ejpmr, 2023,10(10), 504-512

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

FORMULATION DEVELOPMENT AND IN VITRO EVALUATION OF PROLONGED RELEASE BUCCAL PATCH OF SALBUTAMOL

Kunda Komali, V. Jhansi Priya Marabathuni* and Naidu Narapusetty

Department of Pharmaceutics, Bellamkonda Institute of Technology & Science, Podili. A.P-523240.

***Corresponding Author: V. Jhansi Priya Marabathuni**

Department of Pharmaceutics, Bellamkonda Institute of Technology & Science, Podili. A.P-523240

Article Received on 22/08/2023 **Article Revised on 12/09/2023** **Article Accepted on 02/10/2023**

ABSTRACT

In the present work successful attempt was made to formulate prolonged release Salbutamol buccal patch by solvent casting method using hydrophilic polymers HPMC K4M, Carbopol 974P and Polyethylene glycol 400 as plasticizer. The drug polymer compatibility was verified by FT-IR studies. The standard curve of Salbutamol in pH 6.8 phosphate buffer was prepared.Totally 9 trial buccal patches were prepared and evaluated for weight variation, thickness, drug content, folding endurance, swelling property, surface pH, percent moisture loss, *ex vivo* mucoadhesion time, *in vitro* dissolution test and *ex vivo* permeation study.It was observed that increasing the HPMC K4M concentration has a significant increase in mucoadhesion time and decrease in drug release. The optimized formulation shows satisfactory results in the parameters such as thickness, hardness, drug content, swelling index, mucoadhesion time, in vitro dissolution and diffusion studies. It shows zero order drug release profile depending on the regression value.

KEYWORDS: Solvent casting method, Trasdemral delivery system, In vitro studies, Optmised formulation.

INTRODUCTION

Among the various routes of drug delivery, the oral route is perhaps the one mostly preferred by patients and clinicians. Based on our current understandings of biochemical and physiological aspects of absorption and metabolism, many drugs, cannot be delivered effectively through the conventional oral route, because after administration are subjected to pre-systemic clearance extensively in liver, which often leads to a lack of significant correlation between membrane permeability, absorption, and bioavailability [1]

Over the time, scientists and researchers in the drug development industries are focusing on alternate routes of administration to add to the potential of approved drug products, or to overcome the drawbacks of the oral route. To deliver drugs systemically via an alternate route of administration such as intranasal (IN), buccal, sublingual, pulmonary, vaginal, rectal, or transdermal (TD) [2]

Transmucosal routes of drug delivery which comprise of the mucosal linings of the nasal, rectal, vaginal, ocular, and oral cavity offer excellent opportunities and potential advantages over peroral administration for systemic drug delivery. These advantages include possible bypass of first pass effect, avoidance of pre systemic elimination within the GI tract and depending on the particular drug [3] The sites of drug administration in the oral cavity include the floor of the mouth (sublingual), the inside of the cheeks (buccal) and the gums (gingival) [4]

In view of the systemic transmucosal drug delivery, the buccal mucosa is the preferred region as compared to the sublingual mucosa. One of the reasons is that buccal mucosa is less permeable and is thus not able to elicit a rapid onset of absorption and hence better suited for formulations that are intended for sustained release action.

Further, the buccal mucosa being relatively immobile mucosa and readily accessible, it makes it more advantageous for retentive systems used for oral transmucosal drug delivery. A relatively rapid onset of action can be achieved relative to the oral route, and the formulation can be removed if therapy is required to be discontinued [5]

Salbutamol is a short-acting, selective beta2-adrenergic receptor agonist used in the treatment of asthma and COPD. It is 29 times more selective for beta2 receptors than beta1 receptors giving it higher specificity for pulmonary beta receptors versus beta1-adrenergic receptors located in the heart. Salbutamol

is formulated as a racemic mixture of the R- and S-isomers. The R-isomer has 150 times greater affinity for the beta2-receptor than the S-isomer and the S-isomer has been associated with toxicity. This lead to the development of levalbuterol, the single R-isomer of salbutamol. However, the high cost of levalbuterol compared to salbutamol has deterred wide-spread use of this enantiomerically pure version of the drug. Salbutamol is generally used for acute episodes of bronchospasm caused by bronchial asthma, chronic bronchitis and other chronic bronchopulmonary disorders such as chronic obstructive pulmonary disorder (COPD). It is also used prophylactically for exercise-induced asthma.it is chemically calles as **4**-[2-(tert-butylamino)-1-hydroxyethyl]-2-(hydroxymethyl)phenol.[6]

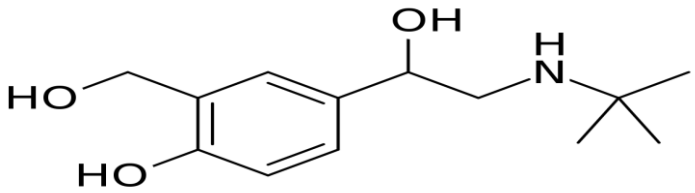

Figure 1: Chemical structure of salbutamol.

EXPERIMENTAL WORK[7-10]

MATERILS AND MEHODS:

S. No.	Materials	Manufacturers
1	Salbutamol	Sample from tenna labs limited
2	HPMC K4M	Merck Limited, Mumbai
3	Carbopol 974P	SD Fine-Chem Limited, Mumbai
4	Poly ethylene glycol 400	Fischer Scientific Chemicals, Mumbai
5	Ethyl cellulose E15	Fischer Scientific Chemicals, Mumbai
6	Ethanol	Merck Limited, Mumbai

Methodology:

Preformulation study

Description of drug

Physicochemical properties of drugs such as state, colour, odour was physically examined and compared with the reported description of drugs.

Drug polymer compatibility study

Fourier transform Infra-red (FT-IR) was the tool for solid state characterization of pharmaceutical solid. FT-IR Spectroscopy of pure drug, and physical mixture were carried out on Shimadzu FT-IR 8400S model to investigate any possible interaction between the drug and the utilized excipients. The samples were finely grounded with KBr to prepare the pellets under a hydraulic pressure of 600 psi and a spectrum was scanned in the wavelength range of 4000 and 500 cm^{-1} using Shimadzu FT-IR spectrophotometer.

Preparation of standard curve

The wave length of maximum absorbance of Salbutamol was found to be 222 nm using Phosphate buffer pH 6.8 as blank. 25 mg of Salbutamol was weighed and transferred to a 50 ml volumetric flask and made upto the volume using methanol. From the resulting solution 1mL were pipetted out into separate 25 mL volumetric flask and made upto the volume using pH 6.8 Phosphate buffer to represent 20 µg/mL of the drug. From this solution 1, 2, 3, 4, and 5 mL into separate 10 mL volumetric flasks and made upto the volume using pH 6.8 Phosphate buffer to represent 2, 4, 6, 8, and 10 µg/mL of the drug. The absorbance of the solutions was measured at 222 nm taking 6.8 Phosphate buffer as blank using UV-Visible spectrophotometer. The calibration curve was then plotted taking concentration (µg/mL) along X-axis and absorbance along Y- axis.

Preparation of buccal patch

The buccal film was prepared by solvent casting method. First the accurately weighed quantity of polymer HPMC K4M was dissolved in required quantity of ethanol:water (1:1) mixture while stirred by a mechanical stirrer. The accurately weighed quantity of carbopol 974P was dissolved in required quantity of distilled water and then neutralized by 10 % NaOH solution to get a transparent viscous solution. Then the carbopol solution was poured into the HPMC solution while stirring to get a carbopol HPMC polymer dispersion. Then the accurately weighed quantity of Salbutamol was dissolved in a minimum quantity of ethanol and added to the polymer dispersion while stirring. Then weighed quantity of plasticizer PEG 400 was added to the drug-polymer dispersion while stirring and left to stir for 30 min to get a homogenous solution. After 30 min of stirring the solution was left idle until the air bubbles were removed and then casted into a petri dish and left for air drying for 24 h, resulting in a thin film after the solvent evaporation.

Preparation of backing layer

The backing layer was prepared by dissolving the accurately weighed quantity of ethyl cellulose in ethanol while stirring to get a 5% w/v solution and then weighed quantity of 2% v/v plasticizer PEG 400 was added while stirring and left to stir for 15 min. Then the ethyl cellulose solution was casted on to a petri dish and left for 24 hours to dry, resulting a thin hydrophobic layer after solvent evap oration. Then the hydrophobic layer was attached to the film by using 5% w/v PVP solution as binder.

Drug loaded in the patch

Diameter of petri dish = 9.6 cm

Radius of the petri dish (r) = 4.8 cm radius

Total Surface Area of petri dish= πr^2 = 3.14 X 4.8 X 4.8 = 72.3 cm^2

Now, Dose was 2 mg in 2 cm X 2 cm = 4 cm^2 4 cm^2 contain 2 mg of drug.

Number of 4 cm^2 films obtained from the main film = 72.3/4 = 18.07

Approximately 18 films of 4 cm^2 can be obtained.

Thus, the amount of drug should be incorporated in the area = 18.07 × 2 = 36.14 mg

So, 72.3 cm^2 contains 36.14 mg of drug.

Ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9
Salbutamol(mg)	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Hpmc k4m (mg)	300	600	600	900	300	900	600	300	900
Carbopol 974p (mg)	360	360	240	240	240	360	120	120	120
Peg 400 (mg)	300	300	300	300	300	300	300	300	300
Salbutamol (mg)	36.14	36.14	36.14	36.14	36.14	36.14	36.14	36.14	36.14
Ethanol:water (ml)	30	30	30	30	30	30	30	30	30
Water (ml)	30	30	30	30	30	30	30	30	30

Evaluation of patch[11-13]

Appearance of the film

The overall appearance of the patch was checked visually.

Weight variation

Three films of 4 cm^2 size were cut randomly, individually the patch were weighed on electronic balance and the mean weight was calculated.

Thickness of patch

The thickness of patch was directly related to drug content uniformity so it was essential to find uniformity in the thickness of the film. It can be measured by calibrated digital Vernier Calipers. The thickness was measured at different spots of the patch and average was taken as film thickness.

Drug content

Spectrophotometric method was used to assess the uniformity of drug distribution through measuring drug content at different parts of the same film. Three 4 cm^2 of each film were weighed individually, dissolved in 20 ml methanol, and the solution was then filtered through filter paper and the concentration of Salbutamol was measured spectrophotometrically at 222 nm. Each preparation was tested in triplicates, and the percentage drug content was calculated from the following equation,

$$\% \text{ Drug content} = \frac{\text{Actual amount}}{\text{Theoretical amount}} \times 100$$

Folding endurance

The folding endurance of the patch was used to estimate the mechanical strength of the patch to withstand the folding or the ability to withstand the brittleness. It was measured by repeatedly folding a patch at the same line before it breaks. The folding endurance was the number of times the film was folded without breaking. Higher the folding endurance value greater was the strength of the patch.

Swelling property

Phosphate buffer pH 6.8 was prepared to check the swelling property of the patch. The initial weight of the patch was determined and placed in the preweighed stainless steel mesh. The system was dipped in the Phosphate buffer pH 6.8. The increase in the weight of the patch was noted by weighing the system at regular intervals [50]. The degree of swelling was determined by the formula

$$\text{Swelling ratio} = \frac{W_s - W_o}{W_o}$$

Surface pH

Patch was slightly wet with help of water. The pH was measured by bringing the electrode in contact with the surface of the patch. The study was performed on three patch of each formulation and average was taken [50].

Percent moisture loss

lt was done to check the integrity of patch at dry condition and hygroscopicity of patch. Three patch of 4 cm^2 size were cut out and weighed accurately. Then the patch were rested in a desiccator Containing fused anhydrous calcium carbonate. After 3 days the patches are removed, weighed and percentage weight loss are calculated. Average percentage moisture loss three patch was calculated

$$\% \text{ Moisture loss} = \frac{\text{Final weight - Initial weight}}{\text{Final weight}} \times 100$$

Ex vivo mucoadhesion time

The ex vivo mucoadhesion/retention time of the oral buccoadhesive films was determined using goat cheek mucosa. Goat check pouch of size 3 x 3 cm^2 was cut and pasted on the inner side of the beaker using double-sided adhesive tape. The film of size 4 cm^2 was cut, and its surface was made wet using a drop of Phosphate buffer pH 6.8. Films were pasted on the surface of the goat pouch by applying a gentle force for 10 sec. Phosphate buffer pH 6.8 (500 ml), maintained at 37 ±1°C, was poured into the beaker and stirred at 150 rpm to simulate buccal conditions. All the experiments were performed in triplicate.

In vitro dissolution test

As there as no official method prescribed for *in vitro* drug release study of buccal patches. A method mentioned and used in previous studies was carried out. The patch was pasted on to the inner side of the vessel using double side adhesive tape. Dissolution was carried out by using prewarmed pH 6.8 Phosphate buffer as dissolution medium. A suitable volume of the sample was withdrawn at every 1 hour. The dissolution parameter was maintained as below Apparatus: USP Type II paddle, Medium: 900 ml of Phosphate buffer pH 6.8, Speed: 50 RPM, Temperature: 37 ^oC ± 0.5 ^oC, Time: 8 hours, Sampling interval: 1hr. The absorbance of the resulting solution was measured by UV spectrometer at 222 nm

Ex-vivo permeation study

Tissue preparation

Buccal mucosa was obtained from freshly sacrificed goat at a local ranch. The mucosa was transported to the laboratory in an isotonic buffer solution pH 7.4 and used within 2h of animal sacrifice. The majority of underlying connective tissues was removed with the help of a scalpel blade and then the remaining buccal mucosa was carefully trimmed with surgical scissor to a proximately uniform thickness of about 500 µm. It was then used for permeation study.

Permeation study

The Ex-vivo buccal permeation study was carried out for best optimized formulation. The permeation study of Salbutamol through the excised layer of goat buccal mucosa was performed using Franz diffusion cell at 37 ± 0.5 ^OC. Fresh goat buccal mucosa was mounted between the donor and receptor compartments. The buccal patch was placed with the core facing the mucosa, and the compartments were clamped together. The donor compartment was filled with 5ml of phosphate buffer pH 6.8. The receptor compartment was filled with phosphate buffer pH 6.8± 0.5 and the hydrodynamics in the compartment was maintained by stirring with a magnetic bead at uniform slow speed. The amount of drug permeated through the buccal mucosa was determined by withdrawing samples at predetermined time intervals and analyzed for drug content by UV spectrophotometer at 222 nm .

Drug release kinetics

Zero order kinetics

First order kinetics

Higuchi model

Korsmeyer and Peppa's model

Hixson and Crowell erosion equation

RESULTS AND DISCUSSION

Preformulation study:

Description of drug

The appearance of the Salbutamol was visually observed. It was found that it was a white powder and it complies with the IP.

Drug polymer compatibility study

The compatibility of drug in the formulation was confirmed by comparing FT-IR spectra of pure drug with FT-IR of its drug with excipients.

Preparation of standard curve

The standard curve of Salbutamol in Phosphate buffer pH 6.8

Data for calibration curve of Salbutamol in Phosphate buffer pH 6.8

S. No.	Concentration	Absorbance at 276nm
1	2	0.13
2	4	0.355
3	6	0.542
4	8	0.754
5	10	0.954

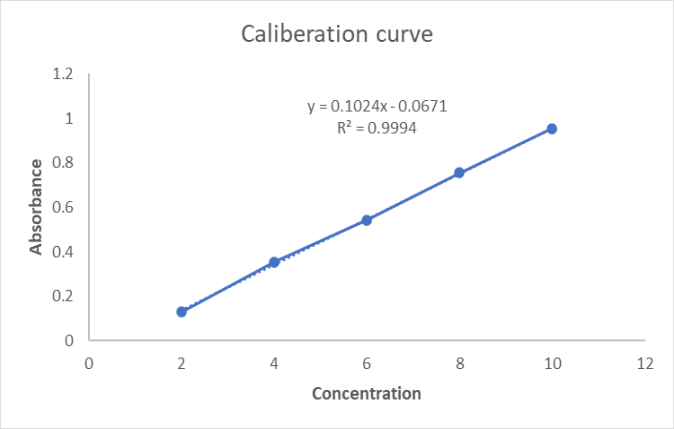

Figure 2: Calibration curve of Salbutamol in Phosphate buffer 6.8.

Evaluation of patches:

Appearance of the film

The overall appearance was found to be clear and transparency was good which showed that the drug has distributed uniformly.

Weight variation

Three films of size 4 cm^2 were cut randomly, individually the patch were weighed on electronic balance and the mean weight was calculated. Weight of patches was ranging from 26.99±0.7 to 97.31±0.5 mg. Weight of patches was found to be increasing proportion of polymer.

Table 3: Weight variation.

Formulation	Weight (mg)(n=3)
F1	44.34 ± 0.6
F2	71.22 ± 0.3
F3	62.57 ± 0.7
F4	89.13 ± 0.8
F5	35.89 ± 0.2
F6	97.31 ± 0.5
F7	53.68 ± 0.6
F8	26.99 ± 0.7
F9	80.25 ± 0.5

Thickness of patch

Thickness of all the patches was found to be in the range of 0.09±0.83 to 0.27±0.85

As the total amount of polymer increases the thickness of the patches were found to be increased.

Table 4: Thickness of patch

Formulation	Thickness (mm) (n=3)
F1	0.14 ± 0.33
F2	0.21 ± 0.89
F3	0.18 ± 0.57
F4	0.25 ± 0.64
F5	0.11 ± 0.97
F6	0.27 ± 0.85
F7	0.17 ± 0.69
F8	0.09 ± 0.83
F9	0.24 ± 0.76

Drug content

All the batches of the patches contain 98.15±0.3 to 101.51±0.1 % of drug which indicate that there is no loss of drug during preparation of the patch. All the batches of the patches exhibit drug content within limit 98 to 102 % which is within the desirable range due to the equal distribution of drug in the solution.

Table 5: Drug content of patches.

Formulation	Drug content (%) (n=3)
F1	99.82 ± 0.8
F2	101.57 ± 0.6
F3	98.25 ± 0.9
F4	98.54 ± 0.9
F5	99.10 ± 0.5
F6	98.43 ± 0.4
F7	100.56 ± 0.2
F8	101.51 ± 0.1
F9	98.15 ± 0.3

Surface pH

Surface pH for all batches was between 6.5±0.03 to 7.1±0.01 which were due to pH of the drug solution as well as the polymer, hence no mucosal irritations was expected and ultimately achieves patient compliance. The results were shown in table - 06

Table 6: Surface pH of patches.

Formulation	Surface pH (n=3)
F1	6.5 ± 0.01
F2	6.8 ± 0.02
F3	6.4 ± 0.01
F4	6.8 ± 0.03
F5	6.8 ± 0.02
F6	7.1 ± 0.01
F7	6.6 ± 0.04
F8	6.5 ± 0.03
F9	6.7 ± 0.02

Folding endurance

Folding endurance is the index of ease of handling the patches. As the amount of polymer increases the folding endurance was found to be increased. Folding endurance for the patches was found to be 412±19 to 530±14. All patches exhibited folding endurance above 300 proving the flexible nature of the patch.

Table 7: Folding endurance of patches.

Formulation	Folding endurance (n=3)
F1	493 ± 16
F2	412 ± 19
F3	502 ± 15
F4	519 ± 19
F5	485 ± 16
F6	530 ± 14
F7	483 ± 16
F8	470 ± 15
F9	506 ± 18

Swelling property

Swelling index shows the moisture uptake and swelling behavior of buccal patches. All the patches were subjected to swelling studies. The results indicated that all the patches exhibited appreciable swelling nature. The swelling index increasing with polymer concentration for HPMC K4M. Also it increases with increasing content of carbopol 974P.

Table - 8: Swelling index of patches.

Formulation	Swelling index (%) (n=3)
F1	224.08 ± 4.5
F2	250.56 ± 3.4
F3	244.87 ± 2.2
F4	297.02 ± 3.1
F5	212.69 ± 2.8
F6	312.43 ± 3.4
F7	225.56 ± 2.4
F8	202.34 ± 2.0
F9	285.09 ± 3.6

Percent moisture loss

The percentage moisture loss of all batches were between 1.25±0.02 to 2.41±0.12 %, which was carried out to ensure physical stability or integrity of buccal films. The increase in polymer concentration increases % moisture loss. This shows that there is no considerable change in the physical stability and integrity of patches. The results were shown in table - 9.

Table 9: Percentage moisture loss of patches.

Formulation	Moisture loss (%) (n=3)
F1	1.68 ± 0.02
F2	2.13 ± 0.09
F3	2.05 ± 0.07
F4	2.28 ± 0.04
F5	1.46 ± 0.06
F6	2.41 ± 0.12
F7	1.91 ± 0.08
F8	1.25 ± 0.02
F9	2.21 ± 0.01

Ex vivo mucoadhesion time

Mucoadhesion time of the patches were ranging from 390±09 to 616±18 min. It shows that increasing in HPMC K4M concentration increases the mucoadhesion time significantly, but increasing carbopol 974P concentration shows very less appreciation in the mucoadhesion time. Formulation F1, F5, F8 doesn't meet required mucoadhesion time for 8 h due to low HPMC K4M concentration. The results were shown in table 10.

Table 10: Mucoadhesion time of patches.

Formulation	Mucoadhesion time (min) (n=3)
F1	427 ± 13
F2	530 ± 17
F3	518 ± 12
F4	592 ± 14
F5	415 ± 11
F6	616 ± 18
F7	510 ± 13
F8	390 ± 09
F9	572 ± 15

In vitro dissolution test

The *in vitro* drug release studies were done for all the batches in Phosphate buffer pH 6.8 using Dissolution apparatus USP type II. The release data were given in the table -11

Dissolution Parameters

Dissolution medium: Phosphate buffer pH 6.8 (900ml)
Paddle speed: 50 rpm
Apparatus: Dissolution apparatus USP type ii
Temperature: 37ºC ± 0.5ºC
Withdrawal time: 8h with 1h interval
Volume withdraw: 5 ml

Table - 11: Cumulative percentage drug release of patches.

Time	Cumulative percent drug release								
(hour)	F1	F2	F3	F4	F5	F6	F7	F8	F9
1	12.72	8.06	11.05	7.56	12.88	6.83	12.01	12.91	7.23
2	21.02	19.78	21.03	18.36	22.14	16.42	20.91	22.31	19.21
3	33.41	30.12	32.21	29.21	33.72	28.66	32.86	34.01	29.91
4	48.24	45.86	46.53	44.92	49.79	43.17	47.61	51.08	45.03
5	58.55	56.17	56.29	53.92	61.06	53.31	57.37	62.45	54.30
6	67.74	64.98	65.53	62.99	68.01	63.11	66.80	70.10	64.66
7	80.73	73.60	76.44	71.89	81.18	71.06	78.15	84.97	72.27
8	94.45	88.23	91.67	80.76	96.74	77.13	94.32	99.34	84.65

Ex-vivo permeation study

Ex vivo drug permeation through fresh Goat buccal mucosa using Franz diffusion cell and the results were given in table - 12

Permeation study parameters

Donor compartment: Phosphate buffer pH 6.8
Receptor compartment: Phosphate buffer pH 6.8
Apparatus: Diffusion cell
Withdrawal time: 8 h with 1 h interval
Volume withdrawn: 5mL

Table 12: *Ex vivo* Percentage drug permeation of patches.

Time	Percentage drug permeation								
(hours)	F1	F2	F3	F4	F5	F6	F7	F8	F9
1	8.64	5.66	9.98	4.80	8.83	2.43	9.67	11.35	4.31
2	18.09	15.09	16.67	13.96	17.11	11.90	17.23	19.36	17.76
3	31.23	28.19	29.21	24.22	26.78	21.78	27.69	29.63	25.31
4	44.67	40.06	41.34	38.99	34.29	33.56	40.11	47.43	39.23
5	53.54	51.19	53.11	47.93	56.06	45.80	53.41	57.82	46.32
6	64.74	59.45	60.33	55.65	68.34	53.34	62.12	73.40	59.03
7	78.73	70.60	73.16	66.49	77.19	62.65	75.97	80.57	68.17
8	86.15	82.34	84.98	72.79	90.41	69.30	86.22	92.61	77.59

Evaluations	**Optimized formulation results**		
Weight (mg)	56.21 ± 0.5	Folding endurance	513 ± 12
Thickness (mm)	0.18 ± 0.43	Swelling index (%)	240.14 ± 2.0
Drug content (%)	98.17 ± 0.7	Surface pH	6.9 ± 0.03
Mucoadhesion time (min)	512 ± 12	Percentage moisture loss (%)	2.04 ± 0.02

Table 13: In - Vitro release of optimized formulation.

Time (hour)	Drug release (%)
1	11.89
2	20.65
3	34.76
4	46.21
5	55.93
6	62.85
7	74.30
8	92.59

Drug release kinetics of optimized salbutamol patch:

The drug release kinetics for the optimized formulation was calculated and the results obtained are presented in table - 14.

Table 14: Kinetic modelling of drug release.

Formulation	Zero order R^2	First order R^2	Higuchi R^2	Hixson Crowell R^2	Korsmeyer peppas R^2	n value
Optimized						
Salbutamol	0.9906	0.8227	0.9681	0.9638	0.9943	0.9787
patch						
formulation						

Examination of correlation coefficient r2 value indicated that the drug release followed a diffusion-controlled mechanism for the optimized Salbutamol buccal patch from the R^2 value. To study the drug release kinetics, data obtained from In-Vitro drug release studies are plotted in various kinetic models. The curve fitting results of the release rate profile of the designed formulation gave an idea on the mechanism of drug release. Based on the "n" value 0.9787 for the optimized formulation, the drug release was found to follow super case II transport. This value indicates a coupling of the diffusion and erosion mechanism and indicates that the drug release was controlled by more than one process. Also, the drug release mechanism was best explained by zero order, as the plots showed the highest linearity, as the drug release was best fitted in zero order kinetics, it indicated that the rate of drug release was concentration independent.

SUMMARY AND CONCLUSION

In the present work successful attempt was made to formulate prolonged release Salbutamol buccal patch by solvent casting method using hydrophilic polymers HPMC K4M, Carbopol 974P and Polyethylene glycol 400 as plasticizer. The drug polymer compatibility was verified by FT-IR studies. The standard curve of Salbutamol in pH 6.8 phosphate buffer was prepared.Totally 9 trial buccal patches were prepared and evaluated for weight variation, thickness, drug content, folding endurance, swelling property, surface pH, percent moisture loss, *ex vivo* mucoadhesion time, *in vitro* dissolution test and *ex vivo* permeation study.It was observed that increasing the HPMC K4M concentration has a significant increase in mucoadhesion time and decrease in drug release. The optimized formulation shows satisfactory results in the parameters such as thickness, hardness, drug content, swelling index, mucoadhesion time, in vitro dissolution and diffusion studies. It shows zero order drug release profile depending on the regression value and shown required mucoadhesion time of 512 min as well as a satisfactory release of 92.59 % at 8h with good mechanical properties. A hydrophobic backing layer was attatched to the patch for unidirectional release. Slow, controlled and maximum release of Salbutamol over a period of 8 h was obtained from the optimized buccal patch. Based on the above results it concluding that the formulation F7 shows the better results compare the with the other formulations.