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Formulation and characterisation of iodised arachis oil cream

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Plenty of chemical agents are utilised for local application in the form of ointment, cream, paste of newer drug delivery systems like transdermal drug delivery system with systemic action and in turn cores of side effects similar to the systemic products like tablets, capsules, Injections etc. To minimise this, an innovative formula is contemplated and formulated by selecting suitable ingredients which are in topical use. In this process Iodised arachis oil is prepared, used in many normal external ailments and are evaluated for standard evaluation techniques.

Keyword: Arachis oil, zinc oxide, emulsion, astringents, antipuritic, Transdermal.

1. Introduction

A large number of chemical agents may be applied to the skin and mucous membranes for their local effects. The locally acting agents that have limited chemical and pharmacologic activity but at the time there are some physical basis of action. Those agents are having general chemicals reactivity include most astringents, irritants, rubifacients, vasicants, sclerosing agents, canstics, cecharotics and antipuritic agents. This study aims to formulate a stable iodised arachis oil smooth cream to get the maximum astringent action of iodine and zinc oxide by limiting the use of water to control the total fatty material in the cream. Further, the effect of water content on the stability of the cream was also determined.

2. Plant Description

i. Botanical name: *Arachis hypogaea* L.
ii. Family: Fabaceae
iii. Common names: Earth nut, Goober pea, Groundnut, *Mani*, Monkey nut, Peanut, Runner peanut, Spanish peanut, Valencia peanut, Virginia peanut.

The plant is a small annual herb, belonging to the family of Fabaceae of the genus *Arachis* and botanically named as *Arachis hypogaea*. The

peanut plant is procumbent or semi-erect, with rather small compound-pinnate, smooth leaves. The seeds are enclosed in a rather fibrous pod.

The peanut is grown mainly for food and as a source of edible oil, arachis oil.

Fig 1: Pic Courtesy-www.hort.purdue.edu/newcrop/Crops/Peanut.html.

iv. Parts of plants consumed: Seeds only for food; tops and hulls for feed [1].

3. Peanut Origin and History

Peanuts are believed to be originating in Central American region from where they spread to other parts of the world by Spanish explorers. Today, peanuts are widely cultivated as an important oil seeds and a prime commercial crop in China, India, African nations, and the United States of America [2].

4. Peanut Oil Nutrition Facts and Health Benefits

- Peanut oil is high in energy; 100 g oil provides 884 calories.
- It is one of the cooking oils with high smoke point; 450 °F. The property which can be employed in setting oil temperature while deep-frying food items.
- Peanut oil has very good lipid profile. It has saturated, monounsaturated and polyunsaturated (SFA: MUFA: PUFA= 18: 49: 33) fats in healthy proportions.
- It is one of the stable cooking oils that has very long shelf life.
- It has been shown that the most peanut-allergic individuals can safely consume refined peanut oil [3].
- Being a vegetable oil, it is a good source of plant sterols, especially β-sitosterol (phytosterols). Phyto-sterols competitively inhibit cholesterol absorption in the gut.
- There by can reduce cholesterol levels by 10% to 15%.

- Peanut oil is high in calories, the oil is especially rich in mono-unsaturated fatty acids (MUFA) like oleic acid (18:1) that helps to lower LDL or "bad cholesterol" and increases HDL or "good cholesterol" in the blood.

5. Peanut Oil

Among edible vegetables oils, peanut oil is exceeded in world production only by soybean. World production of peanut oil, 1964-66, averaged 3,166,000 tons.

6. Uses

- Peanut oil is used mainly for edible purposes in the preparation of shortening, margarines, and mayonnaise, as a cooking and frying oil and as a salad oil.
- As a protectant- seed protectant.
- Dietary aspects

- Recent studies have shown that peanut oil and peanut product-based diets produce a reduction in total and LDL cholesterol [4].
- The use of high oleic acid peanuts as the fat source in a low-fat–high-monounsaturate diet produced significant
- Positive changes in blood lipids in postmenpausal women, including reduction of total cholesterol from 264 to 238 mg/dl [5].
- Peanut oil because of its beta-sitosterol may inhibit cancer growth and may offer protection from colon, prostate, and breast cancer. Snacking on peanuts or peanut products has a satiety effect that enables individuals to control hunger without leading to a weight gain [6].

7. Physical Characteristics of Peanut Oil

Cold pressed peanut oil has deep yellow color with pleasant nutty aroma and sweet taste. Refined oil has light yellow color and has neutral taste.Its specific gravity @ 25 °C is 0.912-0.920, Iodine value-84–100, and saponification value-185–195. Color is an important quality parameter of edible oil, both in the refining process and in the marketplace. The light yellow colour of peanut oil is due to the presence of ß-carotene and lutein [7].

8. Peanut Oil Evaluation and Composition

The Hehner value expresses the percentage of water-insoluble fatty acids plus unsaponifiable matter in an oil or fat. This method is of greatest value in testing butterfat purify and peanut oil has a higher Hehner value than butterfat .The IV, or Wijs iodine number, is the number of grams of iodine absorbed under standard conditions by 100 g of fat. Peanut oil's IV of 82–107 indicates it is more saturated than corn, cottonseed, or linseed oil but is less saturated than coconut, palm, or butter oil. Oil from the high oleic peanut varieties has an IV usually between 73 and 77 [8].

For soap making, the melting point of the fatty acids (titer value) is an important parameter. The titer value for peanut oil is lower than that for cottonseed oil (30–37 °C), cocoa butter, and animal fats and oils but is higher than that for corn (14–20 °C) and/or linseed oil (19–21 °C). The unsaponifiable matter is largely sterols and methylsterols.

i. Fatty Acid Composition Ranges of Peanut Oil [9].

Fatty Acid	Percentage		
Palmitic	8.0–14.0	7.4–12.5	5.3–10.4
Stearic	1.0–4.5	2.7–4.9	2.2–4.4
Oleic	35.0–69	41.3–67.4	52.8–82.2
Linoleic	12.0–43.0	13.9–35.4	2.9–27.1
Arachidic	1.0–2.0	1.2–1.9	1.1–1.8
Eicosenoic	0.7–1.7	0.7–1.4	0.7–2.4
Behenic	1.5–4.5	2.1–3.6	2.2–3.9
Lignoceric	0.5–2.5	0.9–1.7	1.0–1.9

ii. Phospholipids

The major phospholipids of peanut oil are phosphatidic acid (PA), phosphatidylcholine (PC), phosphatidylethanolamine (PE), phosphatidylglycerol (PG), and phosphatidylinositol (PI).

iii. Tocopherols

Tocopherols are considered a moderate antioxidant in the peanut oil. The Codex Alimentaris standard for tocopherols in peanut oil indicates a range of 48–373 mg/kg for alpha-tocopherol, 0–140 mg/kg for beta-tocopherol, 88–389 mg/kg for gamma-tocopherol, and 0–22

mg/kg for delta-tocopherol. Total tocopherol content ranges from 130 to 1300 mg/kg.

iv. Vitamin Content of Peanuts (Units per 100 g Dry Weight) (10).

Constituent	Units
Fat soluble	
Vitamin A	26 I.U.
Carotene (provitamin A)	Trace (<1 ug)
Vitamin D	ND
Vitamin E	26.3–59.4 mg/100-g oil
Alpha-tocopherol	11.9–25.3 mg/100-g oil
Beta-tocopherol	10.4–34.2 mg/100-g oil
Delta tocopherol	0.58–2.50 mg/100-g oil
Vitamin K	ND
Water soluble	
B-Complex	
Vitamin B_1—Thiamine	0.99 mg
Vitamin B_2—Riboflavin	0.14 mg
Vitamin B_6—Pyridoxine	0.30 mg
Vitamin B_{12}—Cyanocobalamin	ND
Niacin—Nicotinic acid	12.8–16.7 mg
Choline	165–174 mg
Folic acid	0.28 mg
Inositol	180 mg
Biotin	0.034 mg
Pantothenic acid	2.715 mg
Vitamin C	5.8 mg

ND–Nondetectable.

9. Formulation of Iodised Arachis Oil Cream

i. Materials and Methods

a. Materials

Arachis oil, Iodine, Zinc Oxide, Calcium Oxide, Water, Scarlet red (oil soluble dye) Mortar and pestle, Mechanical Stirrer, Microscope, Stage micrometer, Eyepiece micrometer, water.

b. Methods

The Iodised arachis oil cream was prepared by the usual trituration method with addition of zinc oxide and calcium oxide [11]. Totally 5 different batches of creams were prepared by changing the quantity of purified water and was tabulated in Table -1. Care was taken to form the iodised arachis oil and a thorough mixing was undertaken. Water is added in different proportion with utmost care since it is a cream preparation, Extensive evaluation parameters are considered and carried out, which are physical appearance, identification of cream by staining and miscibility test, globule size measurement and determination of total fatty materials in the different batches of creams. All the formulations are optimised to select the most suitable formula and suggested for regular usage.

c. Procedure

Preparation of Iodised arachis oil: Accurately measured Arachis oil, weighed Iodine and incorporated with arachis oil by the use of a mechanical stirrer. Place the mixture on a boiling water bath and stirred occasionally till colour of the mixture changes to greenish.

d. Preparation of Cream

Weighed zinc oxide and calcium oxide. Powered and Dispersed in the stated amount of purified water. Dispersion was poured in to a mortar and pestle and added the iodised arachis oil in small quantities to the dispersion with continuous trituration in one direction and continued till the cream was formed [12]. Then transferred to the mechanical stirrer for thorough mixing at 50 RPM till a homogenous product was obtained Likewise five batches of cream were prepared and named as sample 1, 2, 3, 4, 5.

Table 1: Formulation of the Iodised Arachis oil Cream.

1) Aractis Oil 2) Iodine 3) Calcium Oxide 4) Zincoxide 5) Purified Water	Prepared 5 different creams by changing the quantity of purified water Cream I – Water content 5 ml Cream II- Water content 10 ml Cream III- Water content 20 ml Cream IV- Water content 30 ml Cream V- Water content 40 ml

10. Evaluation of Iodized Arachis Oil Cream

i. Physical appearance

The formulated creams were uniform in colour (dark yellowish to greenish) and smell to the original raw materials and had the appearance of a smooth semisolid cream.

ii. Identification of creams

a) Staining Test [13]

The prepared formula was triturated with scarlet red (Oil soluble dye) and placed a small quantity on a microscopic slide covered with cover slip and examined under microscope for phase determination.

b) Miscibility test [14]

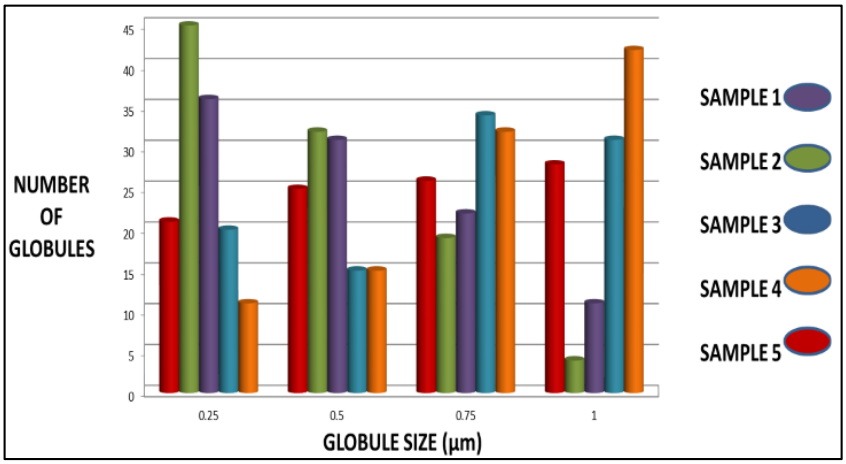
A small amount of cream with arachis oil was stirred well and similarly a small amount of cream was mixed with water and stirred well and found out the result with the help of a microscope.

iii. Globule size measurement

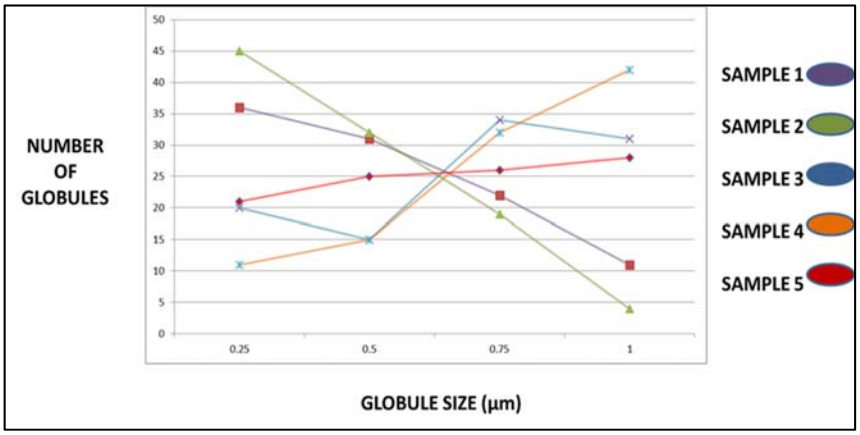
The mean Globule sizes was determined by microscopic method and the globule measurement data was shown in Table 2. Statistical diameters were determined, size distribution represented by histogram and frequency distribution curve.

Table 2: Measurement of Globule Size

Sample	Size of Globule (µm)	Number Globules
Sample1	0-0.25	36
	0.25-0.5	31
	0.5-0.75	22
	0.75-1	11
Sample 2	0-0.25	45
	0.25-0.5	32
	0.5-0.75	19
	0.75-1	4
Sample 3	0-0.25	20
	0.25-0.5	15
	0.5-0.75	34
	0.75-1	31
Sample 4	0-0.25	11
	0.25-0.5	15
	0.5-0.75	32
	0.75-1	42
Sample 5	0-0.25	21
	0.25-0.5	25
	0.5-0.75	26
	0.75-1	28



Histogram



Frequency Distribution Curve

iv. Determination of Total fatty material present in the creams: The total fatty matter present in each formulation was determined and the results are reported in Table 3.

Table 3: Total fatty matter content.

SAMPLE	Water Content (ml)	TFM in %
Cream I	5	94.43
Cream II	10	89.99
Cream III	20	83.62
Cream IV	30	76.27
Cream V	40	70.22
Arachis Oil	Nil	97.56

11. Results and Discussion

From the studies conducted, it was observed that the creams prepared was water in oil type. The following are the characteristics confirmed from the various test factors with a comparative study among the creams prepared (C – 1 to C – V) and it is found that the sample C- 11 gives the best results.

Physically the Batch C-I appears as a smooth cream with a very appealing texture. There was no sign of bleeding for the last one year as it was kept in room temperature as the part of the

stability study. The other samples show the tendency for slight bleeding during this period. The total fatty matter (TFM) value was almost 89% which is well above the requirement. As a water in oil cream its effect lasts for many hours compared to oil in water cream type of cream. The constituents like zinc oxide, calcium hydroxide, arachis oil and iodine which give a better effect on skin. The zinc oxide gives a better astringent activity and arachis oil gives a soothing effect. Iodine also gives a good astringent activity when compared to other formulations which are usually prepared as oil in water emulsions. Hence it is very clear that the formulation marked as C-II is an ideal preparation which can be used for the treatment of skin diseases including psoriasis very successfully.

12. Conclusion

The C–II which contains Zinc Oxide, Calcium Hydroxide, Iodine and Arachis Oil is a water in oil cream and it may provide very good astringent effect on skin since the availability of smallest particles is maximum. Hence it gives the optimum results when it is used for the treatment for skin diseases including psoriasis.

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