Original Articles

COMPARISON OF DISSOLUTION RATES OF DIFFERENT COMMERCIAL ASPIRIN TABLETS

Samina Ayub and S. Ayub Ali

Abstract

Generically identical aspirin tablets made by different manufacturers exhibit differences in dissolution rate of active ingredient.

Introduction

As early as 1948 it was recognised that while the efficacy of a compressed tablet is to some degree related to the speed of disintegration the dissolution of the drug particle is of prime importance. Disintegration of a tablet or other solid dosage form may be defined as the act of disintegrating or state of being disintegrated, i.e. the act of Crumbling or gradual decay. In the case of a tablet it is the process of the whole tablet breaking up into small pieces or granules when in contact with some fluid. Dissolution is the act of dissolving. Rate of dissolution is the rate of dissolving of the medicament from the intact dosage form or fragments of the disintegrated dosage form. Although the first quantitative study of the dissolution process was made by Noyes and Whitney (1897) most pharmaceutical studies on drug release from solid formulation have dealt mainly with disintegration time. There is evidence from theoretical studies (Edwards 1951) that drug concentration on both sides of the epithelial layer of the intestinal wall approaches equilibrium in short time and that drugs are absorbed almost as rapidly as dissolved. Further more Nelson (1959) reported that dissolution rate was rate-determining in absorption of tetracycline, provided that the dosage form restricted the initial surface area and that absorption of benzyl penicillin and acetylsalicyclic acid was rate-limited by the dissolution rate properties of the drugs (Nelson 1959). Therefore, it is apparent that the rate of dissolution of drug particles plays a fundamental role in determining drug availability. Rapid absorption is dependent on rapid dissolution of drug particles.

The present work is an evaluation of the availability of aspirin from commercially available aspirin tablets sold in Pakistan under generic name.

Material and Methods

Five brands of aspirin tablets were examined, The dissolution behaviour of these tablets was investigated using the U.S.P. XIX method. All the dissolution experiments were at 37°C in 0.1 N Hcl.

Ten milliliter of the samples of the solutions were taken at five, fifteen, thirty and sixty minutes by means of a pipette and were appropriately diluted with 0.1 N hydrochloric acid and analysed spectrophotometrically for acetylsalicylic acid and salicylic acid. Absorbance were measured at 275 and 302 millimicrons with a unicam spectro-photometer Model SP 200.

Table I: Analytical Data of Commercial Aspirin Tablets (0.3G)

No.	*Manufacturer*	*Batch No.*	*Average weight*	*Hardness*	*Disintegration*	*Assay*
1.	U.S.S.R. (B.P. grade)	1271076	387 mg	8 kg	10 sec	303.2 mg/tab
2.	Poland (Polfa)	22796	380 mg	4.5 kg	8 sec	300.4 mg/tab
3.	Bayer	4491-S	389 mg	12.5 kg	30 sec	298.5 mg/tab
4.	Aspro Nicholas	7F 1312	379 mg	5 kg	7 sec	305 mg/tab
5.	Hakim Sons	706332	327 mg	4 kg	15 sec	298.5 mg/tab

Table II: Dissolution Characteristics of Commercial Aspirin Tablets (0.3G)

		5 *min*	15 *min*	30 *min*	60 *min*	
Product No.	*Manufacturer*	*Amount in Solution mg.*	*Amount in Solution mg.*	*Amount in Solution mg.*	*Amount in Solution mg.*	*Dissolution half time*
1.	U.S.S.R.	172.78	214.32	253.00	291.00	Less than 5 min
2.	Polfa	163.07	214.32	261.12	287.63	Less than 5 min
3.	Bayer	160.5	200.16	245.5	289.3	Less than 5 min
4.	Aspro-Nicholas	222.9	265.2	279.15	293.5	Less than 5 min
5.	Hakim Sons	42.06	104.9	190.22	246.5	20 min

Dept. of Pharmaceutics, Faculty of Pharmacy, University of Karachi, Karachi

Results

The dissolution of commercial aspirin tablets was followed at 60 rev/min and the results are shown in Tables I and II.

Discussion

Dissolution behaviour was compared on the basis of the time required for half (150 mg) the drug contained in a tablet to go in solution 50% under the experimental conditions. Differences are apparent between brand No. 5 and the remaining brands. In each instance, however dissolution is rapid at first and then decreases in a non-exponental manner. The in vitro disintegration time of aspirin tablets which is often alluded to as an index of the rate at which the drug becomes available for absorption, is no criterion of availability (or rate of solution). The disintegration time of a tablet is merely the time required by the tablet to fall apart into reasonably small particles (10 mesh) not the time needed for drug to go into solution. Extensive studies have shown that the gastro-intestinal absorption of aspirin administered in tablet form is rate-limited by the dissolution of drug in gastrointestinal fluid (Levy 1960). This dependence of aspirin absorption on dissolution rate had been predicted previously on theoretical ground.

References

Edward, L.J. (1931) The dissolution and diffusion of aspirin in aqueous media. Trans. Faraday Soc., 47:1191.

Levy, G. and Hayes, B.A. (1960) Physicochemical basis of the buffered acetylsalicylic acid controversy. New Engl. J. Med., 262:1053.

Nelson, E. (1959) Influence of dissolution rate and surface on tetracycline absorption. J. Am. Pharm. Assoc. Sci., 48:96.

Nelson, E. and Schaldemose, I. (1959) Urinary excretion kinetics for evaluation of drug absorption. Solution rate limited and nonsolution rate limited absorption of aspirin and benzyl penicillin; absorption rate of sulfaethylthiadiazole. J. A. Pharm. Assoc. Sci., 48:489.

Noyes, A.A. and Whitney, W.R. (1897) The rate of solution of solid substances in their own solutions. J. Am. Chem. Soc., 19:930.