Formulation and Evaluation of Nimesulide Dispersible Tablets

G. CHANDRA SEKHARA RAO*, K. E. V. NAGOJI AND M. E. BHANOJI RAO
Roland Institute of Phramaceutical Sciences, Berhampur-760 010.

Accepted 6 July 2002
Revised 31 May 2002
Received 29 October 2001

Dispersible tablets of nimesulide using primojel as dispersing agent with starch, lactose and dicalcium phosphate as diluents were prepared and evaluated as per official (BP) requirements and compared with commercial dispersible tablets. The formulations with starch and lactose as diluents showed fast and rapid dissolution when compared to that of commercial tablets whereas the formulations with dicalcium phosphate as diluent showed less dissolution rate.

Nimesulide, chemically, 4-nitro-2-phenoxy methane sulphanilamide is a relatively new non-steroidal antiinflammatory analgesic drug[1]. It is widely used for the treatment of inflammatory conditions associated with rheumatoid arthritis, respiratory tract infections, soft tissue and oral cavity inflammations[2].

Dispersible tablets are uncoated tablets that produce uniform dispersion in water[3]. The faster the tablet dissolves the quicker the absorption and ultimate onset of therapeutic effect. The concept of the oral dispersible tablet dosage form replaces the use of conventional dry syrup dosage form preparation due to reduction in cost, inventory, improved palatabilily and stability after reconstitution[4]. Though a few dispersible tablets of nimesulide are available commercially, the present study is undertaken with an objective of developing dispersible tablet formulations and to evaluate whether improvement of dissolution of the poorly soluble drug is possible with these tablets.

Nimesulide was a gift sample from Dr. Reddy's Labs., Hyderabad. Primojel, starch, lactose, dicalcium phosphate, aerosil and magnesium stearate were supplied by E. Merck (India) Limited, Mumbai.

Dispersible tablets of nimesulide were prepared by conventional wet granulation method using starch paste (10% w/v) as binding agent as per the formulae given in Table 1. In all the formulations primojel (sodium starch glycolate) was used as super disintegrant[5] in two different concentrations in combination with different diluents like lactose, starch and dicalcium phosphate. Tablet granulations were compressed into tablets by using 9 mm standard punches to a hardness of 3-5 kg/sq.cm on a Cadmach single punch tablet machine. The tablets were evaluated for drug content, hardness, disintegration time, uniformity of dispersion and dissolution rate.

The drug content in the tablets was estimated by spectrophotometric method[6] at wavelength 436 nm using 0.1 N NaOH as reagent. Hardness of the tablets was determined with a 'Pfizer' hardness tester. Disintegration time was determined with Veego disintegration test apparatus using distilled water as fluid. The test for uniformity of dispersion was carried as per BP[3]. Dissolution rate study was done on Tab Machines six stage digital dissolution rate test apparatus USP XXI using 900 ml of phosphate buffer of pH 7.8 as dissolution medium at a speed of 100 rpm and temperature 37±1°. A 5 ml aliquot of dissolution medium was withdrawn at a time interval of 5 min for about 30 min and estimated the drug content spectrophotometrically at 436 nm. The results of drug content, hardness, disintegration time and dissolution characteristics were given in Table 2.

From the results shown in Table 2 it was found that the drug content in all the formulations was within the range 95-100 percent of the labelled claim. Hardness of the tablets was found to be within the range 3-5 kg/sq.cm and passed the friability test. All the formulations except F3 disintegrated within 3 min fulfilling the official requirements. In the test for uniformity of dispersion, all the formulations except F5 and F6 passed the test, whereas 10% of the mass of the dispersion produced by F5 and F6 was retained on sieve no. 22.

*For correspondence

TABLE 1: FORMULATION OF NIMESULIDE DISPERSIBLE TABLETS.

Ingredients (mg)	Formulation					
	F1	F2	F3	F4	F5	F6
Nimesulide	25	25	25	25	25	25
Starch	64.5	62.5	-	-	-	-
Lactose	-	-	64.5	62.5	-	-
Dicalcium phosphate	-	-	-	-	64.5	62.5
Primojel	4.0	6.0	4.0	6.0	4.0	6.0
Starch paste (10% w/v)	2.0	2.0	2.0	2.0	2.0	2.0
Magnesium stearate	2.0	2.0	2.0	2.0	2.0	2.0
Aerosil	2.0	2.0	2.0	2.0	2.0	2.0
Sodium lauryl sulphate	0.5	0.5	0.5	0.5	0.5	0.5

Formulations F1 and F2 gave increased dissolution rate than the commercial tablets, and formulation F4 gave the similar dissolution rate as commercial tablets. Formulations F5 and F6 shown less dissolution rate when compared to commercial tablets. The greater disintegration time of F3 reveals that the percentage of primojel in the formulation is not sufficient. The less dissolution rate of F5 and F6 reveals that the water insoluble dicalcium phosphate is not a suitable diluent in the formulation of dispersible tablets. In conclusion the combination of starch and primojel was found to be superior in formulating dispersible tablets of nimesulide.

TABLE 2: HARDNESS, DISINTEGRATION AND DISSOLUTION CHARACTERISTICS OF NIMESULIDE DISPERSIBLE TABLETS.

Formulation	Hardness (kg/sq.cm)	D.T. (min - sec)	% drug dissolved in 30 min
F1	4.0	1-20	84.375
F2	4.0	1-00	86.125
F3	4.6	4-10	81.750
F4	4.4	2-30	82.125
F5	3.8	2-40	43.670
F6	4.0	2-20	45.165
Commercial tablets	2.5	2-20	81.520

All values are average of three determinations.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. Reddy's Laboratories, Hyderabad for providing gift samples of nimesulide. The authors are also grateful to M/s Roland Inst. of Pharm. Sciences, Berhampur for providing necessary facilities to carry out the research work.

REFERENCES

1. Budavari, S., Eds., In; The Merck Index, 12th Edn., Merck & Co., Inc., Whitehouse Station, NJ, 1996, 1125.
2. Davis, G. and Brogden, R.N., **Drug,** 1994, 48, 431.
3. British Pharmacopoeia, Vol. II, Her Majesty's Stationery Office, London, 1988, 895.
4. Chakrabarti, P.K., Khopade, D.J., Bhattacharya, S. and Naik, S.R., **Indian J. Pharma. Sci.,** 1992, 54, 107.
5. Rudnic, E., In; Gennaro, A.R., Eds; Remington: The Science and Practice of Pharmacy, 19th Edn., Vol. II, Mack Publishing Company, Easton, PA, 1995, 1619.
6. Nagoji, K.E.V., Srinivasa Rao, S., Bhanoji Rao, M.E., and Kanna Rao, K.V., **Eastern Pharmacist,** 1999, 42, 117.