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RESEARCH ARTICLE

FORMULATION AND EVALUATION OF TASTE MASKED ORAL SUSPENSION OF CHLOROQUINE PHOSPHATE

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ABSTRACT

The purpose of this research was to mask the intensely bitter taste of Chloroquine phosphate using ion exchange resin and to formulate oral suspension of the taste masked drug. Batch method was used for formation of drug resin complex. Various ion exchange resins such as Doshion P 544 S and Kyron T- 114 were tried to obtained taste masked drug resin complex (DRC). Optimization of drug loading was carried out. With Doshion P 544 S, the drug-resin proportion of 1:4 achieved equilibrium in 5 hours. 96% w/w of drug loading was possible by this method. Complex formation was confirmed by DSC and IR studies. Oral taste masked suspension was prepared using xanthum gum at various concentrations 0.1%, 0.2% and 0.4% respectively. CPR 1 and CPR 2 batches showed satisfactory assay result that is it fulfills the official requirements. But physical properties of suspension were not satisfactory. CPR 1 was not easily redispersible and with CPR 2 caking was observed with sedimentation volume of 0.4, hence these batches were rejected. CPR 3 was found to be optimized batch as it showed complied assay results were found to be easily redispersible even after 7 days with no cake formation and sedimentation volume of 0.98. and was evaluated for various parameters such as Colour, pH, Viscosity etc. Thus, successful taste masking and formulation of suspension with taste masked drug especially for pediatric, geriatric, and non cooperative patients.

Key words: ion exchange resins, taste masked.

INTRODUCTION

Taste is an important factor in the development of dosage form. The problem of bitter and obnoxious taste of drug in pediatric and geriatric formulations is a challenge to the pharmacist in the present scenario. The major problem of these both drugs was very low solubility & bitter taste. Children are frequently failed to take medications properly because of unpleasant taste of medicament. Non-compliance can lead to worsening of diseased condition. Numbers of taste masking technologies have been used to address t he problem of patient compliance.[1]

In Ion exchange resin (IER) method weak cat ion exchange or weak anion exchange resins are used for taste masking, depending on the nature of drug. Ion exchange resins are solid and suitably insoluble high molecular weight polyelectrolyte that can exchange their mobile ions of equal charge with the surrounding medium.

Malaria is an infectious disease of tropical areas caused by the parasitic infestation of red blood cells by a protozoan of the genus *Plasmodium*, which is transmitted by the bite of an infected female Anopheles mosquito . Four *Plasmodia* species which commonly infect humans are *P. falciparum, P. malariae, P. vivax and P.ovale*. All four species are found in the tropics and sub-tropics around the world. Chlorquine phosphate is potent anti malarial agent prescribed for treating of malaria. It's used for malaria prophylaxis, and appears to be safe . Active against the erthyrocytic forms of *Plasmodium vivax, Plasmodium malariae,* and susceptible strains of *Plasmodium falciparum.* It is very bitter drug. Currently, there is no pharmaceutical alternative to circumvent the compliance problem for Chloroquine phosphate and thus taste masking is necessary to achieve an improved patient compliance to this drug especially in children[2].

MATERIALS

All the materials were procured from by shreya life sciences, Aurangabad. All chemicals were of analytical grade.

Preparation of syrup base:

For this, required quantity of water was taken in a 500 ml stainless steel container, and it was heated to 95ºC. To this, required quantity of methyl paraben and propyl paraben was added with stirring to get clear solution. To this, required quantity of sucrose was added with continuous stirring to dissolve completely. Finally, the prepared syrup base was cooled upto 45ºC.

Addition of drug

For this, the above prepared syrup base was transferred into a clean 500 ml stainless steel vessel. To this, weighed quantity of drug was slowly added with constant stirring, followed by sucralose. The solution was homogenized for 30 min and finally, it was transferred into amber coloured PET glass bottles of 25 ml.

Table 1: Composition of dispersion of Chloroquine phosphate with sucralose

Sr.No.	Batch code	Ratios of Chloroquine phosphate :sucralose
1	$CPSU_1a$	1:1
2	$CPSU_1b$	1:3
3	$CPSU_1c$	1:5

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The same procedure was carried out for the preparation of dispersion of Chloroquine phosphate with syrup base containing sodium saccharin as sweetener.

Table 2: Composition of dispersion of Chloroquine phosphate with saccharin sodium

Sr.No.	Batch code	Ratios of Chloroquine phosphate :sodium saccharin
1	$CPSS_2a$	1:1
2	$CPSS_2b$	1:3
3	$CPSS_2c$	1:5

Preparation of drug: resin complexes (resinate)[5]

For this, batch process was used (Table No.3). The major steps are enlisted below.[53]

- Dispersion of resin (2g) in 100ml deionised water and stirring for 20 min with the help of magnetic stirrer.
- Addition of Chloroquine phosphate (500 mg) slowly with constant stirring.
- Stirring over 4 hrs and pH adjustment with acid (1M HCl) to pH 5.
- Separation of resinate by vacuum filtration through Whatman filter paper (No. 41) and washing with deionised water (3-4 portions of 25 ml each) to remove uncomplexed drug.
- Drying of resinate overnight at room temperature (35 ± 2^{o} C)
- Labelling and storage in tightly closed light resistance container.

Evaluation of dispersions of Chloroquine phosphate with sweeteners[6,7]

The dispersions were evaluated for the following characteristics:

1. Organoleptic properties viz. color, odor and taste

2. Functional properties:

   a) Contents of drug

   b) Viscosity

1. Organoleptic properties

Organoleptic properties viz. colour, odour and taste of dispersions were recorded. Colour was noted by visual observation, odour was checked by individual subjective perception and taste was tested by three panels of tastes.

Functional properties

Contents of drug

- For this, the dispersion of sweeteners equivalent to 300 mg of Chloroquine phosphate was accurately weighed and transferred into 100 ml volumetric flask, containing 0.1 M HCl (15-20 ml).
- The volume was made up to 100 ml using 0.1 M HCl and stirred using magnetic stirrer for 30 min.
- The solution was filtered through whatmann filter paper no 41 and from the filtrate, 5ml was diluted to 100 ml.
- The drug content was noted spectrophotometrically at a previously determined λ_{max} value.

Viscosity

The viscosity of dispersion was determined at ambient conditions. For this, 15ml of dispersion was taken in a small sample adapter and the adapter was set over the viscometer by a stand in such a way that spindle (No.2) was completely immersed in the suspension. Spindle was used at 50 rpm.

2. Dispersion of syrup base with viscosity enhancers

1. **Use of tragacanth gum**

Preparation of syrup base

For this, required quantity of water was taken in a 500 ml stainless steel container, and heated up to 95ºC. To this, required quantities of methyl paraben and propyl paraben were added and solution was stirred till it became clear. To this, required quantity of sucrose was added with continuous stirring. Finally, the syrup base was cooled to 45ºC. the prepared syrup base was transferred into a clean s.s vessel (500 ml) provided with overhead homogenizer. To this, the drug was slowly added with constant stirring, followed by addition of gum tragacanth solution (1% w/v) and stirring was continued for 30 min. The dispersion was transferred into amber coloured glass bottles of capacity 25 ml.[3]

Table 3: Composition of dispersions of Chloroquine phosphate with gum tragacanth

Sr.No	Batch code	Addition of gum tragacant solution (1% w/w/)
1	CPG_1a	1 ml
2	CPG_1b	3 ml
3	CPG_1c	5ml

Use of glycerine:

For this, same procedure used for preparation of dispersion of drug containing gum tragacanth was followed except the gum was replaced with appropriate quantity of glycerin (Table No. 5).

Table 4: Composition of dispersions of Chloroquine phosphate with glycerin

S.No.	Batch code	Addition of glycerrine (5% w/v/)
1	$CPGL_2a$	1 ml
2	$CPGL_2b$	3 ml
3	$CPGL_2c$	5ml

Evaluation of dispersion with viscosity enhancers[5]

The dispersion was evaluated for the following characteristics:

a) Contents of drug

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- For this, the dispersion with viscosity enhancer's equivalent to 300 mg of Chloroquine phosphate was accurately weighed and transferred into 100 ml volumetric flask, containing 0.1 M HCl (15-20 ml).
- The volume was made up to 100 ml using 0.1 M HCl and stirred using magnetic stirrer for 30 min.
- The solution was filtered through Whatman filter paper no 41 and from the filtrate, 5ml was diluted to 100 ml.
- The drug content was noted spectrophotometrically at a previously determined λ_{max} value.

b)Viscosity

The viscosity of dispersion was determined at ambient conditions. For this, 15ml of suspension was taken in an small sample adapter, and the adapter was set over the viscometer by a stand in such a way that spindle (No. 2) was completely immersed in the dispersion.

II. Complexation with ion exchange resins

The drug resin complexes were prepared using two different cation exchange resins using following procedure.

1. Characterization of resins
2. Activation/purification of resins
3. Preparation of drug resin complexes (resinates)

d. Activation/purification of resin

Resins were purified by following procedure

- 5g quantities of individual resin were accurately weighed and taken into beaker (250ml) containing 100 ml of deionised water. The slurry was stirred using magnetic stirrer for 15 min. The dispersion was then filtered through Whatman filter paper (No. 41) and filtrate was discarded.
- The resin mass was washed with methanol (99.8% v/v, 50ml in divide portions) and then with deionised water (50ml) to remove organic and coloured impurities if any.
- The wet resin was treated with 1M HCl (100 ml) for 1 hr with continuous stirring using magnetic stirrer.
- The dispersion was filtered through Whatman filter paper(No.41) and rinsed with about 20ml deionised water for several times. The pH of washing was noted and washing was continued till the pH of the filtrate became neutral or near to neutral.

The liquid form resin mass was drained using suction. The resin mass was dried overnight at 50ºC± 2ºC in hot air oven.

Table 5: Composition of resinates of Chloroquine phosphate and resins

Type of resin	Resinate code	Ratios of Chloroquine phosphate: resin
Doshion P-544 S	CPR_1a	1:1
	CPR_1b	1:2
	CPR_1c	1:3
	CPR_1d	1:4
Kyron T 114	CPR_2a	1:1
	CPR_2b	1:2
	CPR_2c	1:3
	CPR_2d	1:4

Drying of resinate overnight at room temperature (35±2° C)

- Labelling and storage in tightly closed light resistance container.

C. Evaluation of resinates[8]

The taste masked drug samples prepared using resins were evaluated for the following characteristics:

1 Organoleptic properties viz. color, odor and taste

2. Functional properties:

i Estimation of drug loading in resinate

iii Interpretation of infrared spectra of individual resin and their resinates

iv. Evaluation of taste of resinates by panel of tastees

1. Organoleptic properties

Organoleptic properties viz. colour, odour and taste of resinates were recorded by following the same procedures as described for dispersion with sweeteners.

2. Functional properties

i. Estimation of drug loading in resinates

- For this, the resinate equivalent to 80 mg of Chloroquine was accurately weighed and transferred into 100 ml volumetric flask, containing 0.1 M HCl (15-20 ml).
- The volume was made up to 100 ml using 0.1 M HCl and stirred using magnetic

stirrer for 30 min.

- The solution was filtered and further dilutions of filtrate were made.

- The drug content was estimated spectrophotometrically Absorbance was noted at previously determined λ_{max} value.

ii. Interpretation of infrared spectra of individual resins, drug and drug resin complexes

IR spectra of individual resin and resinates of drug were recorded following the same procedure as described for dispersion with sweeteners.

Mixing of DR complex with syrup[9]

For this, the drug resin complex (1:4) (mother liquor) was added in to the syrup base with constant stirring. To this, required quantities of coloring and flavoring agents were added and stirring was continued for 10 min. The final volume of suspension was made up to required quantity using purified water.

Formulation of suspension containing Drug: Doshion P-544s (1:4) resinate and viscosity modifier.

For this, 100ml purified water was taken in 500ml vessel (S.S.) and was heated upto 95ºC.To this, required quantities of preservatives were added followed by sucrose. Syrup base was cooled at 45ºC.

The drug resin complex (1:4)(mother liquor) was added into the syrup base with continuous stirring. The aqueous dispersion of required quantity of xanthum gum was prepared and added to the syrup containing drug resin complex. To this, required volume of aqueous solution of methanol was added followed by the colour sunset yellow FCF w/s and mixed fruit flavor as a flavoring agent with continuous stirring.

Final volume of the suspension was made up to the required quantity, and the bulk was stirred further for 30 min, and finally the pH of the suspension was adjusted between 5.8 to 6.4 using 10%w/v citric acid solution.

The typical formulation of taste masked Chloroquine phosphate suspension included the selected taste modified drug form and following excipients.

Table 6: Composition of suspension containing Chloroquine phosphate: Doshion P 544S (1:4) resinate

Sr.No	Ingredient	Category	CPR1	CPR2	CPR3
1	Chloroquine phosphate	Antimalarial	4.8gm	4.8gm	4.8gm
2	Doshion P-544s	Complexing agent	19.2gm	19.2gm	19.2gm
3	Pharma grade sugar	Sweetner	105gm	105gm	105gm
4	Methyl paraben	Preservative	2.4gm	2.4gm	2.4gm
5	Propyl paraben	Preservative	0.6gm	0.6gm	0.6gm
6	Xanthum gum	Suspending agent	0.131gm	0.262gm	0.525gm
7	Sucralose	Sweetner	750mg	750mg	750mg
8	Menthol	Taste enhancer/Cooling agent	1.98mg	1.98mg	1.98mg
9	Colour sunset yellow FCFw/s	Colourant	0.024ml	0.024ml	0.024ml
10	Mixed fruit flavour	Flavour	1.5ml	1.5ml	1.5ml
11	Purified water	Suspension medium	qs to 300ml	qs to 300ml	qs to 300ml

E. Evaluation of Chloroquine phosphate suspension

The suspension was evaluated for following compendia and non compendia parameters

Sedimentation volume

The formulated suspension was evaluated for physical stability by determining the sedimentation volume. Fifty ml each of suspension was taken in 50 ml stoppered graduated measuring cylinder. The suspension was dispersed thoroughly by moving upside down for three times. Later, the suspension was allowed to settle over three minutes and the volume of sediment was noted. (H0). The cylinder was kept undisturbed for 7 days. The volume of sediment read at and on 7^{th} day was considered as final volume of sediment $(H)_u$. Sedimentation Volume (F) = Hu/ Ho.[10]

Redispersiblity:

For this, (50 ml) suspension was kept in two (A and B) stoppered cylinder which was stored at room temperature (35±2ºC) for 7 days. At regular interval, one stoppered cylinder (A) was removed and moved upside down until there was no sediment at the bottom of the cylinder.

Assay

For this, 10 ml of suspension was taken in 100 ml volumetric flask and the volume was made up to 100 ml using 0.1 M HCl. Then 2 ml of solution from the flask was withdraw and added into 200 ml volumetric flask. Again the volume was made up to 200 ml with 0.1 M HCl, was filtered through whattman filter paper No.41 and absorbance was measured at wavelength at 343 nm in U.V sphectrophotometer and compare it with standard.[11]

***In vitro* drug release:**

Dissolution test parameters

Dissolution test apparatus : USP XXII type II (paddle)

Dissolution medium : 500 ml 0.1 M HCl

Temperature of medium : 37 ±0.5^{0}C

Speed of rotating paddle : 50 rpm

Sampling volume : 10 ml

Sampling time : 10, 20, 30, 40, 50 & 60 min

Duration of test : 60 min

Wavelength for estimation of the drug from the suspension was tested using USP – type II dissolution apparatus .In each of the 6 flashes.10 ml of the suspension was added into the dissolution medium and the test was carried out at above mentioned conditions. The dissolution medium, 500ml 0.1M HCL, was placed into the dissolution flask maintaining the temperature of 37°C± 0.5°C and rpm of 50. Suspension (10ml) was placed in each flask of dissolution apparatus The apparatus was allowed to run for 60 minutes. Samples measuring 10 ml were withdrawn after every 10, 20, 30, 40, 50 and 60 min manually. During sampling samples were filtered through 0.45 µm filter. The fresh dissolution medium was replaced every time with the same quantity of the sample Collected samples were withdrawn, filtered and suitably diluted and analysed at 343nm using U.V spectrophotometer.[13, 14]

Zeta potential

The zeta potential was measured in triplicates in multimodal mode. The technique opted was Malvern zetasizer inspection system (Malvern UK) respectively at 250C. Prior to the measurement, Suspension was diluted with distilled water and the measurements were taken in triplicate.[12]

Comparison of optimized batch with marketed formulation

The optimized formulation of Chloroquine phosphate suspension was compared with that of marketed formulation for various testing parameters as per the procedure mentioned in section

Stability studies

The Chloroquine phosphate oral suspension of the optimized formulation (CPR3) was selected and was packed in 60ml amber colour PET bottle with ROPP cap. The packed bottles were stored at the controlled environmental conditions (Temperature 40 ± 2^0 C and RH 75 ± 5 %) for 90 days .Samples was collected at days 0, 30, 60 and 90.[15]

The analyses comprised chemical testing of quantifiable parameters, which could possibly change during storage, such as viscosity, pH, drug contents, sedimentation volume, redispersiblity, colour, taste, odour and assay, drug release were recorded.

RESULT AND DISCUSSIONS

Drug loading of Chloroquine phosphate in resinate

Drug loading studies revealed that as the concentration of resin increases, percentage drug loading also increases. For Doshion P 544 S, drug loading was found to increase from 81.77% to 98.62% as drug: resin ratio increased from 1:1 to 1:4. For Kyron T114, drug loading increased from 79.63%-96.12% as drug :resin ratio increased from 1:1-1:4. Resinates prepared with Doshion P 544 S exhibits higher drug loading as compared to Kyron T 114.

Table 7: Loading of drug in resinates

Type of Chloroquine phosphate resinate	Resinate code	Ratios of Chloroquine phosphate:resin	% w/w loading of drug
Chloroquine phosphate : Doshion P 544S	CPR_1a	1:1	81.66
	CPR_1b	1:2	89.17
	CPR_1c	1:3	95.13
	CPR_1d	**1:4**	**98.62**
Chlorquine phosphate : Kyron T 114	CPR_2a	1:1	79.63
	CPR_2b	1:2	86.32
	CPR_2c	1:3	92.44
	CPR_2d	1:4	96.12

5.1 Effect of pH:

The pH of the resinates affected both solubility and the degree of ionization of drug and resin (Table No. 8.37). The resinate at selected ratio (1:4) indicated maximum loading of drug at pH 6.00. This may due to the fact that at this pH there was ionization of Doshion (pKa=2-8) allowing exchange with cations from the drug molecule. Hence, pH 6.0 was considere to be most suitable.

Table 8: Effect of pH

Sr. No.	Chloroquine phophate : Doshion P 544 S (1:4)		
	Resinate code	pH	% loading of drug
1	CPR_1dP_1	3	90.24
2	CPR_1dP_2	4	90.94
3	CPR_1dP_3	5	96.79
4	**CPR_1dP_4**	**6**	**97.12**

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5.2: Effect of stirring time:

The percentage drug loading gradually increased with time for stirring upto 5 hrs (Table No. 8.38). However, thereafter, the increment was minimal, hence, stirring time of 5 hrs was considered most suitable.

Table 9: Effect of stirring time

Sr. No.	Chloroquine phosphate : Doshion P 544 S (1:4)		
	Resinate code	Stirring time (hr)	% Drug loading
1	CPR_1dH_1	2	90.62
2	CPR_1dH_2	3	91.17
3	CPR_1dH_3	4	95.56
4	**CPR_1dH_4**	**5**	**98.16**

5.3 Effect of temperature:

Drug loading on Doshion P 544 S was observed in the experimental range of 20°C-60°C (Table No. 8.39). However, higher temperatures did not affect the drug loading considerably. Hence, room temperature (35-37 °C) was employed for preparation of resinates.

Table 10: Effect of temperature

Sr. No.	Chloroquine phosphate : Doshion P 544 S (1:4)		
	Resinate code	Temperature °C (± 2 °C)	% Drug loading
1	**CPR_1dT_1**	**Room Temp (35)**	**97.61**
2	CPR_1dT_2	20	96.63
3	CPR_1dT_3	40	97.13
4	CPR_1dT_4	60	96.81

Based on the above findings, the resinate with Doshion P 544 S was prepared at following selected conditions (Table No 11).

Table 11: Experimental parameters for preparation of resinate with Doshion P544 S.

Sr. No.	Type of parameter	Selected value
1	Drug: resin ratio	1:4
2	pH	6.00
3	Stirring time	5 hr
4	Temperature	35º±2ºC

***In vitro* drug release**

Drug release form batch CPR3 was constant and faster compared to other two batches due to uniform suspending of drug molecule. In 30 minutes it is 83.31% while in 60 minutes it is 99% release.

Table 12: Release data of Chloroquine phosphate from suspension in 0.1M HCl

Time	% drug release		
(min	CPR1	CPR2	CPR3
0	0	0	**0**
10	49.7±058	52.6±0..2	**53.23±0.67**
20	61.40±0.41	63.24±0.11	**64.44±0.23**
30	79.63±0.67	81.20±0.16	**83.31±0.36**
40	89.82±0.16	90.42±0.08	**93.48±0.08**
50	95.67±0.38	96.11±0.41	**98.56±0.12**
60	97.06±0.17	98.45±0.28	**99.09±0.10**

(Mean ± SD, n-3)

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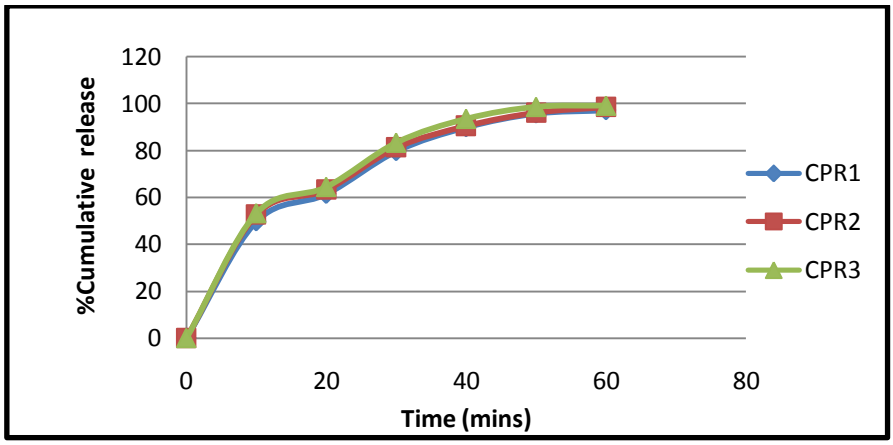

Figure 1: Percent cumulative release of Chloroquine phosphate from suspension

Zeta potential of selected batch CPR3:

The zeta potential of prepared formulation suspension **(Batch CPR3)** was determined as per the procedure mentioned in experimental part 7.4.h; and the results are illustrated in figure 8.20

If all the particles have a large negative or the positive zeta potential they will repel each other and there is dispersion stability. If the particles have low zeta potential values then there is no force to prevent the particles coming together and there is dispersion instability. Particles with zeta potentials more than -30mV are normally considered stable. Zeta potential of the system was found to be -25.1.00 mV, which indicated the suspension having negative charge, which is closer to range.[12]

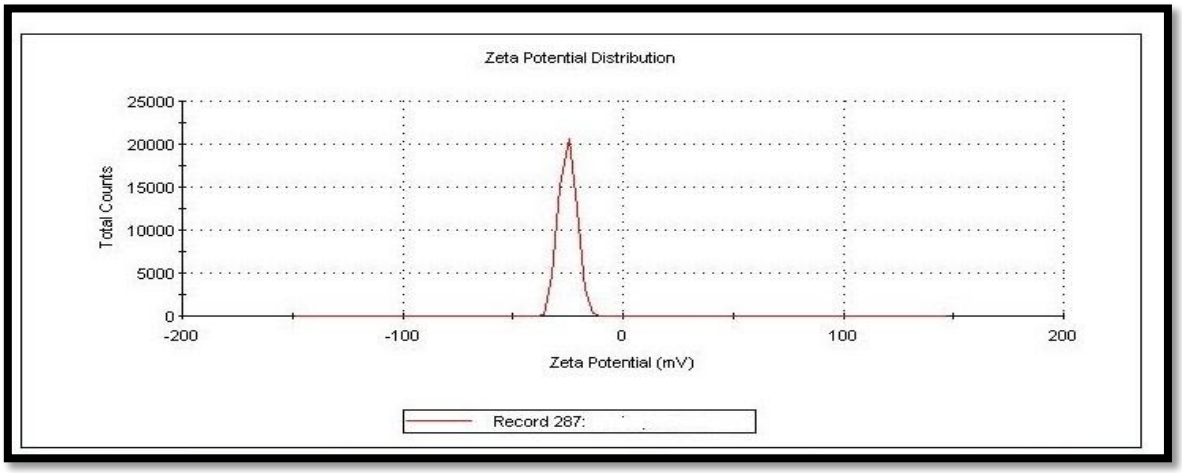

Figure 2: Zeta potential of suspension of Chloroquine phosphate resinate- CPR3

Characteristics of commercial product of Chloroquine phosphate

Comparision of experimental suspension with marketed formulation represents superiority of experimental formulation mainly in taste and in redispersibility.

Table 13: Characteristics of experimental suspension and marketed formulation

Characteristics	Marketed preparation (M)	Experimental suspension (CPR3)
Colour	Sunset yellow	Sunset yellow
Odour	Odourless	Odourless
Taste	Palatable	Sweet
pH	6.4	6.2
Viscosity(cps)	10016	12516
Sedimentation volume	0.96	0.98
Redispersibility	***	****
Assay*	98.01±0.2	97.2±0.6

(Mean ± SD, n=3)*

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Table 14: Release characteristics of Chloroquine phosphate from experimental suspension and marketed Lariago suspension

Time (min.)	Cumulative drug release (%)	
	M	CPR3
0	0	0
10	51.06±0.88	**53.23±0.67**
20	65.06±0.32	**64.44±0.23**
30	82.01±0.69	**83.31±0.36**
40	91.06±0.41	**93.48±0.08**
50	97.63±0.89	**98.56±0.12**
60	98.97±0.52	**99.09±0.10**

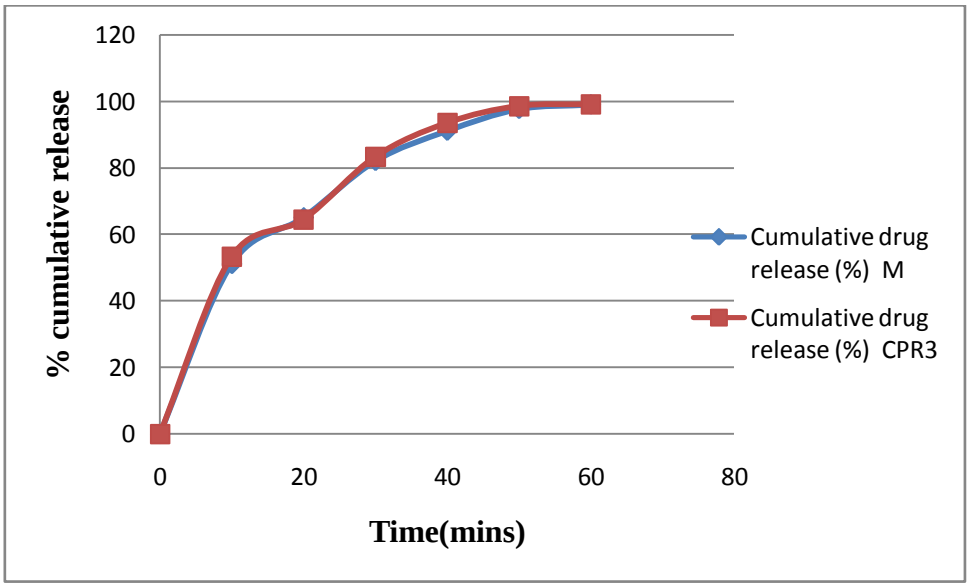

Figure 3: Release profiles of Chloroquine phosphate from experimental suspension and commercial Lariago® suspension

Stability characteristics:

The exposure to accelerated conditions (temperature 40 ± 2^0 C and RH 75 ± 5 %) revealed that the experimental suspension did not undergo considerable changes in assay, sedimentation volume, viscosity, and redispersibility. Moreover, it retained sweet taste during the period of exposure (Table No.8.51). The release characteristics of drug complex from suspension were fairly constant during the period of 90 days.

Table 15: Characteristics of experimental suspension samples during storage over 90 days

Characteristics	Time point			
	0 days	15 days	30 days	90days
Colour	Sunset yellow	Sunset yellow	Sunset yellow	Sunset yellow
Odour	Odourless	Odourless	Odourless	Odourless
Taste	Sweet	Sweet	Sweet	Sweet
pH	6.20	6.20	6.30	6.20
Viscosity(cps)	12516	12518	12518	12517
Sedimentation volume	0.98	0.98	0.97	0.97
Redispersibility	****	****	****	****
Assay*	97.20	97.30	97.10	97.20

Release profile of stable suspension indicates constant and proportionate release in definte time at all intervals and similar at 90 days.

Table 16: Release characteristics of experimental suspension samples during storage over 90 days

Time (in min.)	Cumulative drug release (%)			
	0 days	15 days	30 Days	90days
0	0		0	0
10	53.23±0.67	54.23±0.87	55.23±0.66	57.23±0.64
20	64.44±0.23	66.44±0.73	67.44±0.24	68.44±0.33
30	83.31±0.36	84.81±0.96	86.31±0.76	87.31±0.36
40	93.48±0.08	94.48±0.88	96.48±0.58	97.48±0.18
50	98.56±0.12	98.06±0.12	98.56±0.42	98.56±0.92
60	99.09±0.10	99.09±0.15	99.09±0.18	99.09±0.28

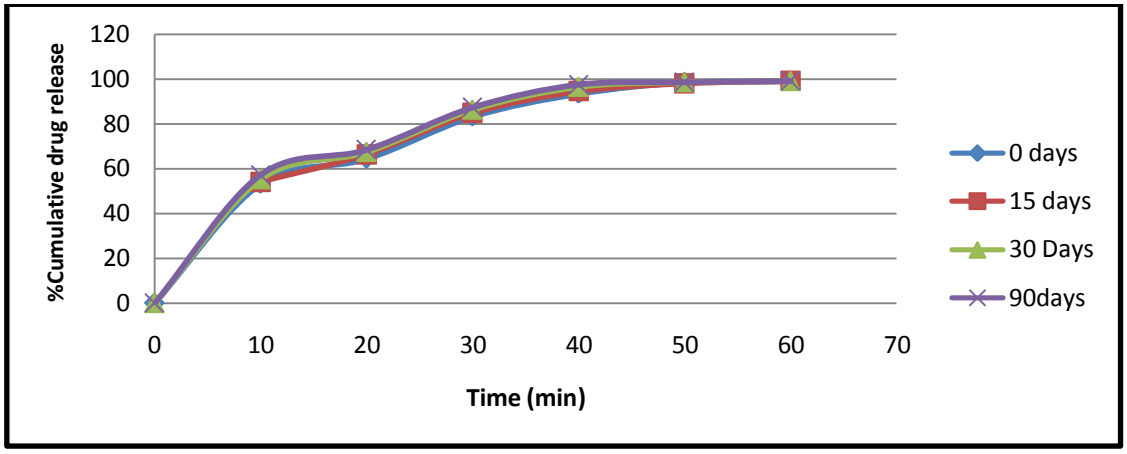

Figure 4: Release profiles of Chloroquine phosphate from experimental suspension stored for 90 days

CONCLUSIONS

The efficient taste masking was obtained from drug–resin a complex that was formulated as oral suspension for better patient compliance. Use of weak cation exchange resin offers superior method for preparing taste-masked substrates of Chloroquine phosphate in this work shows that drug-resin complexes effectively masked bitter taste of Chloroquine phosphate while liquid formulation provides easier way to administer and getting the child to swallow. The Intense bitter taste of Chloroquine phosphate can be successfully masked by complexation using weak cation exchange resin Doshion P 544 S. The resinate of drug: Doshion P 544 S given higher drug loading and better taste masking. It can be concluded that, the complex of Chloroquine phosphate with Doshion P 544 S can be successfully prepared to mask the intense bitter taste of Chloroquine phosphate. The taste masked suspension of resinate prepared will be suitable formulation for patient's to treat malaria.

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