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COMPARATIVE *IN VITRO* EVALUATION OF COMMERCIAL MONTELUKAST SODIUM CHEWABLE TABLETS

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ABSTRACT

Montelukast sodium chewable tablets (5 mg) were evaluated for *in vitro* parameters, both official and non-official, viz., uniformity of weight, hardness test, tensile strength, friability test, *in vitro* dissolution test and assay. All the products were within the general specifications as per IP and USP for tablet formulation. The study on the dissolution profile revealed that product '**C'** had faster dissolution rate while compared to products '**A**' and '**B**'. Assay values were within the limits of 95 % to 105 %. The data obtained through these studies may be useful for further formulation development studies.

Keywords: Montelukast sodium, Chewable tablets, $CysLT_1$ receptor.

INTRODUCTION

Chewable tablets are designed for use by the children and such persons, who may have difficulty in swallowing the tablets. Montelukast sodium is a selective orally active cysteinyl leukotriene (CysLT1) receptor antagonist. It is used for prophylaxis and chronic treatment of asthma. It is described chemically as 1-[[[(1R)-1-[3-[(1E)-2-(7-chloro-2-quinolinyl) ethenyl] phenyl] -3-[2-(1-hydroxy-1-methylethyl) phenyl] propyl] thio] methyl] cyclopropane acetic acid, monosodium salt[1-5]. Montelukast sodium tablet is not an official product and hence, it was thought necessary to carry out *in vitro* testing of the commercial product with special attention to dissolution rate studies. Tablets of 5 mg were chosen for the *in vitro* testing of the commercial products. Though, there are many brands available in the market and they contain identical active ingredients, they may differ from one another due to the different additives used and also due to the different manufacturing processes. In the present study, various quality control parameters were evaluated for the three brands of montelukast sodium chewable tablets and the results are presented.

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EXPERIMENTAL

Montelukast sodium pure drug was obtained as gift sample from Cadila Pharmaceuticals Limited, Dholka ,Ahmedabad, Gujarat and all other chemicals used were of analytical grade. Montelukast sodium chewable (5 mg) tablets of three different brands were purchased and coded as A, B and C. All the products were manufactured within six months at the time of study. The product was evaluated for uniformity of weight, hardness test, friability test, *in vitro* dissolution test and assay.

Weight variation

Twenty tablets were selected at a random and average weight was determined. Then individual tablets were weighed and was compared with average weight and minimum percentage deviation were determined.

Hardness test

Hardness or tablet crushing strength (Fc), (the force required to break a tablet in a diametric compression) was measured using Monsanto hardness tester (Sheetal Scientific Industries, Mumbai). This test was done for five tablets and the average value was recorded.

Tensile strength

The tensile strength (T) of the tablets was calculated using the following formula -

$$T = 2Fc/\pi dt \quad ...(1)$$

Where,

Fc, d and t denotes crushing strength, diameter and thickness of the tablet respectively.

Friability test

Friability of tablets was determined using Roche friabilator (Electrolab, Mumbai). This device subjects the tablets to the combined effect of abrasions and shock in a plastic chamber revolving at 25 rpm. Pre-weighed sample of tablets was placed in the friabilator and were subjected to 100 revolutions. Tablets were dedusted using a soft muslin cloth and reweighed. The friability (f) is given by the formula -

$$f = (1-W_o/W)100 \quad ...(2)$$

where,

W_o = Weight of the tablet before the test and

W = Weight of the tablet after the test

Dissolution test

Dissolution rate of montelukast sodium chewable tablets was performed using LABINDIA DISSO 2000, an eight stage dissolution rate testing apparatus with paddle. The dissolution fluid was 900 mL of 0.5% SLS, with the speed of rotation at 50 rpm and the temperature was set at 37° ± 0.5°C.The samples of dissolution medium (5 mL) were with drawn and suitably diluted, and assayed for montelukast content by measuring absorbance in double beam UV-visible spectrophotometer at 350 nm. The release rate at various time intervals were then determined. An equal volume of fresh medium, which was pre-warmed at 37°C was replaced into the dissolution medium after each sampling to maintain constant volume throughout the test. Dissolution studies were performed in triplicate and the results obtained are shown graphically in Fig 1.

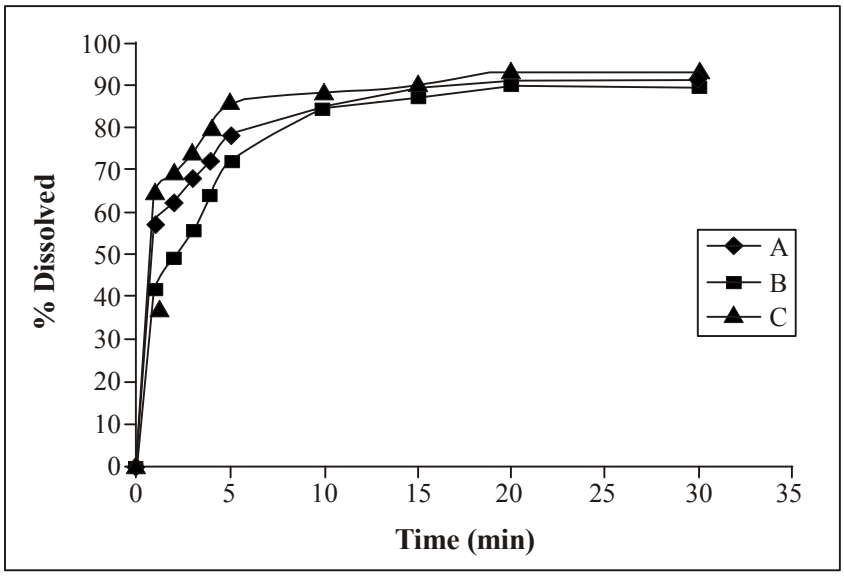

Fig. 1: Dissolution profiles of chewable tablets of montelukast sodium

Drug content

Five tablets were powdered and the blend equivalent to 5 mg of montelukast sodium was weighed and dissolved in suitable quantity of water or methanol. The solution was

filtered, suitably diluted and drug content was analysed spectrophotometrically at 350 nm. Each sample was analysed in triplicate.

All these results are given in Table 1.

Table 1: Evaluation parameters of commercial Montelukast sodium chewable tablets

parameters	Tablets code			
	A	**B**	**C**	**Remarks**
Weight of tablet (mg)	130 ± 0.23	140 ± 0.33	150 ± 0.12	A<B<C
Hardness(kg/cm^2)	3.8	4	4	A<B=C
Tensile strength(kg/cm^2)	9.72 ± 1.28	9.67 ± 0.12	9.55 ± 0.86	C<B<A
Friability test (%)	0.19	0.18	0.16	C<B<A
Dissolution time cumulative % of drug dissolved in 30min	91	90	93	B<A<C
Drug content (mg)	4.9	4.8	5	B<A<C
Assay (%)	98	96	100	B<A<C

RESULTS AND DISCUSSION

As per USP, all the brands of tablets were within the range. Using monsanto hardness tester, the strength of the tablets was tested. All the tablets showed good strength. Sample ‘A’ had minimum hardness while ‘B’ and ‘C’ had maximum hardness.

The friability was carried out for all the brands of tablets. The friability was less than 0.2% for all the brands and are said to be satisfactory.

Assay value of all montelukast sodium tablets were within the range of 95% to 105% of stated amount of montelukast.

The dissolution test was carried at LABINDIA DISSO 2000, 8 stage dissolution apparatus under specified test condition. From the data obtained, it was found that 93% of drug was released for the brand ‘C’ at 30 min while brands ‘A’and ‘B’ had shown 91% and 90% drug release at 30 min respectively. The variation in the commercial montelukast sodium tablets was in the following order B < A < C.

CONCLUSION

All the products gave the satisfactory results with respect to uniformity of weight, hardness test, friability test, assay and *in vitro* dissolution. The brand 'C' had the better dissolution rate, when compared to products 'A' and 'B'. The data obtained through these studies will be useful for further formulation development studies.

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