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FORMULATION AND EVALUATION OF FAST DISSOLVING TABLETS OF PHENYTOIN SODIUM

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ABSTRACT

Fast dissolving tablet of phenytoin sodium was design with a view to provide a quick onset of action. The main objective of the study was to formulate fast dissolving tablets of phenytoin to achieve a better dissolution rate and further improving the bioavailability of the drug. Here Fast dissolving tablets were prepared by direct compression by using super disintegrants such as SSG,MCC and sodium alginates etc. Before preparing evaluated pre-compression parameters that results found to be within I.P limits. Among the all the 6 formulations F4 formulation containing SSG,MCC as super disintegrants considered to be best formulation which shows 98.7% drug release.

KEYWORDS: Phenytoin sodium, fast dissolving tablet, sodium starch glycerate, micro crystalline cellulose, sodium alginate.

1. INTRODUCTION

Fast- Dissolving Tablets

Fast-disintegrating or fast-dissolving tablets are becoming popular as novel delivery systems for drug administration. They are more convenient for children, elderly patients, patients with swallowing difficulties, and in the absence of potable liquids. The most desirable formulation for use by the elderly is one that is easy to swallow easy to handle. Taking these requirements into consideration, attempts have been made to develop a fast-disintegrating tablet. Since such a tablet can disintegrate in only a small amount of water in the oral cavity, it is easy to take for any age patient, regardless of time or place. For example, it can be taken anywhere at any time by anyone who do not have easy access to water. It is also easy to dose the aged, bed-ridden patients, or infants who have problems swallowing tablets and capsules. Recently, many companies have researched and developed various types of fast-disintegrating dosage forms.

The need for the development of fdt

Pateint factors

FDTs are suitable for those patients (particularly pediatric and geriatric patients) who are unable to swallow traditional tablets and capsules .These include the following:

1. Patients who have difficulty in swallowing oral tablet.
2. A middle-aged patient undergoing radiation therapy may be too nauseous to swallow H2- Blocker.
3. A psychotic patient who may try to hide a conventional tablet under his or her tongue to avoid their daily dose of an atypical antipsychotic.
4. A patient with persistent nausea, who may be journey or has little or no access to water.

Effectiveness Factor

Dispersion of drug in oral cavity causes pregastric absorption which avoids first pass hepatic metabolism which increase the bioavailability. Furthermore, safety profiles may be improved for drugs.

Manufacturing and marketing factors

As a drug nears the end of its patent life, it is possible for pharmaceutical manufacturers to develop a given drug entity in a new and improved dosage form. A new dosage form allows a manufacturer to extend market exclusivity, unique product differentiation, value- added product line extension, and extend patent protection, while offering its patient population a more convenient dosage form.

Advantage S Of Fast Disintegrating Drug Delivery System (Fdds)

Ease of administration to patients who refuse to swallow a tablet, such as pediatric and geriatric patients, mentally ill, disabled and uncooperative.

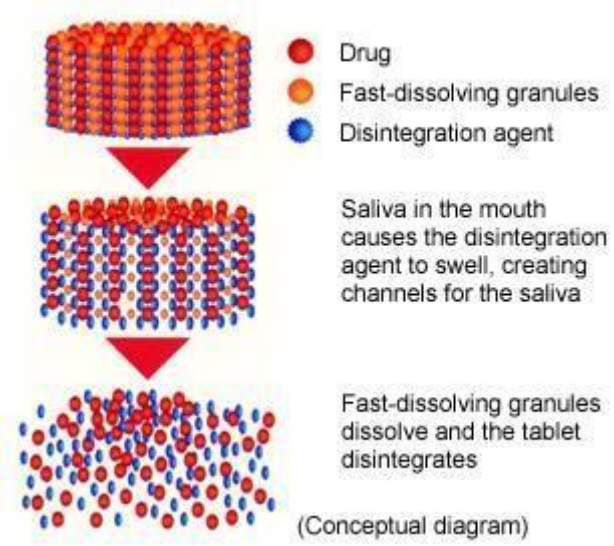
- Convenience of administration and accurate dosing as compared to liquids.
- No need of water to swallow the dosage from, which is highly convenient feature for patients who are

traveling and do not have immediate access to water.
- Good mouth feel property of FDDS helps to change the basic view of medication as "bitter pill", particularly for pediatric patients.
- Ability to provide advantages of liquid medication in the form of solid preparation.
- Rapid dissolution of drug and absorption, which may produce rapid onset of action.
- Some drugs are absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach; in such cases bioavailability of drugs is increased.
- Pregastric absorption can result in improved bioavailability and as a result of reduced dosage, improved clinical performance through a reduction of unwanted effects

Disadvantages
- Fast dissolving tablet is hygroscopic in nature so must be keep in dry place.
- Some time it possesses mouth feeling.
- MDT requires special packaging for properly stabilization & safety of stable Product.
- it is also shows the fragile, effervescence granules property.

Limitations of Fdds
- The tablets usually have insufficient mechanical strength. Hence, careful handling is required.
- The tablets may leave unpleasant taste and/or grittiness in mouth if not formulated properly.

Disintegration mechanism
- The materials used as disintegrants include starches, agar, amylose, cellulose and its derivatives, gum and its derivatives, gelatin, resins, and silicone compounds.
- A few mechanisms of action of disintegrants have been proposed. The first mechanism is evolution of gas from an effervescent couple, e.g., sodium bicarbonate with citric acid upon absorption of water. The expansion of gas can be enough to cause the tablet to disintegrate.
- Another mechanism is swelling of disintegrants by absorbing water to break up the tablet structure.
- In the tablet disintegration process, several factors may affect the disintegration. They include the rate of water absorption, porosity of the tablet, processing parameters, and effect of active ingredients, surfactants, binders, and lubricants. Fast disintegration always requires fast absorption of water into the center of the tablet. Thus, having open pore structures inside the tablets is very important for making fast dissolving tablets.



Disintegration of fast dissolving tablets

Conventional Techniques Used in the Preparation of Fast Dissolving Drug Delivery Systems
1. Freeze drying / lyophilization
2. Tablet Moulding
3. Direct compression
4. Spray drying
5. Sublimation
6. Mass extrusion

Freeze drying: A process, in which water is sublimated from the product after freezing, is called freeze drying. Freeze-dried forms offer more rapid dissolution than other available solid products. The lyophilization process imparts glossy amorphous structure to the bulking agent and some times to the drug, thereby enhancing the dissolution characteristics of the formulation. However, the use of freeze drying is limited due to high cost of the equipment and processing. Other major disadvantages of the final dosage forms include lack of physical resistance in standard blister packs.

Moulding: Tablets produced by moulding are solid dispersions. Physical form of the drug in the tablets depends whether and to what extent, it dissolves in the molten carrier. The drug can exist as discrete particles or micro particles dispersed in the matrix. It can dissolve totally in the molten carrier to form solid solution or dissolve partially in the molten carrier and the remaining particles stay undissolved and dispersed in the matrix. Disintegration time, drug dissolution rate and mouth feel will depend on the type of dispersion or dissolution.

Direct compression: It is the easiest way to manufacture tablets. Conventional equipment, commonly available excipients and a limited number of processing steps are involved in direct compression. Also high doses can be accommodated and final weight of tablet can easily exceed that of other production methods. Directly compressed tablet's disintegration and solubilization depends on single or combined action of disintegrates,

water soluble excipients and effervescent agent. Disintegrate efficacy is strongly affected by tablet size and hardness. Large and hard tablets have disintegration time more than that usually required. As consequences, products with optimal disintegration properties often have medium to small size and /or high friability and low hardness. Breakage of tablet edges during handling and tablet rupture during the opening of blister alveolus, all result from insufficient physical resistance.

The understanding of disintegrant properties and their effect on formulation has advanced during last few years, particularly regarding so called super disintegrants. Disintegration efficiency is based on force equivalent concept, which is the combined measurement of swelling force development and amount of water absorption. Force equivalent expresses the capability of disintegrant to transform absorbed water into swelling force. The optimization of tablet disintegration was defined by means of disintegrant critical concentration. Below this concentration, the tablet disintegration time is inversely proportional to disintegrate concentration and above that disintegration time remains approximately constant or even increases.

Spray-drying: Highly porous and fine powders can be produced by spray drying, as the processing solvent is evaporated rapidly during spray drying. Spray drying technique has been employed to prepare fast dissolving tablets. When immersed in an aqueous medium, the tablets compressed from spray-dried powder, disintegrated within 20 seconds.

Sublimation: Because of low porosity, compressed tablets composed of highly water- soluble excipients as tablet matrix material often do not dissolve rapidly in the water. Porous tablets that exhibit good mechanical strength and dissolve quickly have been developed. Inert solid ingredients (e.g.; urea, urethane, ammonium carbonate, camphor, naphthalene) were added to other tablet excipients and the blend was compressed into tablet. Removal of volatile material by sublimation generated a porous structure.

Mass-extrusion: This technology involves softening the active blend using the solvent mixture of water soluble polyethylene glycol, using methanol and expulsion of softened mass through the extruder or syringe to get a cylinder of the product into even segments using heated blade to form tablets. The dried cylinder can also be used to coat granules of bitter tasting drugs and thereby masking their bitter taste.

Formulations of Fast Dissolving Tablet

Super Disintegrants: Disintegrants play a major role in the disintegration and dissolution of FDT. It is essential to choose a suitable disintegrant, in an optimum concentration so as to ensure quick disintegration and high dissolution rates.

Examples: Sodium starch glycolate, Ac-di-sol (croscarmellose sodium), Crospovidone, Microcrystalline cellulose, Pregelatinised starch are some of examples of disintegrants.

Sugar Based Excipients: Sugar based excipients are used for taste masking and as bulking agents. Most of the dugs are having unpleasant or bitter taste. And the basic requirement for designing FDTs is that the drug should not have disagreeable taste.

Examples: Sorbitol, mannitol, xylitol, dextrose, fructose, etc. are mainly used.

Binders Binders hold the ingredients in a tablet together. Binders ensure that tablets and granules can be formed with required mechanical strength, and give volume to low active dose tablets.

ExamplesSaccharides and their derivatives: sucrose, lactose, starches, microcrystalline cellulose and cellulose ethers such as Hydroxypropyl cellulose (HPC) , xylitol, sorbitol or maltitol.

Diluents Fillers fill out the size of a tablet or capsule, making it practical to produce and convenient for the consumer to use. A good filler must be inert, compatible with the other components of the formulation, non hygroscopic, relatively cheap, and preferably tasteless or pleasant tasting. Plant cellulose (pure plant filler) is popular filler in tablets or hard gelatin capsules. Dibasic calcium phosphate is another popular tablet filler. Other examples of fillers include: lactose, sucrose, glucose, mannitol, sorbitol, calcium carbonate, and magnesium stearate, vegetable fats and oils.

Flavours Flavours can be used to mask unpleasant tasting active ingredients and improve the likelihood that the patient will complete a course of medication. Flavourings may be natural (**e.g**. fruit extract) or artificial.

Example: mint, cherry, anise, peach, apricot, liquorice, raspberry, vanilla.

Colours Colours are added to improve the appearance of a formulation. Colour consistency is important as it allows easy identification of a medication.

Lubricants Lubricants prevent ingredients from clumping together and from sticking to the tablet punches or capsule filling machine. Lubricants also ensure that tablet formation and ejection can occur with low friction between the solid and die wall. Common minerals like talc or silica, and fats

Example: svegetable stearin, magnesium stearate or stearic acid.

Glidants: Glidants are used to promote powder flow by

reducing interparticle friction and cohesion. These are used in combination with lubricants as they have no ability to reduce die wall friction.

Examples: fumed silica, talc, and magnesium carbonate.

Preservatives Some typical preservatives used in pharmaceutical formulations are:

Antioxidants like vitamin A, vitamin E, vitamin C, retinyl palmitate, and selenium

- Citric acid and sodium citrate
- Synthetic preservatives like the parabens: methyl paraben and propyl paraben.

Sweeteners: Sweetners are added to make the ingredients more palatable, especially in chewable tablets such as antacids or liquids like cough syrup. Therefore, tooth decay is sometimes associated with cough syrup abuse. Sugar can be used to disguise unpleasant tastes or smells.

Sublimating Agents The use of sublimating agents including camphor, menthol, and thymol was explored. The addition of camphor lowered the disintegration time (<30 s) further, but the percent friability was increased.

Important Patented Technologies For Fdt
Zydis TechnologyP
Zydis formulation is a unique freeze dried tablet in which drug is physically entrapped or dissolved within the matrix of fast dissolving carrier material. When zydis units are put require water to aid swallowing. To impart strength and resilience during handling, polymers such as gelatin, dextran or alginates are incorporated. These form a glossy

amorphous structure, which imparts strength. To obtain crystallinity, elegance and hardness, saccharides such as mannitol or sorbitol are incorporated. Water is used in the manufacturing process to ensure production of porous units to achieve rapid disintegration while various gums are used to prevent sedimentation of dispersed drug particles in the manufacturing process. Collapse protectants such as glycine prevent the shrinkage of zydis units during freeze-drying process or long-term storage. Zydis products are packed in blister packs to protect the formulation from moisture in the environment.

Wow Tab Technology
Yamanouchi patented this technology. WOW means without water. This technology utilizes conventional granulation and tableting methods to produce FDTs employing low- and highmouldabilit saccharides. Low mouldability saccharides are lactose, mannitol, glucose,sucrose, and xylitol. High-moldability saccharides are maltose, maltitol, sorbitol, and oligosaccharides. When these low- and highmoldable saccharides are used alone tablets obtained do not have desired properties of rapid disintegration and hardness, so combinations are used. The active ingredient is mixed with a low mouldability saccharide (eg. lactose, glucose, and mannitol) and granulated with a high mouldability saccharide (eg. Maltose, oligosaccharides) and compressed into table. Thus tablets obtained showed adequate hardness and rapid disintegration. Because of hardness, shows fast salvation in mouth and offer a very pleasant the tablet is more stable in the environmental conditions mouth feel. The general manufacturing method of tablets than the Zydis or Orasolv and is fit for both usual bottle by this technology involves preparation of sucrose and blister packaging.

Durasolv Technology
This technology is patented by CIMA Labs. The tablets produced by this technology utilize the conventional tableting equipment. Tablets in this are formulated by using drug, nondirect compression fillers, and lubricants. Nondirect compressible fillers are dextrose, mannitol, sorbitol, lactose, and sucrose, which have advantage of quick dissolution and avoid gritty texture. The tablets have disintegration time less than 60 seconds. In this technology more amounts of hydrophobic lubricants, can be used in the formulation. Low compressive force is required to compress the tablet. The production cost is significantly less because direct compression method and conventional package equipment are employed.

Flashtab Technology
Prographarm labs have a patent over this technology. In this technology, microgranules of the taste-masked active drug are used. These may be prepared by using conventional techniques like coacervation, microencapsulation, and extrusionspheronisation. All these processes utilize conventional tableting technology. These tastemasked micro crystals of active drug, disintegrating agent, a swelling agent and other excipients like soluble diluents etc. are compressed to form a multiparticulate tablet that disintegrates rapidly. Disintegrating agents include reticulated polyvinylpyrrolidine or carboxy methylcellulose. Swelling agents include carboxy methylcellulose, starch, modified starch, microcrystalline cellulose, carboxy methylated starch, etc. These tablets have satisfactory physical resistance. Disintegration time is within 1 min.

2. MATERIALS AND METHODOLOGY

Materials

Materials	Suppliers
Phenytoin sodium	S. R Chemicals and Pharmaceuticals India
Mannitol	ESSEL Fine chem. Ltd, India
Sodium starch glycolate	MYL Chem. Mumbai
Aspartame	
Talc	S. D Fine Chem. Ltd, Mumbai, India
Magnesium stearate	S. D Fine Chem. Ltd, Mumbai, India

Equipments

Equipment	Model/ Company
Electric balance	Citizen, India
Tablet compression machine	Cadmach single punch machine
Hardness tester	Monsanto hardness tester
Friability test apparatus	Riche Rich
Dissolution test apparatus	Lab India
Disintegration test apparatus	Campbell electronics
U.V Visible spectrophotometer	Shimadzu UV – 1601, Japan

Preparation of Calibration Curve For Phenytoin Sodium

Standared Curve In PH 7.4 Phosphate Buffer

Stock solution preparation

Accurately weighed 100 mg of drug (phenytoin sodium) was first dissolved in100 ml of pH 7.4 phosphate buffer in 100 ml of volumetric flask to make a concentration of 1000 µg/ml (primary stock solution). From the primary stock solution take 10 ml and make up the volume up to 100ml with pH7.4 Phosphate buffer to make a concentration of 100µg/ml (secondary stock solution).

Sample preparation

From the secondary stock solution pipette out 0.5, 1, 1.5, 2, 2.5 and 3 in to 10ml of volumetric flask and volume made up to with 7.4 pH Phosphate buffer to give various concentrations such as 5, 10, 15, 20, 25 and 30µg/ml were prepared for calibration curve. Standard curve was plotted by taking absorbance of secondary stock solutions in UV double beam spectrophotometer at 224 nm.

Preparation of fast dissolving tablets of Phenytoin sodium

By direct compression method

Fast dissolving tablets of Phenytoin sodium were prepared by taking active drug as phenytoin sodium and mixed with diluents such as mannitol, superdisintegrantes SSG and other Excipients according to prepared formulation then Prepared power blend were directly compressed by using tablet compression machine. Finally 200mg phenytoin sodium tablets were collected.

Ingredien (mg)	F1	F2	F3	F4	F5	F6
Phenytoin sodium	100	100	100	100	100	100
Mannitol	65	65	65	65	65	65
Sodium starch glycolate	20	-	-	10	10	-
Micro crystalline cellulose	-	20	-	10	-	10
Sodium alginate	-	-	20	-	10	10
Aspartame	10	10	10	10	10	10
Talc	3	3	3	3	3	3
Magnesium stearate	2	2	2	2	2	2

Formulation table

Evaluation Parameters For Fast Dissolving Tablets Of Phenytoin Sodium

Active pharmaceutical ingredients (API) characterization

Organoleptic Evaluation:- These are preliminary characteristics of any substance which is use full in identification of specific material. Following physical properties of API were studied.

1. Color
2. Odour
3. Taste

PARAMETERS	PHENYTOIN SODIUM
Organoleptic evaluation	White
Solubility analysis	Soluble in water; the solution is turbid unless pH is adjusted to 11.7. soluble in practically in chloroform, in ether and in methyl chloride.

Precompresstion Parameters

Bulk density

It is the ratio of total mass of powder to the bulk volume of powder. It was measured by pouring the weighed powder (passed through standard sieve # 20) into a measuring cylinder and initial weight was noted. This initial volume is called as bulk volume. From this the bulk density is calculated according to the formula mentioned below. It is expressed in g/ml and is given by

ADb = M/ Vb

Where, M is the mass of powder, Vb is the bulk volume of the powder.

Tapped Density (dt)

It is the ratio of total mass of the powder to the tapped volume of the powder. Volume was measured by tapping the powder for 750 times and the tapped volume was noted if the difference between these two volumes is less than 2%. If it is more than 2%, tapping is continued for 1250 times and tapped volume was noted. Tapping was continued until the difference between successive volumes is less than 2 % (in a bulk density apparatus). It is expressed in g/ml and is given by:

Dt = M / Vt

Where, M is the mass of powder, Vt is the tapped volume of the powder.

Carr's index or % compressibility

It indicates powder flow properties. It is expressed in percentage and is give: Tapped density

Carr's index = Tapped density

%compressibility	Flow ability
5-12	Excellent
12-16	Good
18-21	Fair passable
23-35	Poor
33-38	Very poor
<40	Very Very poor

Hausner ratio

Hausner ratio is an indirect index of ease of powder flow. It is calculated by the following

Formula

Hausner ratio = Tapped density Bulk density

Angle of repose

The angle of repose has been used to characterize the flow properties of solids.

It is defined as maximum angle possible between the surface of the pile of powder and the horizontal plane

tan (ø) = h / r

(ø) = tan-1 (h / r)

Where, ø - is the angle of repose, h - height in cm, r - radius in cm.

The powder mixture was allowed to flow through the funnel fixed to a stand at definite height (h). The angle of repose was then calculated by measuring the height and radius the heap of powder formed. Care was taken to see that the powder particles slip and roll over each other through the sides of the funnel. Relationship between angle of repose and powder flow property.

Bulk density

Flow properties and corresponding angles of repose.

Compressibilit Index (%)	Flow Character	Hauser's Ratio
10	Excellent	1.00–1.11
11–15	Good	1.12–1.18
16–20	Fair	1.19–1.25
21–25	Passable	1.26–1.34
26–31	Poor	1.35–1.45
32–37	Very poor	1.46–1.59
>38	Very, very poor	>1.60

Post Compression Parameters

2. Hardness: -- The limit of hardness for the FDT is usually kept in a lower range to facilitate early disintegrate in the mouth. The hardness of the tablet may be measured using conventional hardness testers (Monsanto tablet hardness tester). It is expressed in kg/cm2 or pound

3. Weight variation test

This is an in process quality control test to ensure that the manufacturers control the variation in the weight of the compressed tablets, different pharmacopoeia specify these weight variation tests. These tests are primarily based on the comparison of the weight of the individual tablets of a sample of tablets with an upper and lower percentage limit of the observed sample average. The

USP has provided limits for the average weight of uncoated compressed tablets. These are applicable when the tablet contains 50mg or more of the drug substance or when the latter comprises 50% or more, by weight of the dosage form.

Method

Twenty tablets were weighed individually and the average weight was calculated. The individual tablet weights are then compared to the average weight. Not more than two tablets should differ in their average weight by more than percentages stated in USP. No tablet must differ by more than double the relevant percentage.

Limits for tablet weight variation test.

Average weight of tablet (mg)	% Difference allowed
130 or less	10%
From 130 to 324	7.5%
> 324	5%

4. Friability

Friction and shock are the forces that most often cause tablets to chip, cap or break. The friability test is closely related to tablet hardness and designed to evaluate the ability of the tablet to withstand abrasion in packaging, handling and shipping. It is usually measured by the use of the Roche friabilator.

Method

A number of tablets are weighed and placed in the apparatus where they are exposed to rolling and repeated shocks as they fall 6 inches in each turn within the apparatus. After four minutes of this treatment or 100 revolutions, the tablets are weighed and the weight compared with the initial weight. The loss due to abrasion is a measure of the tablet friability. The value is expressed as a percentage. A maximum weight loss of not more than 1% of the weight of the tablets being tested during the friability test is considered generally acceptable and any broken or smashed tablets are not picked.

The percentage friability was determined by the formula:

$\% \text{ Friability} = (W_1 - W_2) / W_1 \times 100$

W_1 = Weight of tablets before test W_2 = Weight of tablets after test

5. IN VITRO disintegration time

For a drug to be absorbed from a solid dosage form after oral administration, it must first be in solution, and the first important step toward this condition is usually the break-up of the tablet; a process known as disintegration. The disintegration test is a measure of the time required under a given set of conditions for a group of tablets to disintegrate into particles which will pass through a 10 mesh screen. Generally, the test is useful as a quality assurance tool for conventional dosage forms.

Method

The U.S.P. device to test disintegration uses 6 glass tubes that are open at the top and 10 mesh screen at the bottom end. To test for disintegration time, one tablet is placed in each tube and the basket rack is positioned in a 1-L beaker of water, simulated gastric fluid or simulated intestinal fluid at 37 ± 2^0C such that the tablet remain 2.5 cm below the surface of liquid on their upward movement and not closer than 2.5 cm from the bottom of the beaker in their downward movement. Move the basket containing the tablets up and down through a distance of 5-6 cm at a frequency of 28 to 32 cycles per minute. Floating of the tablets can be prevented by placing perforated plastic discs on each tablet. According to the test the tablet must disintegrate and all particles must pass through the 10 mesh screen in the time specified. If any residue remains, it must have a soft mass. If one or two tablets fail to disintegrate, the test is repeated using 12 tablets.

Disintegration time: Uncoated tablet: 5 minutes.
Coated tablet: 1-2 hours

6. IN VITRO dissolution studies

IN VITRO dissolution study was performed by using USP dissolution testing apparatus 2 (Paddle method). Weighed tablets from different batches were kept in a flask of the dissolution apparatus containing 500 ml of pH 6.8 Phosphate buffer dissolution medium maintained at 37 ± 0.5ºC and at a speed of 50 rpm. Aliquot of dissolution medium (5 ml) was withdrawn at specific time intervals and the samples were replaced with fresh dissolution medium. Aliquot were analyzed spectrophotometrically at 242 nm against Suitable blank using UV-visible spectrophotometer.

7. Wetting time

Wetting time is closely related to the inner structure of the tablets and to the hydrophilicity of the excipient. To measure wetting time, five circular tissue papers of 10 cm diameter are placed in a petridish with a 10 cm diameter. Ten millimeters of water- containing Eosin, a water soluble dye, is added to petridish. A tablet is carefully placed on the surface of the tissue paper. The time required for water to reach upper surface of the tablet is noted as a wetting time. It is obvious that pores size becomes smaller and wetting time increases with an increase in compression force or a decrease in porosity. A linear relationship exists between wetting time and disintegration time. Thus wetting is the important step

for disintegration process to take place.

8. Water absorption ratio

A piece of tissue paper folded twice was placed in a small Petri dish containing 6 ml of water. A tablet was put on the paper & the time required for complete wetting was measured. The wetted tablet was then weighed. Water absorption ratio, R, was determined using following equation,

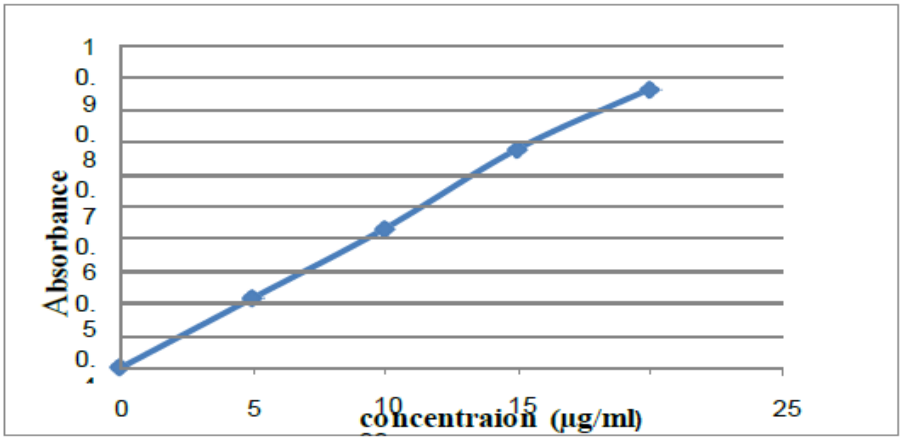
$R = 100 (Wa-Wb) / Wb$

Wb =The weight of the tablet before keeping in the petridish Wa = The wetted tablet from the petridish

3. RESULTS AND DISCUSSION

Standard calibration curve of phenytoin sodium.

S.NO	Concentration (µg/ml)	Absorbance
1	0	0
2	5	0.216
3	10	0.432
4	15	0.678
5	20	0.864
6	25	1.08
7	30	1.296



Standard graph of phenytoin sodium by using 7.4 phosphate buffer

Pre-Compression Parameters

The flow properties of the formulations were found to be in limit and the optimised formula was in limit and has a fair flowing property. This had no effect during compression of tablets.

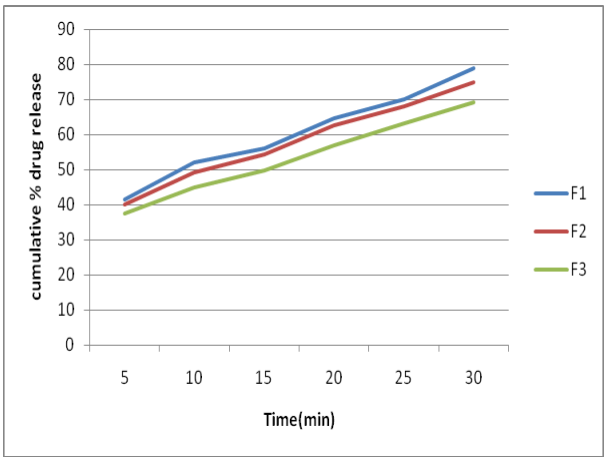
Formulation	BulkDensity (gm/ml)	TappedDensity (gm/ml)	Carr'sIndex (%)	HauserRatio	Angle of repose
F1	0.33	0.37	10.81	1.121	28.72ºC
F2	0.37	0.43	13.95	1.162	29.54ºC
F3	0.49	0.65	24.61	1.326	30.21ºC
F4	0.21	0.25	0.16	1.190	26.24ºC
F5	0.25	0.31	19.35	1.24	26.81ºC
F6	0.28	0.32	12.5	1.142	27.48ºC

Post-Compression Parameters

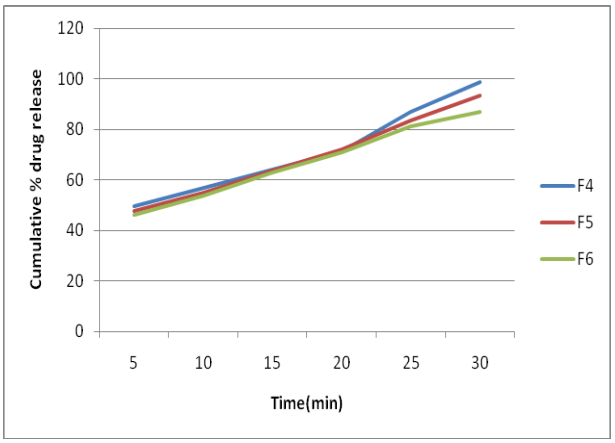
Formulation	Weight variation (mg)	Hardness (KP)	Thickness (nm)	Disintegration (sec)	Fraibility (%)	Wetting time (sec)	Water absorption ratio (%)
F1	200	3.7	2.69	62	0.56	55	69.4
F2	198	3.8	2.78	57	0.64	48	62.1
F3	197	4.1	2.87	53	0.69	43	59.6
F4	199	3.4	2.57	29	0.45	20	83.5
F5	198	3.7	2.69	38	0.49	24	79.8
F6	201	3.6	2.66	42	0.52	35	72.3

Invitro Drug Release

Time (min)	F1	F2	F3
5	41.5	40	37.6
10	52.1	49.2	45
15	56	54.2	49.8
20	64.7	62.6	56.9
25	70	68	63.3
30	79	74.8	69.2



Time (min)	F4	F5	F6
5	49.7	47.6	46.2
10	57.1	55	54
15	64	63.4	62.8
20	71.3	72	70.9
25	87	83.5	81.2
30	98.7	93.2	87



DISCUSSION

Calibration curve of phenytoin sodium

The calibration curve of phenytoin sodium was obtained in the range of 5 to 30 µg at the wavelength of 224 nm. It has shown good linearity with a regression coefficient of 0.9975(r^2 value).

Evaluation parameters for fast dissolving tablets of phenytion sodium

Pre-compression parameters

The values for angle of repose were found in the range of 32°-39°. Bulk densities and tapped densities of various formulations were found to be in the range of 0.49±0.006 to 0.21±0.007 (g/cc) and 0.65±0.01 to 0.25±0.02 (g/cc) respectively. From the result it was concluded that the powder blends had good to fair flow properties and these can be used for tablet manufacture.

Post Compression Parameters

1. Hardness test

Hardness of the three tablets of each batch was checked by using Monsanto hardness tester and the data's were shown in Table no. The results showed that the hardness of the tablets was in range of 4.1 to 3.4 Kg/cm^2.

2. Weight variation test

Tablets of each batch were subjected to weight variation test, difference in weight and percent deviation was calculated for each tablet. The average weight of the tablet is approximately 200 mg; so the permissible limit is 5%. The results of the test showed that, the tablet weights were within pharmacopeial limit.

3. Friability: Tablets of each batch were evaluated for percentage friability. The average friability of all the formulations lies in the range of 0.69 % to 0.45 % which was less than 1% as per official requirement of IP indicating a good mechanical resistance of tablets.

4. In vitro disintegration time

Tablets of each batch were evaluated for IN VITRO disintegration time and the data's were shown in the Table 20. The results showed that the disintegration time of prepared tablets were in the range of 62 - 29 (secs) the tablets of batch F6 prepared using crosspovidone which is suitable for tablet punching.

5. In vitro dissolution studies

Finally, the tablets were evaluated for IN VITRO dissolution studies in Phosphate buffer. Formulations F1 showed 63.3% of drug release with 2mg of SSG, F2 showed 73.8% of drug release with 4mg of SSG, F3 which contain 8mg of SSG showed 78% of drug release with in 30 min, F4 showed 81.8% of drug release with 12mg of SSG, F5 showed 87% of drug release with 16mg of SSG and finally F6 showed 98.7% of drug release with 32.5% of mannitol . This result exhibit a direct relationship between concentration of super disintegrants and drug release. Among the various formulations tablets of batch F6 prepared with 20 mg SSG showed complete release of drug within 30 min.

4. CONCLUSION

- From the investigation it may be concluded that release rate of drug from the fast dissolving tablets can be governed by the concentration and type of super disintegrants employed in the preparation of tablets.
- The pre-compression blend of all formulations were subjected to various evaluation parameters such Bulk denisity, tapped density, angle of repose and compressibility index, Hasner's ratio were found to be within the limits.
- The post compression parameters of all the

formulations also found to be within the limits.

- Among all the 6 formulations of fast dissolving tablets of phenytoin sodium F4 formulation i.e, consists of SSG&MCC is the best formulation because showing % drug release 98.7%

5. REFERENCE

1. Cheng R, Guo X, Burusid B, Couch R.A review of fast dissolving tablets.Pharm Tech, (North America).June, 2000; 52-58.
2. Bi Y, Sunada H, Yonezawa Y, Dayo K,Otsuka A, Iida K.Preparation and evaluation of compressed tablet rapidly disintegrating in oral cavity.Chem PharmBull(Tokyo), 1996; 44: 2121-2127.
3. Quick dissolving tablets.http:/www.biospace.com .27may, 2001.
4. Fu Y, Yang S, JeongSH, Kimura S, Park K. Orally fast disintegrating tablets: Developments, technologies, taste-masking and clinical studies. Crit Rev Ther Drug Carrier Sys, 2004; 21: 433-76.
5. Suresh Bandari, Rajendar kumarMitta palli,Ramesh Gannu,Yamsani Madhusudan Rao. Orodispersible tablets:An overview. Asian Journal of pharmaceutics, Jan 2008.