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NOVEL DRUG DELIVERY SYSTEM FOR PSORIASIS

Project report submitted to **University of Mumbai** Mumbai, Maharashtra, India. In partial fulfillment of the requirements for the degree of

Bachelor of Pharmacy

BY

Miss Mukadam Sabiha Rafique Shirin (**Roll No.16ph33**)

Miss. Mujawar Faeeza Faiz Ahmed Surayya (**Roll No.16ph32)**

Mast. Khan Wasim Mohd Dilsher (**Roll No.16ph25)**

Mast. Khan Uzair Mohd. Aslam Salimunnisa **(Roll No.16ph27)**

Fourth Year B.Pharm (SEM 7nth)

Supervisor

Miss. Masarrat Mukadam

Department of Pharmaceutics
AIKTC School of
Pharmacy,Panvel.

Anjuman-I-Islam's KalsekarTechnical Campus Plot No.2
Sector -16, Near Thana Naka, KhandaGaon,

New Panvel, Navi Mumbai. 410206
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Resolute efforts to achieve the target backed by self confidence are the key to success. Well planned efforts in the right direction surely fruitily in success, but efforts are fruitful due to hands making passage smoother. It is a moment of gratification and pride to look back with Spence of contentment at the long traveled path, to be able to recapture some of the fine moments, to be able to thank the infinite number of people, some who were with me from the beginning, some who joined me at some stage during the journey, whose rally round kindness, love and blessings has brought me to this day. I wish to thank each one of them with all my heart.

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Name Of Student	Roll No.
Miss Mukadam Sabiha Rafique Shirin	**16ph33**
Miss. Mujawar Faeeza Faiz Ahmed Surayya	**16ph32**
Mast. Khan Wasim Mohd Dilsher	**16ph25**
Mast. Khan Uzair Mohd. Aslam Salimunnisa	**16ph27**

*(*Department of Pharmacy)

University of Mumbai.

DECLERATION

I hereby declare that this written submission represents my ideas in my own words and where others ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Name Of Student & Roll Number:

Miss Mukadam Sabiha Rafique Shirin(16ph33),

Miss. Mujawar Faeeza Faiz Ahmed Surayya(16ph32),

Mast. Khan Wasim Mohd Dilsher(16ph25),

Mast. Khan Uzair Mohd. Aslam Salimunnisa(16ph27),

IR@AIKTC-KRRC

CERTIFICATE

Department of Pharmaceutics,
School of Pharmacy,

Anjuman-I-Islam's Kalsekar Technical Campus

KhandaGaon,NewPanvel, Navi Mumbai. 410206

This is to certify that the project entitled "**NOVEL DRUG DELIVERY SYSTEM FOR PSORIASIS"** is a bonafidework Carried out by

Miss Mukadam Sabiha Rafique Shirin (**Roll No.33**)

Miss. Mujawar Faeeza Faiz Ahmed Surayya (**Roll No. 32)**

Mast. Khan Wasim Mohd Dilsher (**Roll No.25)**

Mast. Khan Uzair Mohd Aslam Salimunnisa**(RollNo.27)**

submitted for the appreciation of the degree of Bachelor of Pharmacy in Department of **Pharmaceutics .** The results presented in this project report have not previously formed the basis for the award of any degree. The particulars given in this project report are true to the best of my knowledge.

SUPERVISOR:	**DEAN:**	**DIRECTOR:**
Prof Mukadam	**Dr. Shariq Syed,**	**Dr.Abdul Razak**
Masarrat,		**Honnutagi**

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Approval for Bachelor of Pharmacy

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This project "**NOVEL DRUG DELIVERY SYSTEM FOR PSORIASIS** "by Students Miss MukadamSabihaRafiqueShirin (**Roll No.33**)

Miss. MujawarFaeezaFaiz Ahmed Surayya (**Roll No. 32)**

Mast. Khan wasimMohdDilsher (**Roll No.25)**

Mast. Khan UzairMohdAslamSalimunnisa**(RollNo.27)** is approved for the degree of Bachelor of Pharmacy inDepartmentof pharmaceutics .

Examiners

1.....

2.....

Supervisors

1.Prof.MasarratMukadam.

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ABSTRACT

In this report we are preparing an ointment containing microspheres formulated with curcuminand Musturdfor the treatment of skin disease known as psoriasis. Psoriasis is a T-cell mediated auto immune inflammatory skin disease recognised by skin surface inflammation, anomalous keratinisation etc.Curcumin is a main yellow bioactive component of turmeric,possess wide spectrum of biologicalaction. antiinflammatory,antioxidants,anticarcinogenic,antifungal,antibacterial,antiprotozoal activity.However the benefits are by its extremely poor aqueous solubility,which subsequently limits its bioavailability and therapeutic effect of curcumin.

The musturd oil can applied directly on to the skin, can also help to fight with fungal infection also relieve the painful effects of rheumatism and arthritis as well as help in join a hens and pains.

The aim of present work was to formulate curcumin and mustard microspheres containing sodium alginate as a microencapsulating polymer were loaded in salicylic acid cream which is prepared to be applied topically on the skin for purpose of sustaining effects of the drug.

The drug release from microspheres based cream exhibited a controlled release pattern.The methodology included the use of sodium algenate containing curcumin and mustard microspheres were prepared by emulsion solvent evaporation method,and using DMSO as solvent for penetration enhancer.

The resulting microspheres are characterize by employing scanning electron microscope (SEM). Further, the microspheres are dispersed in salicylic acid cream (1 %w/w). The cream is evaluated for appearance, homogeneity,spreadability, viscosity, ph, and in Vitro drug diffusion study.

Keywords:Microspheres,Drugdelivery,preparation,applications,SEM

➡LIST OF FIGURES:

LIST OF TABLES:

➡LIST OF ABBREVIATION:

No	Abbrevations	Full Form
1	CUR	Cur cumin
2	Ml	Milliliters
3	Gm	Gram
4	hrs.	Hours
5	℃	Degree celcius
6	HPMC	Hydroxy propyl Methyl cellulose
7	UV	Ultra violet
7	%	Percentage
8	No.	Number
8	Rf	Retension factor
9	Mcg	Microgram
0	TLC	Thin layer chromatography
11	Conc.	Concentrations
12	Fig.	Figure
13	W/v	Weight by volume
14	Uv-vis.	Ultraviolet – visible
15	RBF	Round bottom Flast

CHAPTER 1 : INTRODUCTION

INTRODUCTION

Psoriasis is a chronic skin disease result in patches of thick red skin covered with the silvery scales. These patches are referred as plaque which usually occur on the elbow,knees,legs,scalp,lowerback,face,palm,and sole of the feet,nails too..

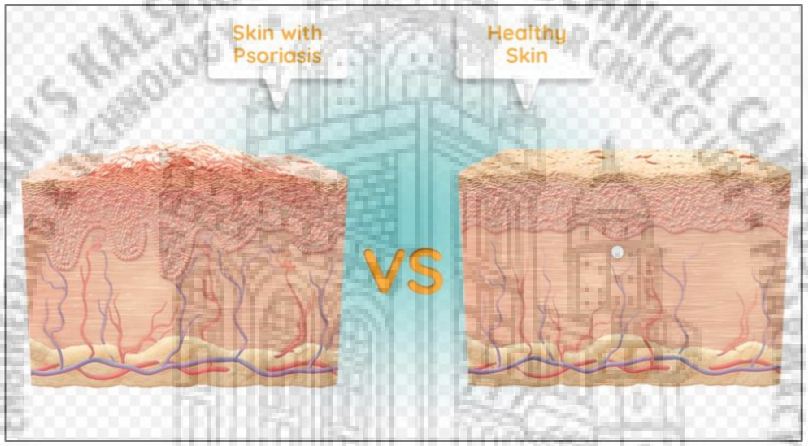


Fig no. 1: Structure of psoriasis skin

TYPES OF PSORIASIS:

- Plaque psoriasis
- Erythrodermic psoriasis
- Pustular psoriasis
- Psoriatic arthritis
- Guttate psoriasis
- Inverse psoriasis

Psoriasis can affect severely and has no cure but the symptoms can be reduced up to some extent.

Skin have number of barrier for penetration through it.

A well designed controlled drug delivery system can overcome some of the problems of conventional therapy and enhance the therapeutic efficacy of a given drug .

To obtain maximum therapeutic efficacy, it becomes necessary to deliver the agent to the target tissue in the optimal amount in the right period of time thereby causing little toxicity and minimal side effects.

There are various approaches in delivering a therapeutic substance to the target site in a sustained controlled release fashion. One such approach is using microspheres as carriers for drugs.

Microspheres are characteristically free flowing powders consisting of protein or synthetic polymers which are biodegradable in nature and ideally having a particle size less than 200 μm.

In contrast to drug delivery system, the word novel is searching something out of necessity.

The drug has to be delivered for a prolonged period of time and many medicines have to be taken simultaneously in case of chronic patients.

Frequent administration of drug is necessary when those have shorter half-life and all these leads to decrease in patient's compliance Curcumin is the active ingredient of the spice,used in cooking in India and other regions.

The origin of the plant curcuma longa L. Curcumin is the potent phyto molecule with a wide range of biological activities and shows low absorption.It was selected for this study because it is poorly absorbed in lower GIT and has short elimination half life 0.39hrs. the poor bio availability 1% of the molecule owing to its insolubility at gastric ph and degradation at alkaline ph of intestine in the humans.high oral doses(8gm per day) in humans result in cmax of 2μm and short half life (28 minutes) limit its used via the oral route. Psoriasis is no cure, but people can manage their symptoms with treatments and natural remedies.

There is some evidence that three herbs or herbal treatments — Mahoniaaquifolium, indigo naturalis, and Aloe vera — can improve psoriasis symptoms by reducing inflammation or skin cell growth.

Topical products are important classes of drug delivery systems, and their use in therapy is becoming more widespread.

The purpose of topical dosage forms is to conveniently deliver drugs to a localized area of the skin.

Curcurmin (CUR), a constituent of Curcuma longa (Family-Zingiberaceae), chemically known as diferuloyl methane has been reported to possess anti-oxidative, antiinflammatory,anticarcinogenic, and hypocholesterolemic properties.

Some of the novel formulations developed using curcumin include liposomes, solid lipid nanoparticles, transdermal fi 1m, microspheres, nanoemulsion, etc.

Following oral administration (up to8 g per day), it is poorly absorbed, and only the traces of compound appear in blood. It undergoes extensive first- pass metabolism,and hence is a suitable candidate for topical formulation.

Considering the fact that most inflammatory diseases occur locally and near the surface of the body, topical application of CUR on the inflamed site can offer the advantage of delivering a drug directly to the disease site and producing its local effect.

However, the barrier properties of intact skin limit the permeability of wide variety of substances, including pharmaceutical active agents.

The most promising technique to reduce barrier properties of stratum comeum is the use of chemical enhancers that allow drug permeation through the skin at an appropriate rate for a suitable time.

The An ideal penetration enhancer should be pharmacologically inactive,nonirritant, non damaging for the skin, potent,and cosmetically acceptable.Terpenes, the naturally occurring volatile oils, posses most

acceptable criteria as penetration enhancers like high percutaneous enhancement ability, reversible effect on the lipids of stratum corneum, minimal percutaneous irritancy at low concentrations (1—5%) and good evidence of freedom from toxicity.

TYPES OF MICROSPHERES

- MICROCAPSULE
  Consisting of an encapsulated core particle Entrapped substance completely surrounded by a distinct capsule wall.
- MICROMATRIX

Consisting of homogenous dispersion of active ingredient in particle. Micromatrices in which entrapped substance is dispersed throughout the matrix

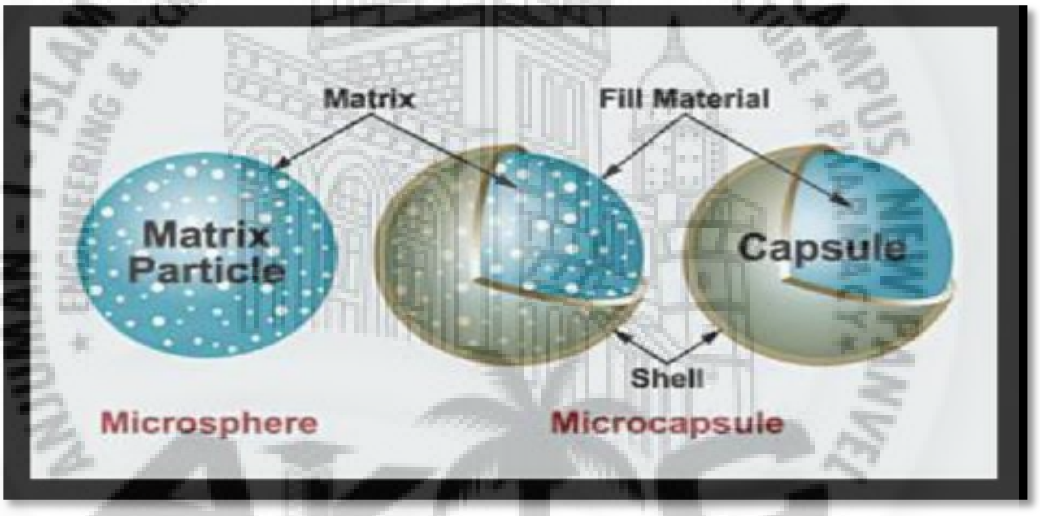


Fig no. 2: Types of microsphers

IDEAL CHARACTERISTICS OF MICROSPHERES :

- Ability to control the release rate for predefined period of time.
- Higher concentration of the drug can be given severe as depot.
- Stability of the preparation after synthesis with a clinically acceptable shelf life.
- Biocompatibility with a controllable biodegradability

ADVANTAGES OF MICROSPHERES:

- Size reduction leads to increase the surface area which can enhance solubility of the poorly soluble drug.

- provide constant drug concentration in blood which can increase patent compliance,
- Decreases dose and toxicity.
- Coating of drug with the polymer helps the drug from enzymatic cleavage hence found to be best for drug delivery.
- Less dosing frequency leads to better patient compliance.
- Better drug utilisation will improve the bioavailability and reduces the incidence or intensity of adverse effects.
- Protect the GIT from irritant effect of drug.
- Convert liquid to solid form and to mask the better taste.
- Reliable means to deliver the drug to the target site with specificity,if modified, and to maintain the desired concentration at the side of interest without untoward effects.
- Reduce the reactivity of the core in relation to the outside environment.
- Biodegradable microspheres have the advantages over large polymer implants in that they do not require surgical procedure for implantation and removal.

➢ LIMITATIONS

- The fate of polymer matrix and its effect on the environment.
- The fate of polymer additives such as plasticiser, stabilisers, antioxidants, and fillers.
- Reproducibility is less.
- Process conditions like change in pH, solvent addition, and evaporation or agitation may influence the stability of core particles to be encapsulated.

- The environmental impact of the degradation products of the polymer matrix produced in response to heat, hydrolysis, oxidation, biological agents.
- Controlled release dosage form cannot be crushed and each types of polymer used in the preparation of microspheres:

A number of different substances both Biodegradable and Non-Biodegradable have been investigated for the preparation of microspheres. This include polymer of Natural and synthetic origin and also semi synthetic polymers.

1. **NATURAL POLYMER:** These polymer are obtained by different sources like protein, carbohydrates, and chemically modified carbohydrates.

   PROTIEN: Albumin, Gelatin, Collagen.

   CARBOHYDRATES: Starch, Agarose, Carrageenans.

   CHEMICALLY MODIFIED CARBOHYDRATES: Poly Cary Dexron, Poly acryl Starch.

2. **SYNTHETIC POLYMER:**

   a. Biodegradable polymer: Polyanhydride, polyalkylcyano acrylates, Lactides and Glycolides.

   b. Non biodegradable polymers: Acrolien, GlycidylMethacrylates, Epoxy polymers etc

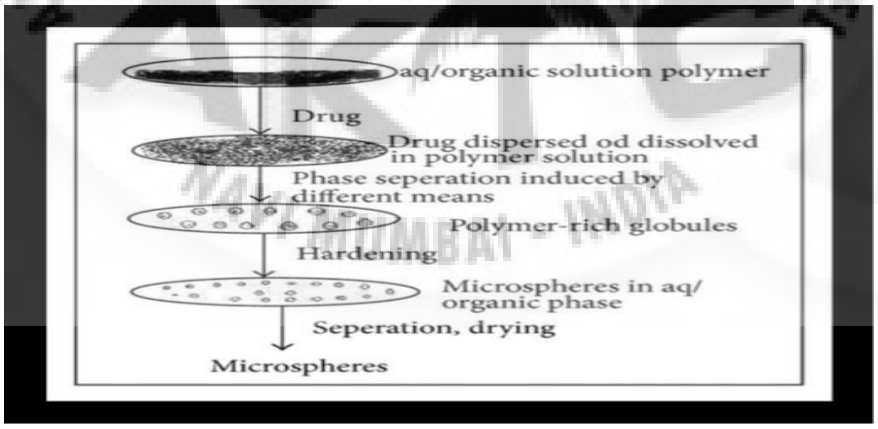


Fig no. 3: Mechanism to form Microspheres

- Most of the drug delivery through micro particles inhibits a matrix type internal solid dispersion morphology structure.

- The drug may be insoluble in the polymeric matrix and drugs are released by erosion. Initially water diffuses into the matrix dissolving the resulting adjacent to the surface of the device

CHAPTER 2: REVIEW OF LITERATURE

REVIEW OF LITERATURE

Microsphere: methods of preparations and application.

Harsh Bansal , Simar Preet, Atul Kumar Guptas

- Microsphere basically free flowing powder consisting of spherical partical of size less then 20micro metre . Efforts were made by many research to explore different other our conversational technique for the Microsphere. Some of these methods such as single emulsion technique, double emulsion technique, polymerization,phase separation convocation technique, spray drying.

It has gained because of its unique properties and medical value. This review intended to give an overview of some viedly used extraction method for curcumin as well as its existing application in different industries.

- Development of new delivery strategies to increase bio availability of cur cumin

  Gudusi viswanath anukunuru and VMReddy .506001

TD improve the bio availability of cur Cumin ,selective dosage forms that include sustained release dosage forms like lipids complexes, solid dispersion , prod rugs ,microsphere etc.

We also prepaid baxicauy it included salicylic acid, beeswax together on a hot plate/Stirrer(Temperature adjusted to 70^{o}C) cur cumin microsphere & mustard microsphere was added to this molten pase write striring .

The entire mixture was stirred while coating to from cur cumin & mustred microsphere.

- Medicinal qualities of mustard oil and its role in human health againts psoriasis disease

Ashok sharma,Reema rani.

Mustard oil contains sodium and potassium which helps to control the acid-base balance in our body. Mustard oil also contais linoleic acid to control sweating during summer. Antifungal is available in mustard oil which accounts antibiotics,fungicidal and cancer prevention qualities.Most of the indian household used mustard oil for cooking and seasowing of food respectively.

CHAPTER 3:AIM & OBJECTIVE

AIM & OBJECTIVE

- The main objective of the present research work was to formulate and evaluate gintment loaded with microspheres of mustard and curcumin to increase bioavailability and to reduce the dosing frequency and to improve patient compliance

- The main objective of topical drug delivery system to deliver drugs into systemic circulation through skin at predetermined rate with minimal inter and intra patient variations

- curcumin is a main yellow bioactive component of turmeric and post wide spectrum of biological action. However the benefits ae by its extremely poor aqueous solubility, which subsequently limits its bioavailability and therapeutic effect of curcumin

- Methods of salicylic acid ointment loaded with microsphere was prepared by solvent evaporation method by taking different ratios of polymer.

- Prepared ointment loaded with mosphere was evaluated for drug interaction by scanning electron microscope/SEM)

CHAPTER 4: MATERIAL AND METHODS

MATERIAL AND METHODS

Musturd oil is gifted from Allahabad district which is obtained by hydro-distillation of seeds of Brassica Juncea.

A fresh turmeric rhizomes of Indian origin were purchased from a local market (Mumbai) from which curcumin oil is obtained from *curcuma longs L.* *(*Turmeric) rhizomes

Methanol, ethanol, sodium algenate, hexane, calcium chloride,DMSO.

INSTRUMENTS:

- Magnetic stirrer.
- Soxhelet apparatus.
- UV absorbance
- Ph meter

➢ SAMPLE PREPARATION

I. For isolation of Turmeric rhizomes were washed with running water to remove the surface dust.
II. Rhizomes dried in shadow at room temperature for 2 days.
III. They stored in polyethylene bags at —20c until used.
IV. Immediately, they were cut into small pieces varying from 0.2 to1cm and ground to fine powder before experiments.
V. The powder was prepared using suitable standard sieves.

I. SOXHELET EXTRACTION TECHNIQUE FOR CURCUMIN :

- The soxhelet extraction, as the reference method, was per-formed as follows: 500g ground turmeric powder was weighed and embedded in a thimble and put in the soxhelet apparatus which was gradually filled with acetone as the extraction solvent.
- The extraction experiment was carried out at 60℃ within 8 h. Upon completion of the extraction, the acetone was separated from the extract

using rotary evaporator (Stuart RE300) under vacuum at 35℃. The residue was dried and weighed, the dissolved in 10ml methanol for calculation of curcumin content using TLC.

- In all extraction experiments acetone was used as extraction solvent due to its high solubalisation.

Fig.no.4: Soxhelet Apparatus.

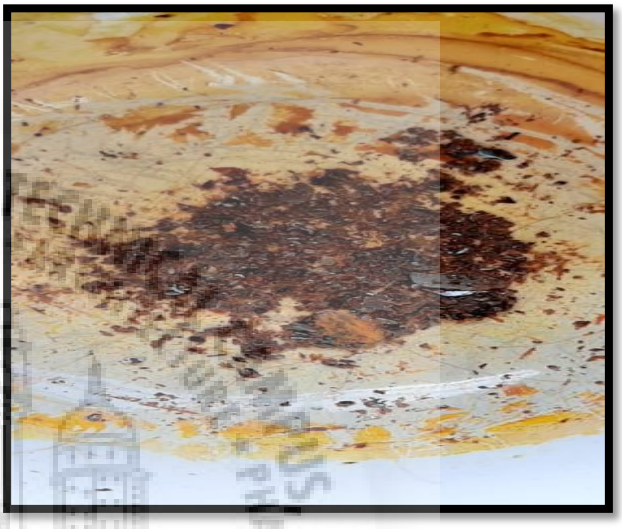


Fig no.5: Curcumin powder

II. CURCUMIN TEST

TEST	OBSERVATION	REFERENCE
Aqueous solution of turmeric + Boric acid	Reddish color	Positive
Addition of alkali	Greenish color	Positive

So here we assume that the present compound is Curcumin:

III. CURCUMIN OIL:

✓ INGREDIENTS:- curcumin powder, coconut oil.

- ✓ PROCEDURE:-
- ✓ Collect a spoon full of thick curcumin powder.
- ✓ Heat a pan in low flame and pour coconut oil in the pan.
- ✓ Add the collected powder to the oil and stir well so that the turmeric extract does not settle at the bottom.
- ✓ Allow the oil to heat at low flame till find bubbles.
- ✓ Let the oil attain room temperature.
- ✓ Pour the oil to an air tight bottle and preserve it from moist and air.

- ➢ **NOTE:**

Turmeric is the fat soluble, studies suggest that the curcumin in turmeric is best absorbed when combined with a fat.

Coconut oil is the great source of healthy fat that blends perfectly with turmeric.

Simply the oil is used as a carrier.

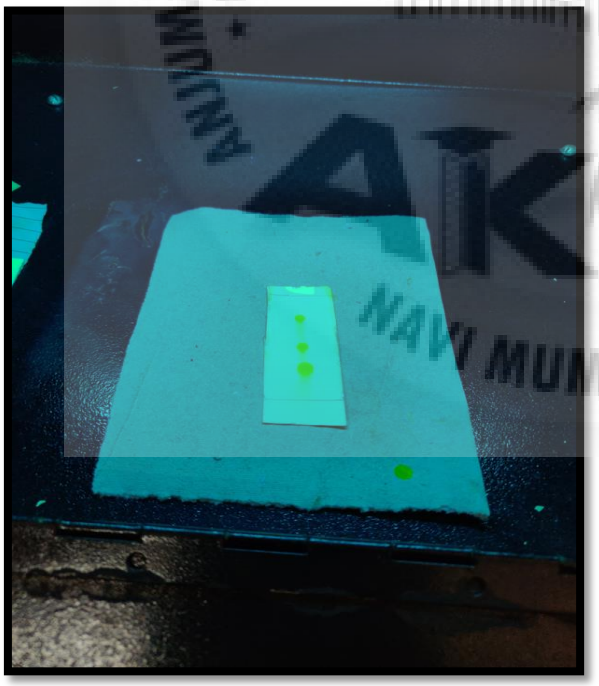
Fig no. 6:Curcumin oil formation

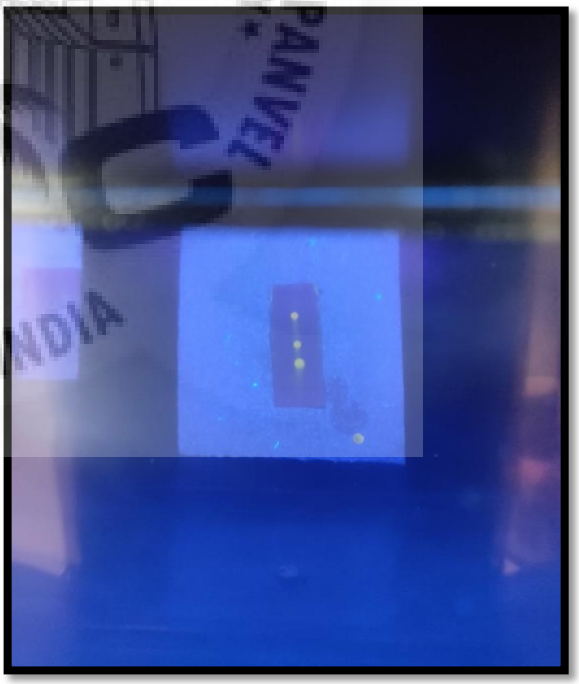
IV. METHOD. TLC AND CONDITIONS:

The chromatographic separation was based on the method described by Tonnesen and karlson. The method was first employed to analyse pure curcumin dissolved in methanol. The separation was performed on a silica gel aluminium plate. The TLC were developed in ascending order in closed glass flat bottom chamber which was presaturated with mobile phase for at least 30min. To maintain the chamber saturated with vapour of mobile phase the wall of inner side of chamber was lined with filter paper. The TLC plate was spotted with a sample from the spotting zone. The TLC bands were visually inspected using UV light (366 nm) to evaluate the peak separation.

V. MOBILE PHASE:

A mobile phase consisting of N-hexane and ethyl acetate ratio of (7:3) was used.





Visualisation at 424nm **Visualisation at 366**

VI. PREPARATION OF STANDARD SOLUTION OF CURCUMIN FOR UV VISIBLE SPECTROSCOPY

Curcumin 10mg was accurately weighed and transferred in a 100ml volumetric flask. Methanol was up to the mark to obtain a concentration of 100micro gram/ml of stock solution. From stock solution 0.1 , 0.2, 0.3, 0.4, 0.5, 0.6, 0.7ml of solutions were withdrawn and diluted to 10ml with methanol to obtain concentration of 1, 2, 3, 4, 5, 6, 7micro gram/ml, respectively.

The standard calibration curve of curcumin was obtained by measuring the absorbance of curcumin solution in concentration range (1-7mg/ml) prepared from stock solutions in methanol at 424nm in triplicate.calibration curve of curcumin was then plotted with absorbance on y-axis and curcuminconc on x-axis.

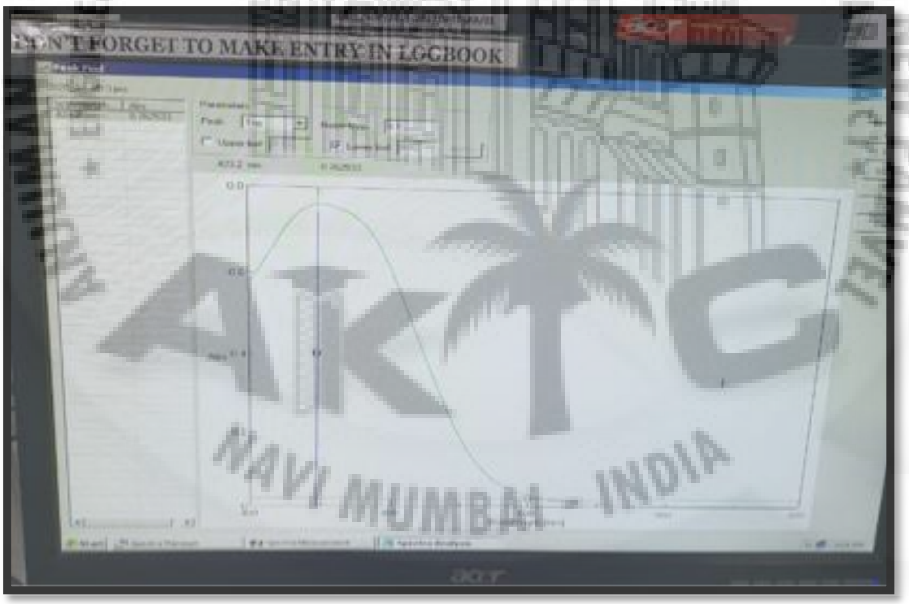


Fig 1: Determination of maximum wavelength of curcumin by Uv

UV VISIBLE SPECTROSCOPY.

- **INSTRUMENTAL WORK:**

Screening of polymer and their combination:-

Different polymer like HPMC, PVP, Ethylcellulose, sodium algenate, using ratio of any two were studied for their forming microspheres.

Microspheres of curcumin oil and Masturd oil were prepared using different ratio above mentioned different polymer using solvent evaporation method. Various polymer with different concentration was checked for desired characteristics of microspheres like physical appearance, stickiness,their tensile strength, by a set of experiments.

The curcumin microspheres are prepared using sodium algenate alone was found to be sticky and wet even after 24 hrs. The polymer prepared using 1% and 2% HPMC and sodium algenate using single polymer at a time were not possible to peel oil from the beats.

The beads of microspheres prepared by polymer PVP alone with different concentration was easily breakable with the cross linker calcium chloride.

Microspheres formulated using HPMC, Ethylcellulose in concentration 3% were very thick and very hard to peel.

The Masturd microspheres were also prepared by different polymer ratio to check their compatibility. With Ethylcellulose and HPMC it was unable to form beads. Sodium algenate and Ethylcellulose were used in ratio 1:2 was able to forming beads and shows less hardness as compare to higher concentration.

The various combinations of polymer in 1:1 ratio is shown in the table below

Table 1 : composition of trails batches with polymers HPMC,Ethylcellulose, PVPK30 to select the polymer combination

Sr.No.	Polymer combination	Polymer ratio
1	HPMC K4M : Sodium alginate	1:1
2	Ethyl cellulose: sodium alginate	1:1
3	HPMC : Ethylcellulose	1:1
4	PVP K30 : Ethylcellulose	1:1
5	PVP K30: sodium alginate	1:1

For above microspheres beads different evaluations was carried out like, weight, tensile strength, appearance. And from the evaluation performed it was found that the beads formed by polymer combination with 1:1 ratio of Ethylcellulose and sodium algenate is more suitable for the formulation than the other combination. As beads form by PVP as on of the polymer was breakable while forming with calcium chloride which act as a crosslinker.

The Beads form using HPMC polymer were brittle and hard and were oil does not removed easily from it.

Thus, polymer consisting of Ethylcellulose and sodium algenate as combination polymer forms flexible and soft, perfect coating with less hardness as compare to other polymer combinations.

Further studies were carried out using different combination ratio polymer Ethyl cellulose : sodium algenate.

Table 2: polymer combination of EC and sodium algenate in different ratio for selecting best polymer ratio.

Sr. No.	Polymer combination	POLYEMR RATIO	
		Curcumin oil	Masturd oil
1	EC: sodium alginate	1:2	1:2
2	EC: sodium alginate	2:1	2:1
3	EC: sodium alginate	3:1	3:1
4	EC: sodium alginate	1:3	1:3

From the above polymer combination, the combination of EC and sodium algenate in the ratio 1:2 for curcumin spheres was found to give superior in appearance, tensile strength, weight over the other combination.

And for the Masturd spheres combination of 2:1 was also found with very thin coating of polymer , appearance and a soft beads were carried out as compare to other combinations.

Selection of polymer combination

Microspheres of curcumin andMasturd with polymer concentration of EC and sodium algenate using DMSO , PEG (polyethylene glycol)as a penetration enhancer.

Table 3 : Microspheres with polymer combination of EC and sodium algenate using DMSO as a penetration enhancer.

Different penetration enhancer		
Ingredients	DMSO	PEG 200
EC	200	200
sodium alginate	400	400
Curcumin oil	10ml	10ml
Musturd oil	10ml	10ml
DMSO	10ml	10ml
Distilled water	40ml	40ml

From above selection of polymer combinations and plasticiser results, the following spheres were made with combination of EC and sodium algenate with DMSO as a penetration enhancer.

The beads were subjected to various evaluation parameter along with SCANNING ELECTRON MICROSPHERES.

A DMSO was found to give a better penetration enhancement further studies were carried out using polymer microspheres made using different concentration of DMSO 10ml, 15ml, 18 ml as a penetration enhancer.The microspheres were evaluated for drug content uniformity along with the uniformity of the weight.

Table 4: Microspheres with polymer combination of EC and sodium algenate using DMSO.

Ingredients	Curcumin microspheres	Maturdmicrosphers
EC	200gm	400gm
Sodium algenate	400gm	200gm
Curcumin oil	10ml	—
Masturd oil	—	10ml
DMSO	10ml	10ml
Distilled water	100ml	100ml

➢ PREPARATION OF CURCUMIN MICROSPHERES:

The curcumin and Musturd microspheres are prepared by emulsion solvent evaporation method. Briefly, combination of polymer that is sodium algenate(200mg) and EC (400mg)was dissolved in mixture of 100ml distilled water and kept for 24 hours until the lumps are dissolved properly. After 30ml of polymer is taken in beaker and kept under propeller stirrer about 300rpm.10ml of solvent DMSO was added for complete absorption after 10ml Solution of drug was added drop by drop to polymer while stirring. Stirring was continued for 45 min for complete removal of solvent.after that microspheres beads are done by taking 0.5 gram calcium chloride which act as a good crosslinker dissolved in 100 ml distilled water. After that microspheres were collected by filtration with whatman filter paper. Collected microspheres are washed with simply distilled water,dried,and then packed into the final container for further evaluation.

The same procedure is also for the Musturd microspheres only the polymer sodium algenate and EC ratio (2:1) were used.

Fig no. 9: Curcumin Microspheres

MUSTURD MICROSPHERES

➢ OPTIMIZATION OF SOME PROCESS PARAMETERS

The effect of process variables such as drug and polymer ratio,stirring speed, and emulsifier concentration on the particle size of the microspheres,drug entrapment efficiency,and drug release were studied.

To determine the influence of drug- polymer ratio, Curcumin microspheres were prepared by various polymer ratio such as 1:2, 1:3, 1:4, 1:5, while keeping the other two variables constant,that is stirring speed at 300rpm.At the end of this process, the final microspheres formed were evaluated. Microspheres were prepared by various stirring speed rates, 500, 1000, 300 rpm while keeping the drug polymer ratio 1:2 . The stirring speed on 300 rpm gives the good compatibility without forming the air bubbles through which it helps to form the perfect coating microspheres. And the final microspheres are formed and evaluated.

Musturd microspheres are also done by the same concept only the difference is drug and polymer ratio. Microspheres are prepared by 300rpm by keeping the drug polymer ratio (2:1)

➢ SELECTION OF OINTMENT BASE

We used different ratio of polymers to make an ointment base.

HPMC and PVP ratio 1:2 which shows the stickiness and increase the solid density.

Ethylcellulose and HPMC which shows the hardness in cream so this was also rejected.

Salicylic acid in petroleum jelly 5% has taken appropriately for the formulation of ointment.

Salicylic acid. 5gm

Petrolium jelly. 95gm

As in psoriasis treatment it act as a scale lifter, helping to soften and removes psoriasis scales.

The drug of curcumin and Musturd spheres are incorporated in salicylic acid formulation.

The drug loaded formulation were tested for physical appearance, Colorado, texture, and homogeneity.

This characteristic were evaluated by visual observation.

Homogeneity and texture were tested by pressing a small quality of formulated cream between the thumbs and index finger.

CHAPTER 5 : RESULTS AND DISCUSSION

RESULTS AND DISCUSSION

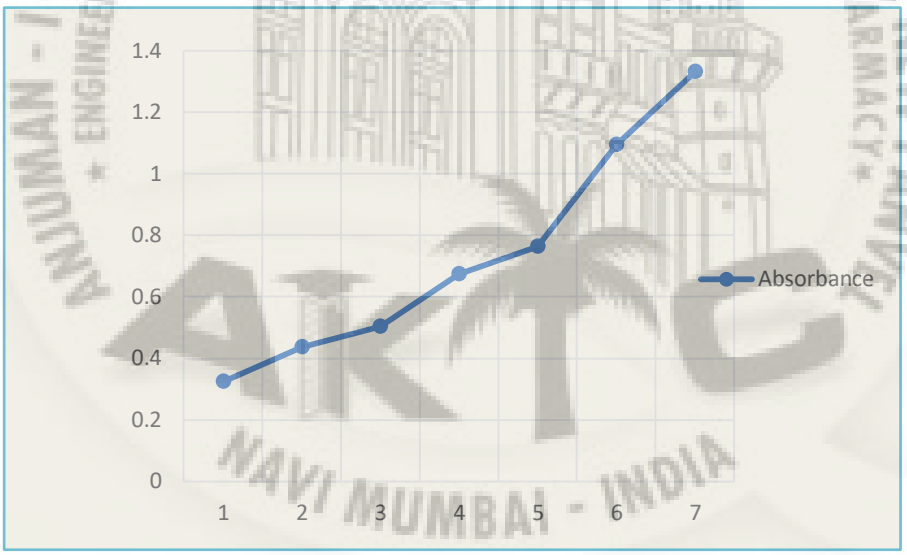
- **TABLENO.5: CURCUMIN TEST:**

TEST	OBSERVATION	REFERENCE
Aqueous solution of turmeric + Boric acid	Reddish color	Positive
Addition of alkali	Greenish color	Positive

Fig 1: Determination of maximum wavelength of curcumin by Uv

➢ TABLE NO.6:UV VISIBLE SPECTROSCOPY:

Concentration in mg/ml	Absorbance
1	0.3241
2	0.4356
3	0.5025
4	0.6732
5	0.7625
6	1.0941
7	1.3313



Evaluation of curcumin oil

➢ THIN LAYER CHROMATOGRAPHY:

Result:- purity of curcumin oil was checked by TLC using silica gel F254.

This spots were visualised in UV spectroscopy at 254nm.

Stationary phase: precoated silica gel plate.

Mobile phase:- n-Hexane : Ethylcellulose (7:3)

Spraying agent :- conc. Vanillin

Right of curcumin oil

Solvent front: 4.9

Solute front: 3.2

Rf = Distance from solute / Distance from solvent

3.2 / 4.9 = 0.6

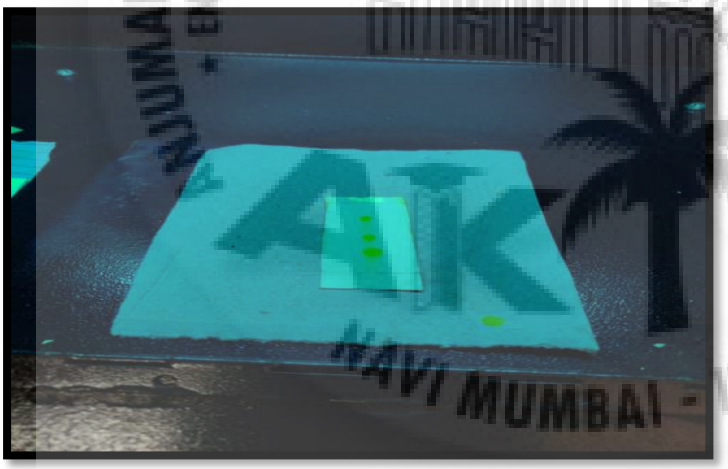


Fig no.7: TLC of curcumin

➢ SEM TEST FOR MICROSPHERES OF CURCUMIN AND MASTURD:

The surface morphology of the Curcumin and Musturd microspheres was examined by scanning electron microscopy (SEM) [Figure 7]. The dry microspheres were placed on carbon stub coated with gold in an ion sputter and scanned using Carl Zeiss Supra 5 model (Germany). The voltage provided was between 5 and 10 kV. SEM shows almost spherical particles with rough and nonporous surface.

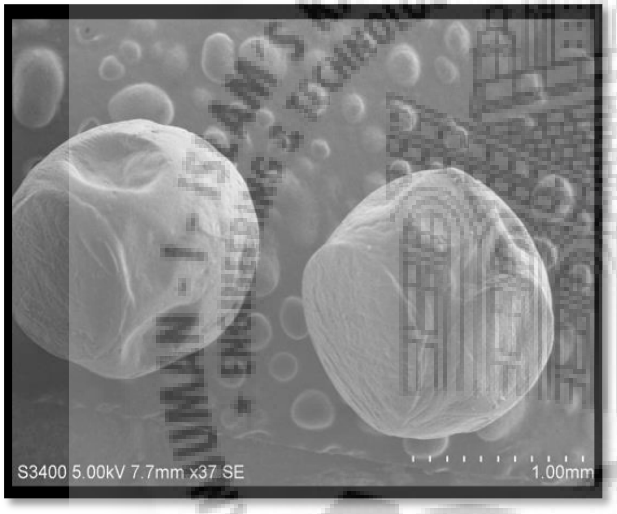


Fig no.10: Mastard Microspher

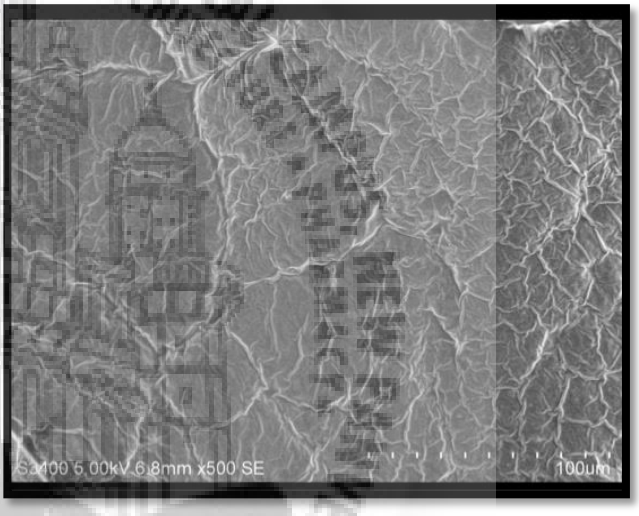


Fig no.11:Curcumin

Evaluation of ointment:

➢ CHARACTERIZATION OF OINTMENT:

1. **SPREADABILITY:**

   Formulation was determined by measuring the spreading diameter of 1g of sample diameter of 1g of sample between two horizontal glass plates(10cm* 20cm) after 1min. The standard weight applied to the upper plate was 25gm. Each formulation was tested two times.

2. **PHYSICAL APPEARANCE:**

The preapared ointment were visually inspected

3. **MICROSCOPIC CHARACTERISTIC OF OINTMENT:**

Internal phase was well dispersed in external phase.

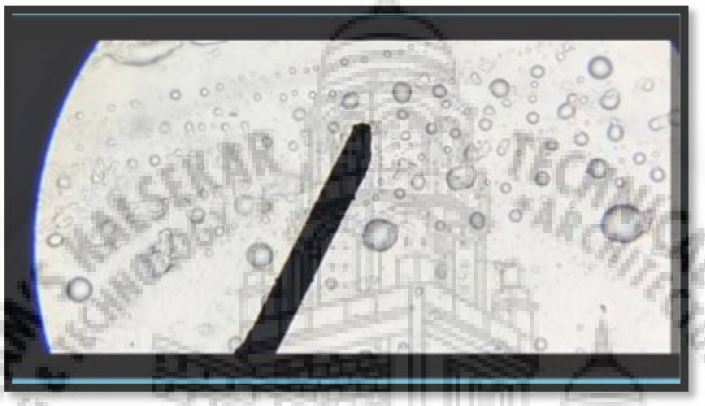


Fig No. 13:PHASE SEPARATION OF OINTMENT

- **Table no.7: Charactristics of Ointment:**

Parameters	Ointment
Colour	White
ODOUR	Pleasant odour
VISUAL APPEARANCE	Smooth and consistent cream
FOREIGN PARTICLES	Free from foriegn particles
Ph	7.01
SPREADABILITY	Moderately spreadable
MOISTURE CONTENT	Moist
IMMIDIATE SKIN FEEL	Moisturizing, No grittiness, and No greasiness.
HOMOGENEITY	Homogeneous

CHAPTER 6 : CONCLUSION

CONCLUSION:

- Turmeric is considered as safe, nontoxic, and effective alternative for many conventional drugs due to its distinguished therapeutic properties and multiple effects on various systems of the body.

- Many are the evidence which supports its therapeutic efficacy.

- The first one is that Curcumin, with its antioxidative property, may reduce the oxidative stress of psoriatic lesions, and bio-efficacy of curcumin based drugs.

- Musturd oil applied directly on to the skin, which help in fight fungal infections, and also relieve the pain.

- There is minute changes in the pH of the formulations after period of 2 weaks.
  SPREADABILITY of the formulation was found to be in the range of 10-25cm.

- All the results show that the ointment loaded with microspheres can be effectively used for the treatment of psoriasis.

CHAPTER 7 : REFRENCE

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Novel drug delivery system for psoriasis

by Masarrat Mukadam

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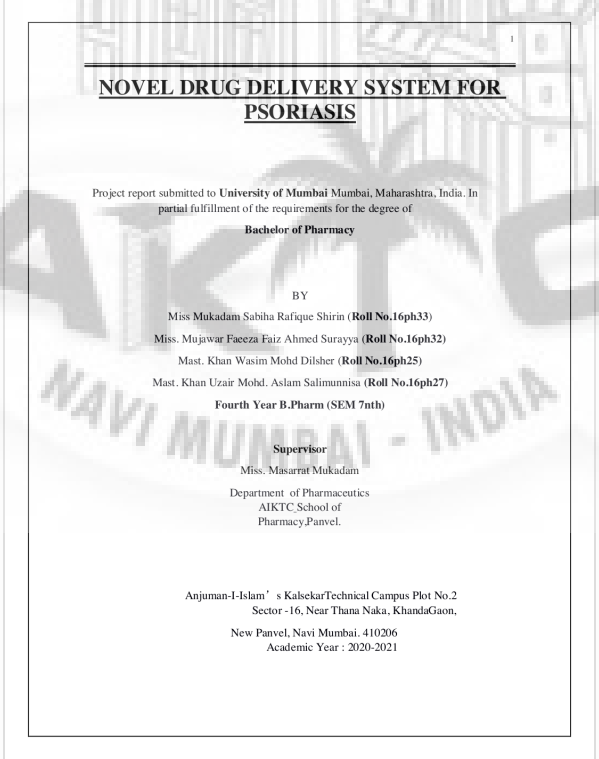

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NOVEL DRUG DELIVERY SYSTEM FOR PSORIASIS

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Bachelor of Pharmacy

BY

Miss Mukadam Sabiha Rafique Shirin (**Roll No.16ph33**)

Miss. Mujawar Faeeza Faiz Ahmed Surayya (**Roll No.16ph32**)

Mast. Khan Wasim Mohd Dilsher (**Roll No.16ph25**)

Mast. Khan Uzair Mohd. Aslam Salimunnisa (**Roll No.16ph27**)

Fourth Year B.Pharm (SEM 7nth)

Supervisor

Miss. Masarrat Mukadam

Department of Pharmaceutics
AIKTC School of
Pharmacy,Panvel.

Anjuman-I-Islam's KalsekarTechnical Campus Plot No.2
Sector -16, Near Thana Naka, KhandaGaon,

New Panvel, Navi Mumbai. 410206
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