

CHAPTER I INTRODUCTION

1.1 Background

Allah SWT says in the Qur'an about the benefits of plants, explained in Surah Al-An'am [6]: 99:

وَهُوَ الَّذِي أَنْزَلَ مِنَ السَّمَاءِ مَاءً فَأَخْرَجْنَا بِهِ نَبَاتَ كُلِّ شَيْءٍ فَأَخْرَجْنَا مِنْهُ خَضِرًا نُخْرِجُ مِنْهُ حَبًّا مُتَرَاكِبًا وَمِنَ النَّخْلِ مِنَ النَّخْلِ مِنْ طَلْعِهَا قِنْوَانٌ دَانِيَةٌ وَجَنَّاتٍ مِّنْ أَعْنَابٍ وَالزَّيْتُونَ وَالرُّمَّانَ مُشْتَبِهًا وَغَيْرَ مُنْتَشِبَةٍ أَنْظِرُوا إِلَى ثَمَرِهِ إِذَا أَثْمَرَ وَيَنْعِهِ إِنَّ فِي ذَلِكُمْ لَآيَاتٍ لِّقَوْمٍ يُؤْمِنُونَ

'It is He who sends down water from the sky, and with it We cause all kinds of vegetation to grow, and We bring forth from the vegetation verdant plants, and from the verdant plants We bring forth abundant grains; and from the date palms, drooping stalks, and vineyards, and (We bring forth) olives and pomegranates, similar and dissimilar. Behold the fruit when it yields, and when it becomes ripe. Indeed, in such there are signs (of Allah's power) for those who believe' (Qs. Al-An'am [6]: 99) One of the green plants that have many benefits is the sembung plant.

The Sembung plant (*Blumea balsamifera* L DC) in Indonesia is commonly used to treat rheumatism, menstrual pain, influenza, flatulence, chest pain, fever, bronchitis, and heart disease. Some of the primary active compound in this plant are volatile oils, flavonoids, terpenes, phenylpropanoids and sterols, these components exhibit pharmacological effects including anti-inflammatory, antibacterial, anticancer, burn treatment, hypoglycaemic, antioxidant, anti-obesity, suppression of nerve inflammation, and antiviral activity.¹ Flavonoids, saponins, and tannins can stabilize

¹ Liping Dai et al., "Identification of Chemical Constituents in *Blumea Balsamifera* Using UPLC-Q-Orbitrap HRMS and Evaluation of Their Antioxidant Activities," *Molecules* 28, no. 11 (June 1, 2023): 4504, <https://doi.org/10.3390/molecules28114504>.

red blood cell membranes so allowing them to act as anti-inflammatory metabolites.²

Balinese people have traditionally used sembung leaves as loloh (herbal drink) which is believed to treat coughs, colds, diarrhoea, and fever. However, loloh sembung leaves has an unpleasant aroma, bitter and slightly astringent taste. Therefore, a better and standardized preparation is needed.³ One of which is tablet dosage form. Tablets are solid preparations that have practical advantages (easy to carry and use without special techniques), precise dosage per tablet, and stability in storage.⁴ Tablet preparations, require to active substances, excipients or additional ingredients are needed, namely fillers, binders, crushers, lubricants, and dyes. Additional ingredients have an important role in tablet formulation, one is a binder that aims to provide compactness and durability of tablets by promoting the cohesion powder particles into granule.⁵

One of the binders in tablet formulation is gelatin. Compared to other binders such as arabic gum, tragakan, and polyvinylpyrrolidone, gelatin is better because it is less prone to contaminated like tragakan and arabic gum, while polyvinylpyrrolidone is hygroscopic. Gelatin has high binding power, produces uniform granules with good compressibility and compatibility, and is a effective binder used for compounds that are difficult to bind.⁶

² Riska Nur Arifah, Nora Idiawati, and M Agus Wibowo, "Uji Aktivitas Antiinflamasi Ekstrak Kasar Buah Asam Paya (*Eleiodoxa conferta* (Griff.) Buret) Secara In-Vitro Dengan Metode Stabilitas Membran HRBC (Human Red Blood Cell)," *Jurnal Kimia Khatulistiwa* 6 (2017).

³ Sri Wahjuni and Ida Bagus Putra Manuaba, "Peningkatan Kesejahteraan Masyarakat Dimasa Pandemi Covid 19 Dengan Pelatihan Pengemasan Produk Loloh Daun Sembung (*Blumea balsamifera* L.) di Banjar Dinas Apityehkaja, Desa Manggis Kabupaten Karangasaem," *Jurnal Pengabdian Kepada Masyarakat* 1, no. 3 (2021).

⁴ Roli, "Formulasi Dan Evaluasi Sediaan Tablet Ekstrak Daun Gedi Hijau (*Abelmoschus Manihot*) Dengan Metode Granulasi Basah," *Pharmacon Jurnal Ilmiah Farmasi*, 2016.

⁵ Ira Nur Fadhilah and Dwi Saryanti, "Formulasi Dan Uji Stabilitas Fisik Sediaan Tablet Ekstrak Buah Pare (*Momordica charantia* L.) Secara Granulasi Basah," *Smart Medical Journal* 2, no. 1 (August 15, 2019): 25, <https://doi.org/10.13057/smj.v2i1.29676>.

⁶ Fadhilah and Saryanti.

Therefore, the researchers conducted this study to formulation a tablet preparations of sembung leaf extract (*Blumea balsamifera* L.) with varying concentrations of gelatin as a binder using the wet granulation method.

1.2 Problem Formulation

The formulation of the problem in this research is:

1. Which formulation of tablet preparation of sembung leaf extract (*Blumea balsamifera* L.) with varying gelatin concentration meets the physical quality standards of the Indonesian pharmacopeia, V edition?
2. What is the effect of varying the concentration of gelatin as a binder on the preparation of tablets of constipated leaf extract *Blumea balsamifera* L.)?

1.3 Research Objectives

The objectives of this research are:

1. Knowing the formulation of tablet preparations of constipated leaf extract (*Blumea balsamifera* L.) with variations in gelatin concentration that produce physical quality evaluations that meet the pharmacopoeial standards of edition V.
2. Knowing the effect of variations in gelatin concentration as a binder on the preparation of tablets of constipated leaf extract (*Blumea balsamifera* L.)

1.4 Benefits of Research

1. Theoretical Benefits

The results of this study can be used as reference material for further research on the formulation of constipated leaf extract tablets (*Blumea balsamifera* L.).

2. Practical Benefits

The results of this study are expected to add to the repertoire of science and add insight for readers, especially researchers in the field of formulation in the pharmaceutical industry and for the community directly.

1.5 Research Authenticity

Research on constipated leaf extract tablets as anti-inflammatories has been conducted by several researchers as shown in Table 1 below:

Table 1. Research Authenticity

Research Title	Research Methods	Research Variables	Results	Research Differences
Effect of Gelatin as a Binder on the Physical Properties of Chewable Tablets of Rosella Flower Petals (<i>Hibiscus sabdariffa L</i>) with Wet Granulation ⁷	Experimental	Dependent : Physical properties of chewable tablets Independent : Rosella flower petals and Gelatin wet granulation method with	various concentration variations affect the hardness and friability but do not affect the weight uniformity of chewable tablets	Dependent : Evaluation of physical quality of tablet preparation Independent : - Extract - Variation of gelatin concentration as a binder
Formulation and Evaluation of Green Gedi (Abelmoschus manihot) Leaf Extract Tablet Preparation by Wet Granulation Method ⁸	Ekperimental	Dependent : Evaluation of tablet preparation Independent : - Green gedi leaf extract - Wet granulation method	Two formulations only fulfil the test requirements for weight uniformity, size uniformity, and disintegration time. Not eligible for tablet hardness and tablet friability tests. So it can be concluded that the preparation does not meet the requirements of the Indonesian pharmacopoeia standard.	Dependent: Evaluation of the physical quality of tablet preparations Independent: - Extract - Variation of gelatin concentration as a binder
Formulation and Physical Stability Test of Bitter melon (Momordica charantia L.)	Ekperimental	Dependent : Evaluation and stability test of the preparation Independent : - Bitter melon extract	Formulation of bitter melon fruit extract tablet preparations with variations in concentration of 5%, 7% and 10% was able to produce tablet preparations that met the requirements of	Dependent: Evaluation of the physical quality of tablet preparations Independent: - Extract

⁷ Rani Dewi Pratiwi, Mimiek Murrukmihadi, and Siti Aisiyah, "Pengaruh Gelatin Sebagai Bahan Pengikat Terhadap Sifat Fisik Tablet Kunyah Kelopak Bunga Rosella (*Hibiscus sabdariffa L*) Dengan Granulasi Basah," *Pharmacy*, no. 01 (2017).

⁸ Roli, "Formulasi Dan Evaluasi Sediaan Tablet Ekstrak Daun Gedi Hijau (*Abelmoschus Manihot*) Dengan Metode Granulasi Basah."

Extract Tablets by Wet Granulation ⁹		- Wet granulation method	the tablet evaluation test.	- Variation of gelatin concentration as a binder
Formulation of Brown Algae Extract (Sargassum sp.) Tablets with Variations of Polyvinyl Pyrrolidone as Binder by Wet Granulation Method ¹⁰	Ekperimental	Dependent : Evaluation of tablet preparation Independent : Variation of polyvinyl pyrrolidone as binder	Evaluation of physical quality that meets the requirements of tablet preparation standards, namely with 5% PVP concentration.	Dependent: Evaluation of the physical quality of tablet preparations Independent: - Extract - Variation of gelatin concentration as a binder
Effect of PVP K-30 Concentration as Binder on the Physical Quality of Takelan (Chromolaena Oldorate.L.) Leaf Extract Tablets. ¹¹	Ekperimental	Dependent : Physical Quality of Tablets Independent : Concentration of PVP K-30, Takelan Leaf Extract	The results of the physical quality of the granules meet the good requirements, testing the results of the physical quality of tablets with a concentration of PVP K-30 at 5% concentration produces takelan leaf extract tablets with good physical quality.	Dependent: Evaluation of the physical quality of tablet preparations Independent: - Extract - Variation of gelatin concentration as a binder

⁹ Fadhilah and Saryanti, "Formulasi Dan Uji Stabilitas Fisik Sediaan Tablet Ekstrak Buah Pare (*Momordica charantia* L.) Secara Granulasi Basah."

¹⁰ Dea Eka Rina, Agung Giri Samudra, and Dwi Dominica, "Formulasi Tablet Ekstrak Alga Coklat (*Sargassum* sp.) Dengan Variasi Polivinil Piroolidon Sebagai Bahan Pengikat Metode Granulasi Basah," *Medical Sains : Jurnal Ilmiah Kefarmasian* 8, no. 1 (January 7, 2023): 65–76, <https://doi.org/10.37874/ms.v8i1.590>.

¹¹ Muh Rijal, Ariyani Buang, and Suprpto Prayitno, "Pengaruh Konsentrasi PVP K-30 Sebagai Bahan Pengikat Terhadap Mutu Fisik Tablet Ekstrak Daun Takelan (*Chromolaena Oldorate.L.*)," *Jurnal Kesehatan Yamasari Makasar* 6 (2022): 98–111.