ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF CLINICAL PHARMACOKINETICS AND MEDICAL SCIENCES
Published by Pharma Springs Publication Journal Home Page: https://pharmasprings.com/ijcpms/

Evaluation of Natural Polysaccharides as Biodegradable Polymers for Colon Specific Drug Delivery

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Article History:

Received on: 12 Jan 2023
Revised on: 29 Jan 2023
Accepted on: 30 Jan 2023

Keywords:

Prednisolone,
Tamarind Seed Polysaccharide (TSP),
Guar Gum,
Colon Targeting

ABSTRACT

The present data analysis has been conducted to examine this same property of natural oligosaccharides to behave as just a degradable delivery company for such colon particular drug delivery and attempt were made of between establish pharmaceutical formulations utilizing tamarinds seeds oligosaccharides but also hydrophilic polymer just like percentage trying to control polymeric materials, that also necessary attempting to prevent this same release of drug within top side build systems but also has shown the discharge this same drug inside the colon even by photosynthetic bacteria deterioration. Steroid inhalers were being used as someone synthesized compounds, which would be androgenic steroids anti-inflammatory drugs used in the diagnosis like inflammatory bowel diseases. This same vitro cell release of drug finding indicates a certain pharmaceutical formulation able to prepare besides tamarind seeds oligosaccharides displayed improved comparable results as for hydrophilic polymer. this also demonstrated a certain mango seed carbohydrate convey almost all of the drug towards the colon as well as severely limits the discharge of something like the drug within top side build systems. So, although, steroid inhalers formulas didn't discharge the drug through gastrointestinal system, even though produced drug towards the bowel leading to delayed permeability of both the drug but also attempting to make drug accessible such as regional and local within the intestines.

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eISSN: 2583-0953

DOI: https://doi.org/10.26452/ijcpms.v3i1.480

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INTRODUCTION

This same colon delivery of drugs does have a number of requests inside the practice area like pharmacologic and therefore is meaningful inside the active ingredient remedy like small intestinal disorder in children somewhere around, Crohn's illness, inflammatory bowel diseases. small intestinal delivery of drugs also achieved this same additional benefit within systemic administration was also generally pro asthma sufferers' drugs, non-steroidal anti-inflammatory agents which are targeted to colon for the treatment like night time respiratory problems

as well as rheumatic diseases and so on [1]. The event of such a tablet formulation a certain enhances this same intranasal permeation like bioactive peptides including glucose, osteocalcin, oxytocin and so on. The bioactivity is indeed very negligible due to destabilization within gastrointestinal is also one of the biggest challenges such as parenteral amino acid sequence delivering which could have been potential whilst also colon trying to target drug - delivery. This can be used also for such management of infections sympathetic of between circadian rhythms including respiratory problems, congestive heart failure as well as rheumatic diseases. The above illnesses were also best described late at night as well as early in the morning indicate. immunosuppressants are indeed generally prodrugs, such as orally administered inside the management of infections like colon (ulcerative Crohn's disease). Absolutely the oral absorption seems to be 75-98 percent. It seems to have a $\frac{1}{2}$ life of two - four hr. The appearance like soloed technology solutions increases the likelihood for the drug to also be set to release inside the colon and therefore, the above inner ear has had a critical part to play through transdermal therapeutic because after intranasal effects of increasing formulas [2]. To succeed in this same colon but to be able to selectively produce but also helps to absorb this same drug there, this same active ingredient should be formed taking into consideration this same obstruction of both the build systems [3]. The colon is indeed a location in which both systemic and local delivery of drugs might be accomplished. As, this same focused delivery of drugs towards the colorectal might well make sure the immediate rehabilitation there at disease ridden premises as well as the illnesses somewhere around colon cancer, might even be able to influence on children allowed to treat so much effective manner whether the drug-related including such 5-fluorouracil have been focused towards the colon [4].

Experimental Materials

Immune suppressants & small and medium enterprises crystalline structure have been obtained because after (Lincoln pharma ltd). pvp k 30, isopropanol, sodium chloride, diammonium hydrogen phosphorous, hydrochloric, talc, magnesium stearate, alcohol, di sodium diphenyl interface is usually (borax) have been acquired that once (Sd fine-chem private limited, ltd, Mumbai). All of the other chemical compounds being used are like reagent grade.

Isolation of Tamarind Seed Polysaccharide (TSP)

Tamarinds seeds oligosaccharides had been filtered even by following techniques through in 3 serial dilutions on something like a laboratory level. 20 gm like tamarind operating system particle decided to add of between 200 ml like temperature is too low pure water but also mixed with water had been able to prepare [5]. The answer had been cooked regarding 20 minutes inadequately trying to stir circumstances through boiling water. This same resulting economic narrow proper answer has been managed to keep up overnight because then almost all of the polypeptides but also fibres decided to settle around. Centrifugal pump above though workaround sometimes when 5000 rpm for all of about 20 mins. This same conceptual design had been kept separate as well as started pouring into the two times the quantity like diethyl ether besides constant trying to stir. This same merchandise had been started pressing, as well as the hardened eventually cause has been thoroughly cleaned as well as the alcohol as well as diethyl ether. Eventually, clean this same merchandise sometimes when 50-600 c inadequately clean. This same selection of material had been surfacing as well as sieve size to acquire particles of various size of the particle's spectrum. Finished product had been deposited inside a centrifuge tube [6].

Studies on viscosities of polymers

1.2% w/v solid dispersion like hydrophilic polymer as well as tamarinds seeds oligosaccharides through 0.2N HCl, pH. 7.5 as well as pH. 6.7 phosphorous buffer solutions seem to have been evaluated through the use of brook field viscosity was measured [7, 8]. The outcomes have been recorded in Table 1.

Determination of swelling indexes of polymer

1 gm like tamarind seeds oligosaccharides, as well as hydrophilic polymer, seem to have been decided to add individually towards the 10 ml of water liquid. this same graduated cylinder to measure had been unsettled strenuously just that 15 minutes but also required to continue for twenty-four hr. shifts. This same inflammation indicator must have been determined by calculating [9].

Method of Preparation of Prednisolone Tablets

This same pharmaceutical formulation has been able to prepare even by wet milling technique. prednisolone was being used as synthesized compounds as well as tamarinds seeds oligosaccharides as well as hydrophilic polymers have been used even though frequency attempting to control polymeric materials through numerous different concerns (20%, 30 %, 40 % and 50 %) as shown in the figure.

The steps involved are as follows [10]:

1. Weigh accurately the ingredients and mixed with the natural polymers (10 %)
2. They wetted masses of partials passes by sieves number of 20, granule obtains and were subjected from drying.
3. Dry granule were lubricated by lubricant, glidant & diluents as per the table.
4. The granule were compressed with employ 9 mm rounds shapes died by Cadmachs CMS 25 tablets machines by gets tablet.

Evaluation of Tablets

The formulated tablets were evaluated from the following physicochemical characteristic by hardness, weight variations, friability, drug contents and in vitro drug release studies.

1. The drug content by analyzed as per pharmacopoeia standards [11].
2. Friability by measures with the use of Rochefabricator
3. The thickness by measures Vernier's callipers.

Preparation of Rat Caeca Medium:

Albino rats were selected for this study, healthy albino rats whose weight is in b/w 150-200 gms were kept by normal feed as well as administrated as for 1 ml dispersion like 1% w/v like tamarinds seeds oligosaccharides inside the distilled water with an assist like thermoplastic ducting straight administered into in the oesophagal province of the animal through an oral mucosal [12, 13]. After the treatment period is completed, wildlife has been made sacrifices well before commencement of such release of drug research as well as the incidents that took place had been expand its operations regarding cecum conventional programming. This same cecum concentration had been instantaneously transmitted in and out of sodium phosphate buffer pH 6.7 to acquire some kind relevant solution concentration that was steamed as well as the CO_2 gas to take care of some kind of anaerobic condition [14].

***In Vitro* Drug Release Studies**

They formulated matrix tablets prednisolone (containing TSP & Guar gum as release retardants) were carried by USP XXIII dissolutions test apparatus (100 rpm, Temperature: 38± 0.5°C) the following media as follows [15]

1. 900 ml 0.1 N Hydrochloric acid from 2 hrs.
2. The above buffer is replaced by pH 7.4 phosphates buffers, which are to test in 3 hrs. (Intestinal transit time).
3. The above buffers replace by pH 6.8 phosphates buffers, which are to be carried in 24 hrs.

When samples were collected blends the specific times interval, filters the solution, the obtained filtrate was analyzed by using UV spectrophotometer [16]. This same preparation with both the best release of drugs recognized from this batches had been comparison the with release of drugs like prednisolone with and without presence of colonic microflora. The susceptibility of Tamarind seed polysaccharide in the prednisolone matrix tablets to cause enzymatic degradation by the small intestinal microbial species have been evaluated whilst also trying to continue this same release of drug research findings along 900 ml like pH. 6.8 phosphate-buffered usually contains 4%w/v rat small intestinal information within a week of five hours [17]. Recommended this same research that once sixth hour of between twenty-fourth hrs. As well as simply remove this same sample were collected sometimes when regular intervals of time for analyzing the drug content at each time interval. Fresh PBS media is replaced after each withdrawal containing the rat caeca content bubbled with CO_2.

RESULTS AND DISCUSSION

The Tamarind seed polysaccharide was isolated as per the procedure and it was confirmed by the FTIR study. The viscosities as well as swelling indexes of natural polymers were performed by using 0.1 N of HCl, pH 7.4 phosphates buffer, pH 6.8 phosphates buffers. The results are tabulated and provide, swelling characteristics by polymers depending on the viscosity. Tamarind seed polysaccharide showed higher viscosity and low swelling characteristics; hence it was considered as a better polymer controls, the drug releases in upper GIT. All formulations were formulated according to the composition. The matrixes tablet were prepared through the process of wet granulation techniques the powder materials offered poor flow characteristics, with the help of natural polymers in different concentrations and the prepared tablets were subjected for physic chemical studies, hardness was found to be in the range of 4.0 ±0.1 to 4.8 ±0.1, % drugs contents founded by ranges 98.15±0.02 till 102.35±0.12, % Friability founded ranges0.31±0.2 to 0.52±0.3 and weight variation was found to be in the range

Table 1: Studies on Swelling index and Viscosities of polymer dispersion

Buffer/Media	1%w/v Guar gum dispersions		1%w/v Tamarind Seed Polysaccharide dispersion	
	Viscosity (cps)	Swelling index	Viscosity (cps)	Swelling index
Water	98.3	6.1	101.8	4.4
0.1 N HCl	101.6	6.4	108.2	3.8
pH 6.8 Phosphate buffer	105.1	5.4	120.4	4.2
pH 7.4 Phosphate buffer	111.1	4.2	131.1	2.2

Table 2: Formulation table for Prednisolone matrix tablets

Ingredient	F1 (mgs)	F2 (mgs)	F3 (mgs)	F4 (mgs)	F5 (mgs)	F6 (mgs)	F7 (mgs)	F8 (mgs)
Prednisolone	20	20	20	20	20	20	20	20
Guar Gum	100	125	150	175	-	-	-	-
Tamarind Seed Polysaccharide	-	-	-	-	100	125	150	175
Starch	25	25	25	25	25	25	25	25
Microcrystalline Cellulose	100	75	50	25	100	75	50	25
Magnesium stearates	3	3	3	3	3	3	3	3
Talc	2	2	2	2	2	2	2	2
Total weights	250	250	250	250	250	250	250	250

Table 3: Physico chemical characterizations of Prednisolone matrix tablet

Formulations Codes	% Drug content	Hardness (kg/cm^2)	% Friability	Weights Variation
F1	99.34±0.18	4.0 ±0.1	0.37±0.1	200±0.18
F2	102.35±0.12	4.1 ±0.2	0.35±0.2	201±0.42
F3	101.85±0.03	4.2 ±0.2	0.42±0.3	202±0.44
F4	98.15±0.02	4.2 ±0.3	0.43±0.2	203±0.24
F5	99.85±0.01	4.3±0.2	0.48±0.2	201±0.33
F6	99.35±0.02	4.4 ±0.4	0.52±0.3	201±0.17
F7	100.65±0.01	4.8 ±0.1	0.39±0.2	201±0.14
F8	100.21±0.01	4.6 ±0.1	0.31±0.2	200±0.21

of200±0.18 to 203±0.24. The Invitro drugs release studies showed that the formulations (F8) retained in the stomach as per the specifications less than 2 hours in stomach and less than 3 hours in the intestine. The formulation F8, minimal drug release and the same are subjected for the invitro drug release studies either with or without colonic concentration. Maximum percent, release of drug like 98.42% as well as the rat colonic information there at the finish like 18 hours work through invitro drug release studies the formulations developed results were subjected study to release kinetics. The correlation coefficient values showed indicative of the drug releases from matrix tablets following Zero order drugs release kinetic Peppa's drugs releases mechanism [Tables 2, 3 and 4].

Table 4: *In vitro* release kinetic prednisolone Matrix tablet

Formulatic	Correlation coefficients					Releases rates		
	Zero Order	First Order	Hixon Crowell	Higuchi	Peppa's	K0 (mg/hr.)	K1 (hr-1)	Exponential Coefficient
F1	0.981	0.971	0.988	0.960	0.941	3.915	3.15	0.764
F2	0.971	0.956	0.981	0.951	0.931	4.177	2.17	0.653
F3	0.987	0.968	0.974	0.964	0.924	4.821	3.281	0.765
F4	0.978	0.962	0.986	0.966	0.936	4.431	3.21	0.653
F5	0.988	0.967	0.976	0.966	0.956	4.356	4.16	0.672
F6	0.987	0.954	0.945	0.975	0.965	4.209	3.79	0.543
F7	0.990	0.967	0.965	0.985	0.975	4.189	4.83	0.457
F8	0.989	0.974	0.988	0.968	0.988	4.578	4.51	0.672
F8+ Caecal content	0.999	0.991	0.989	0.969	0.989	4.762	4.12	0.5564

CONCLUSION

From the observations, it was found. There is present research, this same structure pharmaceutical formulation has tamarind seed polysaccharides most probably to focus on the drug of between colon without even being set to release substantially within gastrointestinal system.

Funding

Nil.

Conflict

Nil.

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Cite this article: Voleti Vijaya Kumar, Nandhini M, Shanmugapandiyan P, Bhagya Buela. Evaluation of Natural Polysaccharides as Biodegradable Polymers for Colon Specific Drug Delivery. Int. J. of Clin. Pharm. Med. Sci. 2023; 3(1): 29-34.