MICROENCAPSULATION OF ALMOND OIL AND ITS APPLICATION IN MASSAGING GEL

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Abstract

The main motive of this research paper is to develop cost effective and productive coating material for encapsulating almond oil (as an active) in face massaging gel without compromising the quality of the active drug , microencapsulation provides the required amount of active drug constituents to the desired site of application .It reduces the dosing frequency and also prevent the degradation of active drug components. There are several coating materials (polymers) used for microencapsulation are; ethyl cellulose, polyvinyl alcohol, gelatine, sodium alginate, pectin etc. In this research experiment the coating material used is ethyl cellulose to encapsulate almond oil by using syringe of gauge size 21G. This process has been used due to ease of availability. Their properties such as yield value, pH, shape of microsphere, colour solubility and stability, its application, benefits has been investigated. Microscopic evaluation shown absence of tails in the microsphere and the microspheres were spherical in shape, by this experiment It is concluded that microspheres encapsulated with almond oil incorporated in face massaging gel was found to be stable and shown no irritancy after application.

Keywords: Almond oil, ethyl cellulose, tween 80, triethanolamine, chloroform, syringe ,methyl chloride.

INTRODUCTION: Microencapsulation is the technique of encompassing components in small, tiny form that may be in solid or liquid form in the capsule which is surrounded by coating also called as polymeric coating leads to the formation of small spherical capsule which is termed as microcapsule ,also known as microsphere , the size of microsphere ranges from 1µ to 1000µ i.e. (1mm) [1]. The coating build the barrier film between the core and the wall material of the microcapsule to avoid chemical and physical reaction and to maintain the biological function and physiochemical properties of the core material.[2].Entrapment efficiency and the drug content encapsulated can be determined by extracting the amount of drug from the microsphere for this weighed amount of dried microspheres can be extracted in buffer solution of the required PH for the time duration of 7hrs or can be extended for 24hrs . Further the dispersed microspheres can be solicited for 40 minutes and filtration can be done through 0.45µm filter. The left filtrate determines the concentration of drug content which can be tested by using spectrophotometer λ 269nm.hence the drug content and the entrapment efficiency can be determined by the following formula.

Drug content = calculated amount of drug /total amount of microsphere×100

Encapsulation efficiency = calculated drug amount/theoretical amount of drug ×100. [3]

DIAGRAM OF MICRCAPSULE

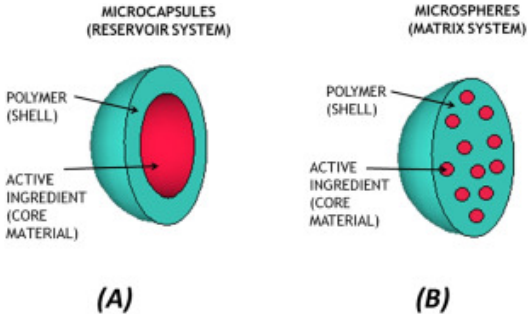

FIG 1: BASIC DIGRAM OF MICROCAPSULE. [4]

AIM OF MICROENCAPSULATION

- The aim of microencapsulation is to strengthen the release of the active drug

after appropriate application on the desired area.
- Highly volatile components can be protected by microencapsulation.
- Environmental sensitive components can be stabilized by this technique.
- This technique also prevents material from oxidation.
- Helps in controlled and targeted release of drug.
- This technology helps in minimizing drug toxicity.
- Several instability factors between the chemicals can be restricted by this technique.[5]

COMPOSITION OF MICROEN CAPSULATION: COATING (SHELL) : Substances that coats the core material with the required thickness film. There are several coating polymers which are used they can be either hydrophobic or hydrophilic, or can be the mixture of both. [6]. The coating materials are composed of polymers, Plasticizers ,Colouring agent ,resins ,lipids ,waxes ,Release rate enhancers etc,

COATING MATERIALS FOR MICROENCAPSULATION

1).Hydrophilic polymers	2).Hydrophobic polymers	3).Waxes and lipids
a).Gelatin	a).Elthyle cellulose	a).Beeswax
b).Starch	b).Polyethylene	b).carnauba wax
c).Gum Arabic	c).silicons	c).spermaceti
d).carboxy methyl cellulose	d).polyethylene vinyl acetate	d).paraffin wax
e).sodium alginate		

CORE MATERIAL

The material which has to be coated may be in solid or liquid state. There are heaps of core materials which are used in cosmeceutics .the core materials which are in liquid form may be diffused or dissolved materials.

COMPOSITION OF CORE MATERIAL

- Active constituents
- Additives (drug release enhancers)
- Stabilizers

ALMOND OIL (AS AN ACTIVE CONSTITUENT)

Almond oil is derived from the almond seeds (Prunus dulcis, or Prunus amygdalus) is a species belonging to the family Rosaceae which is indigenous to Mediterranean climatic condition, almonds are grown in many parts of the world are: Turkey, Italy, morocco, Spain , Australia ,United states and many more.

BENEFITS OF ALMOND OIL

- Encourages healthy and intact skin. Copious in vit E and Vit A which offers in tremendous amount of anti oxidant.
- Fight against U.V damage and reduces all types of skin stress condition.
- Almond oil removes all the accumulated debris as it have high skin penetration efficacy and hence restrict acne formation.
- Moisturizes and hydrates the skin also contributes in tan removal.
- Almond oil act as best skin healing agent for all skin type.
- Diminishes premature ageing signs, there are several external factors causes appearance of fine lines includes pollution, sun exposure, skin dehydration etc.

Taking all the above listed benefits of almond oil, as it gives multiple benefits , almond oil was used in microencapsulation as an active (as core material) in the face massaging gel.[8].

MODES FOR MICROENCAPSULATION

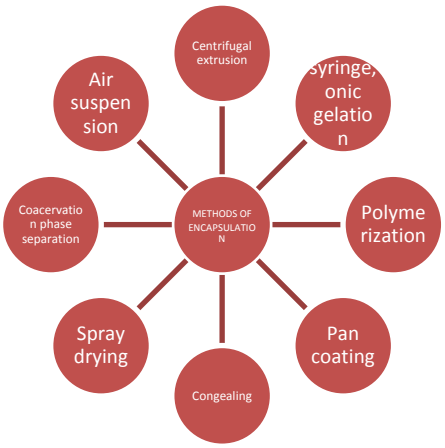

FIG 2: TYPE OF METHOD USED FOR MICROENCAPSULATION. [9-12]

MATERIAL AND METHOD

MATERIAL

Ethyl cellulose was used as shell material. Almond oil (essential oil) was used as core material ,chloroform, tween 80, carbopol 940, triethanolamin

METHODS

At room temperature (31˚C) methyl chloride was used to dissolve almond oil derivatives .Now afterwards ethyl cellulose was added to this solution followed by addition of ethanol. The solution was mixed on magnetic stirrer at 990 R.P.M. until the mixture got homogeneous (consider it as solution A). Another beaker was taken in which tween 80 was taken (0.4%), now solution A was filled in syringe of 21G gauge size and dropped in the solution B in a drop wise manner, it was kept for 5 minutes. The microsphere beads were filtered with chilled water and dried on vacuum drier at room temperature .The drug polymer ratio used was 2:5.

PROCEDURE OF PREPARATION OF MICROBEADS

Fig (a) ethyl cellulose solution o magnetic stirrer

Fig (b). microsphere

Fig (c).Beads with almond oil

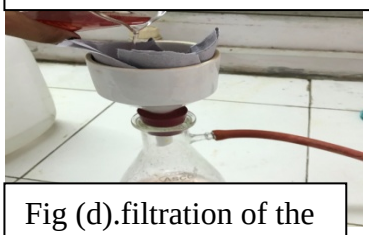

Fig (d).filtration of the beads with chilled water

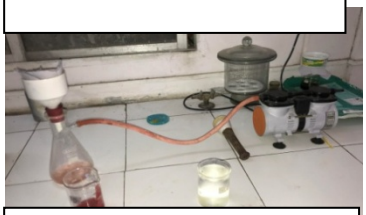

Fig (e).vacuum drying of the beads.

Fig (f).filtered beads

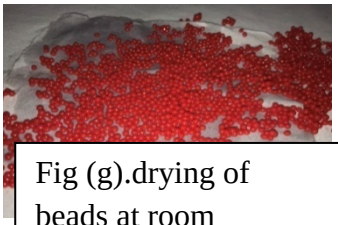

Fig (g).drying of beads at room temperature

Fig (h).beads in the product

FIG 5: FINAL APPEARANCE OF GEL WITH MICROSPHERE BEADS

PARAMETERS FOR THE EVALUATION OF MICROSPHERE AND FACE MASSAGING GEL

a) SHAPE ANALYSIS BEADS

Optical microscope fitted with ocular micrometer used for the evaluation of shape of the microsphere. [13]

b) DETERMINATION OF THE PERCENT YIELD (W/W)

The calculation of the percent yield was done by taking total weight of the dried microsphere with respect to the coating and core material by using the given formula.

Percent yield value = total weight of dried microsphere / core material + polymer amount× 100.[14]

c) DETERMINATION OF PH

The PH of the gel was determined by using digital PH meter, the reading was taken and compared after the addition of the beads.[15]

DIGITAL PH METER

FIG 6: PH METER

d) HOMOGINEITY TEST

Homogeneity test was done by visual checking of the formulated gel for testing the micro beads aggregation , colour dissolution of the beads in the gel, formation of lumps, effect on the clarity of the gel or any other physical changes.[16]

e) TOPICAL TESTING FOR IRRITATION

Performance on the skin has been done on 4 people they were given 1 gm of the massaging gel and instructed to apply on the back of their neck area within $(2)^2$ inch after few hours they were noticed for any type of reaction on their skin.[17].

f) CONSISTENCY TESTING

In the middle of the measuring glass beaker containing gel ,the cone fixed with a holding rod was dropped in the centre from above 10 cm .the travelling distance of the cone from upper most layer of the gel till the end was noted.[18]

Table No1.COMPOSITION OF THE DIFFERENT BASE FORMULATION WITH SAME AMOUNT OF BEADS

NO OF BATCHES	MICROSPHERE BEADS (g)	TRIETHANOLAMINE (TEA)	GLYCEROL	CARBOPOL 940	WATER
F1	0.5	1ml	10ml	0.5gm	Upto100ml
F2	0.5	1ml	11ml	1.0gm	Upto100ml
F3	0.5	1ml	12ml	1.5gm	Upto100ml
F4	0.5	1ml	13ml	2.0gm	Upto100ml

TABLE NO 2.STABILITY TESTING OF THE PRODUCT (FACE MASSAGING GEL) WITH MICROSPHERE BEADS OF BATCH NO [F1] FROM TABLE NO 1

TIME PERIOD	ROOM TEMPERATURE						
	colour	odour	Consistency of gel	Consistency of the beads	homogeneity test	Change in PH	Topical reaction
1st week	NC	NC	8mm	SC	good	6.9	NONE
2nd week	NC	NC	8mm	NC	good	6.9 NC	NONE
3rd week	NC	NC	8mm	NC	good	6.9 NC	NONE

TABLE NO 3.STABILTY OF PRODUCT IN THE OVEN

TIME PERIOD	OVEN (45ºC)						
	colour	odour	Consistency of gel	Consistency of the beads	Homogeneity test	Change in PH	Topical reaction
1st week	NC	NC	8mm	SC	good	6.9	NONE
2nd week	NC	NC	8mm	NC	good	6.9 NC	NONE
3rd week	NC	NC	8mm	NC	good	6.9 NC	NONE

TABLE NO 4.STABILITY OF PRODUCT IN FRIDGE

TIME PERIOD	FRIDGE (5ºC)						
	colour	odour	Consistency of gel	Consistency of the beads	Homogeneity test	Change in PH	Topical reaction
1st week	NC	NC	8mm	SC	good	6.9	NONE
2nd week	NC	NC	8mm	NC	good	6.9 NC	NONE
3rd week	NC	NC	8mm	NC	good	6.9 NC	NONE

DISCUSSION

The yield percent of the beads was found to be 71.42% , the optical microscopy study shown that the beads were spherical in shape with no tails .the gel was determined with ph 6.9 which was constant throughout the experiment . The consistency of the gel after incorporation of microsphere beads was found to be good and the beads gets ruptured after little stress . The gel with beads founds to be with good homogeneity with absence of lumps and transparent in appearance .odour as well as the colour of the gel did not got changed and the gel after topical application did not showed any sensitive reaction. for the final formulation of the gel F1 [table no 1] batch no got selected because it passes the required tests mentioned in table [2,3,4], And same formulation will be used for the future study.(in table no 3 an 4 SC denotes seen changes and NC denotes no changes).In first week from table no 2,3,4 micro beads shown changes i.e. they got swelled in the gel in the first week but in second and third week the swelling was constant for all the condition the acidity of the gel can be reduced by the addition of triethanolamine to the carbopol.

RESULT

For this research study gel formulation has been used for the purpose of massaging , containing encapsulated almond oil ,gel delivers the positive proceed as it contains maximum amount of water . The micro beads used enhances the aesthetic value of the gel as well as the beads encapsulated with almond oil have abundant of skin benefits . several batches of the gel base was prepared from which batch no F1 [table no 1] was selected for the study because it passes the above mentioned test and will be carried forward for tests, made using carbopol as gelling agent along with several other mentioned ingredients.

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