates that consumption of this dose or less over a lifetime would not likely result in the occurrence of chronic non-cancer effects. The RfD is not a direct estimator of risks but rather, a reference point to gauge the potential effects. As the amount and frequency of exposures exceeding the RfD increase, the probability of adverse health effects also increases (U.S EPA, 1994). Nausea, vomiting, abdominal cramps and diarrhea occurred in humans who chronically consumed water contaminated with hydroquinone.

However in one study, no effect on blood or urine parameters was observed in people who were exposed to low doses of hydroquinone for less than 6 months (U.S, EPA, 1987). Rats chronically exposed via gavages suffered from tremors, convulsions and death at the highest levels as well as toxic neuropathy (NTP, 1989). There are reported effects on the stomach and fore stomach lesions in mice (NTP, 1989). In addition, rats studied developed weight loss, ate less and had aplastic anemia when exposed to hydroquinone in their diet (NTP, 1989).

Beauty creams or skin lightening creams or ointments are widely used worldwide either to attempt to remove localized dark patches such as melisma or post inflammatory hyperpigmentation or as a fashion trend aiming to reduce normal melanin in the skin. These creams may contain a variety of ingredients. In many areas, unregulated products are sold, often without listing their contents or they are labeled incorrectly. They may be safe but completely ineffective, or the chemicals may result in side effects and toxicity. They may contain Topical corticosteroids.

The use of Topical corticosteroids (TCs) in dermatology was initiated in 1952 and now it is one of the most extensively used therapeutic formulations in practice.(Sulzberger and Witten ,1952).TCs creams offer rapid symptomatic relief in many inflammatory dermatoses, especially in short-term. But Due to regular and frequent usage of high potency steroids in various dermatoses, local and systemic adverse effects are likely. The common local adverse effects with these preparations include skin atrophy, telangiectasia, (Smith et al., 1976) purpura, striae, skin pigmentation, acneiform eruptions, rosacea, and dermatitis. Another important phenomenon which can occur with continuous use of topical steroids is tachyphylaxis and abrupt discontinuation can lead to rebound dermatological condition. (Singh and Singh, 1986) Betamethasone is a corticosteroid used in topical preparations to relieve skin irritation, itching and flaking from eczema. It is also used as a treatment for local psoriasis. It is used topically for the treatment of, a number of skin diseases, severe allergies. The long term use of this drug may result in thrush, bone loss, cataracts, easy bruising, or muscle weakness (WHO ,2013).Hydrocortisone is used to treat a variety of skin conditions. Hydrocortisone reduces the swelling, itching, and redness that can occur in these types of conditions. This is a mild corticosteroid (Sprung et al., 2008).

II. EXPERIMENTAL PART

Sampling:

Ten different cosmetic samples (Beauty skin Creams) were collected from some Libyan Markets , the study focused on the commercial types of beauty creams, the samples are shown in Table 1:

Table (1): The samples of Cream cosmetic samples:

No	Sample Brand
1	Dexry
2	Vaseline
3	Rose Glycerin
4	Dove
5	Glysdid
6	Jonson
7	Nivea
8	Nivea
9	Tancho
10	Vaseline –Original

2.2. Chemicals:

All the chemical used in this study are chemical grade including:

Ferric Chloride , $FeCl_3$, Potassium Ferrocyanate $K_3 [Fe (CN)_6]$, Sulphoric Acid. Standard solutions of corticosteroids were prepared in methanol. 0.5% (w/v) solutions of iron (III) chloride and potassium hexacyanoferrate (III) were prepared in distilled water. Digital Balance , Water Bath , Spectrophotometer (Type DU 800)

procedure:

Appropriate volumes of working solutions of corticosteroids were transferred into a series of 10 ml volumetric flasks. Sulphuric acid (4N, 2ml) and iron (III) chloride (0.5% w/v, 2 ml), were added to each followed by potassium hexacyanoferrate (III) solution (0.5% w/v, 0.5 ml). The mixture was heated in a water-bath maintained at 70 ± 5 °C for 30 minutes with occasional shaking and diluted to the mark with distilled water. The absorbance was measured at 780 nm against the reagent blank

III. RESULTS AND DISCUSSION

The Results:

Beauty creams or skin lightening creams or ointments are widely used worldwide either to attempt to remove localized dark patches. These preparations may contain Topical corticosteroids. The prolong usage of high potency steroids in various dermatoses can causes local and systemic adverse effects. Sufficient amount of quantity of eight different brands. The absorbance values and contents of cortisone were given in Tables (2&3) and Figure (1).

Table (2) : Absorbance values of Cortisone in the studied samples.

Absorbance Samples	A1	A2	A3
1	0.48	0.360	0.348
2	1.214	1.220	1.213
3	0.371	0.339	0.300
4	0.196	0.204	0.189
5	0.630	0.638	0.640
6	0.310	0.293	0.285
7	0.303	0.314	0.306
8	0.391	0.407	0.423
9	0.237	0.238	0.239
10	0.111	0.109	0.108

The contents of Hydrocortisone in the studied samples were illustrated in Table (3) and Figure (1).

Table (3) : Hydrocortisone values of in the studied samples.

Concentration Samples	C1	C2	C3	Average	±SD
1	365	287	280	277.33	11.23
2	843	847	842	844	2.64
3	294	274	248	272	23.06
4	181	186	176	181	5
5	463	468	469	466.66	3.21
6	255	244	239	246	8.18
7	250	257	252	253	3.60
8	307	318	328	317.66	10.50
9	207	208	209	208	1
10	125	124	123	124	1

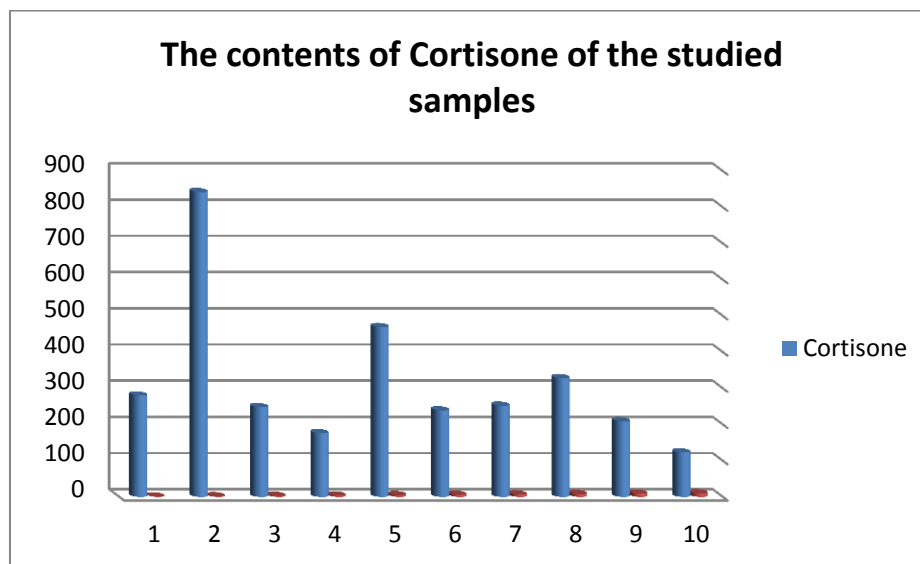


Figure (1) : The contents of Cortisone in the studied samples.

The results recorded wide variations in the Hydrocortisone contents between the studied samples. Generally , the contents were ranged between (124 – 844 ppm). The higher value was recorded in the sample (844 ± 2.64) , No (2) .While the lower contents was recorded in the sample (124± 1) , No(10).

Validation of the method:

Table of (3):The , Regression linearity LOQ , LOD of used method were given in the

parameters	Value
Regression	A = -0.0827 + 00158 C
Linearity	10 - 50 ppm
Slope	.00158
Intercept	-0.0827
R ²	0.998

IV. Discussion:

The method offers the advantages of simplicity, rapidity and sensitivity without the need for extraction. The method is successfully employed for the determination of corticosteroids in pharmaceutical preparations, and common excipients, used as additives in pharmaceuticals, do not interfere with the proposed method. The applicability of the method for the assay of pharmaceutical preparations was examined. The results of assays of available tablets reported for steroids are reflecting the accuracy and precision in comparison to the existing USP method.

The investigated corticosteroids are oxidized by iron (III) chloride in the acidic medium and produce iron (II). The iron (II) ion reacts with potassium hexacyanoferrate (III) and produces bluish green iron (II) ferricyanide complex with an absorbance maximum at 780 nm . The reactivity of corticosteroids towards reduction of iron (III) appears to be, at least in part, a function of their molecular shape, prednisone possessing C11 carbonyl reacts the fastest with Fe³⁺. Similar behavior of steroids is reported with terazolium blue reagent.

The mechanism involved in the reaction of corticosteroids is a two electron oxidation of ketol side chain using iron (III) as oxidizing agent . The reaction conditions were established by varying one parameter at the time and keeping the others constant. The effect of concentration of iron (III) chloride and potassium hexacyanoferrate (III) on the absorbance, while keeping a fixed concentration of prednisone was investigated. The main advantage of the reported method for the detection of the steroids is low costing and rapid assay without sacrificing the sensitivity and accuracy. The consumption of very common chemicals like ferric chloride and Conc. Sulphuric acid which you can find even most laboratories make this method very handy cost wise. The usage of such cheaper chemical will definitely reflect on the cost of the method. As far as the time consumption is concerned, the total time to carry out the complete experiment right from the beginning is less than single hour and it will add up in the values of the reported method. The cost and time is the most serious concern where we have focused while developing method without losing the basics interest like sensitivity and accuracy.

V. Conclusion

Used method recorded different values of Cortisone in the beauty cream samples , also the method was sensitive and rapid .

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