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Herbal Face Gel: A Review of Liquorice And Aloe Vera Based Topical Formulations, their Evaluation and Skin Benefits

Formulation, Evaluation, Stability and Safety, Compiled from Twelve Research and Review Papers

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ABSTRACT

Herbal gels are popular due to their feeling of lightness on the skin, ease of removal and perceived gentleness of the product. One of the most commonly used herbs in facial gels is liquorice (Glycyrrhiza glabra). It is well known for its skin lightening effects, along with its calming and antioxidant properties and is often combined with Aloe vera. This review looked at twelve published papers, five of which were formulation studies, one clinical trial, one lab study and five reviews. Information was gathered on the key active compounds, extraction method, gel/cream vehicles, testing methods, stability and safety of different formulations. Simple methods were used to produce gels with a pH of around

5.7 to 7.2, that had a good appearance and reasonable stability. Lab studies showed antioxidant and anti-inflammatory effects and a small trial using a combination of Licorice and Olive orally was able to reduce dark spots. However, there was variation in the methods used. Few of the studies showed antioxidant/lightening effects of the final product. None of them were specifically a liquorice face gel for lightening and calming. Issues including dark colour, photosensitivity of glabridin and poor solubility were common. This indicates the need for a simple well tested formulation of a polyherbal face gel using a standardised extract.

Keywords: Herbal face gel, Liquorice, Glycyrrhiza glabra, Aloe vera, Glabridin, Polyherbal, Topical formulation, Skin lightening.

1. Introduction

Many people want products to lighten, calm and reduce oiliness of the skin. Many of them will choose products containing plant derived ingredients. As it is expected to be more gentle and safe due to being herbal, along with its long history of use in Ayurveda and other traditional systems. Herbal cosmetics have become a busy field of research with new creams, gels and serums containing extracts coming out every year.

A gel is a good option to use on the face. Topical gels are semi solid preparations with the active ingredient dissolved or dispersed into an appropriate vehicle. They are less greasy than creams and easy to spread, but can be easily rinsed off with water (Kukde et al., 2020). They also have a cooling effect when applied to the skin which is pleasant. If two or more herbs are used it is known as a polyherbal formulation. This means they can take advantage of the various benefits of the plants.

Liquorice, the root of *Glycyrrhiza glabra*, is one of the most well known herbs for skin products. It is a depigmenting agent and is being used in topical products for this purpose (Pastorino et al., 2018). Its compounds have shown antioxidant and anti-inflammatory effects. *Aloe vera* is a natural partner as it is moisturising and calming. This makes them an obvious choice for a face gel.

However, it isn't clear from the literature how to formulate and test the gel. There was variety in the vehicle, concentrations, testing and claims. The aim of this review is to pull together the key points from the twelve papers relating to liquorice and related herbal topical products. The information gathered relates to the active ingredients, extraction, formulation, testing, stability and safety of the products. Finally, gaps in the research are noted and suggestions for future work are given.

3. Literature Included

Twelve papers were reviewed (Table 1). They were chosen as they either relate to liquorice or its compounds, formulating herbal gels or creams, skin lightening or testing. Five of them were original formulation studies, one was a clinical trial, one was a lab study and five were review articles (Figure 1).

Key points from the papers were extracted relating to the herbs, extraction, vehicle, testing and results. Two things must be noted. Firstly, there was a small number of articles and they weren't systematically searched from a database. This means the conclusions will be a general overview. Secondly, a few of the papers were not fully related to the skin. One was looking at an extract of liquorice in an artificial cow rumen. One was focused on growing the crop. The clinical trial was looking at an oral supplement. This paper was also a preprint and hadn't gone through peer review. However, they were still useful, mainly due to the quality of the extract and evidence of lightening.

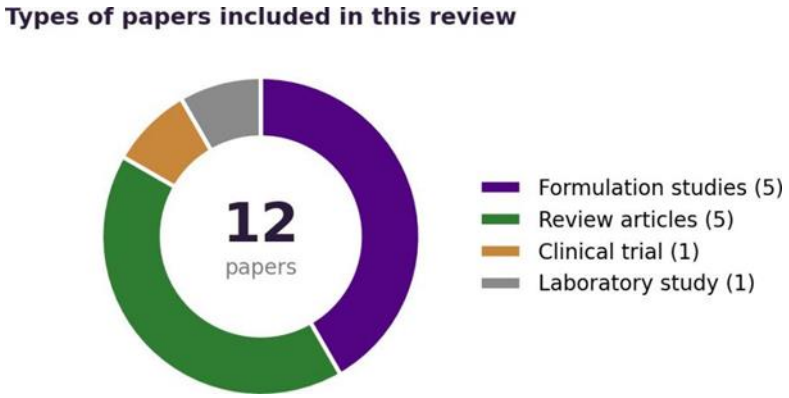


Figure 1. Types of papers included.

Table 1. Papers included.

No.	Paper	Type	Focus
1	Kukde et al., 2020	Formulation study	Liquorice + Tomato Lycopene gel
2	Siahpush et al., 2014	Formulation study	Liquorice + *Fumaria* Cream
3	Ahmadi et al., 2017	Formulation study	*Aloe vera* and Licorice gels (9 formulas)
4	Sangkaew et al., 2024	Formulation study	Liquorice + *Derris* gel for dermatitis
5	Mishra et al., 2025	Formulation study	Liquorice + Aloe Cream
6	Nobile et al., 2025 (Preprint)	Clinical trial	Oral Olive + Licorice Blend for dark spots
7	Ramos-Morales et al., 2018	Lab study	Rumen model with high glabridin extract.
8	Pastorino et al., 2018	Review	Phytochemistry and pharmacology of liquorice.
9	Zhang et al., 2023	Review	Biological effects of Glabridin
10	Karkanis et al., 2016	Review	Composition, safety and culture of Liquorice.
11	Damle, 2014	Review	Constituents and activities of liquorice.
12	Shivhare et al., 2012	Review	Natural Lightening and nourishing agents for skin.

4. Liquorice: Botany and Active Ingredients

Glycyrrhiza glabra belongs to the Fabaceae family. There are around thirty species in the genus, with the root and rhizome being used in medicine. The name comes from a Greek word meaning sweet root. It is known as Yashtimadhu or Mulethi in India and has a long history in Ayurveda. It is used to treat coughs, ulcers, skin diseases and many other ailments (Damle, 2014).

The root contains lots of different compounds. The most well known is glycyrrhizin, a triterpenoid saponin with a much sweeter taste than sugar. There is around 10% of this in the dry root but the amount varies depending on the species and samples. Between 2% and 25% have been reported (Pastorino et al., 2018; Karkanis et al., 2016). Glycyrrhetinic acid is formed when glycyrrhizin is broken down and is responsible for its anti inflammatory effects. The root has a yellow colour due to flavonoids. The most common flavonoid present was liquiritin apioside. Other important ones include liquiritigenin and isoliquiritigenin. Fifteen saponins and forty nine phenolic compounds have been identified (Karkanis et al.).

A specific compound worth noting is glabridin. This is a prenylated isoflavan and is present in around 0.08 to 0.35% of the dry root (Zhang et al., 2023). It is most commonly associated with skin lightening and antioxidant effects. It is also a delicate compound and is mainly degraded by light. It should be stored dry, dark and with low oxygen. The Chinese pharmacopoeia state minimum amounts of liquiritin and glycyrrhizic acid should be present in liquorice showing they are considered markers of quality.

The amount of compounds present will vary depending on the species, part of root, depth of root, climate and time of harvest. Glycyrrhizin is found in highest concentration in roots harvested after the second year of growth (Karkanis et al.). Most liquorice on the market still comes from wild plants meaning there is a risk to supply. As the amount of active compounds can vary greatly between batches of the same amount of root powder, authentication and ideally standardisation of the raw material should be done.

5. Aloe vera and Other Herbs Combined with Liquorice

Aloe vera gel is the clear part of the leaf. It contains polysaccharides such as glucomannan and acemannan. This gives it moisturising, calming and healing effects. It has also been reported to have antibacterial and antioxidant effects (Mishra et al., 2025). Glucomannan stimulates fibroblasts increasing collagen production (Ahmadi et al., 2017). A review looking at skin lightening agents also mentions aloe has lots of amino acids and is a good water binder meaning it is commonly found in moisturisers (Shivhare et al., 2012).

Aloe is sensitive when handling. The yellow latex underneath the skin of the leaf contains aloin. Mishra and co-workers left the leaves to drain for 10-15 minutes and scooped the gel out. This was then centrifuged and filtered using 0.45 and 0.22 µm membranes before storing at 4 °C. The glucomannan content was measured (0.36 mg mL-1) (Ahmadi et al.).

The other herbs used alongside liquorice were tomato, providing extra antioxidants with lycopene (Kukde et al., 2020). *Fumaria parviflora*, a traditional medicine plant used for skin issues, was added to the cream (Siahpush et al., 2014). *Derris reticulata* wood extract containing lots of flavanone lupinifolin was used alongside liquorice in a gel for dermatitis (Sangkaew et al., 2024). Olive polyphenols were combined with liquorice in a supplement (Nobile et al., 2025). Mulberry was also discussed (Shivhare et al.). Mulberry extract is a strong tyrosinase inhibitor with low irritation meaning it would be an interesting herb to combine with liquorice.

Table 2. The herbs used in these products and what roles they provided.

Herb	Main Components	Role in skin products	Source
Liquorice (*G. glabra*)	Glycyrrhizin, glabridin, liquiritin, isoliquiritigenin	Anti-inflammatory, antioxidant, tyrosinase inhibition and antimicrobial effects	All
Aloe vera	Glucomannan, acemannan, vitamins, enzymes and phenolics	Moisturiser, soother and tissue repair	Ahmadi; Mishra; Shivhare
Tomato	Lycopene	Antioxidant	Kukde
Fumaria parviflora	Alkaloids, flavonoids and fumaric acid	Traditionally used for skin disorders	Siahpush
Derris reticulata	Lupinifolin and other prenylated flavonoids	Anti-inflammatory	Sangkaew
Olive	Polyphenols	Reduces melanin (cells) and dark spot effect when taken orally	Nobile
Mulberry	Tyrosinase inhibiting	Brightens skin with low irritation.	Shivhare

6. Biological Activities

6.1 Antioxidant activity

Free radicals cause damage to lipids and proteins and are associated with a dull effect. Liquorice is widely used due to its antioxidant activity. This is because of the presence of phenolics and flavonoids such as glabridin (Pastorino et al., 2018). An extract of liquorice was found to scavenge ~80% of DPPH radicals, protecting skin fibroblasts from oxidant stress. However, pure glycyrrhizin was not a good antioxidant. Another study found their extract had an IC50 of 21.81 µg/mL for DPPH compared to the lycopene within tomato extract with an IC50 of 17.62 µg/mL. Therefore both were active (Kukde et al., 2020).

When looking at final products the antioxidant activity is not quite as impressive. The extract had a DPPH IC50 of 51.89 µg/mL, however the 8% gel had a large increase to an IC50 of 4385 µg/mL. This is due to the dilution of extract in the gel. This means to find the antioxidant effect of the final gel you would need to look at the gel itself rather than the extract. A previous study found that liquorice flavonoids were more potent than vitamin E (Damle, 2014).

6.2 Anti-inflammatory activity

The main components are glycyrrhizin and glycyrrhetinic acid. They act similarly to corticosteroids reducing prostaglandin E2 production (Damle, 2014). Glabridin reduces NF-κB and MAPK signalling pathways. When tested on skin models it reduced TLR4/MyD88/NF-κB activity within Atopic Dermatitis. It was also found to reduce psoriasis like scores in mice (Zhang et al., 2023). Sangkaew et al. (2024) tested an extract of liquorice and *Derris* on activated macrophages and found it reduced the amount of nitric oxide. This was due to the reduction in iNOS gene expression by up to 83% when using 200 µg/mL. However, this was much less active in the final gel (IC50 of 3589 µg/mL compared to 73.86 µg/mL). Again it was due to dilution. A clinical trial found that a 20% glycyrrhizinic acid preparation reduced redness, swelling and itchiness after 2 weeks (Pastorino et al., 2018).

6.3 Skin brightening

Melanin is responsible for skin colouring. It is formed by conversion of tyrosine using the enzyme tyrosinase. Skin lightening agents often work by inhibiting this enzyme, preventing it from maturing or stopping the pigmented granules from being taken into skin cells (Shivhare et al., 2012). The main components mentioned in liquorice were glabridin, glabrene, isoliquiritigenin, licochalcone A and liquiritin. Glabridin inhibits tyrosinase in cultured melanoma cells with no effect on DNA synthesis, liquiritin causes dispersion of melanin and a methanolic extract had an IC50 of 21.2 µg/mL (Damle, 2014). Glabridin has been found to inhibit melanin formation in human melanocyte cells at 0.7 µM (Pastorino et al., 2018).

However, some research has found that this is not as straightforward. Glabridin was found to inhibit tyrosinase with an IC50 of 0.43 µM (Zhang et al., 2023) but docking studies found that it does not directly interact with the active site. It also had no effect on melanin in zebrafish. Therefore stating that it is reported to inhibit tyrosinase is a safer statement than saying it will lighten the skin. There has been some evidence for human use but this is limited. The same review mentions a pilot study with 40 women with melasma who were given a gel containing glabridin and other components for 6 months. This improved their appearance.

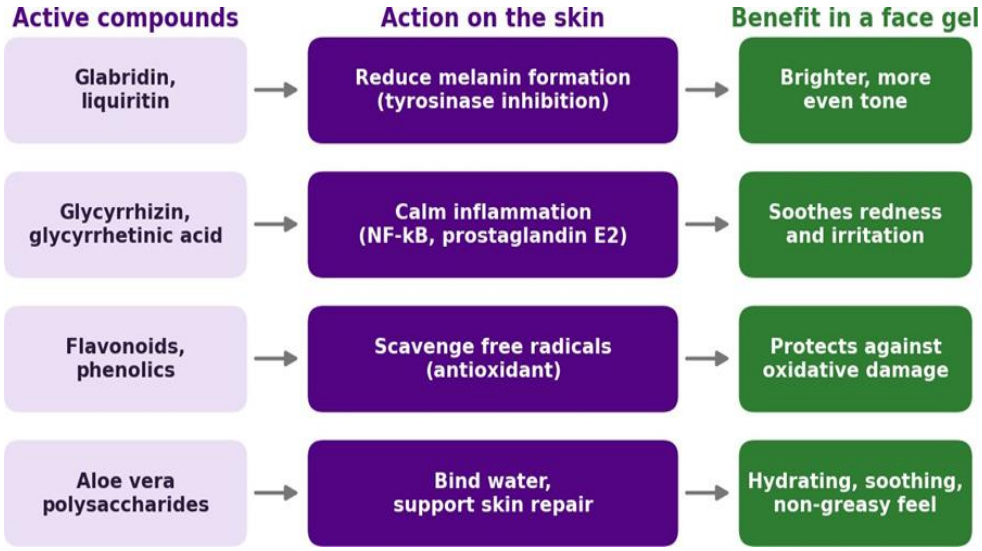


Figure 2. The main active components of liquorice and aloe vera. Their effects on the skin and expected benefits in a face gel.

The latest evidence comes from a pre-print paper by Nobile et al. (2025). They looked at a combination of olive and liquorice polyphenols. The liquorice extract reduced melanin by 23.0% in cultured melanoma cells when using 0.1 mg/mL. The olive extract reduced it by 21.9%. The combination reduced it by 28.5% at the same concentration and 36.4% when using 0.5 mg/mL. This was close to the 34.9% reduction seen by hydroquinone when using 5 µg/mL (Figure 3). However, there was no statistical significance for the additional benefit of the combination. In a double blind, randomised controlled trial with 66 people with dark spots the combination was taken orally for 8 weeks. This resulted in an 18.9% reduction in melanin intensity, 19.9% reduction in spot area and an increase in radiance of 21.2%. As this was ingested rather than topical and the study was funded by the ingredient supplier. This still supports the idea that it will lighten the skin but cannot be used as proof for a topical gel.

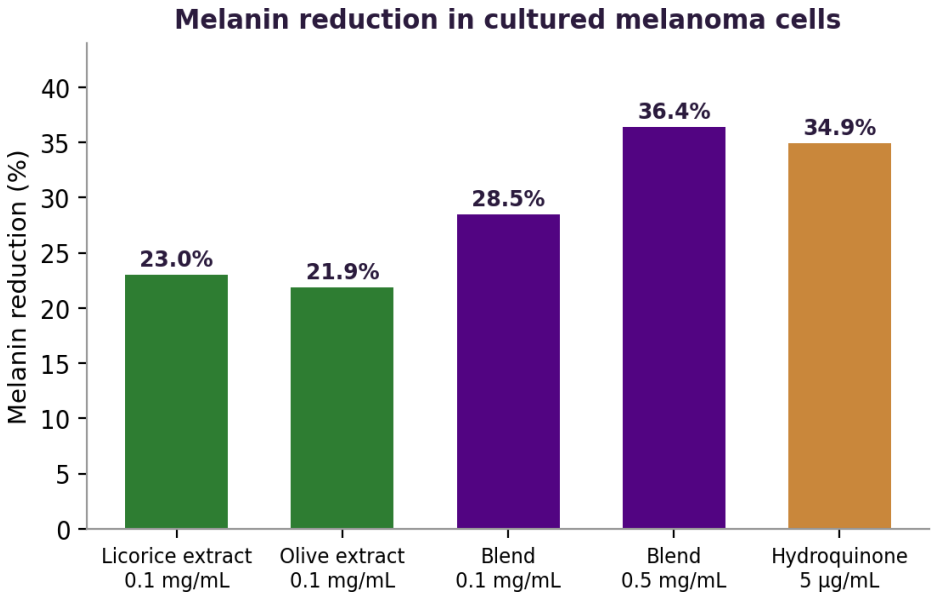


Figure 3. Reduction in melanin in cultured melanoma cells by liquorice, olive, combination and hydroquinone (Nobile et al., 2025).

6.4 Antimicrobial activity

Extracts of liquorice and glabridin have antimicrobial activity against multiple bacteria and fungi. Glabridin was found to inhibit multidrug resistant *Staphylococcus aureus* and *Candida albicans* (Pastorino et al., 2018). The minimum inhibitory concentration for *Staphylococcus aureus* was 12.5 µg/mL (Zhang et al., 2023). Ramos-Morales et al. (2018) found that a glabridin rich extract reduced the number of protozoa greatly in an artificial cow rumen. One group was completely removed and the bacterial diversity decreased. However, this had no affect on digestion of feed. The final product may not always be very active. In Sangkaew et al. (2024) it had no antimicrobial activity against *Staphylococcus aureus* at 10 mg/mL. When using the extract alone it did have activity with MIC of 0.128 mg/mL. Any claim to antibacterial activity should be tested on the final gel.

7. Extraction and Quality of Extract

Most studies used ethanol or an ethanol/water mixture. They used different methods (Table 3). Kukde et al. and Mishra et al. used a soxhlet apparatus with a ratio of 3:7 ethanol:water. They used small amounts of root powder (7 g and 5 g). Siahpush et al. used maceration followed by freeze drying. This produced 16.6 g of dry extract from 100 g of liquorice. Sangkaew et al. macerated using 95% ethanol 3 times. They also carried out solvent partition to produce a high active fraction. Ramos-Morales et al. used 95% ethanol to extract 40 g of root at 45

°C. They purified it using silica gel. This shows that glabridin can be concentrated if required.

Older methods compared to newer ones have been used to extract glycyrrhizin (Karkanis et al., 2016). Using a microwave assisted extraction with ethanol/water only took 4-5 minutes. This produced a higher yield than traditional methods which took 20-24 hours. Other methods include ultrasound and supercritical carbon dioxide. However, more work needs to be carried out before they are widely used in industry. For a student project it would be realistic to use simple maceration or soxhlet extraction. Alternatively a pre-made standardised extract may be the best option.

Table 3. The method used to extract the ingredients.

Study	Method	Notes
Kukde 2020	Soxhlet extraction with 3:7 ethanol:water. 7g root in 300mL	Authentic material used. TLC with glycyrrhizic acid.
Siahpush 2014	Maceration, concentration and freeze drying	16.6g dry extract from 100g liquorice.
Ahmadi 2017	Reflux using 70% ethanol (standardised). Commercial extract in gels.	7.36% glycyrrhizin in powder.
Sangkaew 2024	Maceration with 95% ethanol (1:10 ratio, 3 times). Solvent partition.	HPLC for glabridin and lupinifolin.
Mishra 2025	Soxhlet extraction using 3:7 ethanol:water. 5g in 250mL at 60	Aloe gel filtered (0.45 & 0.22 µm).

Study	Method	Notes
	°C for 2 hours. Rotary evaporation.	
Ramos-Morales 2018	95% ethanol, 40g root in 2L at 45 °C for 2 hours. Purified with silica gel.	High glabridin extract.
Karkanis 2016 (Review)	Microwave, ultrasound and supercritical CO_2	Microwave reduced time to 4-5 mins.

7.1 Standardisation:

- Ahmadi et al. quantified glycyrrhizin in licorice powder (7.36%). Glucomannan in aloe.
- Sangkaew et al. quantified glabridin and lupinifolin using HPLC.
- Kukde et al. quantified using TLC with glycyrrhizic acid as reference. Authentic material used. Authentication of plant, voucher specimen and at least 1 marker compound should be considered the minimum for an herbal product to be comparable between studies.

8. Formulation of Herbal Gels and Creams

There were 3 types of gels and 2 types of creams used. Kukde et al. and Ahmadi et al. used carbopol (934/940) with triethanolamine. Carbopol is a dispersion so it was swelled and then neutralised drop wise to form a clear gel. Kukde et al. adjusted the pH to around 6.8-7. Ahmadi et al. compared 3 concentrations of Carbopol, hydroxypropyl methylcellulose (HPMC) and sodium carboxymethylcellulose (CMC). However, there was some failure. 3 out of 9 gels did not form a stable gel structure. 1 wasn't homogeneous and 1 was too thick to measure. The best gels were 3% CMC and 2% Carbopol. This shows that you must experiment with the polymer and concentration.

Sangkaew et al. used poloxamer 407 at 20%. Poloxamer 407 is a thermogel so it was stored at 4 °C to keep it clear. Siahpush et al. used 0.8% carbomer in an o/w cream with fatty alcohol and surfactants. Mishra et al. used beeswax, coconut oil, cetearyl alcohol, vitamin E, xanthan gum and honey. Propylene glycol was used in almost all formulations. It was used at concentrations between 5-20%. It acts as a humectant and co-solvent. It may also help increase the release rate of the active components (Ahmadi et al., 2017). Preservatives were used such as parabens and phenoxyethanol.

The concentration of extract varied. Kukde et al. and Sangkaew et al. used 8%. Ahmadi et al. used 9% in powder form. Siahpush et al. used 2% and Mishra et al. used 10 mL of extract in the cream. The colour also varied depending on type and concentration of extract. The gels from Ahmadi et al. using raw liquorice powder were opaque and dark. The ethanolic extracts had a yellow-brown colour. As this is a product that people will be using on their face daily appearance is important. A purified extract at a medium concentration would be a better starting point.

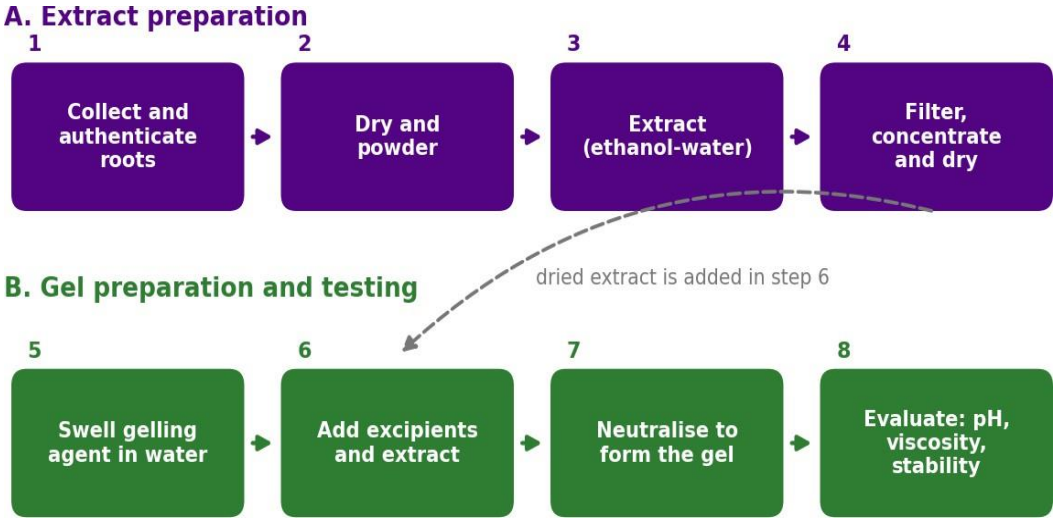


Figure 4. General process for making a herbal face gel from raw root to product. This was the process used in the studies.

Table 4. Composition of the 5 formulation studies and main results.

Study	Product	Herbs Used (Concentration)	Base (Main Excipients)	pH and Viscosity
Kukde 2020	Gel	Liquorice extract (8%) and lycopene (2%)	Carbopol 940 (1g), TEA (1.2mL), propylene glycol (5%), parabens, rose oil.	7.2, 16800cps
Siahpush 2014	Cream (o/w)	Liquorice (2%) and *Fumaria* (2%)	Carbomer (0.8%), cetyl alcohol, paraffin, Tween 80, Span 20, propylene glycol, parabens.	pH 5.7-6.7 (after 3 months).
Ahmadi 2017	Gels (F1-F9)	Aloe gel (15%) and liquorice powder (9%).	Carbopol, HPMC or CMC. Propylene glycol (10-20%), parabens.	pH 5.69-6.01, Viscosity 2600-185000cP.
Sangkaew 2024	Gel	Liquorice extract with *Derris* (8%)	Poloxamer 407 (20%), propylene glycol (18%), ethanol, phenoxyethanol.	pH 6.62, Viscosity 38387cP.
Mishra 2025	Cream (o/w)	Aloe gel (15mL) and liquorice extract (10mL).	Beeswax, coconut oil, cetearyl alcohol, vitamin E, xanthan gum, honey, methylparaben.	pH 6.82, Viscosity 3502cps.

The properties of glabridin make it challenging to formulate a simple gel. It has poor solubility in water and low bioavailability. This limits the amount that can be delivered (Zhang et al., 2023). Methods such as chitosan micelles were used to increase skin penetration. This increased penetration by around 4 times. A nanoemulsion was also used producing 28.26 µg/cm2 compared to 3.82 µg/cm2 in a solution. These techniques are more advanced than could be achieved in a basic lab but show the direction the field is going.

9. Evaluation of Products

All of the studies had similar basic testing. Visual examination was carried out to check for appearance and homogeneity. The pH was measured using a digital meter. It ranged from 5.69-7.2 (Figure 5). Ahmadi et al. state that a safe pH is 5-6 to prevent irritation. Mishra et al. state that 6.82 is acceptable as it is close to normal skin pH. All products were within or very close to the safe range for skin. Kukde's gel had the highest pH of 7.2.

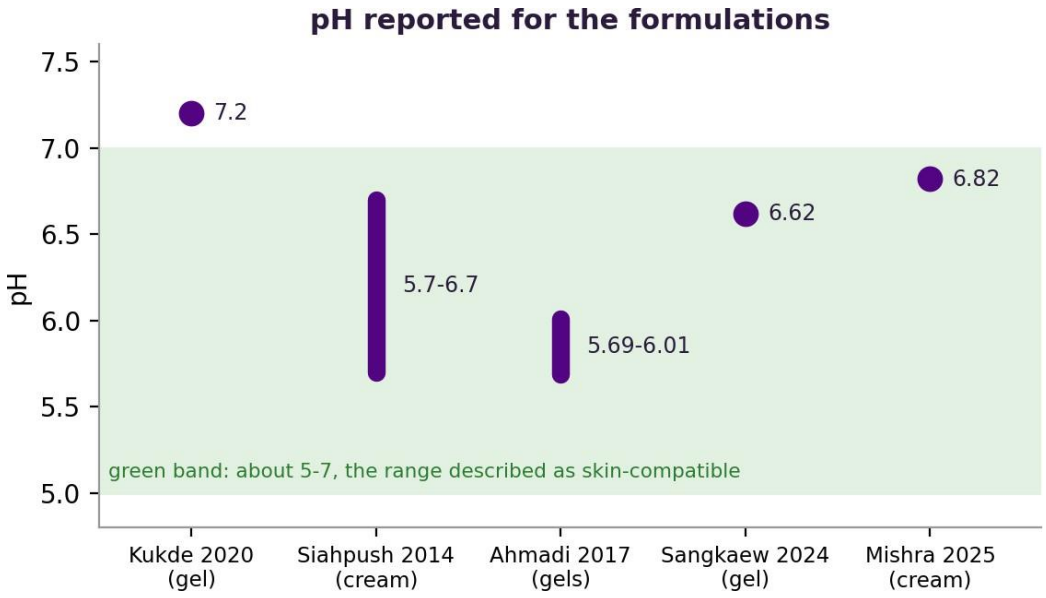


Figure 5. pH of formulations. Individual points and range.

Viscosity was measured using a Brookfield viscometer. The range was wide covering nearly 2 orders of magnitude (Figure 6). The thinnest gel was 2600 cps using 1% Carbopol. The creams and gels were in the middle. The thickest gel was 185000 cps using 3% CMC. This is close to a commercial gel (168000 cps). Viscosity will affect how easy it is to spread and there isn't a correct value. It is preferable to have a shear thinning fluid. This means the gel gets thinner when rubbed. Ahmadi et al. all had shear thinning gels.

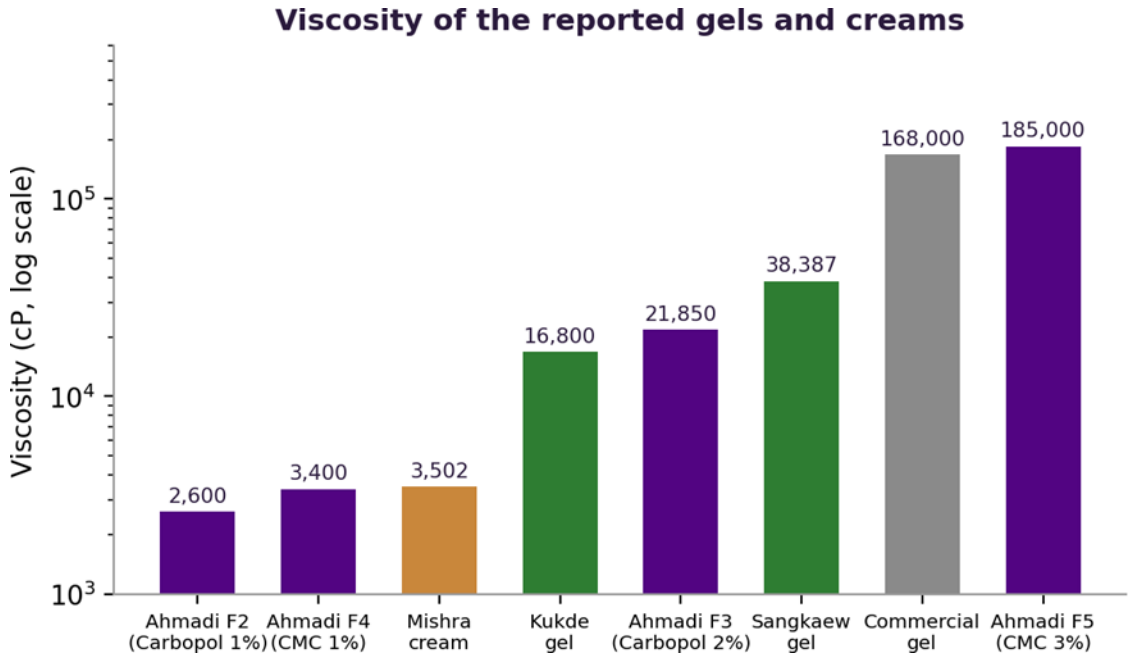


Figure 6. Logarithmic graph showing viscosity of reported gels and creams.

Spreadability was measured using the glass slide method. Kukde and Mishra report results in g.cm/s and Ahmadi reports in mm. This means they cannot be compared. Only 2 studies carried out washability and skin irritation testing. Kukde et al. applied the gel to 1 cm2 of their hand and observed for 72 hours. Mishra et al. observed for 24 hours. These are small patch tests and not formal safety tests.

Figure 7 shows how inconsistent testing was. Only the basic tests were carried out. 2 studies carried out antioxidant testing, 1 carried out anti-inflammatory and 2 carried out antimicrobial. None of them carried out any testing for skin lightening effect. This makes it difficult to compare the formulations. It also means they didn't

Test the main reason for using liquorice.

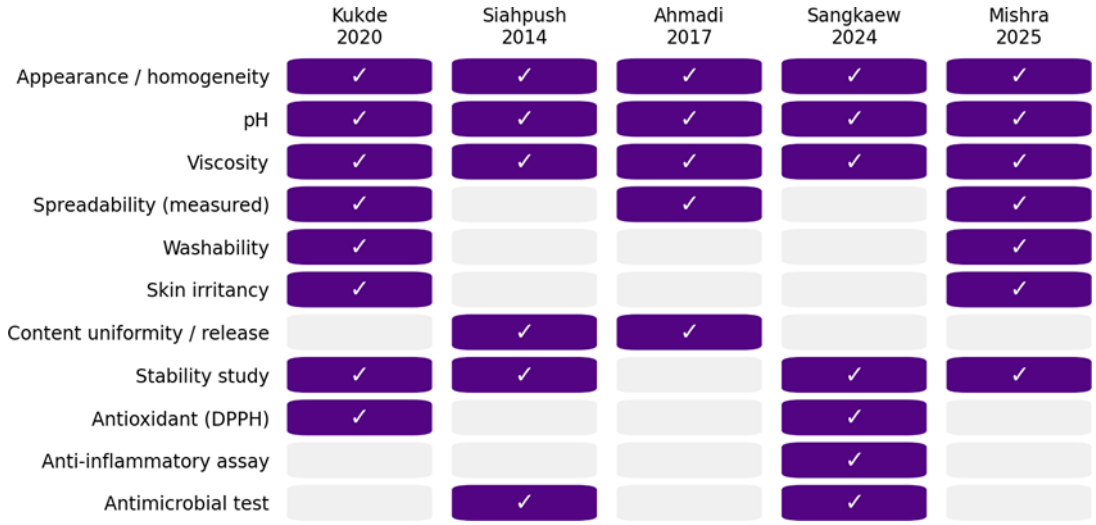


Figure 7. Testing carried out in each of the 5 formulation studies.

Stability and Safety

Different stability methods were used. Kukde et al. stored the gel at 8 °C and 40 °C with 75% RH for 30 days. No phase separation was seen. Siahpush et al. monitored their cream for 3 months. The pH ranged between 5.7-6.7. The preservative passed a microbial challenge test. Mishra et al. stored their cream at 40 °C/75% RH, 30

°C/65% RH and 25 °C/60% RH for 3 months. The pH, viscosity and spreadability only changed slightly (Figure 8). Sangkaew et al. used 6 cycles of heating and cooling between 45 °C and 4 °C. This reduced the time needed. The gel remained the same colour and smell. The pH reduced to 6.13 from

6.62. The viscosity increased to 56079 cps from 38387 cps. However, there was no significant difference shown using statistics. The amounts of glabridin and lupinifolin did not change. However the antioxidant values for DPPH and FRAP decreased.

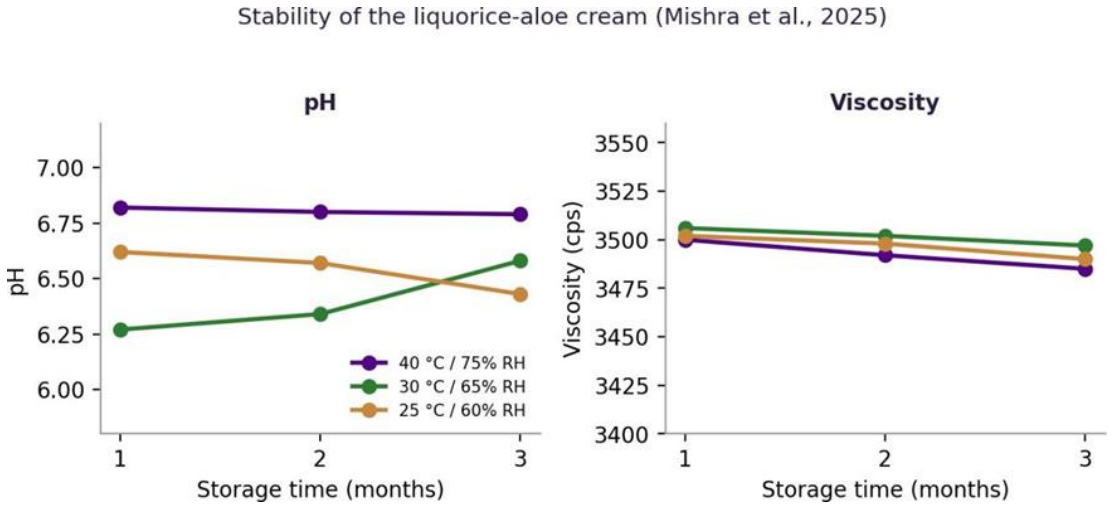


Figure 8: Stability of the liquorice-aloe cream over 3 months including pH and viscosity values at 3 different storage conditions (Data from Mishra et al., 2025).

Glabridin has poor stability when exposed to light (Zhang et al., 2023) which means the product would need to be packaged into an opaque tube or jar. The result from Sangkaew et al. shows that although the gel seemed stable, there was a loss in antioxidant activity. Therefore, a stability test should include a biological/functional assay.

Safety

Liquorice can have some issues with its safety profile when taken orally. Glycyrrhetinic acid inhibits an enzyme which converts cortisol to cortisone. Excessive or long-term consumption can increase blood pressure and reduce potassium levels (Karkanis et al., 2016). Acceptable daily intakes of 0.015-0.229 mg/kg body weight of glycyrrhizin have been suggested. These values were for consuming liquorice however they help to explain why the enzyme was tested in the oral trial from Nobile et al. and found no increase in blood pressure. Simple patch testing on a few volunteers would be good practice here as the gel is for topical use. Aloe also reduces the risk of irritation due to the removal of the latex.

Discussion, Gaps and Future Scope

Overall, it seems that a stable gel or cream can easily be developed using liquorice and with an appropriate pH for the skin. However, the more complex questions are, how much of the extract is needed for it to have a true effect? Does combining the herbs with aloe provide more benefits than using the individual herbs? Ahmadi et al. suggest that using lower amounts of both herbs may provide more benefits; however, they didn't test this. In the combination from Nobile et al., there was no statistical significance with the benefits provided. Claims should be investigated.

There were several gaps. Firstly, none of the 5 formulation studies looked at developing a liquorice face brightening and soothing gel and testing for antioxidant, irritancy and stability. Instead there was a wound healing gel and cream using aloe and liquorice, a liquorice gel with tomato lycopene or *Derris* and another cream with *Fumaria*. However, this was from the papers found and could be confirmed by searching a larger database. Secondly, standardisation of the extracts was rarely done so cannot be compared. Thirdly, there was little evidence for brightening effects in humans. Fourthly, the dark colours and sensitivity to light are known issues however are rarely resolved. Lastly, methods of evaluation and units are varied making it nearly impossible to compare.

This does provide a clear direction. A simple gel could be developed using a standardised hydroalcoholic extract of liquorice and paired with aloe gel for its soothing effects. The gel should be formulated using a suitable base such as Carbopol or CMC with tested polymer concentrations. The gel should be packaged in an opaque container and tested using a standardised minimum testing regime (Table 5). Comparing the combined gel to single herb gels would also answer the question of synergy. In the longer term, developing delivery systems for glabridin would provide the most evidence along with small well designed studies on the topical products in humans.

Table 5: Suggested minimum testing regime for a herbal face gel.

Testing	Method	Reason
Appearance, Colour, Smell & Homogeneity	Visual & tactile	Visual check for first impressions. Checks for lumpiness/splitting.
pH	pH meter (digital), Disperse gel in water.	Skin friendly (5-7)

Testing	Method	Reason
Viscosity & Flow	Brookfield viscometer, Spindle type and speed.	Spreads well and feels pleasant to apply.
Spreadability	Glass-slide method; state units and weight	Ease of application
Washability & Irritancy	Washing & patch testing (approved) for 24-72h.	Pleasant & safe
Marker content	TLC or HPLC for glycyrrhizin/glabridin.	Batch-to-batch comparison
Antioxidant activity	DPPH on gel & extract.	Prove claim on final gel.
Stability	40 °C/75% RH & Room temperature for 1-3 months. Opaque packaging.	Shelf life.
Tyrosinase inhibition (Optional)	In vitro enzyme assay	Supports claim of brightening.

Conclusion

Liquorice is a well studied herb with many benefits including antioxidant, anti-inflammatory, skin lightening and antimicrobial properties due to compounds like glycyrrhizin and glabridin. *Aloe vera* provides additional benefits including hydration and soothing effects. From analysing the 12 papers, it was evident that simple methods can be used to develop gels and creams using liquorice and/or aloe. The evidence to support the claims of the final product brightening, soothing and protecting the skin are weaker as there were few studies looking at the effects of the product. Few studies involved humans.

Standardised extracts, standardised testing and comparison to single herb products would help the field. A face gel with liquorice and aloe vera would be a practical and useful addition to the literature on herbal skincare.

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