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Preparation and Characterization of Time Controlled Drug Delivery System of Sumatriptan Using Natural Polymers

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Abstract

Time controlled drug delivery systems are designed to release the drug after a predetermined lag time to synchronize the disease circadian rhythm.

Sumatriptan is an effective treatment for acute migraine attacks in which this disease show circadian rhythm between 6 a.m. and 8 a.m.

The aim of this work is to prepare time-controlled press-coated tablet that was given at bed time to act at early morning with a lag time of 5.45 hours.

Six formulas of fast dissolving core tablets and three formulas of press-coated tablets were prepared by using direct compression method using different variables to prepare core tablets which include: different types and concentrations of superdisintegrants while different concentrations of natural and synthetic polymers were utilized in preparation of press-coated tablets.

The obtained results showed that formula F4 of core tablet, which contained 25 milligrams of sumatriptan, 5% w/w sodium starch glycolate and avicel PH 102 as diluent, was the selected formula that showed the fastest and complete release of sumatriptan. Also, formula C3 of press-coated tablet , which contained pectin: EC100 mpa.s: HPMCK15M in concentration30 milligrams: 10 milligrams:160 milligrams respectively, was selected as the best coating layer since it gave 5.45 hours lag time .

Keywords: Pulsatile, Sumatriptan, Migraine. Pectin, Ethyl cellulose, Hydroxypropylmethylcellulose.

تحضير وتقييم نظام تسليم دوائي موقوت لدواء السوماتريبتان باستخدام بوليمر طبيعي

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الخلاصة

أنظمة تسليم الدواء النابض هي احدى أشكال الجرع الصيدلانية التي يسيطر عليها الوقت والتي تم تصميمها لإطلاق العنصر الدوائي الفعال بعد فترة زمنية محددة سلفا لمزامنة إيقاع المرض البيولوجية. يظهر الصداع النصفي إيقاعا إيقاعيا مع زيادة ملحوظة في النوبات بين السادسة صباحا والثامنة صباحا.سوماتريبتان هو محفز انتقائي لمستقبلات السيروتونين (٥-هيدروكسي تريبتامين (tryptamine1 (5-HT1 ، هو علاج فعال لنوبات الصداع النصفي الحاد.الهدف من هذا العمل هو إعداد اقراص مغلفة بالضغط مسيطر على توقيتها مع فترة تأخر لتسليم الدواء ٥,٤٥ ساعة.تم تحضير ستة أقراص أساسية سريعة الذوبان وثلاثة أقراص المغلفة بالضغط باستخدام طريقة الضغط المباشر باستخدام متغيرات مختلفة لإعداد الأقراص أساسية والتي تشمل: أنواع وتراكيز مختلفة من المواد المسرعات التفتت في حين تم استخدام تراكيز مختلفة من البوليمرات الطبيعية والاصطناعية في تحضير أقراص مغلفة بالضغط.أظهرت النتائج التي تم الحصول عليها أن الصيغة F4 من القرص الأساسي، التي تحتوي على ٢٥ ملغ من سوماتريبتان، و 5% w/w sodium starch glycolate and avicel PH 102 كمخفف، هي الصيغة المحددة التي أعطت التسليم الأسرع والكامل لسوماتريبتان. أيضا، الصيغة C3 من الاقراص المغلفة بالضغط ، التي تحتوي على pectin:ethylcellulose 100mpa.s:HPMCK15M في تركيز ٣٠ ملغم : ١٠ ملغم : ١٦٠ ملغم على التوالي، تم اختياره كأفضل طبقة مغلفة حيث أعطت ٥,٤٥ ساعات تأخرفي وقت تسليم الدواء.

الكلمات االمفتاحية: نبضي، سوماتريبتان، الصداع النصفي. البكتين، إيثيل السليلوز، هيدروكسي بروبيل ميثيل سيليلولوز.

Introduction

Drug delivery is a term used to describe systems that carry drugs to their targets in the body to ensure its therapeutic effect[(1)]. Oral drug delivery is the most widely utilized route of administration among all the ways that have been explored for systemic delivery of drugs via pharmaceutical products of the different dosage form[(2)]. It is well known that conventional drug dosage forms give instant or fast medication release that provides the determined amount of the drug to the body without any rate control.

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This lack of control leads to a lot of complications inherent to the conventional multiple dosing regimens, e.g., drug accumulation leading to toxicities, variable plasma drug level, and poor compliance. All of above necessitate modification of traditional drug dosage forms which ushered a second generation known as the modified drug-release dosage forms[3]. The modified drug-release dosage forms have a prolonged release of the drug through the longer duration of time which may result in more patient compliance and favorable bioavailability and blood concentration-time profiles of drugs[4]. Several controlled-release preparations present numerous problems such as resistance and drug tolerance, and activation of the physiological system due to long-term constant drug concentrations in the blood and tissues[5]. From above it becomes clear that shifting toward the pulsatile drug delivery system is necessary as it would minimize drawbacks of second-generation dosage forms.

Pulsatile drug delivery systems are time-controlled drug delivery system. These systems are designed to achieve time specific and site-specific delivery of drugs according to the circadian rhythm of the body. In chronopharmacotherapy(timed drug therapy) drug administration is synchronized with biological rhythms to produce a maximal therapeutic effect and minimum harm for the patient. The pulsatile release is also useful for the targeting of the drug irritating the stomach or degradable therein, as well for drugs developing biological tolerance or with an extensive first-pass metabolism [6]. Pulsatile drug delivery system is designated as the transient and rapid release of a certain amount of molecules within a short period immediately after a predetermined off- release period, i.e., lag time [7].

Migraine shows circadian rhythm with the marked increase in attacks between 6 a.m. and 8 a.m.[8]. Sumatriptan is a selective agonist at serotonin 5-HT1 receptors, including 5-HT1B/1D subtypes. It is an effective treatment for acute migraine attacks, and the injectable form has also shown efficacy in the treatment of cluster headaches. Sumatriptan administered subcutaneously, orally, intranasally or rectally was effective in alleviating migraine headache and in the reduction of other symptoms associated with a migraine, including nausea, photophobia and phonophobia[9] .

The main aim of this study is to prepare time-controlled tablet of sumatriptan to synchronize migraine attack and to obtain acceptable physical properties of the tablet.

Materials and Methods

Materials

Sumatriptan was from Avril company, china, croscarmellose sodium,sodium starch glycolate, microcrystalline cellulose (avicel PH 102), pectin, ethylcellulose 100mpa.s and hydroxy propyl methyl cellulose K15M were from Hangzhou Hyper Chemicals Ltd./China, polyvinylpyrrolidone K30 ,Mg stearate and talc were from Samarra Drug Industry/Iraq.

Methods

Preparation of inner layer (fast dissolving core tablet)

Different powder blends of core tablet which contain Sumatriptan as an active ingredient with different types of superdisintegrants (croscarmellose sodium and sodium starch glycolate at concentrations 1, 3, 5% (w/w) of total core tablet weight of sumatriptan) were prepared to be evaluated for their flow properties and compressibility before compressing into a tablet using direct compression method.

Powder mixtures of sumatriptan, polyvinyl pyrrolidone K30, microcrystalline cellulose (MCC, Avicel PH-102), croscarmellose sodium (Ac-Di-Sol), sodium starch glycolate ingredients were dry blended for 20 minutes, followed by addition of talc and magnesium stearate as shown in table1. The mixtures were then further blended for ten minutes, one hundred milligram of resultant powder blend was manually compressed using single biconcave punch machine, with a 6mm punch and die to obtain the round core tablet[10,11].

Formulation of coating mixed blend for press – coated tablet

Combination of different ratios of pectin, ethylcellulose (EC) 100mpa.s and hydroxypropyl methyl cellulose K15M (HPMCK15M) were weighed and dry blended for about 10 minutes and used as a press-coating material for coating the core tablet to prepare press-coated pulsatile tablets by direct compression method[10]. The composition of the coat is shown in table 2.

The final tablet was made by press coating the core tablet and the coating materials using 9-mm die of the tablet machine, 40% of the coating material were poured to the die before placing the core tablet which was covered by the the remaining 60% then it was compressed by single punch machine[12].

Table 1. Composition of core powder blend

Ingredients (mg)	F1	F2	F3	F4	F5	F6
Sumatriptan	25	25	25	25	25	25
Croscarmellose sodium	5	3	1			
Sodium starch glycolate				5	3	1
Avicel PH 102	65	67	69	65	67	69
PVPK30	2	2	2	2	2	2
Mg stearate	1	1	1	1	1	1
Talc	2	2	2	2	2	2
Total weight	100	100	100	100	100	100

Table 2. Composition of coat powder blend

Formula	C1	C2	C3
Pectin (mg)	20	20	30
Ethylcellulose 100mpa.s(mg)	10	20	10
HPMCK15M (mg)	170	160	160
Total weight(mg)	200	200	200

Pre-compression parameters of core and coat powder blends

Micromeritic properties of core and coat powder blends were recorded. These properties include **:** angle of repose was determined by taking accurately the weighed quantity of powder blend into the funnel. The funnel height was adjusted such that the funnel tip should touch the apex of the blend. This blend was then allowed to freely flow through the funnel onto the surface. From the formed powder cone, radius and height were measured, and their angle of repose was calculated using the following equation **(13)**

$\tan^{-1}\theta = h/r$ ..... (1)

Where h and r are the height and radius of the formed powder cone respectively, and θ is an angle of repose.

The type of flow according to angle of repose values are shown in table 3

Table 3. Flow properties and corresponding angles of repose (14)

Flow property	Angle of Repose (degrees)
Excellent	25-30
Good	31-35
Fair –aid not need	36-40
Passable –may hang up	41-45

Apparent bulk density and tapped density

The bulk density, as a measure used to designate packing materials was determined by transporting the precisely weighed amount of blend (2 grams) to the graduated cylinder (10 milliliters) with the help of a funnel. The volume was noted. The proportion of the weight of the sample to the volume was calculated.

To measure tapped density, the same quantity of blend (2grams) was transported to a 10 milliliters graduated cylinder and tapped by hand at a specific height for a fixed number of taps (100). Average of three determinations was taken. The tapped density was defined as the ratio of the sample weight to tapped volume**(15)**.

Carr's index (or % compressibility) and Hausner ratio(16)

It shows powder flow properties. It is represented in percentage and is give

Carr's index= (Tapped density– Bulk density)/ Tapped density×100…… (2)

Hausner ratio

It is an indirect index of ease of powder flow. It is measured by the following formula.

Hausner's ratio= Tapped density/ Bulk density…….. (3)

Lower Hausner ratio (<1.25) indicates better flow properties than higher ones (>1.25). **(17)**

Post-compression evaluation for core tablet hardness test

The crushing strength of the core tablets was measured using a Monsanto hardness tester. Five tablets from each formulation batch were tested randomly, and the average reading was noted. The hardness is measured in kg/cm^2 **(18)**.

Content uniformity

This test applied to core tablet. Ten tablets were weighed and powdered by using mortar and pestle. The powder which is equivalent to 25 mg of sumatriptan was weighed and dissolved in 0.1 N HCl solution (pH 1.2).

The solution gained was filtered, and one mL of the filtrate was appropriately diluted and analyzed for Sumatriptan spectrophotometrically at its λ max [19, 20].

In vitro disintegration time for core tablets

The disintegration test was done for all core tablet formulas at 37˚C using phosphate buffer (pH 6.8) as disintegration media. Disintegration apparatus of a one-liter cylinder with a basket rack assembly containing six open-ended tubes and 10-mesh screen on the bottom was used. A tablet was placed in every tube of the basket and the time required for complete disintegration of the tablets with no palpable mass remaining in the apparatus was measure[14].

In-vitro dissolution test

In-vitro dissolution test is applied for core tablet using USP apparatus type II (paddle) at 37 ± 0.5°C in 900 milliliters of dissolution medium (phosphate buffer pH 6.8) at 50 rpm. Five milliliters samples were withdrawn periodically at different time intervals, and each sample was substituted with an equal volume of fresh dissolution medium. Then, the samples were filtered and analyzed spectrophotometrically at its λ max. Each test was done in triplicate. For optimization many variables evaluated to test its effect on the dissolution of the core tablet from different formulas [21].

Post-compression evaluation for press coated tablet

The prepared coated tablets were evaluated for hardness and release study for press coated tablet as mentioned for core tablets.

In-vitro release studies of press-coated pulsatile tablets

The prepared press coated tablets were examined for in vitro drug release in two different suitable dissolution media(2 hours in 0.1 N HCl (pH 1.2) followed by 4 hours in phosphate buffer pH 6.8) using USP type II dissolution apparatus at 50 rpm to assess their ability to provide the desired lag time before drug release. Five milliliters samples were withdrawn periodically at different time intervals, and each sample was substituted with an equal volume of fresh dissolution medium. Then, the samples were filtered and analyzed spectrophotometrically at its λ max[22].

Variables effecting release of sumatriptan from the core tablet

Effect of type of superdisintegrants

Two different types of superdisintegrants (croscarmellose and sodium starch glycolate) at 5% concentrations were used in (F1 and F4) to study the effect of superdisintegrant types on the drug release properties from sumatriptan core tablet.

Effect of concentration of superdisintegrant

Different percentages of sodium starch glycolate (superdisintegrant) were utilized in the formulation of core tablet formula (F6, F5, F4) containing 1,3 and 5% to analyze the effect of using different concentrations of sodium starch glycolate on sumatriptan release from the core tablet.

Variables affecting the release of sumatriptan from the press coated core tablet (effect of different concentrations of combination of polymers)

Three formulas of coated core tablet were made using different polymers (Pectin, ethylcellulose 100mpa.s and HPMCK15M) in different ratios as recorded in table 2 to study their effect on sumatriptan release from press coated core tablet and also their effect on the lag time required for release of the drug.

Drug – excipients compatibility studies

Physicochemical compatibility between sumatriptan and different excipients was studied using Fourier transform infrared spectroscopy (FTIR) and differential scanning calorimetry (DSC).

1.Fourier transform infrared spectroscopy (FTIR)

The pure drug powder and the optimum formula of core tablet (F4) were analyzed individually by using (Shimadzu 8300, Japan) according to KBr disk method. About 2-3 milligrams sample was mixed with dried IR grade potassium bromide powder to form a uniform blend of about 200 milligrams, and analyzed by FTIR spectroscopy at 4000-400 cm^{-1}[23].

2.Differential scanning calorimetry (DSC)

It was carried out by the same way for the pure drug powder, and the physical mixture of the optimum formula of core tablet F4 , and the optimum formula of core tablet F4 using Differential Scanning Calorimeter (Shimadzu DSC- 60). Samples were heated in an aluminum sample pans at a rate of 10°C/minute over a temperature up to 350 °C under a nitrogen flow of 50 milliliters/minute [24].

Statistical analysis

The results of the experiments were given as mean values ± standard deviation (SD) and analyzed according to the one-way analysis of variance (ANOVA) at which significant results ($p<0.05$) and non-significant ($p>0.05$)[25].

Result and Discussion

Pre-compression parameters of core powder blend

The values of angle of repose, bulk density, tapped density, Carr's index, and Hausner ratio for each prepared core and coat powder blend formula were measured .The results of precompression evaluation tests of core powder blend are illustrated in table 4. These results estimated according to USP [20]. The results show that the prepared core mixtures have acceptable flow properties and compressibility.

Table 4. Pre-Compression Physical Parameter's for Core Powder Blend of Sumatriptan

Formula	Angle of repose (Degree) Mean± SD, n=3	Bulk density (g/cm^3) Mean± SD, n=3	Tapped density (g/cm^3) Mean± SD, n=3	Carr's index Mean± SD, n=3	Hausner ratio Mean± SD, n=3	Type of flow
F1	17.51±0.03	0.546±0.01	0.608±0.02	10.21±1.36	1.11±0.019	Excellent
F2	18.4 ±0.1	0. 495±0.08	0.57±0.021	10.51±1.0002	1.12±0.02	Excellent
F3	25.7±0.2	0.56±0.56	0.632±0.03	10.73±0.37	1.119±0.004	Excellent
F4	21.36±0.56	0.33±0.0٢	0.371±0.03	10.84±0.39	1.122±0.005	Excellent
F5	19.25±0.75	0.345±0.01	0.357±0.015	3.41±0.15	1.041±0.007	Excellent
F6	20.5±0.4	0.311±0.026	0.334±0.028	6.92±0.2	1.07±0.001	Excellent

Postcompression evaluation of core tablet: Hardness, content uniformity and in-vitro disintegration study of core tablets

Hardness testing of solid oral dosage forms is essential because it provides a quantitative estimate of the internal bonding strength of the powder compact, since it gives the tablet sufficient mechanical strength to keep its internal structure and geometry under applied external forces. Differences in tablet hardness are hence known to correlate with differences in dissolution or mechanical response during any postcompression operations such as tablet coating, handling, packaging, storage, or shipping[26].

The results of hardness test for all prepared core tablet formulas were in the range of (4.1-4.53 Kg/cm^2) as shown in table 5 which indicate the tablets had adequate strength property to resist handling, shipping and tablet coating.

The results of drug content test are shown in table 5 that all prepared core tablets had acceptable range according to USP pharmacopeia [14].

The results of disintegration test of all prepared core tablets are shown in table 5. In this study, two types of superdisintegrants were used , CCS and SSG had three different concentrations(1%,3%,5%) w/w of total weight of sumatriptan core tablet.

As shown in table 5, F1 and F4 that contained 5%(w/w) croscarmellose sodium and 5% (w/w) sodium starch glycolate respectively, F4 had the shortest disintegration time, this may be due to the remarkable rapid water penetration and extensive swelling capability of SSG. SSG was reported to possess the capability to absorb water and swell about 300 times its volume and not affected by an increase in compression pressure[27].

The results showed that F2 which contains 3% croscarmellose sodium had shorter disintegration time than F1 that contains higher concentration of this superdisintegrant which may be due to partial gelling that potentially could form a viscous barrier and delay the entry of water into the tablet leading to this delay in the disintegration of tablets of F2[27].

In case of the superdisintegrant sodium starch glycolate was used in formulas F4, F5 and F6 in concentrations 5%, 3% and 1% (w/w) respectively. It was observed that the disintegration time was decreased as the concentration of the superdisintegrant was increased from concentration 1% to 5% (w/w).

Table 5 . Physical evaluation of core tablets of sumatriptan

Formula	Hardness (kg) Mean± SD, n=5	Content uniformity % Mean± SD, n=3	Disintegration time seconds Mean± SD, n=6
F1	4.1±0.13	97.31±0.77	14.25±0.95
F2	4.22±0.17	96.17±0.47	11±4.89
F3	4.52±0.32	98.07±0.45	17.5±2.5
F4	4.43±0.3	98.48±2.6	8.8±1.4
F5	4.7±0.2	95.15±1.08	11.67±1.6
F6	4.78±0.2	96.712±0.95	21.5±2.25

In-vitro release studies of core tablets

Figure 1 shows that F4 has faster dissolution rate where 100% release of Sumatriptan from core tablet obtained in 2 minutes this significant difference ($p \leq 0.05$), this was explained that sodium starch glycolate possesses the additional advantages of being soluble and readily dispersible in water. Its spherical particles, dispersed in a tablet system, offer a larger surface, thus allowing rapid penetration of water into the tablet interior. The main reasons for the efficiency of this disintegrant probably are its high rate of water uptake and its marked swelling properties; these factors cause pressure to be exerted within the tablet, thus breaking up interparticle bonding. This is then followed by the dissolution of sodium starch glycolate particles, which results in the crumbling and disintegration of the entire tablet structure [(28)]. SSG may swell up to three hundred times its original volume in water[(29)].

Formulas F4, F5, and F6 contain different concentrations of sodium starch glycolate used to study the effect of superdisintegrant concentration on the release of Sumatriptan from core tablets as shown in figure 2. F4 which contains 5% w/w sodium starch glycolate show higher percent of drug release. There was significant difference ($p \leq 0.05$) in dissolution rate between the formulas because as we increase in the concentration of superdisintegrant, the disintegration time will decrease. This disintegration is reported to affect dissolution characteristics as well[(30)].

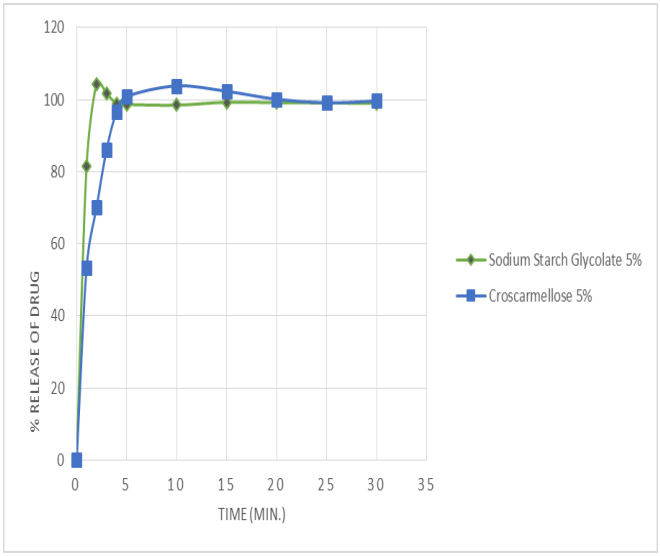

Figure 1. Effect of superdisintegrant type on drug release from core tablet (phosphate buffer pH 6.8, temp. 37 ^{0}C)

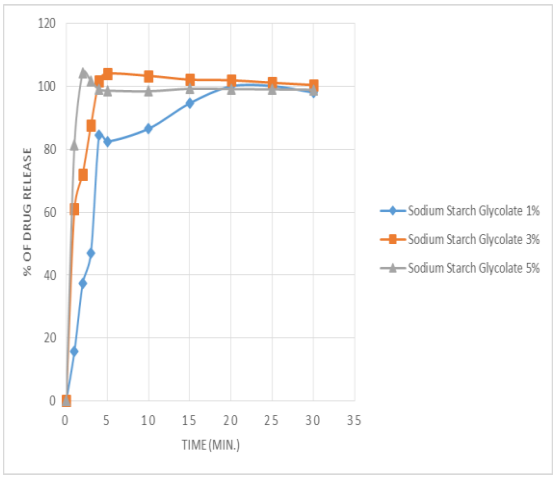

Figure 2. Effect of sodium starch glycolate concentration on drug release from sumatriptan core tablet (phosphate buffer pH 6.8, temp. 37 ^{0}C)

To prepare pulsatile press coated tablet, F4 (that contains 5% (w/w) sodium starch glycolate as superdisintegrant and avicel PH 102 as diluent) was selected as the optimum core part since it produced the fastest 100% release of sumatriptan within 2 minutes.

Post compression evaluation of press-coated pulsatile tablet

The results of hardness of all the press-coated tablets were shown in table 5. These results show that all the prepared press-coated tablets formula agrees with the requirements of USP. The hardness of the press-coated tablets was kept constant in the range 6-7 kg/cm^2 by mounting the

compression force of the machine to eliminate the variability in hardness. The hardness of the press coated tablets slightly increased as ethyl cellulose concentration was increased due to high compressibility of this polymer [31].

Table 6. Post formulation results of press coated core tablet of sumatriptan

Formula	Hardness (kg/cm^2)
C1	6.25±0.4
C2	6.75±0.06
C3	6.25±0.04

In-vitro release studies of press-coated pulsatile tablets

Formulas C1 –C3 were used to study the effect of the combination of natural and synthetic polymers in different proportions (pectin, ethylcellulose100 mpa.s and HPMCK15M). Ratios of the polymers used were 10:5:85, 10:10:80 and 15:5:80 w/w of coating layer; respectively. C1 and C2 was used to assign the effect of ethylcellulose 100 mpa.s and HPMCK15M on the lag time. It was noticed that as the ratio of HPMC increased the lag time will be decreased due to hydrophilicity nature of HPMC. C2 and C3 were used to observe the effect of pectin and ethylcellulose 100 mpa.s on lag time; it was observed that as the ratio of pectin was increased the lag time was decreased because of hydrophilic nature of pectin and its inherited swelling and eroding behavior [32].

The results of In-vitro release studies of press-coated pulsatile tablets are shown in table 7.

Table 7. Lag time of dissolution for different coating formulas of sumatriptan press-coated tablet

Formula	Composition	Lag time in h: min
C1	Pectin:EC100:HPMCK 15M 10:5:85	6:20
C2	Pectin:EC100:HPMCK 15M 10:10:80	7
C3	Pectin:EC100:HPMCK 15M 15:5:80	5:45

Coat formula C3 was chosen as coat for optimum core tablet formula F4 since it gave it gave 100% release the drug after 5.45 hours lag time, which is required to provide a maximum concentration of drug at the time of its maximum need.

Release profile of the press coated system of sumatriptan as shown in figure (3).

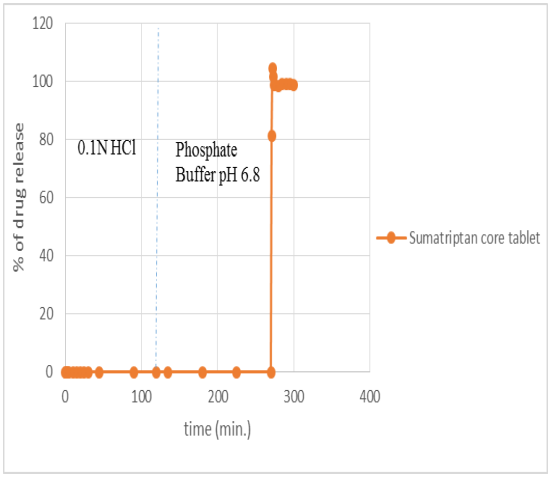

Figure 3. Release profile of sumatriptan from the selected final sumatriptan press-coated tablet

Drug – excipients compatibility studies

Compatibility studies were assigned by using :

- ***Differential Scanning Calorimetry (DSC)***

The DSC technique had been used for chemical stability and compatibility studies[33]. The differential scanning calorimetry (DSC) of sumatriptan pure drug, the physical mixture of optimum core tablet and the optimum core tablet of Sumatriptan were performed using a Shimadzu 8300 DSC, and the DSC thermogram of all samples had been shown in figures (4-6). The DSC thermogram of sumatriptan pure drug, the physical mixture of optimum core tablet and sumatriptan optimum core tablet exhibited the characteristic drug peak indicating compatibility and absence of interaction between the drug and the other components [34].

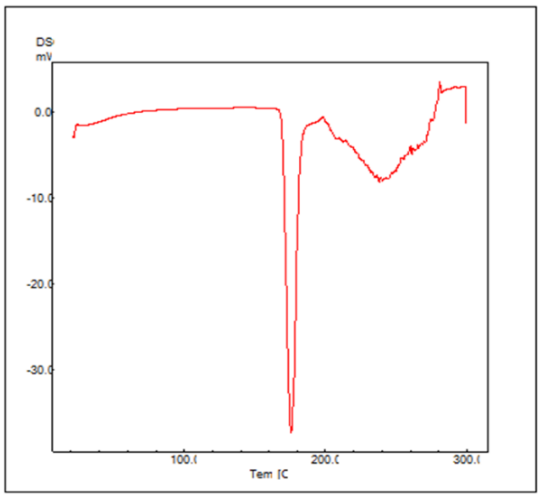

Figure 4. DSC thermogram of pure sumatriptan

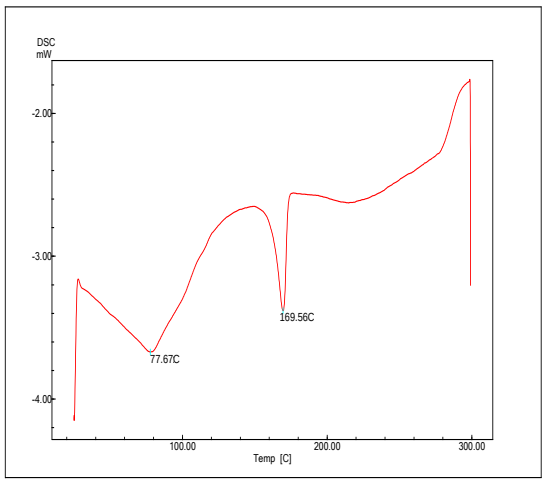

Figure 5. DSC thermogram of physical mixture of sumatriptan core tablet

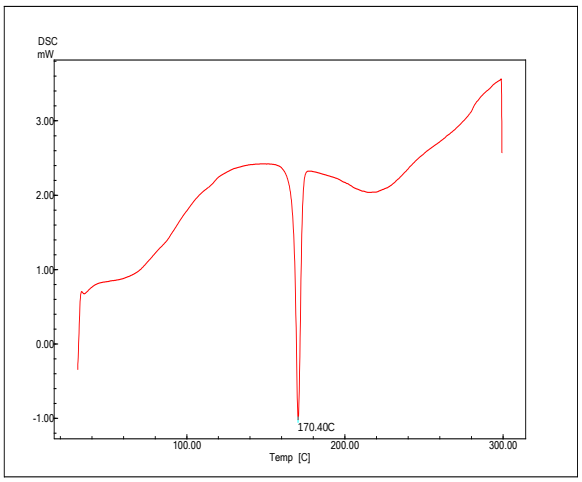

Figure 6. DSC thermogram of sumatriptan optimum core tablet

Fourier Transform Infrared Spectroscopy (FTIR):

FTIR spectrum of pure sumatriptan drug and the selected core tablet are shown in figures 7 and 8 respectively.

In figure 7 it was found the characteristic peaks of sumatriptan pure drug at 3373 cm^{-1}, 1298 cm^{-1}, 1236 cm^{-1}, 1082 cm^{-1} and 636 cm^{-1} belongs to N-H Stretching vibration, C-N stretching vibration, S=O stretching vibration and C-S stretching vibration, respectively.

In figure 8, the characteristics peaks of sumatriptan were found in core tablet were for N–H str. Primary amine at 3391 cm^{-1}, C–N str. at 1299.79 and 1233.26 cm^{-1}, and C–H str. at 2960–2850 cm^{-1} and S=O str. at 1057.76 cm^{-1} and C-S str. at 638 cm^{-1} [(39)].Figure 8 shows the FTIR spectrum of the selected formula of the core tablet F4 containing sumatriptan. There were no significant differences in the main characteristic bands of the drug indicating no interaction between drug and other additives in core tablet formula F4.

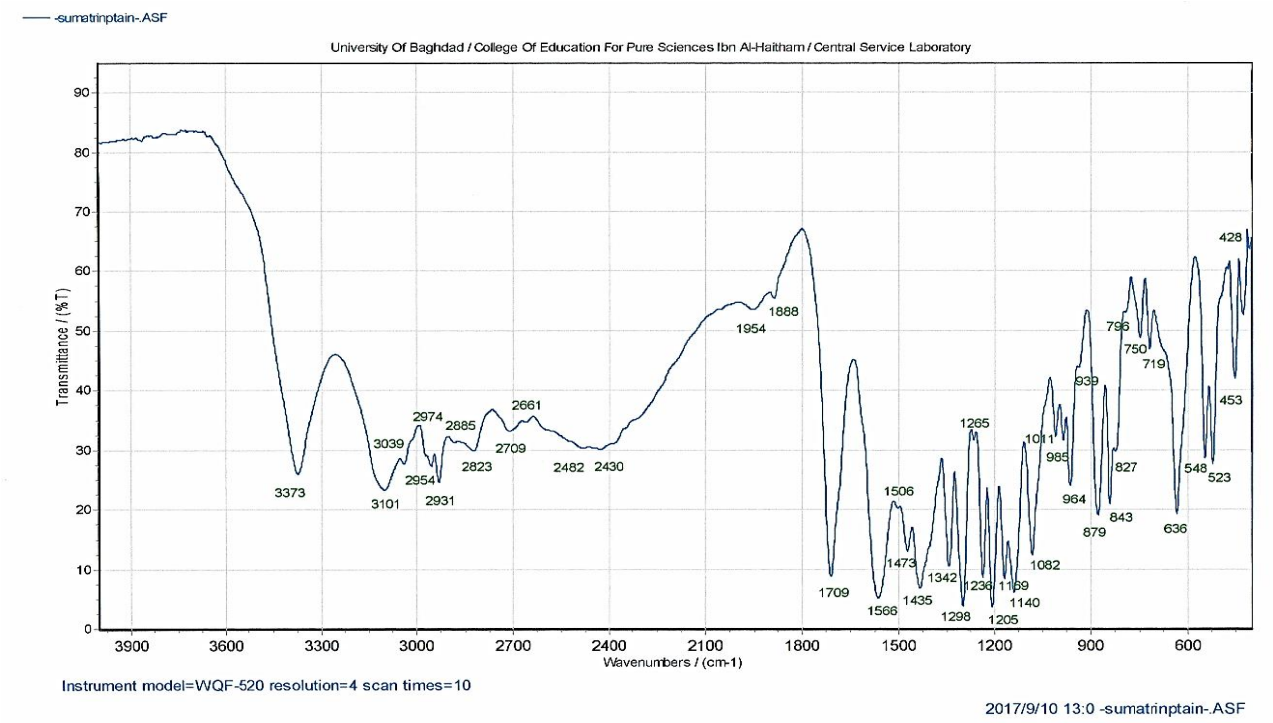

Figure 7. FTIR spectrum of sumatriptan

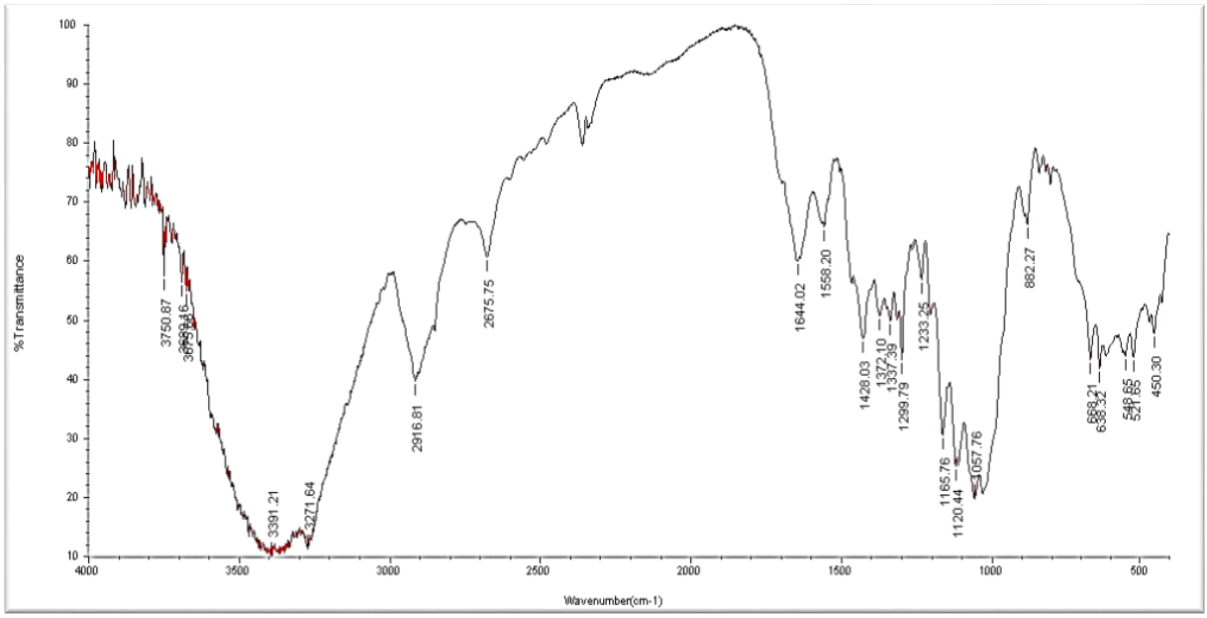

Figure 8. FTIR spectrum of the selected formula of sumatriptan core tablet

Conclusion

Press coated tablet of sumatriptan with core tablet containing avicel PH 102 as a diluent and 5% w/w of SSG as a superdisintegrant and coating layer containing combination of polymers which are pectin ,ethylcellulose 100mpa.s and HPMCK15M in concentration 30 mg:10 mg :160 mg respectively provides optimum lag time required to synchronize the migraine attack

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