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FORMULATION DEVELOPMENT AND EVALUATION OF HERBAL ANTI-ACNE GEL CONTAINING THE LYCOPENE AND ALOE VERA PULP

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Abstract: This study has been undertaken to formulate and evaluate the herbal anti-acne gel made with lycopene from tomato pulp and aloe vera pulp. It is very good attempt made to establish the Herbal gel with the natural ingredients containing hydro-alcoholic extract of Solanum Lycopersicum (Tomato) and Aloe Barbadensis (Aloe vera). Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. Herbal formulations have growing demand in the world market. This study revealed that the developed herbal formulation A1 was comparatively better than other formulations prepared for topical administration. Aloe vera is used with polymers in gels to provide synergistic effect as well as moisturising effect on skin.

Index Terms **- Anti-acne gel, Lycopene, Aloe vera.**

I.INTRODUCTION

The skin is a most extensive and readily accessible organ of the human body. The skin is multi-layered organ and anatomically has many histological layers. Skin is an anatomic barrier between the body and its environment and contributes to about 16-18% of normal body weight. The overlaying outer layer is called epidermis; the layer below epidermis is called dermis. Beneath the dermis are subcutaneous fatty tissues. The pH of the skin varies from 4 to 5.6. Sweat and fatty acids secreted from sebum influence the pH of the skin surface. It is suggested that acidity of the skin helps in preventing the growth of pathogens and other organisms.

The common name for acne is Acne vulgaris, generally characterized by formation of seborrhea, comedones, inflammatory lesions and presence of bacteria in the follicular canal and sebum production. This condition may be painful with redness and inflammation and sometimes pus may be formed. This condition may be due to exposure of the skin to environmental hazards like dust and pollution, consumption of more oily foods, increased production of sebum in the sebaceous glands, due to food habits, etc. Acne can be characteristic lesions, inflammatory papules, pustules, nodules and cysts, which may lead to scarring and pigmentary changes. Acne may occur also due to hormonal changes in the body. Acne is a long-term skin disease that arises when hair sacs are blocked with departed skin cells or is a common inflammatory skin disorder of sebaceous glands, prevalent in adolescence (85% of teenagers aged 11-25 years old) and half of them continue to experience symptoms as adults in the age range of 35-40 years. It is characterized by the formation of inflammatory and non-inflammatory lesions of the hair follicles and /or sebaceous glands commonly referred to as the pilosebaceous unit. A slight degree of acne is typical at puberty, but a serious case can cause unsightly appearance and leaves scarring in many cases even after treatment. In practical terms, acne may be grouped in terms of severity of the symptoms; i.e. mild, moderate and severe.

Skin diseases are common nowadays and 80% of people rely on herbal remedies. Herbal cosmetics are gaining importance in this current scenario. Recent trends in the development of new formulations in the treatment of skin diseases are gaining importance in curing chronic skin diseases. It's lesions are most commonly found in women nearly 5% as compared to men nearly 1% by the age of 40 years. Recent analyses show an increasing prevalence of acne in children, perhaps because of pubertal onset.

A gel is a solid or semisolid system of at least two constituents, consisting of a condensed mass enclosing and interpenetrated by a liquid. Gels and jellies are composed of small number of solids dispersed in relatively large amount of liquid, yet they possess more solid-like than liquid-like character. The characteristic of gel and jelly is the presence of some form of cutaneous structure, which provides solid-like Properties.

The objective of the study was to prepare Herbal Anti -Acne gel containing aloe vera and lycopene with incorporation of excipients. Aloe vera is known as a miracle plant. The most known species of Aloe vera which is grown worldwide is Aloe barbadensis Miller. Aloe vera gel is derived from inside part of aloe leaf. It is the mucilaginous gel produced from centre (parenchyma) of the plant leaf. It is the preparation which is called pure "Aloe vera gel" in common.

The aloe vera gel stimulates cell growth and enhances the restoration of damaged skin. It moisturizes the skin because it has a water holding capacity. If the yellow part used as a drink, it will protect the mucous membrane of the stomach especially when irritated or damaged. Dental disease is to be a major health problem throughout the world. It may be acute or chronic and long-term treatment is required. The efficient use of anti-bacterial agents for the treatment of various dental problems requires a sufficient drug concentration at the site of action without unwanted effect. If Aloe vera is orally administered, shows wound healing enhancement in the early phase after single dose acute radiation exposure and the improving wound activity might be attributed to its stimulating effect on increased inflammatory cell infiltration, fibroblast proliferation, angiogenesis and growth factor production.

Figure 1: Aloe vera plant

1.1 Scientific classification:

Common Names: Aloe indica Royle, True Aloe, Barbados Aloe, Indian Aloe.
Family: Aloeaceae
Synonyms: Aloe barbadensis mill, Aloe barbadensis. Chinensis Haw, Aloe chinensis (Haw.) Baker.
Taxonomy: Aloe Vera is a succulent plant species of the genus Aloe. An evergreen perennial, grows wild in tropical climates around the world and is cultivated for agricultural and medicinal uses.
Description: A perennial herb with short stem and shallow root system. Leaves: fleshy in roseetes, sessile very much horny prickles on the margin, convex below.
Distribution: Aloe Vera grows in acrid climate and is widely distributed in Africa, India and other arid areas. The species is frequently cited as being used in herbal medicine.
Chemical constituents: Barbaloin, Chrysophanol glycoside, Aglycone, Aloe-emodin, Aloesone and Aloesin.
Medicinal properties: Bitter, sweet, cooling, anthelmintic, carminative, stomachic.
Medicinal use: The leaf juice is used in dyspepsia, amenorrhoea, burns, skin diseases.

Solanum Lycopersicum, popularly known as tomato, originated in South America and now is used and cultivated in various parts of the world. This product is cultivated in warm climate regions, but can also be planted inside a greenhouse during winter. Tomatoes are full of vitamins and antioxidants essential to a healthy body. Since the tomato doesn't need a lot of tending, while it's an easy plant to grow. Tomatoes can be consumed in several ways from salads up to sauces and easily harvested, making it the second most consumed vegetable of the American diet and has China being the main country that produces tomatoes in 31% of the total produced in the world.

Figure 2: Solanum Lycopersicum

1.2 Scientific classification:

Binomial name: Solanum lycopersicum
Family: Solanaceae
Synonyms: Solanum Lycopersicum L., Lycopersicon lycopersicum
Geographical sources: Tomato originated from the Andean region of South America, in the area now covered by parts of Bolivia, Chile, Ecuador, Colombia and Peru. The related species of cultivated tomato are native and widely distributed in this region.
Medicinal Uses: The pulped fruit is an extremely beneficial skin-wash for people with oily skin. Sliced Fruits are a quick and easy first aid treatment for burns, scald and sunburn. A decoction of the roots ingested in the treatment of toothache. The skin of tomato fruits is a good source oflycopene, a substance that has been shown to protect people from heart attacks. It seems to be more effective when it cooked and so can be obtained from food products such as tomato ketchup and tinned tomatoes. Lycopene has also been shown to have a very beneficial effect upon the prostate and is being used increasingly to treat enlarged prostate and the difficulties in urination that accompany this disorder. A homeopathic remedy is made from the plant. It is used in the treatment of rheumatism and severe headaches. Tomatoes are also a great source of removing acne from your face. The vitamin A, C and K present in tomatoes helps to reduce acne on your face. You can apply the pulp of tomato and leave it for ten minutes to get maximum benefits.

II. RESEARCH METHODOLOGY

2.1 Lycopene Extraction using Methanol:

Firstly, 65ml of methanol was added in 50 gm of tomato paste for dehydration. The mixture was shaken vigorously and immediately to prevent the hard lumps, and kept for nearly 2 hours. Then the thick suspension present in mixture was filtered. The obtained dark red cake was shaken for next 15 min in a separating funnel with 75 ml mixture of equal volume of methanol and carbon tetrachloride and separated by filtration. The carbon tetrachloride phase was transferred to a separating funnel by adding 1 ml volume of water and shaken well. By this carbon tetrachloride phase was separated and after phase separation, the carbon tetrachloride was evaporated and the residue was diluted with about 2 ml of benzene. By means of dropper, 1 ml of boiling methanol was added in portion, and because of this, the crystals of crude lycopene were appeared immediately and the crystallization was completed by keeping this liquid at room temperature and ice bath respectively. After this, the crystals were washed 10 times by using benzene and boiling methanol.

Figure 3: Lycopene extraction process

Figure 4: Extracted Lycopene

2.2 Extraction of Aloe vera gel:

The fresh Aloe vera leaves were collected from the plant, Aloe barbadensis Linn., washed in the running tap water for 15 min. Then, it was rinsed with sterile distilled water and mild chlorine solution, then dissected the colourless parenchymatous tissue longitudinally, Aloe gel was scraped out using sterile knife, thick epidermis was selectively removed and gel like pulp separated with spoon, minced and homogenized in mixer.

Figure 5: Aloe vera gel extraction process

2.3 Formulation Development:

Carbopol-940 were dispersed in 50ml of distilled water with continuous stirring using mechanical stirrer. 3ml of distilled water was mixed with the required quantity of Methyl paraben, then heated on water bath to dissolve properly. Solution was cooled and was added and mixed with first solution. Then required quantity of aloe vera leaves extract, lycopene and glycerin was added to the above mixture properly with continuous stirring. Tri-ethanolamine was added drop wise to formulation for adjustment of required pH for skin and also added rose oil for fragrance to obtain gel in required consistency.

A1

A2

A3

Figure 6: The prepared formulations

Table 1: Formulation Table			
INGREDIENTS	*A1*	*A2*	*A3*
Lycopene	*0.2 g*	*0.4g*	*0.2 g*
Aloe Juice	*2.5 g*	*4.5 g*	*2.5 g*
Carbopol 940	*0.5 g*	*1 g*	*0.5 g*
Tri ethanolamine	*pH (q.s.)*	*pH (q.s.)*	*pH (q.s.)*
Glycerine	*2 ml*	*4 ml*	*2 ml*
Methyl Paraben	*0.5 ml*	*0.5 ml*	*0.5 ml*
Rose Oil	*2 drops*	*2 drops*	*2 drops*

III. EVALUATION PARAMETERS

3.1 Measurement of pH[7]:

The pH of various gel formulations was determined by using digital pH meter. 1 gram of gel was dissolved in 100 ml distilled water and stored for two hours. The measurement of pH of each formulation was done in triplicate and average values were calculated.

A1

A2

A3

Figure 7: The obtained pH of prepared formulations

3.2 Spreadability[7]:

It indicates the extent of area to which gel readily spreads on application to skin or affected part. The therapeutic potency of a formulation also depends upon its spreading value. Spreadability is expressed in terms of time in seconds taken by two slides to slip off from gel which is placed in between the slides under the direction of certain load. Lesser the time taken for the separation of two slides, better the spreadability. It is calculated by using the formula: S = M. L / T

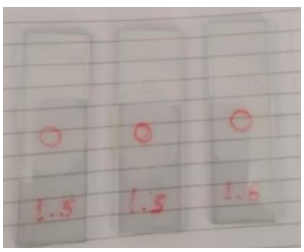
Where,

S= Spreadability.

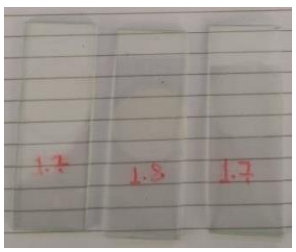
M = Weight tied to upper slide.

L = Length moved on the glass slide.

T= Time taken to separate the slide completely from each other



A1



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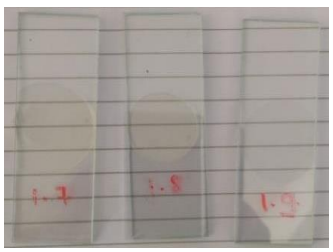

A3

Figure 8: The obtained Spreadability of prepared formulations

3.3 Colour[3]:

The colour of the face wash gel was checked visually.

3.4 Smoothness[5]:

The smoothness of the formulation was tested by rubbing the gel formulation between the fingers and it was observed that whether the gel is smooth, clumped, homogenous or rough.

3.5 Homogeneity[5]:

After the gels have been set in the container, all developed gels were tested for homogeneity by visual inspection. They were tested for their appearance and presence of any aggregates.

3.6 Odour[5]:

The formulation was evaluated for its odour by smelling it.

3.7 Consistency[3]:

It was determined manually.

IV. RESULTS AND DISCUSSION

From the results, it is clearly seen that all developed gel formulations A1, A2, A3 had semisolid consistency, good gelling property as well as homogeneity, tested by visual inspection for appearance and presence of any lumps, flocculates or aggregates. Also it is found that, it was easily washable. The pH of all the formulations were in the range compatible with normal skin physiology, which was very slightly alkaline pH. The gel was Orange in color with a translucent appearance. Amongst all the formulations very optimum spreadability considerable showed comparatively other formulations.

Table 2: Formulation Table

EVAULATION PARAMETERS	*A1*	*A2*	*A3*
pH	*6.71*	*6.3*	*6.4*
Spreadability	*31*	*31.5*	*32*
Colour	*Orange*	*Orange*	*Orange*
Smoothness	*Smooth*	*Smooth*	*Smooth*
Homogeneity	*Good*	*Good*	*Good*
Odour	*Characteristic Odour*	*Characteristic Odour*	*Characteristic Odour*
Consistency	*Semi Solid*	*Semi Solid*	*Semi Solid*

V. CONCLUSION

All these investigations have brought out ultimate factors which leads to the following conclusions:
Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. Because of this, Herbal formulations have growing demand in the world market. The prepared herbal gel is used for topical administration. Here, Aloe vera gel is used with polymers to provide synergistic effect as well as moisturizing effect on skin. This study targets the chronic skin condition “Acne” with the aim of formulating an effective and safe herbal gel containing hydro-alcoholic extract of Solanum Lycopersicum (Tomato) pulp and Aloe Barbadensis (Aloe vera) gel.

This study revealed that the developed herbal formulation A1 was comparatively better than other formulations. The methanolic extract of Solanum Lycopersicum and collected Aloe Barbadensis gel were incorporated into optimized Carbopol gel base. The combination of these two herbal constituents may produce an effect to minimize the Acne problem.

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