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"Preparation and Evaluation of Spray dried microsphere – Sumatriptan Succinate"

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ABSTRACT: The present research work was aimed at development and evaluates of poly lactic co-glycolic acid (mucoadhesive microspheres of Sumatriptan Succinate for nasal delivery to avoid first pass
metabolism and toimprove the therapeutic efficacy in the treatment of Migraine. The microspheres were prepared by a spraydrying technique. Particle size was analyzed by optical microscope technique and found to be in the range of12-30 µm,which is favorable for intranasal absorption. The shape and surface characteristics were determinedbyscanningelectronmicroscopy(SEM)which depictedthesphericalnatureandpossesssmoothsurfaceso fthe microspheres. The percentage encapsulation efficiency was found to be in the range between 94-100%. Invitro mucoadhesion was carried out using sheep nasal mucosa and result obtains in 76.11-97.12.DifferentialScanning Colorimetry, result indicated a molecular level dispersion of Sumatriptan Succinatein
themicrospheres.InvitroreleasestudiesinpH6.2phosphateb ufferindicatedanomaloustransportmechanismfor drug release of Sumatriptan Succinate from the microspheres. On the basis of these results, SumatriptanSuccinateloadedPLGA microspheresmay beconsideredasapromising nasaldelivery system.

Keywords:DrugRelease,IncorporationEfficiency,PolyLa ctic CoGlycolicAcid,ParticleSize,SwellingIndex

I. INTRODUCTION -

Poly (lactic-co-glycolic acid) (PLGA), is significantlyused biocompatible and biodegradable polymerforencapsulationofhydrophilicandlyophilict herapeuticdrugmolecule[1,2].MoreoverPLGA(50:50)p olymerisnontoxicforhumanconsumptionandbychoo singappropriatepolymer composition predetermine drug releasewasobtained[3,4,5]Sumatriptansuccinate isclassofdrugformanagement of migraines. It aid to relive
painheadacheandothermigrainesymptoms.Itselectiv elybindwith5HT-1Breceptorsandthereby,Stimulating5-HT1Breceptorsandreducing the vascular pulsation and may providereliefinmigraineheadaches.Itsabsolutebioav ailabilityis15%[6,7].Various method used for preparation of PLGAmicrospherelikephaseseparation,emulsionsol vent evaporation and spray drying techniquebut spray draying is most
advantageous methodcompared because it is one step method havinghighdrugloadingcapabilityandreliableness.T he Microspheres formed by this method have ahighdrugloading.[9].Besidethesethespraydrying technique is more precise and easy forscalingupcomparedtoothermethods[8]

II. MATERIALS AND METHOD

Sumatriptansuccinateiskindgiftfrom(Dr-Reddy's Laboratories, India). Poly (d, l-lactide-coglycolide acid) (PGLA 50:50) gift sample fromResomer RG-502H, Inherent viscosity = 0.21 dl/g(Purac biomaterial, Gorinchem, Nederland).Alldifferent solvents and chemicals used were ofanalyticalgrade.

Preparation of Sumatriptan Succinate LoadedPLGAMicrospheres –

SumatriptanSuccinatemucoadhesivemicro sphere was prepared using varies drug andpolymerratio.PLGA50:50wasdissolvedinaceton esolution,SumatriptanSuccinatewasaddedtoabovep olymersolution.Themicrospheres were obtained by spraying the feedin a spray dryer with a standard 0.7mm nozzle(LU-223 Advanced, Labultima, India. When theliquid was inserted to the nozzle with a peristalticpump, atomization occurred by the force of thecompressed gas, disrupting the liquid into tinydroplets**.** The droplets beside hot air were

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blownintoachamberwheneverthedropletswasgaseous and discharge out through associateddegree exhaust tube. The dry product was thencollected in a collection pot. The spray dryingconditions,inlettemperature,spray

Evaluation test -

Evaluation of Spray Dried Microspheres-In Vitro Taste Masking The study was conducted in accordance to the method adopted from Shukla et al.[6] The required amount of spray dried microspheres equivalent to 70 mg sumatriptan succinate was placed in a 25 ml beaker. A volume of 5 ml phos- phate buffer solution pH 6.8 (United States Pharmacopeia (USP)) was added and the mixture was allowed to stand for 60 s. A 5 ml volume of phosphate buffer pH 6.8 was used to mimic the salivary fluid volume and pH. After the specified time, the suspension was filtered through 0.45 m m nylon membrane filter. The filtrate was analyzed for drug content using UV/Visible spec- trophotometer (Hitachi, Japan) at 227 nm. The experiment was run in tripli- cate.

1)Thermal Analysis Differential Scanning Calorimetry (DSC) (Perkin Elmer, Pyris 6 DSC, California, U.S.A.) was used to evaluate the compatibil- ity between sumatriptan succinate and Eudragit EPO. The DSC experiments were performed on plain drug, Eudragit EPO and spray dried drug loaded microspheres. Accurately weighed samples (5—7 mg) were sealed in flat bottom aluminium pans and thermograms were recorded at a constant rate of 10 °C/min over a temperature range of 30—300 °C. Inert atmosphere was provided by purging helium gas at a flow rate of 20ml/min .

3) **Drug Entrapment Efficiency, Loading and Yield** -The entrapment effi- ciency and drug loading in microspheres was estimated by dissolving 50 mg of spray dried powder in methanol and further diluted with 0.01 N HCl. The samples were analyzed using UV/Visible spectrophotometer (Hitachi, Japan) at a wavelength of 227 nm. Entrapment efficiency, drug loading and yield

2)Particle Size The analysis was performed using a Mastersizer S (Malvern Instruments, U.K.) fitted with MS1 small volume sample disper- sion unit connected to a dispersion unit controller. The spray dried micro- spheres were dispersed in water and sonicated for 2 min using bath sonicator (Branson 5200, Branson Ultrasonics, Danbury, U.S.A.) to prevent aggrega- tion before measuring particle size. Samples were

III. RESULTS -

1.Product yield - Product yield was found in the range between 25 to 60 % These comparatively low values coualso be owing to th low amount of feed used for the preparation of every batch and by the structure of the spray drie equipment that lacked a lure to capture the smallest and lightest particles .

2.Particle size - Average particle size of microspheres ranged from 10 to 35 µm, such particles are considered to be suitable for nasal administration It was found that increasing drug to polymer ratio will slightly increased the size of particle

3.Drug Loading and Incorporation Efficiency - Incorporation efficiency was high since it always exceeded 90 the result indicated that increasing the ratio of drug to polymer will increasing drug loading

IV. DISCUSSION

Poly latic co-glycolic acid(PLGA) is a biocompatible polymer, it does not cause any deleterious effect or toxic response in the nasal mucosal cavity even if used for prolonged periods was evaluated by Histopathological studies. These results demonstrated that PLGA microspheres were potential to be used as a vehicle for the nasal delivery of Sumatriptan succinate. However extensive pharmacokinetics and pharmocodynamic studies are required to establish a correlation, if any, before establishing nasal delivery as an alternative.

REFERANCE -

1. Zheng,C.,Liang,W.,2010.Aone-stepmodified methodtoreducetheburstinitialreleasefromPLGA microspheres.DrugDeli,17,77
2. Bhise,S.B.,Yadav,A.D.,Avachat,A.M.,&Malayandi, R., 2008. Bioavailability of intranasaldrugdelivery system.Asi.J.of Pharm,201-215.
3. Chien,W.Y.,Chang,S.F.,1998.Nasalsystemicdrugdelivery.NewYork:MarceldekkerInc,39,1-26.
4. https://pubchem.ncbi.nlm.nih.gov/compound/Sumatriptan-succinate
5. https://www.ebi.ac.uk/chebi/searchId.do?chebiId=CHEBI:64359 8, 581-97.
6. Huang, Y.C., Yeh, M.K., & Chiang, C.H., 2002. Formulation factors in preparing BTM-

chitosan microspheres by spray drying method. Int J Pharm, 242, 239-42.

7. Prajapati, R.K., Mahajan, H.S., &Surana, S.J., PLGA Based Mucoadhesive Microspheres for Nasal Delivery: In Vitro / Ex Vivo Studies. Indian Journal of Novel Drug delivery, 3(1), 9-16.
8. Patil, S.B., Sawan, K.K., 2009.Development, optimization and in-vitro evaluation of alginate mucoadhesive microsphere of carvedilol for nasal delivery. Journal of Microencapsulation, 26(5), 432–443.
9. Tuncay, M., Calis, S., Kas, H.S., Ercan, M.T., Peksoy, I., &Hincal, A.A., 2000. Dicofenac sodium incorporated PLGA (50:50) microspheres: formulation considerations and in vitro/in vivo evaluation. Int J Pharm, 195, 179-88.
10. Mahajan, H.S., Gattani, S.G., 2010. In situ gels of Metoclopramide Hydrochloride for intranasal delivery: In vitro evaluation and in vivo pharmacokinetic study in rabbits. Drug Delivery, 17(1), 19.
11. Vyas, T.K., Babbar, A.K., Sharma, R.K., Singh, S., &Misra, A., 2006. Preliminary brain-targeting