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Formulation and evaluation of dispersible tablet of paracetamol and ibuprofen

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ABSTRACT

The objective of the study is to develop paracetamol and ibuprofen orally dispersible tablet using co processed super disintegrants and comparative study with the marketed product. paracetamol and ibuprofen orally dispersible tablet was prepared by direct compression method using co processed super disintegrants such as cross povidone and sodium starch glycolate in different concentrations. The developed oral disintegrating tablets were evaluated for different physical chemical evaluations like drug content, hardness, friability, weight variation, wetting time, In vitro disintegration time, *In-vitro* drug release etc. All formulations had shown the results within the prescribed limits.

Keywords: Paracetamol and Ibuprofen, Dispersible tablet,

INTRODUCTION

Oral route is most preferred route by medical practitioners and manufacturer due to highestacceptability of patients. About 60% of all dosage forms available are the oral solid dosage form. The lower bioavailability, long onset time and dysphasia patients turned the manufacturer to the parenterals and liquid orals. But the liquid orals (syrup, suspension,emulsion etc) have the problem of accurate dosing mainly and parenterals are painful drug delivery, so most patient incompliance[1-3]. This tablet disintegrates instantaneously when placed on tongue, releasing the drug that dissolves or disperses in the saliva [4]. fast dissolving tablets to increase its oral bioavailability [5] .Paracetamol is an old first generation non-opioid analgesic and antipyretic drug [6].Paracetamol in combination with Ibuprofen – a non-steroidal anti-inflammatory drug (NSAID) which is also administered for the treatment of aches and pains arising from all shades of inflammation, .in patients' compliance arising from better efficacy noticed as engendered by analgesic, antipyretic and anti-inflammatory activities of the combination. [7]

MATERIALS AND METHODS

Paracetamol IP sri Krishna pharmaceuticals Hyderabad,ibuprofen shasun chemical and drugs Hyderabad, Sodium starch glycolate jain impex chem. ahamadabad, Micro crystalline cellulose sigachi chlora chemicals andrapradesh, lactose

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kawarlal chemicals Holland,starchs.bimpex, mahaarastra All other chemicals and reagents used were of analytical grade.

Preparation of dispersible tablets of paracetamol and ibuprofen

Sieve ibuproben and paracetamol through 40 mesh in a basin and mix well.sieve MCC,SSG(50% added during wet mixing) and lactose through 40 mesh. Mix to attain uniformly.preparea stsarch slurry by using 50ml watr. Dissolve ponceau 4R IN 10 ML OF WATER, add this to the starch slurry and mix well. Boil 150 ml of water, and the boiled water to the starch slurry and mix well to form a translucent paste.wet mix the active portion with prepared binder solution and mix well to attain a dough consistency.Dry granules at a temperature of 50.-60c pass the dried granules through sieve 30. Check the moisture content of the granules. Sieve the lubricants colloidal silicon dioxide, magnesium stearate, aspartame and remaining 50% of ssg through sieve 60 and mix well the dried granules. Add sweet orange and pineapple with the dried granules and mix well, store the granules in double poly bags.

Evaluation of post-compression parameters [6,7, 10, 11, 12]

Weight variation

The weight of the tablet being made was routinely determined to ensure that a tablet contains the proper amount of drug. The IP weight variation test is done by 20 tablets were selected randomly from each formulation after compress ion, weighed individually using a“Electronic weighing balance” and average weight was determined. The individual weights are compared with the average weight for the weight variation. The tablets met the IP specification that not more than 2 tablets are outside the percentage limits and no tablet differs by more than 2times the percentage limit.

Tablet hardness

The resistance of tablets to shipping or breakage under conditions of storage, transportation and handling before usage depends on its hardness. The hardness of each batch of tablet was checked by using “Monsanto hardness tester”. The hardness was measured in terms of kg/cm2. 5 tablets were chosen randomly and tested for hardness. The average hardness of 5 determinations was recorded.

Friability

Friability generally refers to loss in weight of tablets in the containers due to removal of fines from the tablet surface. Friability generally reflects poor cohesion of tablet ingredients.

Tablet thickness

Thickness of the tablet is important for uniformity of tablet size. Thickness was measured using “Vernier Callipers”. It was determined by checking the thickness of ten tablets of each formulation.

Drug content uniformity

The tablets were tested for their drug content uniformity. At randomly selected 5 tablets from each formulation were finely powdered and powder equivalent to 100 mg of paracetamol and ibuprofendrug was weighed accurately and dissolved in 100ml of phosphate buffer solution at pH 7.2. The solution was shaken thoroughly. The un-dissolved matter was removed by filtration through Whatman No.41 filter paper. Then the serial dilutions were carried out. The absorbance of the diluted solutions was measured at 288nm. The concentration of the drug was computed from the standard curve of the paracetamol and ibuprofen **in** phosphate buffer solution at pH 7.2.

In-vitro Disintegration time

Tablet disintegration is an important step in drug absorption. The test for disintegration was carried out in “Electro lab USP disintegration test apparatus”. It consists of 6 glass tubes which are 3 inches long, open at the top, and held against a 10 mesh screen, at the bottom end of the basket rack assembly. To test the disintegration time of tablets, one tablet was placed in each tube and the basketrack was positioned in a 1 liter beaker containing phosphate buffer pH 7.2 as medium. The volume of medium was 900ml and temp was 37°C ± 0.2°C. The time taken for the complete disintegration of the tablets with no palatable mass remaining in the apparatus was measured.

In-vitro Dissolution studies

Dissolution testing of dispersible tablet of paracetamol and ibuprofen **was** carried out with “Paddle type-II USP dissolution test apparatus” at rpm 50 and temperature 37±0.5°C both dissolution

media and water. At each specified intervals of time 5 ml sample was withdrawn and replaced by fresh media. The samples were analytically tested to determine the concentration by UV spectroscopy method at wavelength of 288 nm. The % drug release was calculated using an equation obtained from the calibration curve.

RESULTS AND DISCUSSION

Thickness of tablets

All the Dispersible tablet formulations were evaluated for their thickness using Verniercalipers and the results are shown in Table No 3**.**Also the crown diameter of all the formulation was 4.6 to 4.8mm

Hardness

All the formulations have an average hardness in between 4.0to 4.5 kg/cm2 which was found to be acceptable; because these formulations have to be disintegrated on the tongue between 30seconds to 2minute. So excess of hardness is not favored for these formulations.

Friability

The average percentage friability for all the formulations were between 0.13% to 0.14%, which was found to be within the limit (i.e. maximum 1%). So the maximum friability was 0.14% and the minimum friability 0.13% values respectively

In-vitro disintegration time

The average *in-vitro* disintegration time for all the formulations were in the range of was 30 seconds to3 min and control formulation F1 which shows 240 seconds. The in-vitrodisintegration time for formulation F2 was 30 seconds and highest disintegration time.

Drug Content

The range of uniformity of drug content for all formulations was 99.12%w/w to 100.04%w/w respectively thus all the formulations were found to be comply with the standards given in IP

Stability Studies Results

Stability study was conducted for one best formulations selected based on in-vitrodisintegration time and *in-vitro* drug release.. There was no significant reduction in drug release profile of formulation F2 no significant taste, colour and odour changes. After two months stability studies.

TABLE:1Formulation and Evaluation of Trail Batches:

S.No.	Name of the Ingredients	Batch-I Per Tablet	Batch-II Per Tablet	Batch-III Per Tablet	Batch-IV Per Tablet	Batch-V Per Tablet	Batch-VI Per Tablet
1	Ibuprofen	100mg	100mg	100mg	100mg	100mg	100mg
2	Paracetamol	125mg	125mg	125mg	125mg	125mg	125mg
3	Micro crystalline cellulose	25mg	25mg		25mg	25mg	
4	Lactose	25mg		25mg	28.8mg		29mg
5	Starch	29.8mg	29.8mg	54.8mg	30mg	69.8mg	69.8mg
6	Sodium starch glycolate	30mg	30mg	30mg			
7	PVP K-3				8mg	8mg	8mg
8	CCNa				18mg	18mg	18mg
7	Ponceau 4R	0.2mg	0.2mg	0.2mg	0.2mg	0.2mg	0.2mg
8	Aerosol 200	4.0mg	4.0mg	4.0mg	4.0mg	4.0mg	4.0mg
9	Aspartame	10mg	10mg	10mg	10mg	10mg	10mg
10	Magnesium stearate	3mg	3mg	3mg	3mg	3mg	3mg
11	Sweet orange DC 100pH	4mg	4mg	4mg	4mg	4mg	4mg
12	Pine apple DC 106pH	4mg	4mg	4mg	4mg	4mg	4mg

		360mg	335mg	346	356	362	359

Table: 2 Evaluations of Trial Batches

S.No.	Parameters	Trail 201	Trail 202		Trail 203	Trail 204	Trail 205	Trail 206
1	Average Weight	360mg	360mg		360mg	360mg	360mg	360mg
2	Hardness	4kg	4kg/cm^2		4 to 4.5kg/ cm^2	4 to 4.5kg/ cm^2	4 to 4.5kg/ cm^2	4kg/ cm^2
3	Thickness	4.6mm	4.7 to 4.8mm		4.6mm	4.7mm	4.8mm	4.8mm
4	Disintegration Time	3min.	30sec		1min	2min 20sec	49sec	84sec
5	Moisture Content	0.8	0.8		0.6	0.9	0.8	0.13
6	Friability	0.14%	0.13%		0.13%	0.13%	0.14%	0.14%
7	Flow	Satisfactory	Satisfactory		Satisfactory	Satisfactory	Satisfactory	Satisfactory
8	Assay		Paracetamol :124.46mg Ibuprofen : 100.08mg		P:125.6mg Ib:99.87mg		P:124.5mg Ib:100.8mg	
9	Dissolution		% of label Claim					
			Paracetamol	Ibuprofen				
			(1)98.64%	(1)100.43%				
			(2)97.95%	(2) 98.20%				
			(3)99.88%	(3) 99.02%				
			(4)100.06%	(4) 99.37%				
			(5)97.93%	(5) 99.14%				
			(6)100.04%	(6) 99.18%				
10	Dispersion		Uniformly dispersed and smooth dispersion or complies					

Table: 3 Comparision Studies of Marketed Product

S.No.	Parameters	Trail 202	Market Sample Duoflam Kid
1	Average Weight	360mg	342mg
2	Hardness	4kg/cm^2	4kg/ cm^2
3	Thickness	4.7 to 4.8mm	4.8mm
4	Disintegration Time	30sec	1minute 30seconds
5	Moisture Content	0.8	
6	Friability	0.13%	
7	Flow	Satisfactory	
8	Assay	Paracetmol :124.46mg Ibuprofen : 100.08mg	Paracetmol :124.05mg Ibuprofen : 95.94mg
9	Dissolution	% of label Claim Paracetamol Ibuprofen	% of label Claim Paracetamol Ibuprofen

		(1)98.64%	(1)100.43%	(1)99.65%	(1) 96.30%
		(2)97.95%	(2) 98.20%	(2)103.32%	(2) 98.68%
		(3)99.88%	(3) 99.02%	(3)102.35%	(3) 99.11%
		(4)100.06%	(4) 99.37%	(4)102.56%	(4) 98.88%
		(5)97.93%	(5) 99.14%	(5)104.44%	(5) 101.68%
		(6)100.04%	(6) 99.18%	(6)101.47%	(6) 97.03%
10	Dispersion	Uniformly dispersed and smooth dispersion or complies			

CONCLUSION

Six trials were taken using different diluents and binders in different concentration out these trial was found to have better dispersion and disintegration time so this tablet has been taken for comparison with the market sample and the following physical and chemical parameters were evaluated stability study was performed for prepared tablet at 40 c75%RH for2 month .at the end of study, it was found that on degration was observed and the formulation was found to be stable.

REFERENCES

[1]. Patel Nibha K, Pancholi SS. An Overview on: Sublingual Route for Systemic Drug Delivery. *IntJResPharma Bio Sci.* 3(2),2012, 913-923.
[2]. Amir H Shojaei, Sen-lin Zhou, XiaolingLi.Transbuccal Delivery of Acyclovir (II): Feasibility, System Design and *In-vitro* Permeation Studies. *IntJPharmPharma Sci.* 1(2),1998, 66-73.
[3]. Khairnar GA, Sayyad FJ. Development of BuccalDrug Delivery System Based on MucoadhesivePolymers. *Int J Pharm Tech Res.* 2(1), 2010, 719-735.
[4]. Kavitha K, Nalini CN, Kasturi GD, Merlin JP, Varalakshmi V, Maragatham C. Effect of betadex on the solubility and dissolution behavior of rofecoxib. The Antiseptic101, 2004, 463-465. 7.
[5]. Lalla JK, Mamania HM. Fast dissolving rofecoxib tablets. Indian Journal of Pharmaceutical Sciences66, 2004, 350-352.
[6]. Martindale: The complete drug reference. Sweetman SC, (Ed). 36, 2009, London, Pharmaceutical Press.
[7]. Emdex: The complete drug formulary. Lagos, Lindoz Products Ltd 2010/2011.
[8]. Rowe RC, Sheskey PJ, Quinn ME, editors. Handbookof pharmaceutical excipients. 6th ed. Washington. AJoint Publication of American Pharmaceutical Association and The Pharmaceutical Press;2009, 129-33, 208-10, 404-7, 424-8, 608-610, 663-6.
[9]. Bhanja SB, Ellaiah P, Roy HK, Samal BK, TiwariS,Murthy KVR. Formulation and Evaluation ofPrindopril Sublingual Talets. *Int J Res Pharm Bio Sci.* 2(3), 2011, 1193- 98.
[10]. Korsemeyer RW, Peppas NA. Macromolecular and modeling aspects of swelling–controlled systems. InMansdrofsz, rosemann TJ, ad, Controlled Release Delivery systems. New York. Marcel Dekker;1983,77.
[11]. ShyamalaBhaskaran. Industrial pharmacy. New Delhi. Birla Publications; 1, 2010, 46-69.
[12]. ICH Q1A (R2) Stability testing guidelines: Stability Testing of new drug substances and products. 2008,Available from: URL:http:/ /www.tga.health.gov.au/ docs/ pdf/ euguide/inch/273699r2en.pdf