

FORMULATION AND EVALUATION OF HERBAL FACE SERUM***Miss Sneha Kedar, Dr. T. K Kedar and Dr. Sanjay K. Bais**

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ABSTRACT

Currently, the need for skin The number of care items and therapies has grown significantly. Greater extent. A lot of emphasis has been placed on maintaining a proper appearance and a standard of beauty. Consequently, individuals and businesses alike are increasingly inclined to take care of their skin. A cleanser, serum, moisturizer, and sunscreen are the standard components of a skin care regimen. It has been observed that among these, serums are the new standard for creating a great skin regimen. Serums are made for a variety of skin types, including dry, oily, and everything in between This literature's objective review is to emphasize the many advantages of utilizing the appropriate serum composition for a variety of skin types and what outcomes the vast majority of

people can anticipate. It includes details about a great number of skin ingredients that are brightening and healing utilized in modern serums and how these substances that give the skin a particular glow that might not be achievable otherwise. Even though there aren't any efficient procedures in place at the moment, accessible for reducing the rate of skin aging circumstances, serums may contain a range of concentrate. The effects of vitamins and acids have been miraculous.

KEYWORD: Skin care, Serums, Skin types, Brightening, Anti-aging, Vitamins.

INTRODUCTION

In the areas of skin science, chemical study, and drug research cosmetics, The study of human skin is essential for evaluating the effects of external agents., these substances interactions and penetration of such compounds mechanisms, their toxicity to the various dermal structures.^[1] Since prehistoric times, People have always known the importance of

beauty, and the wish to look attractive and healthy has increased over time. The term “cosmetic” comes from Greek and means “to adorn,” or enhance appearance. Cosmetology is the study and practice of beauty therapy. It involves learning about makeup and how to apply it, along with the art of improving the look of the skin, hair, and nails. For a skincare formulation to be effective, it must successfully transport its active ingredient into the skin. A face serum helps deliver important active ingredients into the skin, reducing the need for harmful chemicals to give quick results.^[2] Similar to other topical formulations, cosmetic serums may be formulated as water-based or oil-based concentrates. A serum is a concentrated preparation that contains up to ten times more active ingredients than a regular cream. Consequently, it quickly and effectively solves the beauty problem.^[3] Face serums are concentrated skincare formulas that come in both water-based and oil-based type because serums, also known as concentrates, have almost ten times more active ingredients than creams. They are able to treat skin concerns more effectively.^[4] All skincare products, whether moisturizers, anti-aging or anti-wrinkle formulas, or serums should contain antioxidants, cell-communicating ingredients, and skin-identical ingredients. These ingredients are necessary for all skin types. To keep the skin as healthy as possible, face serum contains several ingredients, including a neuropeptide, that are associated with improved better skin barrier function and fewer visible fine lines and wrinkles. The serum has sodium hyaluronate, vitamins C and E, and green tea extract for added benefits. AP-8, a neuropeptide involved in muscle contraction, and beta-glucan, a bioactive compound that enhances cell turnover and immunosurveillance, both exhibit antioxidant properties and contain polyphenols.^[5]

History

It's not surprising that early versions of modern serums came from horse blood, egg albumin, and beef placenta. Since serum is the clear yellow liquid left when blood clots. The guarantee of the products' commercial availability, sterility was maintained in ampoules filled with oxyquinoline and, afterward, parabens. This method has been utilized ever since items had short shelf life and only small amounts had to be made and used right away to keep them from spoiling. In people placed great importance on hygiene, exercise, and skincare. People used zinc oxide for skin lightening, though it sometimes led to allergic reactions. At the same time, hygiene items became more available.^[6] Oatmeal, egg yolks, honey, and rough cleansers were popular for smoothing the skin and treating imperfections. Additionally, lemon juice served as a natural skin brightener. Additionally, skincare goods like chapstick, baby powder, and vaseline were created during this time. The 1900s saw a boom in the

availability of skincare products for women. Murad's lines and Burt's Bees were first released in 1989 and the 1980s, respectively. In 2002, Botox was licensed by the Food and Drug Administration to treat frown lines on the face. The Zeno, a portable, battery-powered device that debuted in 2007, kills bacteria and makes them invisible in a matter of treatments. Serums have changed and advanced greatly since their inception in the 1930s.^[7]

Type of face serum

1. The oil serum

Herbal face serums use natural plant oils and extracts. They are light and soak into the skin easily. These serums give the skin important antioxidants, vitamins, and minerals, making it look healthy and glowing. Serums work better for targeted skin issues since they have more active ingredients than regular creams. Oil serum is intended to give the skin significant hydration and nourishment in addition to other active ingredients to target specific skincare concerns including aging, dryness, or dullness.^[8] Oil serums usually contain a blend of plant-based oils that are rich in fatty acids and antioxidants, such as rosehip, argan, or jojoba oils. These oils help to retain moisture and increase overall hydration levels by restoring the skin's lipid barrier. In addition to oils, oil serums may contain active compounds that address specific skin issues, such as vitamins, peptides, or botanical extracts. For example, vitamin C can help balance and brighten skin tone, while HA helps make the skin fuller and more moisturized.^[9] In the skincare sector, oil serums have gained a lot of traction thanks to their luxurious textures and potent benefits. From intensive moisturization to antioxidant defense, these specialists are such an important component of modern skincare routines. Oil serums contain concentrated blends of natural oils that are carefully selected to give the skin a wealth of nutrients, antioxidants, and emollients. Traditional moisturizers, which are mostly made of water-based chemicals, don't have the same concentration of lipids as oil serums. This makes them particularly useful for replenishing and fortifying the skin's lipid barrier. They drink a lot of water. fast-absorbing formulations. emollient content, which rehydrates and seals in moisture for sustained hydration. This will be especially helpful for people who live in arid climates and have dry skin. Usually, you use an oil serum after you clean and tone your face, but before you put on a moisturizer A small amount are typically sufficient because oil serum is Highly concentrated. Apply the serum with upward movements until it sinks in completely.^[10] Although many skin types can benefit from oil serums. Before using any skincare product, Conducting a patch test beforehand is always advisable. If you have each concerns or specific skin disorders, you should contact a dermatologist. Their nutrient-rich

formulations are available. Oil serums usually contain a wide range of plant oils, All of these ingredients are rich sources of essential fatty acids, vitamins, and antioxidants. They work in harmony to nourish the skin, combat signs of aging, and promote a healthier, more radiant complexion.^[11]

2. The gel-based serum

this characteristics combination of gel and serum are type of skincare product called “gel serum.” Because gel serums are lightweight and gel-like, they sink surface of the skin rapidly They are typically created containing a high level of active compounds chemicals target specific beauty care concerns, just like conventional serums.

your consumer’s skin appears momentarily lifted or firmed in particular facial regions because to the “tightening” sensation that gel serums provide.^[12] The gel serum's water-based formulation enables the incorporation of some incredible plant extracts that dissolve in water One of this key advantages A key benefit of gel serums is their capacity to nourish the skin without making it feel oily or heavy. Gel serums are therefore particularly well-suited for those with oily or mixed skin varieties who may be more susceptible to congestion or breakouts from heavier solutions.^[13] Along with hydration, gel serums may also include additional healthy components like vitamins, peptides, or antioxidants to address specific skincare issues. while Peptides help the skin make more collagen and slowly make it firmer. Generally speaking, gel serums are a well-liked choice for consumers seeking potent yet lightweight skincare products since they offer a revitalizing and effective means of delivering certain skincare advantage with out making the skin feel heavy. They makes it possible for them to enter the skin more efficiently.^[14] Typically, a small amount of product is sufficient, and by gently massaging it upward, it can be fully absorbed into the skin. utilize gel serums because the majority of them are lightweight and non-greasy. Because they hydrate the skin without making it feel weighed down. Their concentration of active ingredients is higher. such conventional serums, gel serums contain high concentrations of key actives like peptides, vitamins, antioxidants, and hyaluronic acid (HA). Among other skin care concerns, these ingredients aid in the treatment of issues such as fine lines, wrinkles, lack of radiance, dryness, and uneven tone. The gel-like nature of gel serum facilitates quick skin absorption, enabling potent chemicals to penetrate deeply into the skin's underlying layers.^[15] This rapid absorption makes it easier for the skin to be effectively hydrated and nourished. Gel serums are generally versatile because they may be applied alone or combined with additional skincare

steps like moisturizers or sunscreen. Additionally, you can include them in both your morning and night-time skincare routines. The cooling and calming effects of gel serums, which are ascribed to their light and refreshing texture, are highly advantageous for those with sensitive or inflamed skin. Because gel serums are so concentrated, a small amount is typically sufficient. Apply the serum using light, upward motions until it sinks in completely.^[16]

3. Water-soluble serum

Gel-type serums are similar to water-based serums, though they might or might not include natural or synthetic thickeners. A water-based face serum is used. The occlusive barrier that the oils will form will permit higher component penetration. Water is the main element in water-based serums, which are thin skincare formulations. Because of this, they are ideal for hydrating skin without making it seem greasy or heavy. To aid in the skin's quick absorption, these serums typically contain a high concentration of water-soluble active ingredients. Water-based serums work well for every skin type, especially oily or acne-prone skin because these provide intense hydration, that is one of their key benefits. HA, glycerin, and A. vera are a few examples. In addition to providing hydration, water-based serums can target particular skincare issues by incorporating Vitamins, antioxidants, plant extracts, and more. advantageous components. For example, niacinamide vitamin B3, can make the skin smoother and make imperfections less noticeable of pores, Water-based serums are light, absorb quickly, and work well for water-soluble ingredients. typically used immediately cleaning and toning, but prior to moisturizing because of their lightweight composition, which enhances their ability to penetrate the skin. A tiny quantity of serum is typically enough, providing mild hydration and potent Active ingredients that enhance the skin's health and appearance. Water-based serums are a common choice for skincare regimens due to their many advantages. Unlike thicker oil-based formulas, water-based serums penetrate into the skin fast and leave no residue, making them ideal for application both morning and night.^[16]

One of the key benefits of water-based serums is their strong hydration. They typically contain high levels of Humectants, Humectants keep the skin hydrated all day. include things like glycerin and HA. Water-based serums usually include other beneficial ingredients including vitamins, antioxidants, and botanical extracts in addition to hydration.^[17] These chemicals can help with a number of skincare problems, addressing signs of aging and skin fatigue, including wrinkles and dullness. For example, water-based serums usually contain Vitamin C can help make the skin look brighter and protect from environmental damage.^[18]

Another advantage of water-based serums is their versatility. They may be easily layered with other products or added to existing skincare routines because they don't feel heavy or cause piling. This allows users to customize their skincare regimen to address their unique skin conditions while benefiting from light hydration.^[19]

4. The emulsion serum

One kind of A moisturizer that protects and strengthens the skin. and distributes effective chemicals on the skin is an emulsion-based face serum. An emulsion is composed of two immiscible phases, for example water and oil, which inherently resist combination maintain their stability. The best possibility of delivering strong active ingredients deeper An emulsion helps the active ingredients get into the skin. Despite this fact that the skin's barrier makes it hard for cosmetic products, like oil and water mixtures, to reach the deeper layers. the most suitable for accomplishing this incredible accomplishment. The emulsion's hydrating qualities will strengthen the skin's protective layer.^[20] "Emulsion serums" are cutting-edge skincare products that They mix serum benefits with a light, easy-to-apply texture. These mixtures bridge the gap between traditional serums, which are highly concentrated, and lighter formulations. usually very concentrated in active chemicals easier to absorb for the skin One of the main features of emulsion serums is their ability to offer a harmonious blend of active ingredients and hydration. They often include a higher concentration of water-based compounds than traditional serums, making them more moisturizing and suitable for a wider range of skin types.^[21] Moreover, emulsion serums usually contain moisturizing components like glycerin or HA. These components support levels all day long. In addition to being moisturizing, emulsion serums contain potent active ingredients that target specific skincare concerns. These may consist of vitamins, peptides, antioxidants, or plant extracts, depending on the composition.^[22] their lightweight structure, emulsion serums sink into the skin easily Emulsion serums are great because they feel light on the skin. After applying emulsion serums, the skin feels soft, silky, and moisturized; in contrast to bulkier moisturizers or creams, they absorb rapidly and don't leave a greasy aftertaste. They are particularly well-suited for use during the day as they moisturize and provide nourishment without leaving a greasy or heavy feeling.^[23]

5. The pressed balm serum

Along with the conventional the base of the balm butter, waxes, and Alongside oils, balm serums incorporate lipophilic active compounds, which may exert beneficial effects on the

skin. This skin is nourished as well as hydrated by the protective layer that the butter and waxes form, which makes it possible for the pressed serum's active components to function. To make a balm serum, several thousand excellent Plant oils may be combined together with a variety intriguing, unique natural butters and waxes Redressed ointment serums are an innovative fusion of skincare products that combine the richness of a balm with the concentrated efficacy of a serum. This product has a special texture that melts when it touches the skin. providing deep moisture and nutrients while targeting specific skincare conditions. The luxurious, velvety texture of pressed balm serums often It melts into the skin and feels luxurious when applied.^[24] This deep moisturizing and relaxing qualities of pressed balm serums are among its primary advantages; these qualities are particularly beneficial for those with dry skin. Helps keep the skin moisturized and fixes its protective barrier, these creams typically contain a blend of nutritious Oils, natural butters, and skin-softening ingredients like squalane, cocoa butter, or shea butter. Pressed balm serums can also be enhanced with potent active ingredients like vitamins, antioxidants. They can be used as a targeted therapy in addition to pre-existing skincare regimes or as a stand-alone moisturizer for persons with normal to dry skin.^[25] Although pressed balm serums are often more costly, they are a cost-effective option because you only need a little amount for each application due to their concentration. Furthermore, pressed balm serums are usually packaged in convenient jars or compacts, making them easy to transport and use while on the go. These solid serums reduce waste and mess, and They don't leak or spill as easily as regular liquid serums. Pressed balm face skincare serums are different from traditional skincare products in a number of ways. First of all, their unique recipe delivers focused therapy and intense hydration in a single convenient solution by combining the benefits of a serum and a balm. Pressed balm serums are particularly helpful for those with dry skin because of their thick, velvety texture, which allows for thorough moisturization. Furthermore, by strengthening the skin's protective layer, this richness helps to retain moisture and stop its loss during the day.^[26]

Herbs used in face serum

Liquorice Root Extract for Skin

Because of its antioxidant qualities, liquorice roots more especially from substances like flavonoids, triterpene saponins, and glycyrrhizin. These ingredients support a number of skin-improving benefits, including depigmentation, lightening, whitening, anti-aging, anti-inflammatory, moisturizing, acne-fighting, and photoprotective actions.^[27]

Because of its many different skin-improving qualities, using liquorice root extract in your skincare routine has proven beneficial. Licorice root extract can help improve your skincare routine. routine because the extract brightens your complexion, combats aging symptoms, reduces inflammation, and shields your skin from UV rays. It functions as a hydrating agent and offers UVB protection.^[28]



Fig. 1: Liquorice Root.

Aloevera Gel for Radiation Protection and Skin Care Benefits

Anti-inflammatory effects: It reduces redness, swelling, and irritation caused by UV or gamma radiation. **Protective Effects Against Light rays:** Research possesses shown that it can lessen the harm that radiation exposure causes to the skin.

Anti-aging and moisturizing qualities: Muco polysaccharides, which are present in aloevera gel, Help the skin hold moisture and stay hydrated. Aloe vera helps protect the skin from UV and gamma-radiation damage. also increases fibroblasts, which helps stimulate collagen and elastin production. fibers, increasing epidermis suppleness as well as decreasing wrinkles.^[29]



Fig. 2: Aloe Vera Gel.

Carrot Seed Oil: Helps Keep Skin Young and Controls Oil

Anti-senescence qualities: This essential oil helps well known due to its capacity for improve look as well as reverse and lessen fine lines.

Great for Oily Skin: It keeps these complexion balanced along with healthy by reducing essential oil production.

Packed with carotenoids: Strong antioxidants found in carrot seed oil have been shown to have Properties that help prevent aging, degeneration, and potentially cancer.

Cosmetic rejuvenation: In 2019, a study showed that oil has renewing qualities at a cosmetic level.^[30]



Fig. 3: Carrot Seed Oil.

Manjistha : A Powerful Ayurvedic Herb for Skin Health

The herb Ayurveda has used manjistha (Indian madder) for many generations because of its skin-healing properties. Manjistha is taken from the dried roots of the *Rubia cordifolia* plant, an Ayurvedic herb. Has been used extensively for its ability to improve skin. This powerful herb is well-known for treating a number of skin issues, including as inflammation, pigmentation, and acne.^[31]



Fig. 4: Manjistha.

Flaxseed (Linseed) Gel: A Nutrient-Rich Skincare Treatment

Flaxseed, a product of the Linaceae family and derived from the flax plant (*Linum usitatissimum*), is well known for its nutritional advantage and new skincare uses.

The skin of the flaxseed is where the fiber is mostly found. Flaxseed has lots of omega-3 fatty acids, plenty of fiber, and lignans. The fiber mainly sits in the seed's outer coat. The skin of the flaxseed is where the fiber is mostly found.^[32]

Among the many skincare advantages of flaxseed gel are:

Hydration: Flaxseed gel's high water content helps seal in and replenish moisture, leaving the skin feeling soft and dewy.

Decreased inflammation: Flaxseed gel's phytoestrogens have Anti-inflammatory properties that help calm sensitive skin.^[33]

Better skin barrier function: Flaxseed gel's omega-3 fatty acid content helps to maintain a strong skin barrier by lowering Water loss through the skin and improving skin hydration levels in general. With adding apply flaxseed gel to your beauty routine, you may take advantage of all the many advantages this nutrient-dense substance has to offer.^[34]



Fig. 5: Flaxseed.

Almond Oil: A Natural Solution for Healthy Skin

Oleum amygdalae, another name for it, it's a kind of glyceryl oleate that has any faint smell with a nutty flavour.

This is a common alternative to olive oil since this is practically It does not dissolve in alcohol but dissolves easily in ether or chloroform.

Natural almond oil has several advantages for your skin, such as:

Reduces inflammation qualities: Natural Almond oil has Reduces inflammatory chemicals that soothes and comforts sensitive skin.

Moisturization: Almond oil functions as an emollient, keeping your skin moisturized and locking in moisture.

Vitamins that nourish the skin: this is high has vitamins E and A that can to strengthen the skin as well as lessen aging symptoms.^[35]



Fig. 6: Almond Oil.

Glycerin

It has been scientifically proven that Glycerin is safe and works well on the face. It helps the skin hold water, keeping it hydrated, less dry, and more refreshed.^[36]

Rose Water: A Natural Toner That Balances Skin pH.

Natural rose extract has the ability to balance pH and is a natural skin toner. There are several advantages to using rose water, glycerin, and almond oil in your skincare routine every day, such as hydration, anti-inflammatory qualities, skin nourishing, moisturizing, and pH-balancing effects.^[37]

Green tea

There are many medicinal and pharmacologically active compounds in tea. There are more than 500 chemicals in rose water, with over 400 organic and 40 inorganic ones. These compounds have been extracted from the tea since early 1800s.^[38] Because green tea is not fermented, it retains all of its natural chemicals.

Green tea keeps all its original plant compounds because it does not go through fermentation.

This section reviews phytochemical studies on green herbal tea and categorizes its main bioactive compounds.



Fig. 7: Green tea.

Tea polyphenols

The term “tea polyphenols” refers to the polyphenols found in tea. There are roughly thirty different types of chemicals, mostly made up of phenolic acids, flavonoids, anthocyanins, and catechins. Green tea has more polyphenols than other types of tea. (20–30%), making it a great natural antioxidant.

Catechins

The main tea catechins are C, EC, EGC, ECG, and EGCG. Studies show that green tea catechins, especially EGCG, can help fight cancer, viruses, and oxidative stress.

Flavonoids

Flavonol, Green tea contains a high concentration of glycosides, predominantly myricetin, quercetin, and behenyl glycosides. This sugar chain has disaccharides or trisaccharides and simple sugars like glucose, galactose, rhamnose, arabinose etc. Anthocyanins are water-soluble pigments and a type of flavonoid.

Alkaloids

Purine alkaloids constitute the majority of the alkaloids present in tea. Among them, caffeine is present in the highest amount (2–5%). It also has tiny amounts of theophylline and theobromine. The primary constituents of tea’s cooling action are these three alkaloids.^[39]

Table 1: Common ingredients for serum.

Hyaluronic acid	Dehydrated and patchy skin
Retinol	Anti- inflammatory properties
Alpha hydroxyl acids	Superficial peeling agent
Vitamin E	Antioxidant
DMAE(dimethylaminoethanol)	Anti-ageing
Glycerin	Humectant
Green tea	Anti-inflammatory
Resveratrol	Antioxidant

Evaluation of Herbal Face Serum**Appearance Check**

Look at the color, clarity, and texture Ensure no separation, lumps, or bad smell.

PH Test

Check pH with a pH meter or strip. Ideal pH range: 4 – 6.5

Viscosity (Thickness)

Check if the serum is too thick or too runny. Compare with the original batch.

Microbial Testing

Total bacteria and fungi count. Ensure harmful microbes.

Stability Testing

Store at different conditions: Room temperature High temperature (40°C).

Application

Concentrates give the skin the necessary quantity of effective ingredients in a way that is quicker so it can absorb The concentrated active ingredient components provide moisturizing, renewing, lifting, other properties that are comparable to those of creams.

The sole difference is that observable benefits can be acquired faster with correct use of concentrates. Many face serums not only hydrate the skin but also offer anti-aging effects.

Among these substances that can boost collagen synthesis vitamin C, peptides, and growth factors.

When taken regularly, these serums can promote a more youthful complexion and reduce the appearance of aging indicators.

A common side effect of facial serums is brightness.

Vitamin C, niacinamide, and AHAs are a few of the compounds that can help lessen sun damage, dark spots, and hyperpigmentation, leaving the skin with a more even tone and bright glow.

Exfoliation is a significant advantage of various face serums. AHAs, BHAs, and enzymes work by removing dead skin cells and clearing clogged pores.

Certain facial serums also offer relaxing and soothing qualities. With soothing, anti-inflammatory ingredients—such as niacinamide, chamomile, and aloe vera—these serums are highly suitable for sensitive or reactive skin.^[40]

CONCLUSION

Because of their rapid absorption and high concentrations of active ingredients, face serums have become a crucial component of contemporary skincare. They offer specific advantages like hydration, nutrition, brightening, or anti-aging properties and penetrate deeper into the skin than conventional creams. Different kinds of serums, such as pressed balm, water-based, gel, oil-based, and emulsion, provide answers for different skin types and issues. Serums are a wise choice for anyone looking for noticeable and long-lasting skin improvement because of their efficacy and adaptability. All things considered, serums help close the gap between simple moisturizers and sophisticated skin care procedures, increasing the effectiveness and focus of skincare regimens.

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