Available online on 15.12.2020 at http://ajprd.com

Asian Journal of Pharmaceutical Research and Development

Open Access to Pharmaceutical and Medical Research

Open Access

Research Article

Formulation of Black Cumin (*Nigella Sativa* L.) Ethanol Extract Gel Preparation with Addition of Dimeticone as Hair Tonic

Wulansari S*, Reveny J, Nainggolan M.

Faculty of Pharmacy, Universitas Sumatera Utara, Medan, Indonesia

A B S T R A C T

Objective: This study aims to formulate a gel preparation for the ethanol extract of Black Cumin (*Nigella sativa* L.) with the addition of dimethicone as a hair tonic.

Methods: Characterization examinations of Black Cumin (*Nigella sativa* L.) simplicia were carried out. Simplicia is macerated using 80% ethanol and concentrated in a rotary evaporator then in a freeze dryer until the extract is thick. The concentrations taken are 3%, 5% and 7%. Then tested the simplicia characterization, rat hair growth activity and an evaluation of the preparations was carried out, namely the homogeneity, organoleptic test, and microbial contamination test.

Results: The results of the simplicia characterization test were water content of 6.63%, water soluble content of 24.64%, total ash content of 3.55% and acid insoluble ash content of 0.29%. Hair tonic preparations are stable in storage for up to 12 weeks from organoleptic, homogeneity. The hair growth activity of the ethanol extract hair tonic gel from 3 concentrations, the best was 7% (1.96 ± 0.00).

Conclusion: Black Cumin (*Nigella sativa* L.) ethanol extract gel has hair growth activity.

Keywords: *Black cumin (Nigella sativa L.), hair tonic, hair growth activity*

A R T I C L E I N F O: Received 18 Oct. 2020; Review Completed 03 Dec. 2020; Accepted 05 Dec. 2020; Available online 15 Dec. 2020

Cite this article as:

Wulansari S*,Reveny J, Nainggolan M, Formulation of Black Cumin (*Nigella Sativa* L.) Ethanol Extract Gel Preparation with Addition of Dimeticone as Hair Tonic, Asian Journal of Pharmaceutical Research and Development. 2020; 8(6):42-45.
DOI: http://dx.doi.org/10.22270/ajprd.v8i6.875

***Address for Correspondence:**

Wulansari S, Faculty of Pharmacy, Universitas Sumatera Utara, Medan, Indonesia

INTRODUCTION

Hair is the crown of everyone, because it has a function as protection against the environment such as cold or hot temperatures, ultraviolet rays and a support for appearance[1]. Healthy hair is characterized by a black color, thick, non-falling and not tangled[2]. Hair loss is said to be normal, namely 40-80 strands per day. However, if it exceeds 100 strands every day, it will cause baldness[3]. Based on the results of the study, 56.8% of men experienced baldness and 50% of women experienced hair loss disorders, an average age of 28 ± 14 years was noted to have these disorders[4]. The solution to the problem of hair loss is done by using cosmetic products such as hair tonics.

Hair tonic is a cosmetic preparation that is used to help strengthen, improve growth and / or maintain hair condition[5]. Currently, the preferred form of hair tonic dosage form is gel form, because of its good ability to spread on the skin, has a cool effect due to slow evaporation from the skin, easy to wash off water, good drug release, and no physiological inhibition of hair function[6]. The gel is easy to wash off, so if the hair on the head is exposed to water or sweat the preparation will not last longer. Therefore it is necessary to have a water resistant agent such as dimethicone[7], which has the advantage of being easy to spread, as well as providing softness and smoothness to the skin[8]. Dimethicone is effective as a water resistant agent with a concentration of 3% [9].

Indonesia's natural wealth, is very supportive for the use of traditional materials[2]. One of the plants that is useful in increasing hair growth is Black cumin (*Nigella sativa* L.) which is a plant from the *Ranunculaceae* family which contains oleic acid[10], flavonoids, amino acids and

vitamins (thamin, riboflavin, pyridoxine and folic acid) [11] which can accelerate hair growth[1], prevent hair loss[12], as an antibacterial and antifungal[13].

MATERIALS AND METHODS

Material

The materials used in this study were cumin (Nigella sativa L.), 96% ethanol, chloralhydrate (Merck), floroglusinol (Merck), mercury (II) chloride (Merck), potassium iodide (Merck), sodium hydroxide (Merck), iodine (Merck), bismuth (III) nitrate (Merck), nitric acid (Merck), acetic acid (Merck), iron (III) chloride (Merck), concentrated hydrochloric acid (Merck), lead acetate (Merck) , alpha naphthol (Merck), magnesium powder (Merck), 2N hydrochloric acid, 96% ethanol, 2N sulfuric acid, isopropanol (Merck), chloroform (Merck), amyl alcohol (Merck), toluene (Merck), concentrated sulfuric acid (Merck), Karbopol, glycerin, Triethanolamine, methyl paraben, propyl paraben, sodium metabisulfite, dimethicone, 2% minoxidil, Potato Dextrose Agar (PDA), Plate Count Agar (PCA), and Peptone Dilution Fluid (PDF).

Research methods

Preparation of Black Cumin Extract (*Nigella sativa* L.)

A total of 7 kg of simplicia powder is put into a closed vessel, 10 parts of solvent are added. Soak for the first 6 hours, stirring occasionally, then let stand for 18 hours. The maserate is collected in a dark bottle and then separated by precipitation, then filtered. The search process is carried out twice. The extract was collected and concentrated using a rotary evaporator, dried with a freeze dryer[14].

Simplicia Characterization Test

Testing of simplicia characterization includes Determining the water content of the extract, Determining the concentration of water-soluble extract, Determining the content of the soluble extract of ethanol, Determining the ash content, the content of the acid insoluble ash[15].

Making Hair Tonic Gel

Table: 1. Formulas for hair tonic gel preparations

Ingredients	Formula I (%b/b)	Formula II (%b/b)	Formula III (%b/b)
EE	3	5	7
Dimetikon	3	3	3
Carbopol	0,5	0,5	0,5
Na. metabisulfit	0,1	0,1	0,1
Metil paraben	0,14	0,14	0,14
Propil paraben	0,02	0,02	0,02
Gliserin	20,0	20,0	20,0
TEA	q.s	q.s	q.s
Aqua	Ad 100	Ad 100	Ad 100

EE: Ethanol Extract

In the manufacture of hair tonic gels, the percentage composition of the hair tonic gel preparations refers to the herbal hair gel formula that has been carried out[16].

Evaluation of Gel Preparation Quality

Evaluation of the quality of gel preparations includes organoleptic examination, homogeneity, and microbial contamination tests including the Total Plate Number (ALT) and Kamir Fungi Number (AKK) [17].

Measurement of Hair Growth Activity

Average Hair Length of Rats

The average hair length of rats was obtained by measuring 10 strands of hair using a caliper on days 7, 14 and 21 after application. Results are expressed as mean ± SD hair length of 10 hairs[18].

Weight of Rat Hair

Measurement of the hair weight of rats was done by shaving the hair that grew in the test area then weighing all the hair that grew in the basting area and it was only done on the 21st day. Results were expressed as rat hair weights ± SD [18].

RESULTS AND DISCUSSION

Black Cumin Extract (*Nigella sativa* L.)

From the extraction process, a thick Black Cumin extract was obtained, then dried using a freeze dryer obtained 273 g of EEJH.

Simplicia Characterization

The results of the simplicia characterization examination of Black Cumin (*Nigella sativa*L.) Can be seen in **Table 2**

.

Table: 2. Data on characterization of Black Cumin (*Nigella sativa* L.)

No	Inspection parameters	Result (%)	Requirements for Indonesian Natural Cosmetics Ingredients (Kemenkes RI, 2014)
1.	Water content	6,63%	-
2.	Water soluble essence	24,64%	>22%
3.	Extract soluble in ethanol	27,11%	>18%
4.	Total ash content	3,55%	<8,0%
5.	Acid insoluble ash content	0,29%	<1,3%

Evaluation of Gel Preparation Quality

Evaluation of the quality of the gel preparations included organoleptic examination, homogeneity, and total plate count and mold values[17].

Organoleptic examination of the hair tonic gel was carried out to see the possibility of physical instability of the hair tonic gel preparation during the storage process. This organoleptic test is carried out visually by observing odor, color, and homogeneity.

The shape and consistency observed for 90 days did not change after storage. The color of the gel formula in the Ethanol Extract of Jintan Hitam (EEJH), formula III produces a clear black color. The color of the resulting gel did not change after 90 days of storage. The resulting difference in color is influenced by differences in the concentration of the extract used.

The resulting odor is a distinctive odor of cumin in formula III EEJH, while formula I, II has a distinctive smell of carbopol. The odor of the black cumin gel preparation produced did not change after 90 days of storage.

The homogeneity test aims to see the uniformity of the particles in the gel preparation so that it provides maximum quality when used. In the homogeneity test of the black cumin hair tonic gel, the EEJH formula, the observation time for 4, 8, and 12 weeks showed a homogeneous gel preparation.

The microbial contamination test aims to determine the microbiological contamination contained in the preparation or extract. The test results for the microbial contamination of Black Cumin Extract (*Nigella sativa* L.) included the determination of the Total Plate Number (ALT) on the ethanol extract with a result of 0.934×10^3. Determination of Yeast Mold (AKK) in Ethanol Extract with a result of 0.6685×10^3.

The results of the Black Cumin Extract and Preparation Microbial Contamination Test showed that the number of colonies obtained both on ALT and yeast fungi were taken under the average number of colonies that would be calculated according to the quality requirements of traditional medicines according to BPOM RI No. 12 of 2014, so the black cumin extract had fulfilled the requirements because the number of bacteria and mold / yeast obtained is lower than the predetermined requirements.

Measurement of Hair Growth Activity

Average Hair Length of Rats

Table: 3. Data on Average Hair Length of Rats in Ethanol Extract of Black Cumin (*Nigella sativa* L.)

	Average Hair Length of a Rat (mm) ± SD			
	Day 0	**Day 7**	**Day 14**	**Day 21**
Blank	0	0,29±0,03	0,61±0,01	0,89±0,01
Positive Control	0	0,83±0,02	1,83±0,02	2,12±0,03
EEJH 3%	0	0,48±0,00	1,01±0,04	1,20±0,02
EEJH 5 %	0	0,56±0,02	1,38±0,00	1,75±0,01
EEJH 7%	0	0,65±0,01	1,55±0,00	1,96±0,00

The Black Cumin hair tonic gel preparation had hair growth activity close to the positive control on day 21.

Description:

Blank : Gel without black cumin extract

Positive Control : Minoxidil 5%

EEJH : Black cumin ethanol extract

The results of statistical data test showed that all groups and blank had significant differences.

Rat Hair Weight

Table: 4. Data on the average hair weight of rats Ethanol extract of Black Cumin (*Nigella sativa* L.)

	The Average Hair Weight of the Black Cumin Ethanol Extract Rats (mg) ± SD
	Day 21
Blank	0,0180±0,008
Positive Control	0,0920±0,008
EEJH 3%	0,0500±0,012
EEJH 5 %	0,0620±0,008
EEJH 7%	0,0700±0,010

Description:

Blank :Gel without black cumin extract

Positive Control : Minoxidil 5%

EEJH : Black cumin seed ethanol extract

The results of the statistical test showed that the hair weight data were normally distributed, so the ANOVA test was continued. The ANOVA test results showed that there was a significant difference in hair weight in each group of white rats. Of the three groups tested had significant differences ($p < 0.05$) with positive control.

CONCLUSION

Black Cumin (*Nigella sativa* L.) ethanol extract gel has hair growth activity.

ACKNOWLEDGEMENT:

The author thanks the Phytochemical Laboratory and USU Cosmetics Laboratory for assisting the author in completing this research.

REFERENCES

1. Diana, W dan Wahini M. *Penggunaan Ekstrak Buah Alpukat dan Madu Sebagai Bahan Aktif Hair Tonic Untuk Rambut Rontok*. Fakultas Teknik. Universitas Negeri Surabaya. 2014; 03(01): 227-232
2. Aini, Q.*Uji Aktivitas Pertumbuhan Rambut Kelinci Jantan dari Sediaan Hair Tonic yang Mengandung Ekstrak Etanol Daun Mangkokan (Nothopanax scutellarium L.)*. Jurnal Farmasi Lampung.2017; 6(2): 2
3. Nurjanah dan Krisnawati, M. *Pengaruh Hair Tonic Lidah Mertua (Sanseviera Trifasciata Prain) dan Seledri (Apium Graveolens Linn) Untuk Mengurangi Rambut Rontok*. Fakultas Teknik. Universitas Negeri Semarang.2014; 3(1):2.
4. Legiawati, L.*Jenis Kerontokan Rambut Dan Kebotakan Pasien Poliklinik Kulit Dan Kelamin Rsupn Dr. Cipto Mangunkusumo Tahun 2013; 2009-2011*. Departemen Ilmu Kesehatan Kulit dan Kelamin. FK UI. 40(04):160.
5. SNI 16-4955-1998. (1998). *Losio Tonik Rambut*. Badan Standardisasi Nasional, Jakarta. 1-4
6. Voight, R. (1994). *Buku Pelajaran Teknologi Farmasi*. Edisi Kelima. Yogyakarta: Gadjah Mada University Press. 170, 436.
7. Caswell, M. *Sunscreen Formulation and Testing* ' smetics and toiletries magazine.2001; 116(9):52-55
8. Starch, M., Dias, T.C.A., Vervier, I., Reeth, I.V., dan Ramos, M.C.T. (2007). *Expanding Silicone Technologies for Sun Care Performance Complements Aesthethics*. Dow Corning Corporation. USA. 2-7
9. Suryaputra, G. (2015). *Formulasi Sediaan Tabir Surya Ekstrak Air Buah Stroberi (Fragaria vesca L.) Dalam Bentuk Sediaan Krim*. Surabaya: Skripsi, Fakultas Farmasi. Universitas Katolik Widya Mandala. 96.
10. Mardiana. (2011). *Karakteristik Asam Lemak dan Kolesterol Rajungan (Portunus pelagicus) Akibat Proses Pengukusan*. Bogor: Skripsi, Fakultas Perikanan dan Ilmu Kelautan IPB. 40
11. Landa, P., Marsik, P., Vanek, T., Rada, V., dan Kokoska, L. *In Vitro Anti- Microbial Activity Of Extracts From The Callus Cultures Of Some Nigella Species*. Journal Biologia Bratislava. 2006; 61(3):286-287.
12. Kristiningrum, E. *Suplemen Untuk Rambut Sehat*. Medical Department PT. Kalbe Farma. 2018; 45(6):454-456