Research Article

STABILITY STUDIES OF FAST DISPERSIBLE KETOPROFEN 100 mg TABLETS

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ABSTRACT

In the present study long term testing (12 month) and accelerated testing (6 month) were carried out on fast dispersible Ketoprofen 100 mg tablets in order to assess the physical and chemical stability of Ketoprofen tablets. All the formulations were tested for disintegration test, % drug content and % drug release over the entire period of testing. These formulations did not show any significant change in any parameter during 12 month and 6 month of testing at 25±5°C/60±5% RH and at 40±5°C/75±5% RH, respectively. All the results were within the acceptable limits.

Keywords: Accelerated stability testing, Ketoprofen, Disintegration test, Drug content, Drug release.

INTRODUCTION

The preparation of an established dosage form is critical for drug effectiveness and for patient safety. The physical and chemical parameters, such as the storage conditions and the presence of additives, may influence the stability of compounds, these factors obtained extensive consideration in the field of manufacturing of drugs[1]. Stability plays an essential role in the development of drug compounds. It describes numerous factors that may influence the expiration date of compounds, including the physical and chemical stability during the formulation phase, procedure development, packaging and post-marketing stage. The assessment of the stability of a given compound requires an understanding of the features of drug compound. Lack of drug product stability may influence the purity, strength and safety. During stability testing the compound will be exposed to degrading conditions particularly moisture, pH, oxygen, temperature and light. Stability testing permits the establishment of suggested storage situations, retest periods, shelf-life and expiry date. Stability testing will state the environment for the manufacturing and storage of drug compound[2]. Ketoprofen is a nonsteroidal anti-inflammatory compound with well-recognized antipyretic and analgesic characteristics. It is extensively used in the treatment of osteoarthritis, rheumatoid arthritis and other musculoskeletal disorders[3]. Ketoprofen produce inhibitory effects on leukotriene and prostaglandin synthesis as well as it produce antibradykinin activity[4]. In the previous study we developed nine different formulations of fast dispersible Ketoprofen 100 mg tablets. Powder blends of all the formulations were tested for Hausner's ratio, Carr's index and Angle of Repose. Different physico-chemical tests including hardness, thickness, diameter, friability, disintegration, test for finess of dispersion, weight variation, dissolution and assay were carried out. All the results were within the acceptable limits[5].

The aim of the present study is to assess the quality of fast dispersable Ketoprofen tablets by storing all the nine formulations at 30 ± 2°C/40 ± 5% relative humidity for 12 months and 40 ± 2°C/ 75 ± 5% relative humidity for 6 months.

MATERIALS AND METHODS

In the present study all the nine formulations were stored at 30°C ± 2°C/65% RH ± 5% RH for 12 months and 40°C ± 2°C/75% RH ± 5% RH for 6 months. 40 tablets from each formulation were placed in amber colored glass bottles. These tablets were subjected to 30°C ± 2°C/65% RH ± 5% RH and 40°C ± 2°C/75% RH ± 5% RH. Samples were tested at particular time intervals at 0, 3, 6, 9 and 12 months for 30°C ± 2°C/65% and at 0, 3 and 6 months for 40°C ± 2°C/75% RH ± 5% RH[6]. The samples stored at 40°C ± 2°C/75% RH ± 5% RH for accelerated study were kept in humidity chamber (Nuaire, USA). All the formulations were evaluated for disintegration test, % drug content and % drug release.

RESULTS AND DISCUSSION

Zaid and Qaddomi[7] developed enteric coated diclofenac sodium tablets. These tablets were found to be stable within 24 months of study when stored at room temperature, which indicated that enteric coated formulations were reproducible. In the present study all the nine formulations of fast dispersible Ketoprofen 100 mg tablets did not show any significant change in assay during 12 months of testing at 25±5°C/60±5% RH and during 6 months of testing at 40±5°C/75±5% RH. Physical parameters of all the formulations i.e. dissolution, disintegration and assay were evaluated over the entire period of testing. All the results were found to be in acceptable limits. The assay of F1-F9 at 25±5°C/60±5% RH during 0 and 3 month were ranged from 92.69 ± 0.29 % to 99.77 ± 1.30 % and 91.88 ± 1.11 % to 99.13 ± 1.59 %, respectively. Similarly, during 6, 9 and 12 month the assay values were ranged from 91.40 ± 0.84 % to 98.82 ± 1.33 %, 90.88 ± 1.24 % to 98.13 ± 0.89 % and 90.24 ± 0.11 % to

97.59 ± 1.59 %, respectively. The % drug release of F1-F9 at 25+5°C/60±5% RH during 0, 3 and 6 month were ranged from 92.53 ± 1.97 % to 106.40 ± 0.59 %, 92.45 ± 1.42 % to 106.35 ± 0.87 % and 92.23 ± 1.24 % to 106.29 ± 0.97 %, respectively. Similarly, during 9 and 12 month the % drug release were ranged from 91.59 ± 0.82 % to 106.21 ± 0.87 % and 91.45 ± 0.27 % to 105.99 ± 0.24 %, respectively. No considerable change was monitored in disintegration test during 12 months of study at 25±5°C/60±5% RH. The values of disintegration test during 0 and 3 month were ranged from 19 ± 1.0 sec to 122 ± 0.29 sec and 19 ± 0.99 sec to 123 ± 1.36 sec, respectively. Similarly, during 6, 9 and 12 month the values were ranged from 20 ± 0.36 sec to 123 ± 0.98 sec, 21 ± 0.45 sec to 124 ± 1.87 sec and 23 ± 0.11 sec to 125 ± 0.36 sec, respectively as shown in table 1.

Table 1: Stability data of fast dispersible Ketoprofen tablets at 25±5°C/60±5% RH

Parameters	Periods	Formulations								
		F1	F2	F3	F4	F5	F6	F7	F8	F9
Disintegration Test (sec) (n=6)	0 Month	36 ± 0.12	30 ± 0.11	78 ± 0.88	65 ± 0.55	70 ± 0.86	19 ± 1.0	12 2 ± 0.29	20 ± 0.99	44 ± 0.28
Dissolution Test (%) (n=3)		101.72±0.13	101.59±0.84	106.40±0.59	103.42± 0.77	102.81±1.36	104.68±0.14	98.58 ± 0.38	97.8 ± 0.99	92.53 ± 1.97
Assay (%) (n=3)		98.89 ± 1.41	97.55 ± 0.96	95.55±1.79	97.71±1.88	95.61 ± 1.47	99.77 ± 1.30	96.05 ± 1.35	98.23 ± 1.98	92.69 ± 0.29
Disintegration Test (sec) (n=6)	3 Month	36 ±0.34	31 ± 0.22	78 ± 0.58	65 ± 0.33	71 ± 0.56	19 ± 0.99	123 ± 1.36	20 ± 1.36	45 ± 0.56
Dissolution Test (%) (n=3)		101.51± 0.11	101.57±0.71	106.35±0.87	103.4±0.38	102.52±1.79	104.58± 0.28	98.51 ± 1.69	97.82 ±0.98	92.45 ± 1.42
Assay (%) (n=3)		98.27 ± 0.22	97.21 ± 0.27	95.21 ± 0.21	97.53±0.97	95.04 ± 1.89	99.13 ± 1.59	95.89 ± 0.29	97.24 ± 1.60	91.88 ± 1.11
Disintegration Test (sec) (n=6)	6 Month	36 ± 0.25	31 ± 0.33	78 ± 0.28	65 ± 0.28	71 ± 0.44	20 ± 0.36	123 ± 0.98	21 ± 0.38	45 ± 1.82
Dissolution Test (%) (n=3)		101.48± 0.88	101.45±0.97	106.29±0.97	103.35±1.33	102.43±0.89	104.45± 0.29	98.45 ± 0.39	97.75 ± 1.27	92.23 ± 1.24
Assay (%) (n=3)		97.97 ± 0.51	96.39 ± 1.71	94.86 ± 0.87	96.97 ± 1.28	94.78 ± 1.85	98.82 ± 1.33	95.12 ± 1.89	96.56 ± 0.99	91.40 ± 0.84
Disintegration Test (sec) (n=6)	9 Month	37 ± 0.11	33 ± 0.16	78 ± 0.78	66 ± 0.36	72 ± 0.36	21 ± 0.45	124 ± 1.87	21 ± 0.28	46 ± 0.27
Dissolution Test (%) (n=3)		101.18± 0.38	101.29±0.36	106.21±0.87	103.31±0.24	102.37±1.28	104.21±0.44	97.98 ± 0.26	96.55 ± 0.56	91.59 ± 0.82
Assay (%) (n=3)		96.84 ± 1.69	95.89 ± 0.24	94.13 ± 1.27	96.65 ± 1.27	94.13 ± 0.39	98.13 ± 0.89	94.64 ± 1.91	96.01 ± 1.27	90.88 ± 1.24
Disintegration Test (sec) (n=6)	12 Month	37 ± 0.12	34 ± 0.88	78 ± 0.97	66 ± 0.99	73 ± 1.10	23 ± 0.11	125 ± 0.36	22 ± 1.49	46 ± 1.85
Dissolution Test (%) (n=3)		100.25± 0.26	101.16±0.58	105.99±0.24	102.89±0.29	102.25±0.22	103.88±1.36	97.66 ±0.22	96.23 ± 0.56	91.45 ±0.27
Assay (%) (n=3)		96.56 ± 0.89	95.12 ± 0.79	93.63 ± 0.99	95.51 ± 0.27	93.33 ± 0.17	97.59 ± 1.59	93.86 ±1.28	95.84 ± 1.89	90.24 ± 0.11

Table 2: Stability data of fast dispersible Ketoprofen tablets at 40±5°C / 75±5% RH

Parameters	Periods	Formulations								
		F1	F2	F3	F4	F5	F6	F7	F8	F9
Disintegration Test (sec) (n=6)	0 Month	36 ± 0.88	31 ± 0.29	78 ± 1.69	65 ± 1.0	69 ± 0.22	20 ± 0.79	123 ± 0.28	20 ± 0.55	45 ± 0.58
Dissolution Test (%) (n=3)		101.72± 0.28	101.59 ± 1.25	106.40 ±1.08	103.42±0.25	102.81 ± 1.27	104.68 ± 0.88	98.58 ± 0.47	97.8 ± 1.47	92.53 ± 0.44
Assay (%) (n=3)		98.89 ± 1.27	97.55 ± 0.34	95.55 ±1.44	97.71 ± 1.24	95.61± 0.55	99.37 ± 0.47	96.05±1.20	98.23±1.24	92.69±1.27
Disintegration Test (sec) (n=6)	3 Month	36 ± 0.25	32 ± 1.98	78 ± 0.25	66 ± 0.24	70 ± 0.16	22 ± 1.41	125 ± 0.29	23 ± 1.97	48 ± 1.79
Dissolution Test (%) (n=3)		101.43 ± 0.11	101.17 ±1.28	106.18±1.91	103.09 ± 0.11	102.11 ± 0.99	103.82 ± 0.47	97.22 ± 0.99	96.48 ±1.37	91.23 ± 0.28
Assay (%) (n=3)		97.88 ± 0.22	96.86 ±0 .87	94.84 ± 1.28	96.89 ± 1.27	94.55±1.23	98.98 ± 1.23	95.68±0.99	97.67±1.37	91.58±0.21
Disintegration Test (sec) (n=6)	6 Month	37 ± 0.99	34 ± 0.39	79 ± 1.36	67 ± 0.87	70 ± 0.36	23 ± 0.97	128 ± 0.84	26 ± 0.29	52 ± 0.38
Dissolution Test (%) (n=3)		100.11 ± 0.28	101.15 ±1.27	105.55 ± 0.66	102.37 ± 0.97	102.09 ± 1.27	103.79 ± 0.25	97.11 ± 0.88	96.1 ± 1.24	91.11 ± 1.11
Assay (%) (n=3)		97.18 ± 0.27	95.85 ±0.55	93.99 ±1.88	96.06 ± 0.88	94.03±0.55	97.78 ± 1.21	94.39±0.45	96.49±0.28	91.06±0.28

Arunachalam *et al*[8] formulated the Levofloxacin Hemihydrate floating tablets. They assessed the stability of Famotidine in these tablets. Tablets were kept at different temperatures which were 4°C ±2°C, 27°C ±2°C and 45°C ±2°C for 45 days at RH 75±5%. No variations were observed in the controlled release tablets.

In the present study the % drug release of F1-F9 at 40±5°C / 75±5% RH during 0, 3 and 6 month were ranged from 92.53 ± 0.44 % to 106.40 ±1.08 %, 91.23 ± 0.28 % to 106.18±1.91 % and 91.11 ± 1.11 % to 105.55 ± 0.66 %, respectively. The assay values were ranged from 92.69 ± 1.27 % to 99.37 ± 0.47 %, 91.58 ± 0.21 % to 98.98 ± 1.23 % and 91.06 ± 0.28 % to 97.78 ± 1.21 %, respectively. The values of disintegration test during 0, 3 and 6 month were ranged from 20 ± 0.79 sec to 123 ± 0.28 sec, 22 ± 1.41 sec to 125 ± 0.29 sec and 23 ± 0.97 sec and 128 ± 0.84 sec, respectively as shown in table 2.

Kibria *et al*[9] carried out the stability study of sustained release pellets of Ambroxol Hydrochloride stored at 40°C, 40°C/75%RH, 30°C/70%RH and room temperature for three months. Results showed that the formulation showed steady drug release (f_2>50) throughout the testing period at 30°C/70%RH. Lusina et al[10] carried out the stability study of losartan/hydrochlorothiazide tablets in three different stages which were forced degradation, selection of packaging and formal stability studies. The

results of forced degradation studies indicated that these tablets were susceptible to moisture. The results showed after accelerated (6 months) and long-term (12 months) stability testing is that those tablets which were packaged in OPA/Al/PVC//Al blisters was microbiologically, physically and chemically stable.

CONCLUSION

Stability testing assures the quality of the test formulations. It indicated the physical and chemical features of the dosage form. Present study indicated that all the formulation were stable during long term (12 months) and accelerated study (6 months).

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