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FORMULATION AND EVALUATION OF FAST DISSOLVING TABLET CONTAINING ACETAZOLAMIDE

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Keywords:

MDTs- Multidrug Therapy, IP- Immune-precipitation, UV- Ultra violate

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ABSTRACT: This entire study is based on the drug delivery system of the pharmaceutical company to design the drugs. In order to identify the effectiveness of the drug, this study has tried to identify the bonds between peptides & proteins. In this context, this study has chosen the drug acetazolamide and based on the chemical properties, it has made a calibration curve of the drugs in water solution. In addition, this study has tried to analyze the recompression factors to identify the percentages of drug release in relevant time duration.

INTRODUCTION: Drug delivery systems in the pharmaceutical industry have been known for the drug designing process. The dosage of tablets and capsules is quite popular in the pharmaceutical world. The popularity and effectiveness of tablets occur in the evolution of several pharmaceutical industries. For past decades, oral drug dispatch has been known to be the most broadly advantageous route of administration among all the different routes. It can be said that the drugs of the next generation can be predominantly based on "peptides and protein and that may cause the loss of the authority of conventional hard dosage forms unsettled to the difficulty of traditional dosing such drugs in the form of mouth dissolving tablets. The tablet is one of the most used dosages for the convenience of using drugs.

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In addition, due to the compactness, self-estimation and easy manufacturing process, this study will conduct this experiment to identify the percentages of drug releases in terms of proper time duration within the proper solution.

Review of Literature: The concerned research aimed to analyze the activity of the chosen drug with the help of different advanced technology. The main focus of this section was to review the pre-existing data findings from different scientific sources. According to the viewpoint of conventional or patent technologies might be used for developing technologies concerning the production of oral disintegrating tablets [8]. Doctors recommend oral pills to patients because they can be taken anywhere at any time. On the other hand, it does not require water for swallowing and shows its efficacy within minutes. Furthermore, it has also been observed that these tables get melted or dispersed within the mouth as soon as it is taken. The fast-dissolving tablets were formulated by direct compression method by use of natural super-disintegrating substances like dehydrated banana

powder of banana. According to various research and studies, it has been observed that the demand for using MDTs has increased because of their waterless usage and other associated benefits [4]. The past applications of the selected drug have been critically analyzed and further reviewed in this article. Recent discoveries concerning this drug's production have been introduced to improve the performance of the pharmaceutical industry.

In this context, a broad range of drugs can be developed in tablet forms. Fast dissolving tablets have been formulated by the following techniques: Tablet moulding, spray drying, lyophilization, sublimation, and addition of disintegrants & so on. There are several kinds of the fast dissolving tablets such as ***"****Zydus, OraSolv, DuraSolv, Flash Dose & Wow tab".* This study aims to formulate tablets which can be easily disintegrated and compressed directly to get uniformity in the tablets [11]. Due to the palatability of the drugs, they can be accepted by patients of any age group. Due to the easy process of administration of the drugs, it uses in the treatment of the drugs such as *"Meniere's disease".*

In order to develop the capsules, there should consider the different kinds of physiochemical properties of the components of the tablets in terms of getting aware of any kind of side effects [10]. In order to develop the tablets, there should adopt an innovative drug delivery system in terms of getting the safest, most convenient as well as economical methods of the administration process. In order to improve the limitation of compliances, it is highly necessary to design the new dosage of the drugs.

MATERIALS AND METHODS: Various materials and methods were used for the formulation of tablets. The "disintegration time" of tablets is made by using different methods. The materials used in the above experiment such as "Crospovidone, Saccharin sodium, microcrystalline cellulose, Acetazolamide," and so on. Various parameters have been set for the formulation of the MDTs, such as disintegration time, hardness of the tablets, friability, drug-containing test, thickness, weight variations, and so on. All the formulated tablets were performed through the "weight variation test" as the % weight variation was within the IP limits. The limit should be ±7.5% of the weight [7].

According to standard pharmacopoeia, the standard thickness of tablets was explored to be 2.58 mm. Each formulation batch was arbitrarily taken, and the force required to splits the tablets was explained using a "hardness tester" [5]. As a result, the hardness of the tested sample was 2.5 to 3.0 kg/cm2. "Roche-type friability test apparatus" was used to test the chosen compound's friability. The highest friability of the test was explored to be 0.8%. The results content of the drug was within the limit specified by the IP. To identify the percentages of drug releases, this study has tried to use of hardness test based on the sample solution of the drugs [11]. On the other hand, it has tried to estimate the value of friability in terms of getting results based on the content of the drugs that the IP has restricted.

RESULTS AND DISCUSSION: A recent examination was performed to evaluate and formulate the mouth-dissolving acetazolamide tablets by "direct compression method" using "corn starch, sodium starch glycolate, magnesium stearate, povidone, and dicalcium phosphate" as directly compressible to enhance palatability [2]. The experimental design aimed to analyze the mechanism of action of the chosen drug through the preparation of MDTs. The sublimation and direct compression methods were adopted for the formulation of the chosen tablet. The findings obtained from the experimental design are further examined and evaluated. The evaluation of the data findings is further provided in the image below.

TABLE 1: PHYSICAL PROPERTIES OF THE CHOSEN DRUG

S. no.	Test	Specification	Observation
1	Colour	White or yellowish-white	White
2	Taste	Not clear	Champagne like
3	Appearance	Crystalline powder	Powder
4	Melting Point	258-259°C	261-263°C
5	Solubility	Slightly soluble in water and ethanol, insoluble in chloroform and ether	Slightly soluble in water, soluble in acetone, insoluble in chloroform

Calibration Data of the Drug in Water: The value of λmax of the drug acetazolamide has been determined through the scanning method of the solution of the drug 10µg/ml with the help of a UV spectrophotometer of 200-400 nm. The value of λmax is 288nm, used to determine the presence of the drug in the solution. The absorbance of the solution of the drug of 5-25 µg/ml solutions can be measured with the 288nm of UV spectrophotometer as per given in **Table 1.**

TABLE 2: CALIBRATION DATA OF ACETAZOLAMIDE

S. no.	Concentration (µg/ml)	Absorbance at 288nm
1	5	0.159
2	10	0.306
3	15	0.469
4	20	0.601
5	25	0.771

"Calibration Curve of Acetazolamide": 10µg/mL solution was scanned to determine the maximum wavelength in different concentrations. The reading of the UV spectrophotometer was calculated in a range between "200 nm and 400 nm". Furthermore, the absorbance was calculated and measured at 288 nm. The drug concentration that was used for measuring the absorbance ranged between "5µg/mL and 25µg/ml".

According to the calibration curve data, a linear regression correlation was found, and the correlation value is 0.998 in the water. These values of the calibration curve have been denoted by the reaction y =mx+c. Each value of the reaction has mentioned below:

Y – Absorbance at 288 nm

X– Concentration

Slope (m) – 0.030 Intercept (c)–0.005

Abs=0.030 conc.+ 0.005

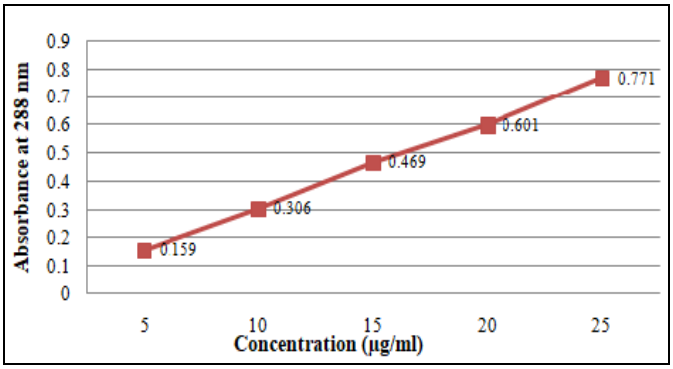

FIG. 1: "CALIBRATION CURVE OF THE DRUG IN WATER"

Pre-compression Parameters: All formulations have been stated as per formulation testing to maintain the stability of the compression. In this test "the bulk and tapped density, angle of repose, Hausner's ratio and Carr's Index" [6] have been used in determining the compressibility & the properties of the flow.

TABLE 3: PRE-COMPRESSION PARAMETERS

Formulation Code	Bulk density (g/cm^3)	Tap density (g/cm^3)	The angle of repose(°)	Carr's index (%)	Hausner's Ratio
MDT1	0.769	0.901	28.71	14.65	1.17
MDT2	0.765	0.903	31.22	15.28	1.18
MDT3	0.768	0.899	29.26	14.57	1.17
MDT4	0.772	0.897	30.11	13.94	1.16
MDT5	0.765	0.9	28.29	15.00	1.18
MDT6	0.769	0.896	29.63	14.17	1.17
MDT7	0.771	0.891	31.48	13.47	1.16

This section of the study has discussed the parameters of the pre-compression such as the % of drug release through the evaluation of MDTs [3]. Moreover, this study has evaluated the hardness, thickness, Weight variation, and friability and thus it has tried to measure the amount of drug content in water. The below table has been made based on the direct compression method based on the dissolving capabilities. Through this table, it has tried to compare within the disintegration time, % of drug release from the MDTs

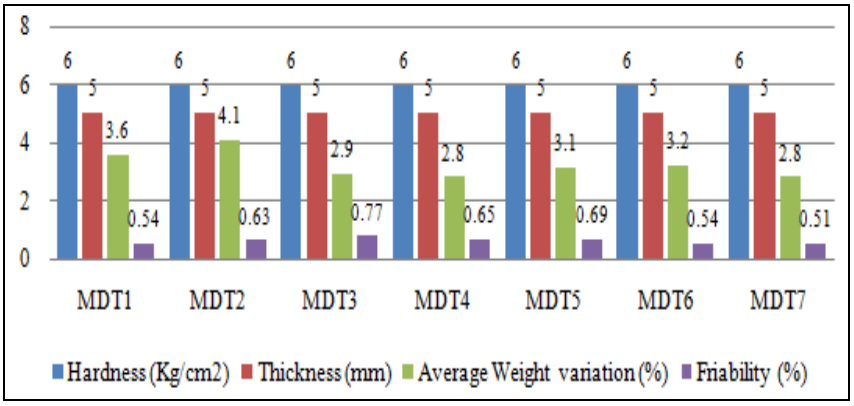

FIG. 2: COMPARISON OF POST-COMPRESSION PARAMETERS

TABLE 4: COMPARISON OF WETTING, WATER ABSORPTION, DISINTEGRATION TIME & % OF DRUG RELEASE

Formulation Code	Wetting time (seconds)	Water absorption ratio	Disintegration time (seconds)	Drug release (%)
MDT1	39	78.6	37.2	80.80
MDT2	43	81.4	49.3	88.70
MDT3	47	76.1	28.9	90.40
MDT4	36	83.7	34.6	91.90
MDT5	29	78.5	31.3	95.10
MDT6	31	81.9	26.4	96.10
MDT7	32	87.3	28.1	96.90

This table there has tried to present the high capillary activity of the drug in terms of pronouncing hydration & gelling capacity [1]. On the other hand, this table shows the hardness and structure of the pores that can increase water uptake and may increase the faster rate of disintegration.

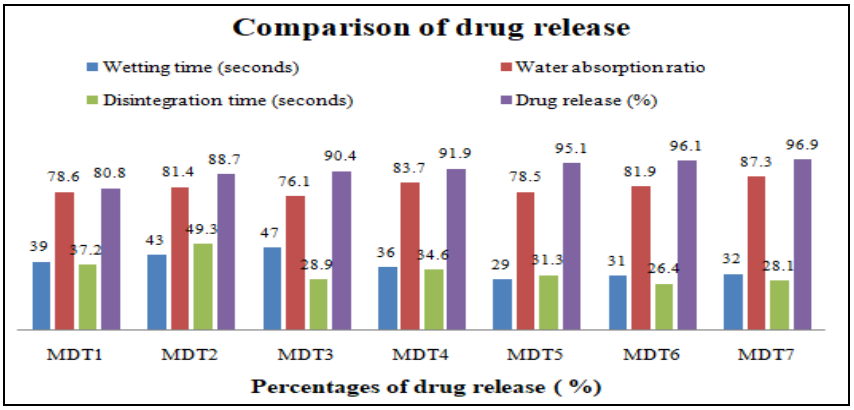

FIG. 3: COMPARISON OF WETTING, WATER ABSORPTION, DISINTEGRATION TIME & PERCENTAGE OF DRUG RELEASE

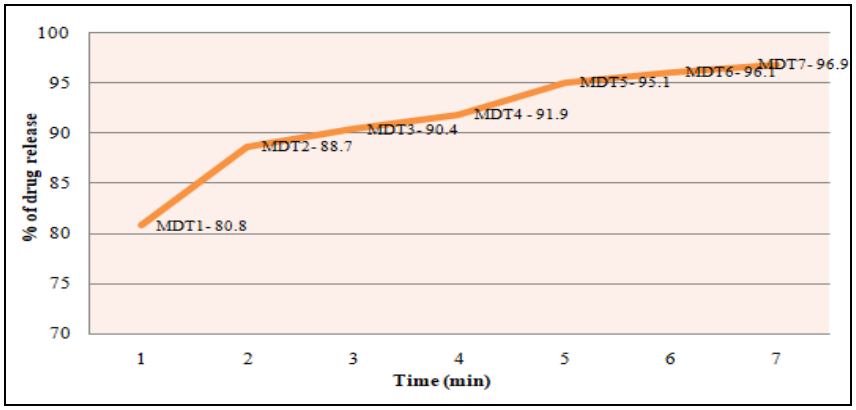

FIG. 4: PERCENTAGE OF *IN-VITRO* DRUG RELEASE BASED ON THE FORMATION OF THE DRUGS

CONCLUSION: Thus, it can be concluded that the intake of oral pills such as "acetazolamide" has been gaining popularity nowadays. The research has also focused on various unique and sophisticated technologies for analyzing the effectiveness and efficacy of the chosen drug. The chosen drug can be formulated by disintegrating the sublimating agents. The study concludes the significance of these agents by calculating the efficacy through drug action as well as the peak concentration of the plasma. The benefits of MDTs can be assayed from this research concerning the proper management of "acute allergic symptoms". The future scope of this research lies in different areas analyzed through this experimental procedure. This research has opened wide paths concerning the activity of the chosen drug using multiple digital technologies. Further research on the following topic can be done using data from this study. Furthermore, this article could be used as scientific evidence for researching a similar relevant topic.

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CONFLICTS OF INTEREST: Nil

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