



Evaluation of An Effective Hair-Care Product: Extracting, Accessing and Formulating Onions, Lemon and Honey-Based Anti-Hair Loss and Anti-Premature Gray-Hair

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Abstract

Human hair on the scalp is a highly noticeable characteristic that plays a role in social and sexual indication, is frequently a reflection of a culture or personal style and provides important data for forensic and scientific examinations. Research on the variety of human hair types is generally important to people who study human evolution and human biology since it is a significant aspect of current human development. A person's scalp and different populations might have different morphologies of hair fibers, which are intricate, multilayered structures (Koch *et al.*, 2020). Onion also uses in the cosmetic industry. They reduce hair loss and increases the expansion rate of hair (Maharu *et al.*, 2020). Lemon (*C. limon*) is the trusted ingredient to fight most of the dreaded enemies of hair growth-dandruff and hair fall which is rich in vitamin C and helps to restore the pH balance of the skin. It is used to treat flaky dandruff. Honey that has been used in beauty preparation since ancient time is just as popular today and is used in an increasing number of skins in hair care cosmetic products. The onions were obtained from Toro local government area of Bauchi state. Lemon was obtained from a farmhouse in Nasarawa state and Honey was purchased from Taraba state. Extraction, Formulation and Evaluation of physicochemical parameters were carried out according to standards methods described by (Ayo and Agu, 2012). The results show that; Refractive Index (1.471), Specific gravity (0.811), pH (4.8), Viscosity (0.566), Saponification Value (16.497mg/g), Iodine Value (7.106mg/g), Acid Value (1.683 mg/g), and Peroxide Value (222mg/g) are in accordance with standard of WHO/FAO/NAFDAC. It is conformed to standard commercial grade and had been considered and revealed some important properties which are suitable and capable for reversing and controlling hair loss and premature gray hair.

Keywords: Onion, Lemon, Honey, Hair and WHO/FAO/NAFDAC.

1. Introduction

Human hair on the scalp is a highly noticeable characteristic that plays a role in social and sexual indication, is frequently a reflection of a culture or personal style and provides important data for forensic and scientific examinations. Research on the variety of human hair types is generally important to people who study human evolution and human biology since it is a significant aspect of current human development. A person's scalp and different populations might have different morphologies of hair fibers, which are intricate, multilayered structures (Koch *et al.*, 2020).



Hair is made of a tough protein called keratin. A hair follicle anchors each hair into the skin. The hair bulb forms the base of the hair follicle. In the hair bulb, living cells divide and grow to build the hair shaft. Blood vessels nourish the cells in the hair bulb and deliver hormones that modify hair growth and structure at different times of life. Healthy hair is characterized as being pigmented, soft, smooth, glossy and flexible yet strong enough to be able to withstand shearing forces such as friction (Greenwood and Handsaker, 2012).

The onion (*Allium cepa* L. from Latin *cepa* onion), also known as the bulb onion or common onion, is a vegetable that is the most widely cultivated species of the genus *Allium*. Its close relatives include the garlic, shallot, leek, chive and Chinese onion *Allium cepa* family *Liliaceae* has been reported to possess antimicrobial, antibacterial, better nourishment, nutrients and used as hair scalper hair loss (Patel *et al.*, 2018).

Onion is also used in the cosmetic industry. They reduce hair loss and increase the expansion rate of hair (Maharu *et al.*, 2020).

Lemon (*C. limon*) is the trusted ingredient to fight most of the dreaded enemies of hair growth-dandruff and hair fall which is rich in vitamin C and helps to restore the pH balance of the skin. It is used to treat flaky dandruff.

The main raw material of *C. limon* is fruit, particularly the essential oil and juice obtained from it. The *C. limon* fruit stands out as having well-known nutritional properties, but it is worth remarking that its valuable biological activities are underestimated in modern phytotherapy and cosmetology (Marta *et al.*, 2020).

Citrus limon fruit juice (lemon juice) has traditionally been used as a remedy for scurvy before the discovery of vitamin C (Marta *et al.*, 2020).

Honey is a natural product that has been widely used for its therapeutic effects. It has been reported to contain about 200 substances. Honey is composed primarily of fructose and glucose but also contains fructo-oligosaccharide (Tahereh and Moslem, 2013).

Honey that has been used in beauty preparation since ancient times is just as popular today and is used in an increasing number of skins in hair care cosmetic products. Popular health and beauty products containing honey include bath and shower product, body scrub's, face cream. Skin lotions and hair conditioners (Sitaram, 2005).

Since a few decades ago, honey was subjected to laboratory and clinical investigations by several research groups. The most remarkable discovery was antibacterial activity of honey that has been mentioned in numerous studies (Tahereh and Moslem, 2013).

2. Statement of Problem/Justification

Nowadays; an increase in the number of population battling with premature gray hair and hair loss have become worrisome in our society today. And most of the people from the academic environment have found to be much for this problem due to their levels of thought and stress they went through in. People have not yet known the solution for it. For this reason, this study is set to address the challenge in our society by providing affordable made product formulated with Onion, Lemon and Honey which can be apply to the scalp in order to help the growth of hair on the scalp.

Scope

This research will cover the extraction, evaluation and formulation of anti-hair loss and anti-premature gray hair using onion, lemon and honey. The formulated hair care product using onion, lemon and honey would be used to address anti- hair loss and anti-premature gray hair.

Aim

The aim of this research is to develop hair care formulated using onion juice, lemon juice and honey which can be used for the remedy of hair loss and premature gray hair.

Objectives

The objectives of the study are as follows.

- (i) To extract onion and lemon juices.
- (ii) To formulate the hair care product using onion, lemon and honey.
- (iii) To determine physicochemical parameters such as refractive index, specific gravity, pH, viscosity, sensitivity test, saponification value, iodine value, acid value and peroxide value.



3. Methodology

Sample Collection

The onions were obtained from Toro local government area of Bauchi state. Lemon was obtained from a farm house in Nasarawa state and Honey was purchased from Taraba state.

Sample Preparation

Fresh onions were cut in small pieces. These pieces take into the mixer apparatus crush the content of onions then collect the onions. This extract is passed through the muslin cloth to take the pure extract in filtrate. This extract is used for formulation. The same procedure was done for lemon. The pure honey was used for formulation.

Formulation of Hair Care

The various ingredients used in the formulation of hair cream were mixed in their standard proportion and presented in a tabular form.

Table 1: Ingredients Used in the Formulation of Hair Care

Ingredients	Quantities
Candle wax (g)	25
Petroleum Jelly (g)	350
Linolin (g)	6
Vitamin E (ml)	13
Paraffin Oil (ml)	200
Menthol crystal (g)	9
Perfume (Banana) (ml)	6
Colour oil base	Just a pinch of colour
Onion (ml)	600
Lemon (ml)	600
Honey (ml)	300

Formulation process all the ingredients mention above were added in a pot and they were heated at the mild temperature 60oC, until all melted into a liquid form. The flame was then put off and the onion, lemon and honey were added while stirring to achieved a homogenous mixture, then the fragrance was added lastly and there was continuous stirring until a desirable viscous mixture was obtained and stored in an air tight container.

4. Physicochemical Evaluation of Hair Care

Refractive index

The refractometer was clean and completely dry. A drop of sample mixture was placed on the lower part of prism and closed tightly. Then allow to stand for 1-2 minutes. The refractometer knob was adjusted to obtain half circles bright and dark and record the result.

Specific gravity

Empty specific gravity bottle was weighed (W_1) then the same bottle was filled with water (W_2) and then weighed and also the same bottle was filled with sample mixture (W_3) and weighed. Thus, specific gravity can be expressed as

$$\frac{W_3 - W_1}{W_2 - W_1}$$

Determination of pH

The pH meter was calibrated by standard buffer solution of 4,7 and 9.2. The pH electrode was immersed in the sample mixture and allowed it to stabilizer and measure the reading.

Viscosity

100ml of distilled water was filled into viscometer and allowed to drop completely and time taken was observed. The same procedure was carried out for the sample mixture.



t_1 = time taken for distilled water

t_2 = time taken for sample mixture

$$= \frac{t_2 - t_1}{t_2}$$

Sensitivity test

The formulated hair product will apply on 1cm skin of hand and expose to sunlight for 5-10 minutes.

Saponification value

2g of cream (mixture) was accurately weighed into a 250ml of conical flask and 10 ml of ethanol; ether mixture of (2:1) was added 25ml of 0.5 N alcoholic KOH was kept into the flask for 30minutes, then the flask was cooled. The cooled solution was titrated against 0.5 N of HCl using phenolphthalein indicator. Similarly, the blank titration was performing without taking cream (mixture). The amount of KOH in mg used was calculated.

Iodide value

0.5g of the cream was accurately weighed into a glass Stopper bottle of about 250ml capacity. 10ml of carbon tetrachloride was added and dissolved. 20ml of Wj solution was added and inserted into the Stopper which has been moistened with potassium. It was mixed and allowed to stand for 30 minutes. 15 ml potassium iodide solution and 100ml of water were added. It was mixed and titrated with the standard thiosulphate solution using starch as indicator just before the end (titration = a ml), the blank was carried out simultaneously, committing and omitting the cream (titration = b ml)

Acid value

A 0.1molar solution was prepared; weighed 0.56gram KOH pellets and dissolved in 100ml of distill water and stirred continuously. The prepared 0.1molar KOH solution filled the burette. Preparation of sample; 5g of cream was measured and dissolved in 25ml of ethanol and 25 ether mixture and shake. 1ml phenolphthalein solution was titrated with 0.1 molar KOH solution.

Peroxide value

5g of cream was weighed into a clean dry boiling tube and 1g powdered of potassium iodide and 20ml of solvent mixture was added. It was placed in a boiling water bath for 60 seconds, the contents of water were poured and add the washing to the titration flask containing 20ml potassium iodide solution. The tube was washed twice with 25ml of water and added the washing to the titration flask. Then it was titrated with 0.002M thiosulphate, using starch as indicator (Ayo and Agu, 2012).

5. Results

Table 2: Result for Physicochemical Evaluation of Hair Care

Parameter	Value (x)
Refractive Index	1.471
Specific Gravity	0.811
pH	4.8
Viscosity	0.566
Sensitivity	Not Irritating
Saponification (mg/g)	16.497
Iodine Value (mg/g)	7.106
Acid Value (mg/g)	1.683
Peroxide Value (mg/g)	222

6. Discussion

In table 2, the Refractive Index Value of 1.471 which is found within the range values of WHO/FAO/NAFDAC standard according to Oragwu (2020). The Specific Gravity Value of 0.811 fell within the ranges of 0.8 - 0.93,



which are less dense to water and could be incorporated in hair cream formulation according to Oragwu (2020). The pH value of 4.8 had conformed with standard pH range of human skin which lies between 4.7 – 5.75. Since Human skin is slightly acidic, the cream will help to keep it balanced according to Oragwu (2020). The Viscosity Value of 0.566 had also conformed to the WHO/FAO/NAFDAC standard according to Oragwu (2020). A lower number of viscosity means that the cream can flow well at low temperature. The Saponification Value of 16.497 shows a very high quality compared to other seed oil according to NAFDAC Recommendations (2016). Saponification value is the measure of Alkali reactive groups in fat and oil, and is simply, the mass of KOH needs to saponify 1g of oil. Studies has shown that, low saponification value ensures suitability of the oil for industrial uses. The Iodine Value of 7.106 had conformed with the standard according to Oragwu (2020) and it is a parameter used to determine unsaturation of fats and oils. High iodine value indicates high unsaturation. Cream with iodine value of above 125 are classified as dry cream; those with value 110 -140 are classified as semi dry creams, while those with value less than 110 are considered as nondrying creams. The Acid Value of 1.683 had conformed to the standard value of WHO/FAO/NAFDAC and also falls within the allowable limit edible oil according to Oragwu (2020). The Peroxide Value of 222 had also conformed with WHO/FAO/NAFDAC according to Oragwu (2020).

7. Conclusion

The results of physicochemicals evaluation of Hair Care in table 2, are in accordance with the standard of WHO/FAO/NAFDAC, it is conformed to standard commercial grade and had been considered and revealed some important properties which are suitable and capable for reversing and controlling hair loss and premature gray hair.

Recommendation

It is therefore recommended that people should be encouraged in using herbal hair care due to its availability and it minimize the cost production of commercial hair care. Further studies should focus on extractions of oils from Onion and Lemon, to formulate the hair care and compare with present studies.

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