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VARIATION OF MANIHOT AMYLUM AS A DISINTEGRANT IN TABLET FORMULATION RESULTS WITH THE ACTIVE INGREDIENTS PARACETAMOL, IBUPROFEN AND CAFFEINE

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ABSTRACT

In general, oral medications must first dissolve in digestive fluids before they can be absorbed through the intestinal wall. Therefore, increasing the dissolution rate is a rate determining step that can increase drug absorption, especially for substances that are difficult to dissolve (Giang, T.P. 1987). One drug that is difficult to dissolve is ibuprofen. Ibuprofen is an analgesic, antipyretic, non-steroidal anti-inflammatory drug with water solubility of 0.049 mg/ml and is almost insoluble (Bhattamishra, S.D and Padhy, R.K. 2009). In addition to the active ingredients, tablets can also contain excipients such as diluents, binders, disintegrants, lubricants (lubricants, non-stick agents, glidants) and in some cases can contain flavoring or coloring agents. (Shamsuni, 2007). Ibuprofen in Ibuprofen in the Class II Drug biopharmaceutical classification system has poor solubility and is very permeable (Dressman and Butler, 2001). Ibuprofen is too uniform and has poor flow characteristics (Resenack, Muller, 2002).

This study aims to formulate and evaluate the physical quality results of manihot amylum with desintegran of 3%, 5% and 10%. Experimental research method to determine variations in the concentration of manihot amylum Observation of the results of evaluating the physical quality of the preparation includes organoleptic tests, water content, flow time, repose angle, pH, disintegration time test and tablet hardness testing. The results of this research indicate that there is an influence of differences in the concentration of manihot amylum has a There is a water content test for all formulations that meet the requirements, namely <5%. In the test, the disintegration time of the formulation met the requirements, namely less than 15 minutes. The pH test of all formulations meets the requirements. In the flow time test all formulations met the requirements. In the angle of repose test the preparation meets the requirements. However, when the tablet hardness test does not meet the requirements, it can occur due to the influence of the binder used in the formulation.

Keywords : Cafeein, Tablet, Paracetamol

INTRODUCTION

Tablets can be defined as a solid dosage form containing one or more active substances with or without various excipients (which improve the quality of the tablet preparation, smooth free flow properties, cohesiveness properties, disintegration speed, and anti-stick properties) and are made by pressing the powder mixture in a tablet machine. . The IV edition of the Indonesian Pharmacopoeia defines tablets as solid preparations containing medicinal ingredients (active substances) with or without fillers (Siregar, 2008).

In general, oral medications must first dissolve in digestive fluids before they can be absorbed through the intestinal wall. Therefore, increasing the dissolution rate is a rate determining step that can increase drug absorption, especially for substances that are difficult to dissolve (Giang, T.P. 1987). One drug that is difficult to dissolve is ibuprofen. Ibuprofen is an analgesic, antipyretic, non-steroidal anti-inflammatory drug with water solubility of 0.049 mg/ml and is almost insoluble (Bhattamishra, S.D and Padhy, R.K. 2009). In addition to the active ingredients, tablets can also contain excipients such as diluents, binders, disintegrants, lubricants (lubricants, non-stick agents, glidants) and in some cases can contain flavoring or coloring agents. (Shamsuni, 2007). Ibuprofen in Ibuprofen in the Class II Drug

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Paracetamol is an analgesic-antipyretic drug. The action of paracetamol is to inhibit prostaglandins in the CNS but does not have a peripheral anti-inflammatory effect, reducing fever through direct action on the hypothalamus which regulates the heat center. Paracetamol (CHNO2) tablets contain no less than 90.0% and no more than 110.0% of the amount stated on the label (MOH RI, 2014). Paracetamol is a material with poor compactibility characteristics and poor flow properties. To improve flow properties and compactibility, the wet granulation method is used in making tablets (Voigt. 1984). This method contains a binder in the form of mucilage to increase cohesiveness so that the hardness is higher (Siregar and Wikarsa, 2010).

Caffeine is a xanthine alkaloid compound and is believed by most people to fight drowsiness. This substance can be found in various plants or fruits, energy drinks, chocolate, coffee and tea. In general, coffee is a nerve stimulant for the human body, for this reason drinking coffee or tea will eliminate drowsiness and fight fatigue. The body will feel fitter after drinking a cup of coffee or tea (Sofwan, 2013). According to European Food Information Council (EUFIC) and the International Coffee Organization (ICO) recommend that the amount of caffeine that is within safe limits for consumption is 300 mg per day. This is equivalent to five glasses of tea, five glasses of instant coffee, three glasses of robusta coffee, or two glasses of arabica. Although several studies have said that consuming 1000 mg of caffeine a day is still safe, it is best to limit consumption of 183 to only 300 mg per day considering the level of caffeine acceptance.

METHODS

Weigh the lactose for each formulation, put it in a mortar and grind it finely, Weigh Paracetamol, ibuprofen, caffeine, amylum, cmc Put it in a fine and homogeneous grinding mortar. After the internal phase is mixed homogeneously, the powder mixture is put into the slug. The slug that has been formed is crushed again to form granules, Granule evaluation test, Mix everything (granule, glidant and lubricant) and grind until homogeneous, Sift the preparation using a special sieve so that the particle size is uniform and press the tablet.

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Table 1.of formulations for paracetamol, ibuprofen and caffein tablets.

Material	F1	F2	F3	Purpose
Paracetamol	350 mg	350 mg	350 mg	Active ingredients
Ibuprofen	200 mg	200 mg	200 mg	Active ingredients
Caffein	50 mg	50 mg	50 mg	Active ingredients
Amylum manihot	3%	5%	10%	Desintegroator
Mg Stearat	0,5%	0,5%	0,5%	Lubrican
Talcum	1%	1%	1%	Glidan
CMC Na	2%	2%	2%	Fastening
Lactose		Ad 100%		Filling material

RESULTS

Stability Test Results

In the test results that we have carried out, there are results as shown in the following table 2.

No.	evaluation	Result		
		F1	F2	F3
1.	Organoleptic			
	Color	White	White	White
	Form	Fine powder	Fine powder	Fine powder
	Flavor	Bitter	Bitter	Bitter
2.	Test water content	1,19%	1,38%	1,69%
3.	Test flow time	9,15 second	9,36 second	9,58 second
4.	Repose Angle Test	36 °	37°	34°
5.	pH	5,60	5,98	5,60

DISCUSSION

Stability Test Results

Stability means that drugs (medicinal ingredients in medicinal preparations), stored under certain storage conditions in storage and transportation packaging, do not show any changes at all or change within permissible limits. The stability of a pharmaceutical preparation product can be defined as a particular formulation design in a specific packaging, which is demonstrated to maintain physicochemical, therapeutic microbiological and toxicological specifications. Efforts are made to ensure that this design is able to guarantee that data collection on packaged drug product samples is obtained (Connor et al, 1992: 129).

Stability testing of pharmaceutical products is a complex set of procedures involving considerable expense, time consumption, and scientific expertise to establish quality, efficacy, and safety in drug formulations. The scientific and commercial success of a pharmaceutical product can only be ensured by an understanding of the drug development process and the many important aspects of a comprehensive development plan. The most important steps during the development stage include the pharmaceutical analysis and stability studies necessary to determine and confirm the identity, potency and purity of the ingredients, as well as the formulated product (Singh et al., 2000). Pharmaceutical product stability can be defined as the ability of a formulation in a particular container/closure system to remain within its physical, chemical, microbiological, toxicological, protective and information specifications (Kommanaboyina et al., 1999)

The physical and chemical stability of medicinal substances, either alone or together with formulation ingredients, is the most important criterion for the success of a medicinal product. Investigating the stability of drugs with various pharmaceutical ingredients is also important to determine che mical and physical stability and unite them before formulating them into dosage forms (Ansel, 1989: 59-60).

Physical stability is evaluating changes in the physical properties of a product that depend on time (storage period). Examples of physical changes include migration (change) in color, change in taste, change in smell, changes in texture or appearance. Evaluation of the physical stability test includes: organoleptic examination, homogeneity, pH, specific gravity (Vadas, 2010). The chemical stability of a drug is the length of time a drug maintains its chemical integrity and potency as stated on the label within the specified time limit (Attwood and Florence, 2008).

The pH test in the preparation made in formulation 1 has a pH of 5.60, formulation 2 is 5.98 and in formulation 3 it is 5.60. In the pH test the results meet the existing pH standards, namely 3-9 (Paul J. Sheskey and Marian E. Quinn 2009). pH testing helps ensure that granule formulations remain stable during storage and use. The pH of the formulation can influence the solubility of the active substance in the granule, the optimal pH maximizes the solubility of the active substance, thereby

increasing the bioavailability and effectiveness of the product (Michael E. Aulton and Kevin M.G. Taylor 2004). A pH that is too low can trigger degradation of the active substance, reducing the effectiveness of the drug. Inappropriate pH can affect the physical properties of granules, such as cohesiveness and shape (Raymond C. Rowe 2009).

Test results for water content are important because they can affect the quality of the product produced. The main purpose of testing water content is to determine the water content of materials so that it can inhibit the growth of unwanted microbes (Yamin, Ayu, and Hamzah, 2017). The water content of the formulation was measured by weighing 1 g each and then placing it in a halogen moisture balance for 10 minutes until a constant weight was obtained (Syafrida, Darmanti, and Izzati, 2018). The water content in this study was found to be F1 1.19, F2 1.69 and F3 1.38. The water content in all formulations meets the requirements, not more than 10% (Materia Medika Indonesia edition IV). High water content can facilitate microbial growth. According to research conducted by (Rosidah, Zainuddin, Agustini, Bunga, & Pudjiastuti, 2020), determining water content aims to determine the content or amount of water in a preparation. High amounts of water will facilitate the growth of microorganisms as a result affecting quality, stability and safety. However, the results of determining water content in all research formulations currently still meet standard parameters. Determining the water content is important to maintain the quality of each formulation and prevent the growth of bacteria, fungi and insect damage. Based on BPOM 2018, the requirement for water content is <5%..

Flow time is the time required for a number of granules to flow through the funnel, which is expressed as the amount of powder that flows per unit time (Banker and Anderson, 1986). Flow properties are influenced by particle shape, particle size and interparticle cohesiveness. A good granule is one that can flow freely so that it can then be compressed into a tablet preparation. The smaller the concentration of the binder, the smaller the size, viscosity and density, thereby increasing the cohesive force between granule or powder particles. High cohesion forces make it difficult for granules to flow freely. A small density means that the molecular weight is also small, causing a lack of influence of gravitational force on the mass, because the cohesive force is higher than the gravitational force so that the granules cannot flow freely. (Anshory et al, 2007). The average flow time of Formulation I was 9.15 seconds, Formulation II was 9.36 seconds and Formulation III was 9.58 seconds. The three formulations showed results in < 10 seconds so it can be stated that the three formulations meet the requirements for good flow time.

The angle of repose test in preparations made in formulation 1 has an angle of repose of 36°, formulation 2 is 37° and in the third formulation it is 34°. In the flow time test the results met the existing standards, namely 25° -40° (Rori et al. 2016). The angle of repose test is a test of the largest angle formed by the powder surface to the horizontal plane during the test. Test the angle of repose to determine grain flow characteristics. The corner has an excellent angle of repose when the angle of repose is less than 40° (Lachman et al. 2008). The size of the angle formed is influenced by the particle size, the magnitude of the attractive force and the friction force between the particles (Lee, 2001). The smaller the particle size, the higher the cohesive force. High cohesiveness makes it difficult for granules to flow and causes the angle of repose formed to be larger (Anshory et al, 2007).

The tablet disintegration time test was carried out using a Disintegration Tester, the results of the disintegration time test were obtained with the aim of knowing when the tablet will break and disintegrate in gastric fluid. Evaluation of tablet disintegration time is very important because it is related to the absorption of the drug by the body when the tablet disintegrates into its constituent particles (Ambari et al. 2019). The results of the disintegration time test on the tablets made were 14 minutes 3 seconds, these results are in accordance with existing literature, namely <15 minutes. Things that influence the disintegration time can be seen from the concentration of the disintegrant used and also the binder used in the formulation (Siregar and Wikarsa. 2010).

Tablet hardness testing is a benchmark for assessing the durability of tablets when subjected to impact during the manufacturing, packaging and distribution processes (Rori and Sudewi, 2016). Hardness measurement using a hardness tester. The hardness of the tablets produced was 12.10 kg, this result exceeds the tablet hardness range according to existing literature, namely 4-8 kg (Lachman et al. 2008). This can occur due to the concentration factor of the disintegrant used in the formulation. In the tablet formulation tested, the concentration of Manihot amylum had the highest concentration compared

to other formulations, namely 10% apart from being used as a desiccant for Manihot amylum. can also be used as a binder. Tablet hardness is influenced by the binder used, the better the bond between the particles, the stronger the tablet will be (Kusuma and Aprilia. 2018). Tablet hardness affects the brittleness and disintegration time of the tablet, the greater the tablet hardness, the smaller the brittleness of the tablet and the longer the tablet disintegration time.

CONCLUSION

There is a water content test for all formulations that meet the requirements, namely <5%. In the test, the disintegration time of the formulation met the requirements, namely less than 15 minutes. The pH test of all formulations meets the requirements. In the flow time test all formulations met the requirements. In the angle of repose test the preparation meets the requirements. However, when the tablet hardness test does not meet the requirements, it can occur due to the influence of the binder used in the formulation.

REFERENCE

Anshory, H., et al.2007. Jurnal Ilmiah Farmasi. Formulasi tablet Effervescent dari Ekstrak Ginseng Jawa (Talinum paniculatum) dengan Variasi Kadar Pemanis Aspartam. Vol. 4, No. 1.

Bhattamishra, S.D & Padhy, R.K. 2009. Estimation of ibuprofen solubilization in cationic and anionic surfactant media: application of micelle binding model. Indian J. Chem Tech. 16, 426-430.

Depkes RI. 2014. Farmakope Indonesia Edisi V. Jakarta : Departement Kesehatan Republik Indonesia.

Dressman, J., and Butler, J. 2001. The Biopharmaceutical Classification System. Hal 70-71

Harbir, Kaur. 2012. Processing Technologies for Pharmaceutical Tablet – A areview. International

Research Journal of Pharmacy; 33(7): pp. 20-23.

Kusuma. D., Aprilia E.D. 2018. Evaluasi Fisik Tablet Parasetamol Generik Dan Tablet Parasetamol Bermerk Dagang. AKFARINDO Vol 3 No. 1. Yogyakarta

Lachman, L.H.A. Lieberman., dan Kanig, J.L., 2008, Teori dan Praktek Farmasi Industri Edisi Ketiga, Universitas Indonesia, Jakarta.

Lee, R. E. 2001. Effervescent Tablets : Key Facts About A Unique, Effective Dossage Form. New Hope: Amerilab Technologies

Resenack N, Muller, B. W. 2002. Ibuprofen Crystal with Optimized Properties.

Internasional Journal of Pharmaceutics 245. Germany. 9-24

Riyan Fandari. 2013. FORMULASI TABLET PARACETAMOL SECARA GRANULASI BASAH DENGAN BAHAN PENGIKAT MADU. Program

Studi DIII Farmasi. Fakultas Farmasi. Universitas Setia Budi Surakarta

Siregar, C.J.P. dan S. Wikarsa. 2010. Teknologi Farmasi Sediaan Tablet: Dasar- Dasar Praktis. Jakarta: EGC.

Sirisha, Botla., Pogula Swathi., K.Abbulul. 2018. A Review On Pharmaceutical Mini - Tablets. International Journal Of Science and Research (IJSR); 8 (9) : pp.515-521

Syamsuni, H. 2007. Farmasetika dasar dan hitungan farmasi. Jakarta: EGC