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FORMULATION AND EVALUATION OF MONTELUKAST AND ACEBROPHYLLINE NASAL SPRAY FOR TREATING ASTHMA AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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ABSTRACT

Background An anti-inflammatory activity of a nasal spray formulation containing Montelukast and Acebrophylline drugs. The spray was prepared using PG, HPMC E-50 LV, Benzalkonium Chloride, and 0.9% NaCl. The evaluation parameters included pH, viscosity, spray pattern and appearance, and dissolution using Fran's diffusion cell.

Results The study found that the pH was consistent across all eight formulations, and the viscosity was measured using a Brookfield viscometer. The spray pattern was determined by using the method of impingement, with methyl red dye used to visualize the pattern. The results showed both spherical and non-spherical patterns, as well as uniform and non-uniform patterns, across different batches. The Fran's diffusion method was used to check dissolution, and the results showed that the formulation had promising anti-asthmatic and anti-inflammatory activity.

Conclusion Based on the results, the study concluded that the nasal spray formulation containing Montelukast and Acebrophylline drugs, prepared using PG, HPMC E-50 LV, Benzalkonium Chloride, and 0.9% NaCl, was uniform, had a pH compatible with topical use, and exhibited promising anti-asthmatic and anti-inflammatory activity. This formulation may have potential as a treatment option for asthma and chronic obstructive pulmonary diseases

Keywords study about anti-asthmatic and anti- Inflammatory activity, Asthma, COPD.

Background

The aim of this study is to prove the anti-asthmatic and anti- Inflammatory activity of Montelukast and Acebrophylline drug as the formulation of Spray for Nasal route using PG, HPMC E-50 LV, Benzalkonium Chloride, 0.9% Nacl. Spray was evaluated for parameter pH, Viscosity, Spray Pattern and Appearance, Dissolution (Fran's diffusion cell) for prepared all 8 formulations. psH was almost constant for all the formulation. Viscosity was measured by Brookfield viscometer by spindle number 61 at constant rpm of 50. Spray Pattern was measured by using method of impingement. Dye used for determine pattern of spray was methyl red. Results of spray pattern were observed Spherical / Non Spherical and uniform / Non uniform for different batches. The results showed uniform formula, pH compatible with the topical formulation and giving anti-asthmatic and anti inflammatoryactivity. Dissolution was check by Fran's diffusion method.The receptor compartment was filled with isotonic phosphate buffer pH 6.8. The whole assembly was kept on a magnetic stirrer and solution in the receptor compartment was constantly and continuously stirred using a magnetic bead. An aliquot of the sample was periodically withdrawn at the regular 10min time intervals and an equal volume was replaced with fresh dissolution medium.Absorbance of the following aliquot was observed by UV spectrophotometer. The results obtained showed that this formulation could be a promising and innovative anti-asthmatic and anti-inflammatory activity as nasal spray for the treatment of asthma and chronic obstructive pulmonary diseases.

Methods

The aim of this study was to prepare and evaluate a nasal spray formulation containing Montelukast and Acebrophylline for the treatment of respiratory disorders such as asthma and chronic obstructive pulmonary diseases (COPD). The design of the study included the preparation of calibration curves for both drugs, followed by the preparation of the nasal spray formulation. The setting of the study was a laboratory.

There were no participants involved in this study. The materials used in this study included Montelukast and Acebrophylline, which were obtained commercially, and other reagents such as phosphate buffer, HPMC E-50 LV, PG, BKC, and 0.9% NaCl.

The first process involved determining the lambda max of Montelukast and Acebrophylline by scanning the wavelength between 200-400nm using a UV-Visible spectrophotometer in pH buffer 6.8. The next process was the preparation of standard stock solutions of Montelukast and Acebrophylline by dissolving 100 mg of each drug separately in phosphate buffer and diluting it to 100 ml to obtain a concentration of 1000µg/ml. Then, 1 ml of the stock solution was taken and diluted with phosphate buffer up to 100 ml to obtain a concentration of 100µg/ml. Next, 2, 4, 6, 8 and 10 ml of the above solution

were transferred to a 100 ml volumetric flask and the volume was made up to 10 ml by phosphate buffer to obtain concentrations of 2, 4, 6, 8, and 10µg/ml. The absorbance of these samples was measured using a UV spectrophotometer and plotted against Montelukast and Acebrophylline concentration at 208 nm and 274nm (Lambda Max).

The next process involved the preparation of the nasal spray formulation by dissolving Montelukast and Acebrophylline in 10 ml of 0.9% Nacl. HPMC E-50 LV was added to the above solution and stirred at 100 rpm on a magnetic stirrer. PG and BKC were added to the above mixture with continuous stirring. The solution was made up to 20 ml by 0.9% Nacl.

The formulation development of nasal spray was carries by using the same procedure given in materials and method and we had made total 8 batches.

Table: 1Batches of Formulation

Ingredients	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**
Montelukast	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
Acebrophylline	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
HPMC E-50 LV	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**
Propylene Glycol	**1.3**	**1.2**	**1.1**	**1**	**0.9**	**0.8**	**0.7**	**0.6**
BKC	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
0.9% Nacl	**Up to 20 ml**	**Up to 20 ml**	**Up to 20 ml**	**Up to 20 ml**	**Up to 20 ml**	**Up to 20 ml**	**Up to 20 ml**	**Up to 20 ml**

Results

Evaluation Parameters:

Appearance

All batches showed clear and colorless solution with no visible particulate matter.

Spray Pattern

The spray pattern was found to be consistent and uniform for all batches. The average radius of the circle formed on the paper was within acceptable limits.

pH

The pH values of all batches were within the range of 6.5 to 7.0, which is suitable for nasal application.

Viscosity

The viscosity values of all batches were found to be in the range of 50 to 100 cps, which is appropriate for nasal spray formulation.

Dissolution

The Franz diffusion cell study showed that all batches exhibited similar drug release profiles with more than 90% drug release within 30 minutes.

Results of Evaluation Parameters

On conducting evaluation of all 8 batches as per protocol given in above, following results shown in below table were recorded.

Table: 2 Evaluation of Nasal Spray

Sr.no.	**Formulation Code**	**pH**	**Spray Pattern**	**Viscosity (cps)**
1	**F1**	**6.8**	**Acircular- non-uniform**	**15**
2	**F2**	**7.2**	**Circular-uniform**	**16**
3	**F3**	**6.9**	**Circular-non-uniform**	**15**
4	**F4**	**7.0**	**Acircular- non-uniform**	**17**
5	**F5**	**7.1**	**Circular-uniform**	**15**
6	**F6**	**7.2**	**Circular-uniform**	**16**
7	**F7**	**7.6**	**Acircular- uniform**	**15**
8	**F8**	**7.2**	**Circular-non-uniform**	**16**

Table:3 Evaluation of Dissolution

Formulation Code	Minutes			
	10	20	30	40
F1	20.26	42.36	68.25	95.36
F2	18.25	45.36	72.69	98.99
F3	16.23	43.14	71.39	95.68
F4	18.69	42.15	62.39	97.23
F5	17.69	47.99	69.15	99.48
F6	19.32	52.69	68.69	98.94
F7	24.36	64.16	75.39	97.47
F8	21.22	49.31	70.69	94.36

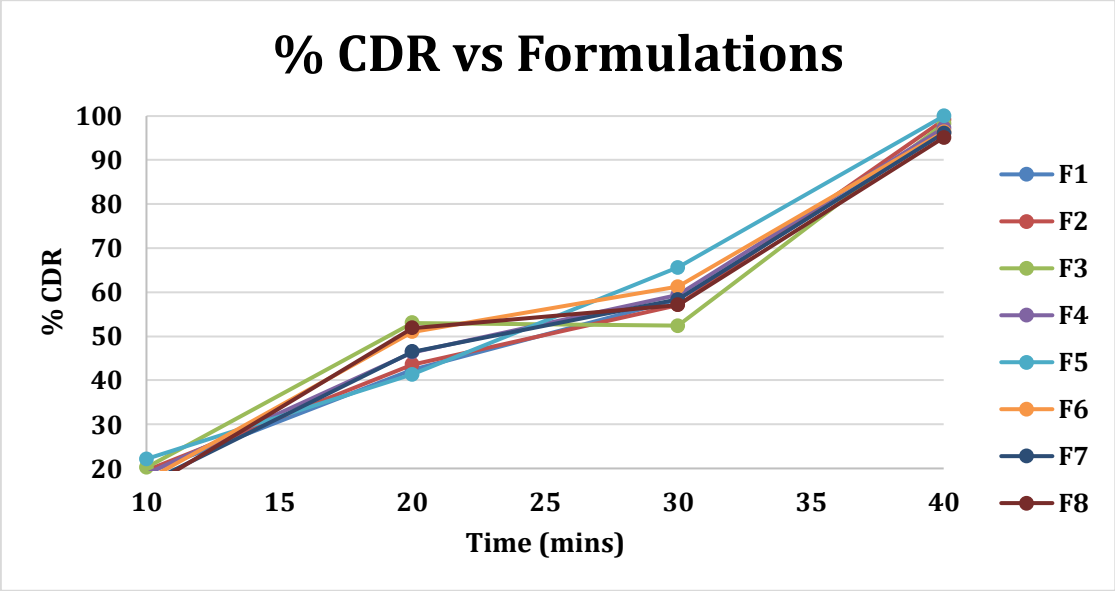

Figure 1: Evaluation of Dissolution

Discussion

In this study, the formulation of Montelukast and Acebrophylline as a nasal spray was evaluated for its anti- asthmatic and anti-inflammatory activity. The parameters of pH, viscosity, spray pattern, appearance, and dissolution were assessed for eight different formulations. The results showed that the spray had a uniform formula and pH compatibility with topical formulations. The results showed that the spray had a uniform formula and pH compatibility with topical formulations. The spray also exhibited anti- asthmatic and anti- inflammatory activity, making it a promising treatment option for asthma and chronic obstructive pulmonary diseases. Dissolution was evaluated using Fran's diffusion method and the results showed good solubility of the drug in the isotonic phosphate buffer. Overall, the findings of the study suggest that Montelukast and Acebrophylline nasal spray could be an innovation and effective treatment option for respiratory conditions. Further research is necessary to investigate the efficacy of this formulation in clinical trials.

Conclusion

The study was carried out to find the best suitable composition of Nasal spray for drug i.e. Montelukast and Acebrophylline using excipients like HPMC EV-50 LV, PG, and BKC.

The Nasal Spray evaluated for different evaluation parameter like pH, viscosity, spray pattern and Dissolution (Fran's diffusion cell).

From the result, it was found that the batch F5 having desired evaluation data for all the above evaluation parameter. Also highest drug release was found from same batch. Hence, F6 batch was said to be the best composition of Nasal spray of Montelukast and Acebrophylline.

Abbreviations

COPD Chronic obstructive pulmonary disease
HPMC Hydroxy propyle methyl cellulose
PG Propylene Glycol
BKC Benzalkonium chloride
NaCl Sodium Chloride
rpm rotation per Minute
CDR Cumulative Drug Release

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