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Chemical composition and formulation of face gel using linum usitatissimum (Flax Seed)

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Abstract
Flax seed *(Linum usitatissimum*) is additionally known as Alsi, is a blue flowering plant that produces two types of flax seed, brown and golden. Flax seed contains omega-3 fatty acid, α-Linolenic Acid (ALA), protein, fiber, Secoisolariciresinol diglucoside (SDG) and phenolics such as phenolic acids, ligands, tannins, flavonoids. Flax gel helps in treat sagging, wringles, retain tightness and moisture skin. The aim of the study is to prepare face gel using Flax seeds, *Aloe Vera*, Vitamin E oil and then estimate the effects and benefits of face gel on skin, also analyzing the chemical composition of this face gel by using phytochemical test, UV-Spectophotometer and FTIR spectrometer.

Keywords: flaxseed, *Linum usitatissimum*, alsi, ALA, skin moisture

Introduction
Flax seed comes from the plant *linum usitatissimum* in the family linaceae, genus Linum. The largest producer of flax seed is Russia. (R Bernacchia, *et al*,. 2014) Flax seeds produced in two colours one is brown and another one is yellow in colour both have high omega-3s (ALA) also rich in vitamins and minerals. Flax seed contain omega fatty acids that keeps your skin moisturizer, hydrated, regulate oil production, balance inflammatory response, soften rough skin, soothing effects on dermatitis, improve fatty acid composition in skin, remove black heads and dead cells to get a healthy glow. Anti-ageing components of flax seed is lignans and antioxidants (Yvette Brazier, 2020). It balance out estrogen in body reducing acne breakouts and sebum production also regulated by flax seed (Thompson may, 2020). Flax seed are rich in anti-inflammatory and anti-oxidant property that helps in reducing health issues. (Holy Nadia Rabetafika, *et al*. 2011) Lignans which appear to have antioxidant property reducing the risk of cancer and improve heart health by fiber and Omega -3s present in flax seed. Flax seed is also an insoluble fiber which prevent constipation. *Aloe Vera* is a plant species of genus aloe. It originates in Arabian Peninsula but grows wild in tropical regions (RH Davis, *et al*. 1989). It is widely used in cosmetics, beverages, or ointment. *Aloe Vera* contain polysaccharides can repair burnt skin and introduce new cells on skin. Antioxidants (Vitamin C and E), anti-inflammatory anti-bacterial present in flax seed makes your skin firm, kills pathogens, remove acne causing bacteria and reduce pimple bumps (RJ Makins, *et al*. 2004). Vitamins are essential to maintain skin health and appearance. Vitamin E treats variety of skin issues like acne, psoriasis, and ageing effect (J Atkinson, *et al*. 2007). Vitamin E is also a fat soluble with anti-inflammatory property reduce UV damage on skin and protects from sun exposure (AL Tapple, 1962).

Materials and Method
Collection of Material
Flax seeds and *Aloe vera* gel, are purchased fromlocal market of THIRUKOVILUR, Vitamin E oil is purchased in the medical shop of THIRUKOVILUR.

Preparation of Flax Seed Gel
Using the following ingredients to prepare the gel are1/4 cup of flax seed, 2.5 cups of water, Essential oil (2-Vitamin E capsule), and one spoon of *Aloe vera*.

Procedure
Pour 1/4 cup flax seed into 2.5 cups of water. Kept it boil on medium heat for about 20-30 minutes, stirring up to ensure the flax seeds don't stick to the bottom of the pan. You will want the texture of the flax seed mucilage to consistent with egg whites. Neither thick nor runny. Allow the gel to cool with the flax seed for 45 minutes to an hour. After this time, the gel get thicken. Stain the gel using filter and add *Aloe vera* gel and Vitamin E oil to your mixture. Next pour your gel into a glass bottle.

Phytochemical Screening of Extracts
Flax seed extract was tested for the presence of active principles such as carbohydrates, proteins, Glycosides, Saponins, phenols, Alkaloids, Flavonoids, Tannins, Free Amino Acids. Preliminary phytochemical screening of the fruit extract was carried out as per the methods and tests given by Day and Raman (1957)

Tests for Carbohydrates
a. Molisch's test
Test solution with few drops of Molisch's reagent and concentrated H2SO4 added slowly from the sides of the test tube. Formation of violet ring at the junction of two liquids indicates the presence of carbohydrates.

b. Fehling's test
The test solution when heated with equal volume of Fehling's A and B solutions, formation of brick red precipitate, indicates the presence of reducing sugars.

Tests for Proteins and Amino Acids
a. Biuret test
To the test solution, 4% sodium hydroxide and few drops of 1% copper sulphate solution was added, development of violet or pink colour indicates the presence of protein.

b. Million's test
To the test solution, Million's reagent was added and warm on a heated water bath formation of red colour indicates the presence/absence of protein.

c. Xanthoproteic test
To the test solution, one ml of concentrated sulphuric acid was added, white precipitate is formed, which turns into yellow and on addition of sodium hydroxide formation of orange colour precipitate indicates the presence/absence of protein.

Test for secondary metabolites
Test for alkaloids
a. Wagner's test
To the extract (1ml) add 1ml of Wagner's reagent prepared by mixing 2g of iodine and 6g of potassium iodide in 100ml distilled water. The formation of reddish brown precipitate was an indication of the presence of alkaloids.

b. Hager's test
To 1 ml of extract and 1 ml of Hager's reagent [saturated solution of Picric acid] are added and mixed. Crystalline yellow precipitates indicated the presence of Alkaloids.

c. Marqui's test
To 1 ml of extract, 1 ml of Marqui's reagent [3ml of concentrated Sulphuric acid+ 2 drops of 40% Formaldehyde] was added and mixed. Dark orange or purple colouration indicated the presence of Alkaloids.

Test for Tannins
Modified Prussian blue test
To 1ml of extract, added 1 ml of 0.008M Potassium ferrocyanate and 1ml of 0.02M FeCl3 in 0.1M HCl. Appearance of blue colour indicated the presence of Tannins.

Test for Saponins
Froth test
About 5ml of diluted extracts were taken in a test tube and shaken vigorously and kept for 5min. Formation of foamy layer indicates the presence of saponins.

Test for Glycosides
About 2ml of the concentrated leaf extracts taken in a test tube and add a quantity (10ml of 50% H2So4) was added to. The mixture was heated in a water bath shaker for 15min.To these mixtures add 2ml of Fehling's solution and then the mixture was boiled. Development of a brick- red precipitate indicated the presence of glycosides in the extracts.

Test for Flavonoids
A 2ml of each extracts were taken in separate test tube add few drops of sodium hydroxide solution. The yellow colour was formed and it became turn to colourless while addition of diluted sulphuric acid confirmed the presence of flavonoids.

Test for phenol
Ferric chloride test
To the extracts add 3-4 drops of 5% Ferric chloride solution and observed the formation of dark blue or blackish colour which may indicate the presence of phenol in the extracts.

Test for Terpenoids
About 5ml of each leaf extract was taken and add 2ml of chloroform and 3ml of concentrated Sulphuric acid notice the formation of layer and colour. A reddish brown coloration of the interface confirms the presence of Terpenoids.

Result
The study illustrates the chemical composition and quantitative analysis of *Linum usitatissimum* face gel. Chemical composition was determined by phytochemical analysis and the anti-aging and smoothening effects of *Linum usitatissimum* face gel was proved by before and after skin comparison for one month.

Gel Preparation

Fig 1: *Linum usitatissimum*

Fig 2: Boiling seeds

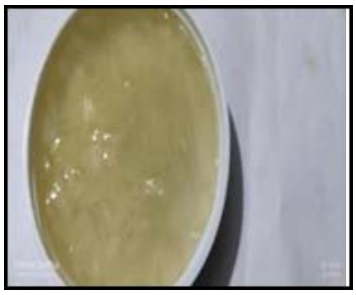


Fig 3: Flax seed mucilage

Formulation of Face Gel

Fig 4: *Aloe vera* gel

Fig 5: Vitamin Eoil

Fig 6: Face gel

Phytochemic Alanalysis of Formualted Gel

Flax seed extract was tested for the presence of active principles such as carbohydrates, proteins, Glycosides, Saponins, Alkaloids, Flavonoids, Tannins and phenolic compounds.

Table 4: Phytochemical analysis of face gel

Test	Results
Carbohydrates	+
Protein	+
Flavonoids	+
Alkaloids	+
Saponins	_
Glycoside	+
Phenols	+
Tannins	+

Phytochemical Test

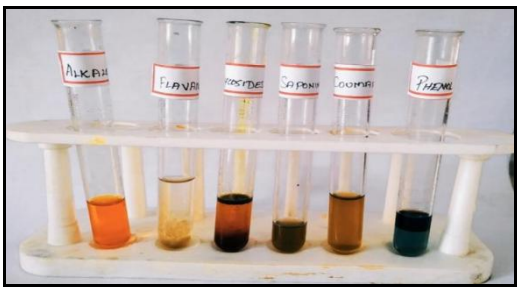
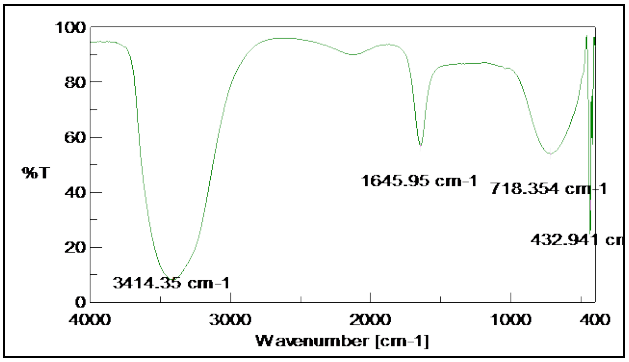


Fig 7: Phytochemical screening

Comparison of Skin Before and After Application of Formulated Gel

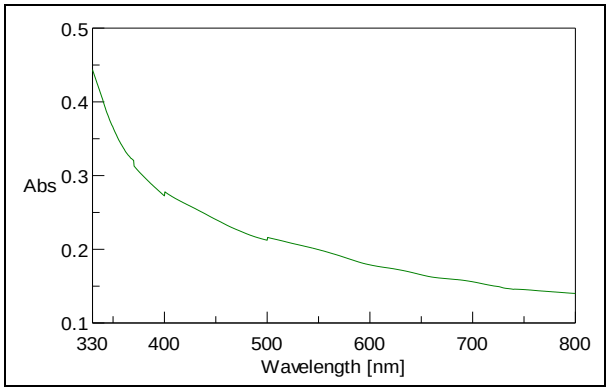
Fig 8: Result of skin comparison

Fourier-Transform Infrared Spectrometer Interpretation of Face Gel



Graph 1: FTIR Interpretation of face gel

Ultraviolet-Visible Spectrum of L. Ussitatissimum Face Gel



Graph 2: UV-Vis Spectra of face gel.

Discussion

The problems caused by chemicals have come into lime light very recently. The present work formulation of skin care was aimed to formulate a face gel using natural ingredients with a hope to minimize the side effects as produced by available synthetic ones. Skin care gel was formulated using natural products like *Linum usitatissimum*, *Aloe vera gel*, Vitamin E oil are well known for their medicinal and cosmoceutical value in the traditional Indian system of medicine. They stimulate cells to prevent wrinkles and tightens the skin and also provide moisturizing effects.

Preliminary qualitative phytochemical analysis was carried out to identify the primary and secondary metabolites in aqueous extracts of face gel was described above and the results are also given in the table 4. Thus, this study proved that the gel extracts of *Linum usitatissimum* possess valuable phytochemicals and it could act as an effective anti-ageing.

The wavelength in FTIR 3414.35cm^{-1} (Graph.1) having alcohol group (OH group of carbohydrates, proteins and polyphenols), the wavelength of 1645.95 cm^{-1} having carbonyl group and 718.354 cm^{-1} having Aromatic rings (Phenyl compounds) in the gel composition of *Linum usitatissimum*. FTIR spectrometer interpretation proves the qualitative determination of functional groups such as O-H groups, C=O groups and aromatic phenyl groups. Therefore it confirms the presence of carbohydrates, fatty acids, proteins and phenol compounds which are beneficial for skin care.

The characteristic the absorbance of wavelength of face gel using the technique UV- Vis Spectrophotometer. UV-Vis can be used to obtain the spectrum of colour compound. The absorbance spectrum of green colour is shown (Graph.2). The green colour shows light in the visible spectrum. The green colour has a (ƛ) max absorbance. Kinetics can be measured from a plot of a absorbance at one wave length overtime. A plot of the absorbance green colour is 330nm. The presence of these phytochemicals was also supported by the spectroscopic studies showing the characteristic peaks obtained in UV-Vis region. By using UV-Vis spectrum profile of aqueous extract of L*inum usitatissimum* showed the peaks at 350, 400 and 500 nm with the absorption of 0.15 and 0.45.

Skin comparison method before and after gel application of one month, (Figure.15) shows the positive result by providing best wrinkles less and smooth skin. Thus, the product was more beneficial and contains amazing properties which leads to successful result.

Summary and Conclusion

In our day to day life, everyone desired to have fair texture, tone, beauty without any adverse effects. Flax seed *(Linum usitatissimum*) is a multi-purpose crop and its gel extract is beneficial for healthy skin. The result of the present study proves that *Linum usitatissimum* gel has excellent anti-aging and moisturizing properties and also its chemical composition was determined by phytochemical analysis. Also FTIR spectrometer and UV spectrophotometer interpreted the functional groups such as O-H group, C=O group and Aromatic phenyl groups which proves the presence of carbohydrates, proteins, omega-fatty acids and phenolic compounds. Therefore flax seeds constitute a good source of chemical compounds, useful in providing good skin care properties. However, there are many products of flax seed which shows beneficial effects in commerce.

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